World Armaments and Disarmament

SIPRI yearbook 1983

Stockholm International Peace Research Institute

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Stockholm International Peace Research Institute

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PREFACE

This is the fourteenth annual SIPRI review of what is going on in the world military sector, and of the progress—or lack of progress—in the attempts to constrain that activity. The purpose is to provide an overview of what is happening to military expenditure, to the arms trade, and to weapons development, production and deployment—particularly the deployment of nuclear weapons; and then to report on the negotiations and discussions at Geneva, New York, Vienna and Madrid. There are special chapters this year which deal with the two crucial sets of negotiations at Geneva on nuclear weapons. Developments in the militarization of outer space, and in chemical and biological warfare, are discussed. A new feature this year is the study of a conflict—the conflict in the South Atlantic over the Falkland/Malvinas Islands. The introductory chapter summarizes the current situation.

In addition to the annual reports on military developments and on arms control, this Yearbook also includes a number of background studies. Two chapters are devoted to subjects on which the United Nations has now commissioned special reports. One is on military research and development—looking in particular at the statistical problems of estimates for the United States and the Soviet Union. The second is on military prices—it examines the ways in which military price indices can be constructed, and discusses their utility. There is a special chapter on factors which may undermine the efforts to prevent the spread of nuclear weapons. There is a study of the Soviet Union's arms trade, and a discussion of the economic determinants of French arms sales. There are notes on some of the problems of military expenditure statistics in Latin America and Israel. In the field of military technology, there is a chapter on anti-tank missiles.

We are grateful to a number of outside contributors who have helped us with this Yearbook: Mr Simon Lunn and Mr Jefferson Seabright, on intercontinental nuclear weapons; Dr Warren Donnelly, on pressures on the non-proliferation regime; Professor Ulrich Albrecht, on Soviet arms sales; Professor Edward Kolodziej, on French arms sales; Dr Sigrid Pöllinger, on the negotiations at Vienna; and Mr Homer Jack, on non-governmental organizations and disarmament questions. They have no responsibility, of course, for any assessments or judgements made in other chapters.

Once again this year, Connie Wall and Billie Bielckus have been responsible for the mammoth task of getting this Yearbook out on time.

Frank Blackaby
Director

March 1983

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Figures were prepared by Alberto Izquierdo.

GLOSSARY

Acronyms

ABM	Anti-ballistic missile
AGM	Air-to-ground missile
ALCM	Air-launched cruise missile
ASAT	Anti-satellite
ASBM	Air-to-surface ballistic missile
ASM	Air-to-surface missile
ASW	Anti-submarine warfare
ATM	Anti-tank missile
AWACS	Airborne warning and control system
BMD	Ballistic missile defence
BW	Biological weapon
C^3I	Command, control, communications and intelligence
CBM	Confidence-building measure
CBW	Chemical and biological warfare
CD	Committee on Disarmament
CEP	Circular error probable
CSCE	Conference on Security and Co-operation in Europe
CTB	Comprehensive test ban
CW	Chemical weapon
DC	Disarmament Commission
ENMOD	Environmental modification
ERW	Enhanced radiation (neutron) weapon
FBS	Forward based systems
FOBS	Fractional orbital bombardment system
GLCM	Ground-launched cruise missile
IAEA	International Atomic Energy Agency
ICBM	Intercontinental ballistic missile
INF	Intermediate nuclear force
INFCE	International Nuclear Fuel Cycle Evaluation
IRBM	Intermediate-range ballistic missile
ISMA	International Satellite Monitoring Agency
LRTNF	Long-range theatre nuclear force
MAD	Mutual assured destruction
MARV	Manoeuvrable re-entry vehicle
M(B)FR	Mutual (balanced) force reduction
MIRV	Multiple independently targetable re-entry vehicle
MRV	Multiple (but not independently targetable) re-entry vehicle
NPT	Non-Proliferation Treaty
NWFZ	Nuclear weapon-free zone
OPANAL	Agency for the Prohibition of Nuclear Weapons in Latin America
PNE(T)	Peaceful Nuclear Explosions (Treaty)
PTB(T)	Partial Test Ban (Treaty)
R&D	Research and development
RV	Re-entry vehicle
RW	Radiological weapon
SALT	Strategic Arms Limitation Talks
SAM	Surface-to-air missile
SCC	Standing Consultative Commission (US–Soviet)
SLBM	Submarine-launched ballistic missile
SLCM	Sea-launched cruise missile
SRBM	Short-range ballistic missile
SSBN	Ballistic missile-equipped, nuclear-powered submarine
START	Strategic arms reduction talks
TTBT	Threshold Test Ban Treaty

Anti-ballistic missile (ABM) system	Weapon system for intercepting and destroying ballistic missiles.
Anti-satellite (ASAT) system	Weapon system for destroying, damaging or disturbing the normal function of, or changing the flight trajectory of, artificial Earth satellites.
Atomic weapon	Explosive device in which the main part of the explosive energy released results from the fission of the nuclei of heavy atoms such as uranium-235 or plutonium-239.
Ballistic missile	Missile which follows a ballistic trajectory (part of which may be outside the Earth's atmosphere) when thrust is terminated.
Battlefield nuclear weapons	*See:* Theatre nuclear weapons.
Binary chemical weapon	A shell or other device filled with two chemicals of relatively low toxicity which mix and react while the device is being delivered to the target, the reaction product being a super-toxic chemical warfare agent, such as nerve gas.
Biological weapons (BW)	Living organisms or infective material derived from them, which are intended for use in warfare to cause disease or death in man, animals or plants, and the means of their delivery.
Chemical weapons (CW)	Chemical substances—whether gaseous, liquid or solid—which might be employed as weapons in combat because of their direct toxic effects on man, animals or plants, and the means of their delivery.
Circular error probable (CEP)	A measure of missile accuracy: the radius of a circle, centred on the target, within which 50 per cent of the weapons aimed at the target are expected to fall.
Committee on Disarmament (CD)	Multilateral arms control negotiating body, based in Geneva, which is composed of 40 states (including all the nuclear weapon powers). The CD is the successor of the Eighteen-Nation Disarmament Committee, ENDC (1962–69), and the Conference of the Committee on Disarmament, CCD (1969–78).
Conference on Security and Co-operation in Europe (CSCE)	Conference of the European states and the USA and Canada, which on 1 August 1975 adopted a Final Act (also called the Helsinki Declaration), containing, among others, a Document on confidence-building measures and certain aspects of security and disarmament. The Conference holds follow-up meetings.
Conventional weapons	Weapons not having mass destruction effects. *See also:* Weapons of mass destruction.
Counterforce attack	Nuclear attack directed against military targets.
Countervalue attack	Nuclear attack directed against civilian targets.
Cruise missile	Missile which can fly under its own power at very low altitudes (and can be programmed to follow the contours of the terrain) to minimize radar detection. It can be air-, ground- or sea-launched and deliver a conventional or a nuclear warhead with high accuracy.
Disarmament Commission (DC)	A subsidiary, deliberative organ of the UN General Assembly for disarmament matters, composed of all UN members.
Enhanced radiation weapon (ERW)	*See:* Neutron weapon.
Enriched nuclear fuel	Nuclear fuel containing more than the natural content of fissile isotopes.
Enrichment	*See:* Uranium enrichment.
Eurostrategic weapons	*See:* Theatre nuclear weapons.

Fall-out	Particles contaminated with raidoactive material as well as radioactive nuclides, descending to the Earth's surface following a nuclear explosion.
First-strike capability	Capability to destroy within a very short period of time all or a very substantial portion of an adversary's strategic nuclear forces.
Fission	Process whereby the nucleus of a heavy atom splits into lighter nuclei with the release of substantial amounts of energy. At present the most important fissionable materials are uranium-235 and plutonium-239.
Flexible response capability	Capability to react to an attack with a full range of military options, including a limited use of nuclear weapons.
Fractional orbital bombardment system (FOBS)	System capable of launching nuclear weapons into orbit and bringing them back to Earth before a full orbit is completed.
Fuel cycle	*See:* Nuclear fuel cycle.
Fusion	Process whereby light atoms, especially those of the isotopes of hydrogen—deuterium and tritium—combine to form a heavy atom with the release of very substantial amounts of energy.
Ground zero	The point on the Earth's surface at which a nuclear weapon is detonated or, for airburst, the point on the Earth's surface directly below the point of detonation.
Helsinki Declaration	*See:* Conference on Security and Co-operation in Europe (CSCE).
Intercontinental ballistic missile (ICBM)	Ballistic missile with a range in excess of 5 500 km.
Intermediate nuclear weapons	*See:* Theatre nuclear weapons.
International Nuclear Fuel Cycle Evaluation (INFCE)	International study conducted in 1978–80 on ways in which supplies of nuclear material, equipment and technology and fuel cycle services can be assured in accordance with non-proliferation considerations.
Kiloton (kt)	Measure of the explosive yield of a nuclear weapon equivalent to 1 000 tons of trinitrotoluene (TNT) high explosive. (The bomb detonated at Hiroshima in World War II had a yield of some 12–15 kilotons.)
Launcher	Equipment which launches a missile. ICBM launchers are land-based launchers which can be either fixed or mobile. SLBM launchers are missile tubes on submarines.
Launch-weight	Weight of a fully loaded ballistic missile at the time of launch.
Manoeuvrable re-entry vehicle (MARV)	Re-entry vehicle whose flight can be adjusted so that it may evade ballistic missile defences and/or acquire increased accuracy.
Medium-range nuclear weapons	*See:* Theatre nuclear weapons.
Megaton (Mt)	Measure of the explosive yield of a nuclear weapon equivalent to one million tons of trinitrotoluene (TNT) high explosive.
Multiple independently targetable re-entry vehicles (MIRV)	Re-entry vehicles, carried by one missile, which can be directed to separate targets (as distinct from—multiple but not independently targetable re-entry vehicles—MRVs).
Mutual assured destruction (MAD)	Concept of reciprocal deterrence which rests on the ability of the nuclear weapon powers to inflict intolerable damage on one another after surviving a nuclear first strike. *See also:* Second-strike capability.

Mutual reduction of forces and armaments and associated measures in Central Europe	Subject of negotiations between NATO and the Warsaw Treaty Organization, which began in Vienna in 1973. Often referred to as mutual (balanced) force reduction (M(B)FR).
Neutron weapon	Nuclear explosive device designed to maximize radiation effects and reduce blast and thermal effects.
Nuclear fuel cycle	Series of steps involved in preparation, use and disposal of fuel for nuclear power reactors. It includes uranium ore mining, ore refining (and possibly enrichment), fabrication of fuel elements and their use in a reactor, reprocessing of spent fuel, refabricating the recovered fissile material into new fuel elements and disposal of waste products.
Nuclear weapon	Device which is capable of releasing nuclear energy in an explosive manner and which has a group of characteristics that are appropriate for use for warlike purposes. The term denotes both the thermonuclear and atomic weapons.
Nuclear weapon-free zone (NWFZ)	Zone which a group of states may establish by a treaty whereby the status of total absence of nuclear weapons to which the zone shall be subject is defined, and a system of verification and control is set up to guarantee compliance.
Peaceful nuclear explosion (PNE)	Application of a nuclear explosion for such purposes as digging canals or harbours or creating underground cavities.
Plutonium separation	Reprocessing of spent reactor fuel to separate plutonium.
Radiological weapon (RW)	Device, including any weapon or equipment, other than a nuclear explosive device, specifically designed to employ radioactive material by disseminating it to cause destruction, damage or injury by means of the radiation produced by the decay of such material, as well as radioactive material, other than that produced by a nuclear explosive device, specifically designed for such use.
Re-entry vehicle (RV)	That part of a strategic ballistic missile designed to carry a nuclear warhead and to re-enter the Earth's atmosphere in the terminal phase of the trajectory.
Second-strike capability	Ability to survive a nuclear attack and launch a retaliatory blow large enough to inflict intolerable damage on the opponent. *See also:* Mutual assured destruction.
Standing Consultative Commission (SCC)	US–Soviet consultative body established in accordance with the SALT agreements..
Strategic Arms Limitation Talks (SALT)	Negotiations between the Soviet Union and the United States, held from 1969 to 1979, which sought to limit the strategic nuclear forces, both offensive and defensive, of both sides.
Strategic Arms Reduction Talks (START)	Negotiations between the Soviet Union and the United States, initiated in 1982, which seek to reduce the strategic nuclear forces of both sides.
Strategic nuclear forces	ICBMs, SLBMs and ASBMs (not yet deployed) as well as bomber aircraft of intercontinental range.
Tactical nuclear weapons	*See:* Theatre nuclear weapons.
Terminal guidance	Guidance provided in the final, near-target phase of the flight of a missile.

Theatre nuclear weapons	Nuclear weapons of a range less than 5 500 km. Often divided into long-range—over 1 000 km (for instance, so-called Eurostrategic weapons), medium-range, and short-range—up to 200 km (also referred to as tactical or battlefield nuclear weapons). For the USSR, weapons of a range exceeding 1 000 km (but less than 5 500 km) are medium-range. The USA uses the term 'intermediate' to denote weapons of a range both above and below 1 000 km (but not short-range).
Thermonuclear weapon	Nuclear weapon (also referred to as hydrogen weapon) in which the main part of the explosive energy release results from thermonuclear fusion reactions. The high temperatures required for such reactions are obtained with a fission explosion.
Throw-weight	'Useful weight' of a ballistic missile placed on a trajectory toward the target.
Toxins	Poisonous substances which are products of organisms but are inanimate and incapable of reproducing themselves. Some toxins may also be produced by chemical synthesis.
Uranium enrichment	The process of increasing the content of uranium-235 above that found in natural uranium, for use in reactors or nuclear explosives.
Warhead	That part of a missile, torpedo, rocket or other munition which contains the explosive or other material intended to inflict damage.
Weapons of mass destruction	Nuclear weapons and any other weapons which may produce comparable effects, such as chemical and biological weapons.
Weapon-grade material	Material with a sufficiently high concentration either of uranium-233, uranium-235 or plutonium-239 to make it suitable for a nuclear weapon.
Yield	Released nuclear explosive energy expressed as the equivalent of the energy produced by a given number of tons of trinitrotoluene (TNT) high explosive. *See also:* Kiloton and Megaton.

NOTE ON CONVENTIONS

The following general conventions are used in the tables:

.. Information not available
( ) Uncertain data or SIPRI estimate
– Nil or not applicable

'Billion' in all cases is used to mean thousand million.

Introduction[1]

Once more, in 1982, there was no progress in arms control or disarmament. Indeed, it is now a full decade since there has been any substantial, subsequently ratified measure of arms control. Not surprisingly, this absence of progress has been accompanied by accelerating trends on the armaments side. Military expenditure has been rising faster in the past four years than it did in the previous four. Expenditure on military research and development is also rising fast. If the current arms control negotiations at Geneva fail, there is the prospect of an increase in the world stockpile of nuclear weapons from the figure of around 50 000 today to a figure of well over 60 000 early in the 1990s, with many new, more accurate warheads.

From time to time, in the history of weapon procurement and weapon deployment, there are years which seem to mark a new stage in the process of military confrontation. 1983 is probably such a year. Once new deployments have been made, they are rarely reversed; in the past they have usually proved to be 'points of no return'. If no agreement is reached at Geneva, and large numbers of new missiles with nuclear warheads are deployed in Western Europe which can reach the Soviet Union, that will mark a new stage in the confrontation between NATO and the Warsaw Treaty Organization (WTO). It could well set back the possibilities of progress in arms control for a lengthy period. If, on the other hand, an agreement is reached, the way will be open for progress towards much more radical reductions in weapon numbers.

The issues which are being negotiated at Geneva are the central issues of 1983. A year ago, the prospects for success in the negotiations seemed bleak. This year there is some possibility of movement. For the first time in the history of arms control negotiations, matters are being argued out before the court of public opinion. No previous arms control negotiations (except possibly those concerned with atmospheric nuclear tests) have had this degree of public attention. It is important that the public should be fully informed of the detailed arguments on either side. The issue is not more complex—but much more important—than other questions which have been submitted to referenda in the countries concerned.

This introduction briefly surveys the world military sector, and the attempts currently being made to constrain or modify world military activity. It deals first with nuclear issues—the dominant concern of 1983. Then there is a section on military expenditure, production, technology, and the arms trade. It is followed by a note on the Falklands/Malvinas

[1] The introduction was written by Frank Blackaby.

conflict. Finally, the chapter reviews the progress—or rather the lack of progress—in the various forums where arms control and disarmament are discussed: at New York, Geneva, Vienna and Madrid. There is an appendix on nuclear weapon stockpiles.

I. Nuclear issues

Eurostrategic nuclear weapons

The negotiations now going on at Geneva about the Soviet SS-20 missiles and the proposed US Pershing II and cruise missiles do not even have an agreed title—which is unfortunately symptomatic. The United States calls them the 'Intermediate Nuclear Force Negotiations'. The Soviet Union calls them 'Talks on the Reduction of Nuclear Arms in Europe'. These negotiations are represented in the West as being essentially addressed to the problem of the Soviet SS-20 missiles. This is only partly true. Soviet intermediate-range missiles targeted on Western Europe have existed for a long time in considerable numbers, partly to offset US superiority in strategic nuclear weapons. The decision to replace the old SS-4s and SS-5s with the new SS-20s may have been treated in the Soviet Union as a fairly routine modernization decision. However, the Soviet Union took a long time to recognize the concern building up in Western Europe about missiles which were much more effective and which therefore appeared more threatening than those which they replaced.

The SS-20 is a missile which can carry three independently targetable warheads of 150 kilotons. Some probably carry only a single warhead. Its range is given as 5 000 km in the West, and somewhat less by the Soviet Union, which points out that they have never been tested over a distance as great as 5 000 km. The difference in the estimate is of some importance; according to the Soviet Union, SS-20 missiles deployed in the Novosibirsk region cannot reach significant targets in Western Europe. Although classed as mobile, this missile's mobility is limited: it depends on a physically prepared launch position. The missile system can be reloaded but, since it releases intense heat during launch, another missile cannot be reloaded for several hours. According to Western sources, at the end of 1982 altogether 333 SS-20s had been deployed. Some two-thirds were estimated to be able to reach Western Europe; some of these are in swing positions, from which they can reach either European targets, or targets in the Far East, South-East Asia or the Middle East. The other third are not able to reach Western Europe, but are targeted on China or other locations in the Far East.

The Pershing II missile is much more accurate than the SS-20. It does not depend on pre-surveyed or physically prepared launch positions. It

can be reloaded after a shorter interval than the SS-20. However, the US suggestion to deploy one reload missile per launcher was turned down by the West German government. The range of this missile is also a disputed matter. It tends to be entered in the West as 1 800 km; the Soviet Union claims it to be 2 500 km. Again the issue is important: with the longer range this missile could reach military targets in and around Moscow from launching sites in FR Germany. The flight-time would be short, 12 minutes or less.

The ground-launched cruise missile depends on pre-surveyed, but not physically prepared launch positions. Its guidance system could make it as accurate as the Pershing II. The maximum range is 2 500 km; being subsonic, it would take hours to reach targets in the Soviet Union.

These are the main missiles in contention at the Geneva talks.

The Pershing II missiles and the ground-launched cruise missiles are, of course, not yet deployed. Taking just the missiles with ranges over 1 000 km which are at present deployed in the European theatre, and including the French and British missiles on the Western side (a point discussed below), the Soviet Union has a superiority in this group of missiles of the order of 2 or 2.5 to 1. If nuclear-capable aircraft with combat radii of well over 1 000 km are included, the force ratio remains of the order of 2.5 to 1 in favour of the WTO. However, there are substantial differences of opinion between the two sides about the ranges of some of these aircraft. That is one argument for restricting the initial stage of the negotiations to missiles.

In the negotiations, both sides say that they are looking for parity or equality. This is unfortunate because, with very different mixes of weapons on each side, the argument about what precisely constitutes parity can be an endless one. Secondly, there is no military requirement for parity. Even if one side has 'more' nuclear weapons, according to some category of measurement—launchers, warheads or throw-weight—there is no rational military use which can be made of that so-called superiority. The demand for parity is a political, not a military demand. Each side apparently believes that the appearance of nuclear inferiority would weaken its international political position in some way.

Early on in the negotiations, the Soviet Union declared a unilateral moratorium on the deployment of medium-range nuclear weapons in the European part of the Soviet Union. Western sources have since claimed that this moratorium is not being observed. There is no way that outsiders, without access to satellite photographs, can exercise any judgement on this matter. The initial Soviet proposal was to reduce the number of long-range theatre nuclear delivery vehicles to 600 on each side by the end of 1985, and to 300 by 1990. These figures were to include aircraft as well as missiles, and also to include British and French forces. There would be

considerable difficulties about deciding which aircraft should be included in these totals, because of the dispute about the combat radii of some of the aircraft in the inventories of either side. In December 1982, the Soviet Union suggested a specific limit for the number of Soviet missiles: that they should equal those of Britain and France. Even though the Soviet statement said "along with this, an accord must be reached on reducing to equal levels on both sides the number of medium-range nuclear-delivery aircraft", this move appeared to open the possibilities for negotiations concerned primarily with missiles in the first stage, with the aircraft sector put in at the second stage.

The US/NATO position is still that the 'zero option' is the ultimate objective: the United States would cancel the deployment of cruise and Pershing missiles if the Soviet Union dismantled all SS-4, SS-5 and SS-20 missiles, regardless of their location. However, interim proposals are being put forward of equal numbers of land-based intermediate missiles on either side—omitting French and British missiles on the NATO side.

Clearly one of the main problems is that of the French and British nuclear missiles. Since they are targeted on the Soviet Union, they have to be taken into account either at the START negotiations or in the European context. Because of the widely divergent approaches, START is likely to become a long drawn-out negotiation. For the purposes of an interim agreement, considering the urgent nature of the euromissile issue, it therefore seems desirable to include them in the talks on nuclear weapons in Europe. At this stage, the question is not whether to bring France and Britain into the negotiations; it is merely a question of 'counting rules' in an interim agreement. It may be recalled that without French and British involvement in the negotiations, their forces were actually taken into account in the 1972 SALT I interim agreement on offensive weapons, as acknowledged by the Soviet Union in a unilateral statement attached to that agreement.

French and British forces do indeed have different qualities and missions from those of the Soviet Union. Inclusion of them is therefore no simple matter. However, in various ways, all arms control negotiations are faced with problems of asymmetries. If precisely matching systems were made a requirement for arms control, negotiations would be rendered impossible.

On balance, the arguments for their exclusion do not seem strong. To say that they are national and strategic is an empty play on words. SS-20s also have strategic uses; so, too, do cruise and Pershing missiles; and they are all national forces. Another argument is that the Soviet Union should not be allowed equivalence to all other nuclear forces in the world, since this implies (to use a favourite Chinese term) hegemony. This argument would be more persuasive if it were not for the fact that both French and

British missiles are explicitly targeted on the Soviet Union. It is useful to consider what the United States would do if it were threatened, not simply by Soviet missiles, but also by missiles stationed in, say, South America. It would undoubtedly require a separate counter to those missiles as well —though one might indeed argue that this was quite unnecessary. In sum, in negotiations which are considering Soviet missiles targeted on Western Europe, it seems logical to include on the other side West European missiles targeted on the Soviet Union.

Reducing the number of Soviet missiles targeted on Western Europe to the equivalent of French and British forces would require the Soviet Union to reduce that total substantially. Such a reduction would also bring the situation roughly back to the *status quo ante*—that is, the position as it existed before the SS-20 missiles were deployed. One problem in establishing this equivalence is the problem of what unit to count—launchers or warheads. (This is another example of the problems that arise once both sides declare that they look for parity.) If the counting unit is to be warheads, then there is the question of whether the multiple warheads on some French and British missiles, which spread out but which cannot be aimed at different targets, should be counted as one warhead or more. An even greater problem will, of course, arise if Britain and France proceed—as they at present intend to do—to substantially increase the number of their independently targetable nuclear warheads.

Secondly, there is the question of what should happen to Soviet missiles which are no longer deployed against European targets. It is clearly undesirable that they should be used simply to increase the number of Soviet missiles which are pointed East rather than West. The missiles to be removed from striking range of Europe should be decommissioned, together with the infrastructure presently supporting them. An agreement for Europe should, moreover, be accompanied by a freeze on intermediate-range missile deployments elsewhere.

There are other things which are needed for an effective agreement on missiles in Europe. To avoid circumvention, there should also be a freeze on the deployment of missiles with ranges of between 500 and 1 000 km. If some kind of interim agreement can be reached on missiles in Europe, it might then be sensible to combine the negotiations on European intermediate-range nuclear forces with those on strategic nuclear weapons. There are a great many issues which overlap the two negotiations. For example, it would clearly amount to circumvention of any agreement on land-based European nuclear missiles, if large numbers of sea-launched cruise missiles were deployed to perform essentially the same functions as the land-based missiles already included in the European negotiations.

Strategic nuclear weapons

The negotiations about strategic nuclear weapons also have an urgency. There are many disturbing technological developments in train. Increases in accuracy are giving these weapons much greater potential for striking at hardened military targets. Some of the proposals for the deployment of cruise missiles could make arms control measures in this field much more difficult, because of the problem of verifying whether such a missile was nuclear-tipped or not. The two sides hold very different mixes of strategic nuclear forces. The Soviet Union has historically placed greater emphasis on its land-based intercontinental ballistic missile (ICBM) forces; it has relied much less on submarine-launched ballistic missiles (SLBMs). Soviet submarines are more vulnerable than US submarines to anti-submarine warfare; and the Soviet Union has only 15–20 per cent of its ballistic missile-carrying submarines at sea at any one time. (For the USA the figure is closer to 50 per cent.) The Soviet Union also has fewer aircraft in its bomber forces and these are in a lower state of readiness.

The United States has a very different mix of forces. Half of its strategic warheads are carried on submarine-launched ballistic missiles, and less than a quarter on land-based missiles. The United States Administration takes the view that the Soviet superiority in heavy land-based missiles has given it an overall superiority in strategic forces. Consequently the US proposals are specifically addressed to reducing the size of the Soviet land-based missile force. The Soviet proposals, on the other hand, are based on the belief that either side should be relatively free to deploy the mix of systems that it prefers.

The US Administration has begun a process of substantial technological improvements to all three legs of the US strategic triad. (It is incidentally not true, as argued by the US Secretary of Defense, that the US strategic forces 'stood still' during the 1970s: in that decade, the number of nuclear warheads in the US strategic force rose from 4 000 to 10 000.) The modernization of the bomber force includes the construction and deployment of 100 B-1B bombers, as well as the development of the advanced technology (or Stealth) bomber. A total of 3 800 cruise missiles are to be deployed both on the new B-1B bombers and also on some of the existing B-52s. The sea-based strategic deterrent is being enhanced by the construction of the Ohio-class submarines, on which the Trident D-5 missile will eventually be deployed. This missile is expected to be accurate enough to destroy well-protected military targets. In addition, several hundred nuclear-tipped sea-launched cruise missiles are to be deployed on general-purpose submarines, and possibly also on surface vessels.

Substantial controversy has arisen over the proposal for the modernization of the third leg of the triad—land-based ballistic missiles. The

Administration is proposing the production and eventual deployment of 100 MX missiles, which (in an Orwellian turn of phrase) have been christened the 'Peacekeeper' missiles. These missiles will have greater accuracy and greater throw-weight than the existing Minuteman missiles. The controversy has concerned the basing mode for this missile—the attempt to find a basing mode in which it is not vulnerable to attack. The initial proposal of the Carter Administration was to deploy them in a kind of race-track, where the exact location would not have been known. The next proposal was to install them in hardened Minuteman silos. The third proposal was one of 'closely spaced basing', on the grounds that incoming missiles would commit 'fratricide' in attempting to destroy them. (This method of basing would certainly violate the spirit, if not the precise letter, of the SALT I and II accords, which state that "each party undertakes not to start construction of additional fixed ICBM launchers".) The question has now been referred back for consideration by a commission, which had not reported at the time of writing. Meanwhile Congress has declined to appropriate money for production, until it receives the special commission's recommendation on the basing problem.

Little is known about the Soviet Union's plans for the future. It undertook extensive programmes of expansion throughout the 1970s. More than half of its land-based strategic missile sites were rebuilt to accommodate the SS-17, SS-18 and SS-19 ballistic missiles. Most of these new missiles deploy independently targetable warheads. As in the United States, new submarines are being built and new missiles with independently targetable warheads are being developed for deployment with them. It was recently announced that the Soviet Union had tested a long-range cruise missile, presumably a weapon which could be deployed on submarines or surface vessels off the coasts of the United States. The Soviet Union has had difficulty in developing solid-fuel systems, both for land-based and submarine-launched missiles. Almost all present Soviet strategic missiles are liquid-fuelled, which makes them less reliable (but does enhance their throw-weight). There is a report of the development of a new Soviet swing-wing strategic bomber, similar in design to the B-1. In total, the Soviet Union has more delivery vehicles and a greater throw-weight than the United States, but a smaller number of nuclear warheads.

The negotiations begin in a sense from the SALT II Treaty in that, although the United States has refused to ratify the treaty, both the United States and the Soviet Union indicate that they intend for the time being not to act in a way which would defeat the object and the purpose of the treaty. However, in the absence of some further agreement soon, it is doubtful whether that mutual agreement could hold much longer.

Unfortunately the basis of mutual understanding which had been painstakingly constructed during the SALT negotiations seems to have been

dissipated: the two sides now have substantially divergent approaches to the problem of control of these weapons. The US proposal at Geneva is for a phased process of reduction. In the first phase, both sides would be limited to 5 000 nuclear warheads deployed on no more than 850 ballistic missiles; no more than half of the warheads could be deployed on land-based missiles. In the second phase, both sides would achieve equal aggregate throw-weight. There are a number of differences from the SALT II treaty. It appears that bombers and cruise missiles are left aside in the first phase; ballistic missile warheads become the unit of account. The proposal for equal limits of throw-weight is designed to reduce the Soviet land-based threat. There is a strong emphasis on more effective verification, though no precise details have been publicly given of the additional procedures suggested. This proposal would make the Soviet Union restructure the nature and composition of its strategic nuclear forces, with a major shift away from land-based missiles.

The Soviet proposal is for a phased reduction of the total of heavy bombers, and land-based and sea-based ballistic missiles to a figure of 1 800 on each side; reduction of warheads to an equal agreed level; a freeze on further deployment of US forward-based systems within range of Soviet territory; a prohibition of long-range cruise missiles; and safe zones for submarines, in which ASW (anti-submarine warfare) activities would be prohibited. The Soviet Union, in these negotiations on strategic weapons, appears to be particularly concerned about the US cruise missile programme.

Thus both sides are now proposing substantial reductions in their nuclear strategic forces, which was not the case in the previous SALT negotiations. However, it is not easy at the moment to see how the two substantially divergent approaches can be reconciled.

French and British nuclear forces

French and British nuclear forces are acquiring added importance at the moment. This is not simply because of the argument about whether their numbers should be counted in the European missile negotiations. They are also becoming more important because both Britain and France are planning to increase and improve their nuclear forces at a time when the United States and the Soviet Union are negotiating about actual reductions. The British government plans to replace its Polaris system with four new submarines, each with 16 launchers for the Trident II missiles. The United Kingdom is not disclosing how many warheads it proposes to put on these missiles, on the grounds officially given that uncertainty is an important component of deterrence. However, uncertainty and secrecy are also potent components of arms competition. The Soviet Union may well

assume the worst case, as has so often happened on the Western side because of Soviet secrecy. So the Soviet Union might well assume that the United Kingdom might put some 14 independently targeted warheads on each missile, making a total of 896 nuclear warheads. If we add the French improvement plans, Britain and France by the end of the next decade could have a total of some 2 000 nuclear warheads that could be delivered on Soviet territory. These are obviously not negligible figures: the Soviet Union and the United States are currently discussing such proposals as a reduction of the number of strategic nuclear warheads each side holds to a figure of 5 000.

British and French forces must at some point be brought into arms control negotiations; France has indicated it would join negotiations when the gap between its forces, and those of the United States and the Soviet Union, became narrower. (China has made a similar statement.) Britain seems not to have indicated when it would be prepared to negotiate. It is obviously an illusion for Britain and France to consider that they can continue to increase the number of their warheads targeted on the Soviet Union without any reaction from the Soviet side.

No first use of nuclear weapons

When at the United Nations the Soviet Union made a unilateral declaration that it would not be the first to use nuclear weapons, NATO countries indicated that they were not prepared to do the same. However, NATO thinking about its strategy in Europe is showing signs of change. The doctrine of 'flexible response', which implies that NATO would be prepared to be the first to use nuclear weapons in Europe, is coming under increasing challenge from academics, politicians, religious leaders and the well-informed public. In a now famous article in *Foreign Affairs*, four eminent Americans argued against the doctrine. The criticism of it can be summed up in the words of US Senator Sam Nunn: "Under conditions of strategic parity, a NATO nuclear response to non-nuclear Soviet aggression in Europe would be a questionable strategy at best, a self-defeating one at worst."

These criticisms are beginning to have some effect on military thinking. The NATO supreme commander has not gone so far as to accept the idea of 'no first use': he has, however, gone so far as to suggest that, with appropriate expenditure on conventional forces, the strategy could be changed to one of 'no early use' of nuclear weapons. However, for this purpose he has put in a demand that NATO countries should raise their target figure for the annual rise in military expenditure from 3 per cent to 4 per cent.

The new-look NATO strategy which General Rogers has in mind is sometimes referred to as 'deep strike' (incorporating elements of the broader US concept of 'airland battle'). It involves exploiting Western superior technology to provide the means to target and destroy with conventional methods the WTO follow-on forces before they could reach the line of contact. It is a strategy which capitalizes on recent advances in conventional weapon technology: the application of micro-electronics to enhance the front-line units' ability to quickly collect, handle, and distribute information about the enemy; and the substantially increased lethality of conventional weapons carrying improved munitions that can be delivered from existing platforms.

There are, of course, many proposals now current in Western Europe for non-nuclear defence. The importance of this particular idea lies in the fact that NATO is giving it serious consideration. The opposition to nuclear weapons is actually having some effect on military thinking. It is, after all, only a few years since there was a proposal to maintain and modernize NATO's stock of tactical nuclear weapons: to introduce the enhanced radiation weapon (the neutron bomb) into Europe as a way of dealing with potential tank attacks from the WTO side.

Nuclear weapons and the new peace movements

No account of world developments in armaments and arms control would be complete without some reference to the new peace movements. It is because of the activities of these movements that the negotiations about nuclear weapons are so much in the public eye. Governments now consider that they have to take account of public opinion on these and other military matters, much more than they ever did before.

A number of opinion polls show that, particularly in Europe, people have been growing more fearful of the outbreak of a third world war; and the proposal to install new nuclear missiles in Western Europe does not have wide popular support. These developments in public opinion are no doubt partly cause and partly consequence of the rise of the new peace movements. These movements take many forms. In some countries, old-established organizations have gained considerably in strength; elsewhere new movements have sprung up—particularly among certain professional groups, such as physicians. The environmental movements have taken up the cause of opposition to nuclear weapons. There has been growing concern in the churches, with a number of reports questioning whether it could ever be right to use nuclear weapons, or to use them first. In Eastern Europe, the position of the official peace organizations is very different from that of organizations in the West: in the East these organizations are not critical of their own government's policy and they do not comment on

the activities of their own military sector. However, in some parts of Eastern Europe there are signs of non-official peace activity; in some cases these have been met by official attempts at suppression.

The Western anti-nuclear movements of the 1950s dwindled away in the 1960s, partly because the signing of the Partial Test Ban Treaty removed an important rallying focus, and partly because relations between the United States and the Soviet Union appeared to be improving. As it so happens, these movements were losing strength just at the time when the world nuclear weapon stockpile was increasing very rapidly—though very few people knew that this was happening. Perhaps the best indicator of the success or failure of these movements will be the future trend of the quantitative and qualitative changes in the world stockpile of nuclear warheads. At the moment the prospect is still of a further substantial increase in that stockpile. It would be some measure of the success of these movements if that trend could be checked and eventually reversed, and if the process of warhead improvement could be arrested.

II. Military expenditure, production and the arms trade

World military expenditure and production

The rise in world military expenditure is accelerating—a warning sign. The past four years show a rate of increase (in volume terms) of nearly 4 per cent a year; that compares with a figure of just over 2 per cent a year in the previous four-year period. A good part of the acceleration is explained by the change in trend in the United States. The peak figure for US military expenditure was at the height of the Viet Nam War in 1968. After that, military spending in the United States dropped in real terms until the middle of the 1970s, then stayed roughly constant up to 1979. Since 1979 it has been rising fast—by an average of 7 per cent a year in volume between 1979 and 1982.

However, the change in the United States is not the whole story. In recent years military expenditure has been increasing faster than 4 per cent a year in the Middle East, South Asia, the Far East (excluding China), Oceania and Latin America. The volume trend in the Soviet Union is a much debated figure. The CIA estimate used to be that it was in the region of 3–4 per cent a year throughout the 1970s. However, the latest CIA estimate is apparently of a figure of around 2 per cent for the past six years or so. The areas in the world which have not joined in a rapid rise in the past four years consist of Western Europe (both NATO Europe and non-NATO countries), China and—on rather doubtful statistics—Africa.

By 1982, the SIPRI estimate for the size of world military spending, in current 1982 dollars, had reached the figure of $700–750 billion.

The gap between the military spending of the United States and that of NATO Europe has been widening, reflecting partly the increased stress in the USA on global 'responsibilities'. It seems likely that it will become wider still. In general, in Western Europe, finance ministers have continued to win out over defence ministers; the politicians clearly do not consider the Soviet threat to be either so powerful or so imminent as to require them to change their economic strategies. There are two exceptions to that general rule—Britain and Italy; they appear to be the only countries which have paid any effective attention to the 3 per cent volume target which NATO originally set over five years ago.

US military spending has followed a 7 per cent growth path (in volume of outlays) for three years now; the Administration's forward plans call for a continuation of this average rate of growth for another five years. If these plans were to be put into execution, by 1988 the volume of US military spending would be very nearly double that of 10 years earlier. However, although Congress approved a very substantial increase in military spending for fiscal year 1983, the 1984 budget proposal seems unlikely to win approval in its present form. This is partly the consequence of a very sharp change in US public opinion in the past two years. Between autumn 1980 and October 1982, an opinion poll showed a fall in the proportion in favour of increased military funding from 71 to 17 per cent. Members of Congress are particularly concerned about the consequences of military spending for the budget deficit, which is currently expected to be of the order of $200 billion in fiscal year 1983, and almost as high again in fiscal year 1984.

So far, Congress has not made significant cuts in the so-called 'big-ticket' items. The aircraft carriers, the Trident submarine programme (with the reduction of one submarine), the B-1 bomber, and the major fighter aircraft programmes have been approved. The only two items held back (possibly temporarily) are the MX and the Pershing II missiles. The naval programme for fiscal year 1983 was also approved by Congress. The long-term objective of that programme has been stated by the US Secretary of Defense to be "to restore and maintain maritime superiority over the Soviets".

There is obviously a link between the naval build-up and the Rapid Deployment Joint Task Force (RDJTF). The RDJTF has now become a unified command, including elements from all four services; total combat manpower is approximately 200 000 army soldiers and marine infantry. There is increased funding for transportation and for pre-positioning of equipment and stores; the construction of base facilities outside the United States continues.

The United Kingdom is one of the two European countries which have met the 3 per cent volume target set by NATO; now there is super-

imposed on that military expenditure the cost of the Falklands/Malvinas war. The total cost of the 'Falklands element', including the cost of the garrison and the cost of replacement and additional equipment, appears likely to be of the order of £3 billion over four fiscal years (1982/83 to 1985/86).

In France, the nuclear deterrent is a major budget priority. Nuclear forces accounted for 14 per cent of the defence budget in 1982; the intention in 1983 is for a particularly rapid increase in expenditure on tactical nuclear weapons while holding back expenditure on conventional weapons.

In Japan, various changes and events have created a climate which is more favourable to military spending: the rather fragile domestic consensus against the substantial Japanese build-up seems to be weakening. There are suggestions to revise the Constitution to deal with the so-called 'no-war clause'; a group is also seeking to revise the US–Japanese security treaty to make it more bilateral—as it stands it gives the United States the major responsibility for defending Japan in time of war. Japan's weapon procurement programme emphasizes enhanced naval, air defence and anti-submarine capabilities, in line with US suggestions that Japan should equip itself to extend its defence surveillance of sea routes out to 1 000 nautical miles from its shoreline. The five-year defence plan announced in July 1982 calls for annual increases of military expenditure in real terms of between 6.3 and 8 per cent. If this programme goes ahead, it seems virtually certain that the traditional 'one per cent of gross national product' limit will be broken.

In the Soviet Union, the picture remains of a steady, not particularly rapid upward trend, which shows no sign of moderating. On the other hand, the economic growth rate has been slowing down. To quote US Professor Myron Rush: "The opportunity costs of Soviet defence spending are especially severe, since the centrally directed Soviet economy fully utilises its productive capacity. Resources not used in defence need not stand idle as they might in the United States, but would be more readily available for use in the civilian economy".

The US Defense Intelligence Agency's estimates of Soviet output show continuous high levels. In actual numbers of weapons, such as tanks and fighter aircraft, the figures show the Soviet Union outproducing the United States by a wide margin. However, they do not indicate any strong upward trend in aggregate output numbers. Events in 1982 tend to provide some support for the picture of Western technological superiority in weaponry; for example, Israeli F-15 and F-16 fighters established full superiority over the MiG fighters of the Syrian Air Force. Of course, this was not simply a consequence of the equipment. Superior tactics, a better trained air force, and excellent co-ordination of early-warning and

electronic warfare capabilities may have been more decisive. However, the quality of the equipment probably played some part.

China is not increasing its military spending significantly. Military modernization still appears to take fourth place after the modernization of industry, agriculture and science. There are, however, some Chinese military technological advances to note. China has announced that it is developing a three-stage liquid-fuelled rocket capable of launching satellites into geostationary orbit. It has also successfully test-fired a ballistic missile from a submerged submarine.

The arms trade

The proliferation of major conventional weapons throughout the world continues. The total volume of transfers of these weapons for the period 1978–82 was about 80 per cent greater than in the previous five-year period. In that period, the United States and the Soviet Union each account for about one-third of total arms exports. The Soviet Union, however, is the larger supplier to the Third World. The Soviet deliveries are to a limited number of countries, and—with a few exceptions—production licences are not granted; it follows that the countries of the Third World that receive weapons from the Soviet Union tend to receive these weapons in very large numbers.

During fiscal year 1982, the United States signed arms sales agreements with foreign countries valued at $21 billion, with contracts covering a further $10 billion pending acceptance from recipient countries. These orders will be coming through in deliveries in the next few years: the volume of US arms exports seems bound to rise in the next few years. This increase in orders follows the change in policy under the new Administration, which establishes arms sales once more as a major foreign policy instrument. However, US arms sales to Taiwan have proved something of an impediment to the major US policy objective of better relations with China.

In a number of arms-supplying countries, there is considerable economic pressure to find export outlets for weapon production. This appears to be true even in the Soviet Union. Soviet arms exports provide a substantial volume of hard currency, and this appears to be an important consideration now in Soviet arms sales policy. In France, because of the economic importance of arms sales, the Socialist government has not made any significant changes to its predecessor's policies. In FR Germany, a modification to the export guidelines—permitting arms exports if they are considered necessary for vital international and security interests—may result in a relaxation of constraints. In Austria, on the other hand, there has been some tightening of restrictions, with a ban on arms sales to countries seriously abusing human rights.

Arms production in Western countries is becoming increasingly a multinational affair, with joint production agreements and licensed production. In this way weapons developed in countries with restrictive trade policies can be produced and exported from countries whose policies are less restrictive. Thus we find basically the same 155-mm towed howitzer being produced in Belgium (GC-45), in Austria (GHN-45) and in South Africa (G-5).

Chemical and biological warfare

The chief developments of the year in the field of chemical and biological warfare were threefold. There were new attempts by the international community to respond to the charges directed against the Soviet Union of using chemical and biological weapons. The United States' move towards chemical weapon rearmament was checked for the time being, because Congress was unwilling to appropriate funds for the production of binary weapons—though the construction of the plant continues. Some modest progress was made in the negotiations for a chemical weapons convention.

The United Nations Expert Group in its final report on the US allegations of use of biological and chemical weapons in Laos, Kampuchea and Afghanistan concluded: "While the group could not state that these allegations had been proven, nevertheless it could not disregard the circumstantial evidence suggestive of the possible use of some sort of toxic chemical substance in some instances". This is not a strong endorsement of the US State Department's allegations. The group was, of course, heavily handicapped because it did not have access to the areas in which chemical or biological weapons were alleged to have been used; nor did it have resources commensurate with the magnitude of its task. The main conclusion is the clear need for pre-existing international machinery that can cope decisively with future allegations of this kind: and a proposal to this effect has been endorsed by the General Assembly.

In the United States, the building of the Integrated Binary Production Facility at Pine Bluff Arsenal continues. However, Congress refused to appropriate funds for actual binary weapon production. The question will come up again in 1983: in its budget request for fiscal year 1984, the Administration has again requested funds for procurement of binary weapons.

In 1982 the usual miscellany of estimates on the size of the Soviet stockpile of chemical agents was produced; however, probably the most useful statement was that of a senior US Department of Defense official testifying to the US Congress that "we do not know very well the size of the Soviet chemical munitions stockpile"; and the same official went on to express ignorance about where Soviet CW munitions were deployed and about the

size and scope of Soviet research and development in this field. The Soviet Union might have taken the opportunity, during 1982, to declare that, like the United States, it too had for some years been observing a *de facto* moratorium on chemical weapon production. Unfortunately it made no such declaration.

The negotiations on a chemical weapons convention in the Committee on Disarmament are discussed below.

The military use of outer space

The militarization of outer space continues. In the United States, the military space budget is one of the faster rising items in military expenditure: for fiscal year 1983, it showed an increase of some 20 per cent in real terms over the previous year. The growing importance of the military use of outer space is indicated by the establishment in September 1982 of a new Space Command. This new centre will control all military operations of the space shuttle; it will be responsible for all the data obtained from the world-wide tracking of spacecraft as well as data from early-warning satellites; and it will plan orbit strategies for military satellites. In the Soviet Union, an anti-satellite test was conducted in June 1982; this test, it was suggested, was co-ordinated with the test launch of two intercontinental ballistic missiles and two anti-ballistic missile tests.

The UNISPACE 82 Conference, held in Vienna in August, was predominantly concerned with the peaceful uses of outer space. However, a good deal of concern was expressed about the danger implicit in the use of outer space for military purposes. While expressing concerns about the impact of space technology on the environment (which could be modified by gases released from the exhausts of rocket launchers), and the possibilities of satellite collisions, the conference failed to indicate that such problems arise mainly because of the greater use of this technology for military purposes. Three-quarters of all satellites launched, after all, have been military satellites. A collision between satellites might lead one power to suppose that the other side had used an anti-satellite weapon. There was also concern at the increasing saturation of the geostationary orbit, in which many of the satellites are military.

In February 1983, the nuclear reactor of a Soviet military ocean-surveillance satellite re-entered the Earth's atmosphere. No debris was reported on land; however, some radioactive contamination will eventually fall on the Earth's surface. This is not the first such accident. As a result of a previous Soviet accident in 1978, President Carter pledged that the United States would pursue a ban on nuclear power sources in outer space. However, this position was later abandoned. There are plans, both in the Soviet Union and in the United States, to orbit in space larger

nuclear reactors than in the past. The idea of prohibiting this practice is one which should be reintroduced.

The United States President, on 24 March 1983, launched a proposal for a much more substantial research programme into space-based lasers as anti-ballistic missile weapons. The Soviet Union also has a very active research programme in this area. This could lead to a dangerously unstable situation if one side developed an effective defence before the other side had done so. It could lead to an extremely expensive arms race in space: to more intensive development of anti-satellite weapons. It could also lead to more rapid deployment of nuclear weapon launchers which are less susceptible to attack by space-based lasers: and in total to further increases in the number of nuclear warheads targeted on a potential enemy, in the hope of swamping defences. The deployment of a laser weapon in outer space, as an anti-ballistic missile weapon, would violate the spirit, if not the letter, of the anti-ballistic missile treaty. If X-ray lasers are deployed (which are the type of laser showing the most development potential for this purpose) it implies putting a nuclear device similar to a nuclear warhead in outer space. This, again, would seem to violate the spirit of the Outer Space Treaty.

III. The Falklands/Malvinas conflict

The Falklands/Malvinas conflict was an unnecessary war. It can hardly be said that the occupation of the islands was in the vital interest of Argentina. Sooner or later the UK would have come to an agreement with Argentina; having dismantled a colonial empire, Britain was not likely to cling to a few barren islands on the other side of the world at the expense of relations with the Latin American continent. There is evidence that responsible diplomats in the United Kingdom were considering a far-reaching compromise solution. Indeed practical preparations had been made for some possible devolution in agreements of 1971 and 1974, which established closer ties between the islands and the mainland. As a result of the war, the likelihood of an early negotiated settlement has been put off for many years.

There are a number of points of concern for those who look forward to the development of peaceful ways of settling disputes. Neither country submitted the dispute to the International Court of Justice. The principle of self-determination, which Britain used extensively in the negotiations, has not always been given such importance: Britain did not, for example, invoke it on behalf of the Diego Garcians when they were moved from their island and settled in Mauritius. In both Argentina and the UK the war brought about a surge of nationalistic feeling, distracting attention from economic difficulties. This distraction has proved more short-lived

in the country which lost the war than in the country which won. The war has not led to any real peace.

Both countries suffered considerable losses, both direct and indirect. Britain will have to spend considerable sums over and above the increase by which its military budget is planned to grow. Argentina will have to use its scarce resources to rebuild its decimated air force, and to acquire new weapons. Another consequence of the war is a probable arms build-up in the region as a whole. The rearmament of Argentina is already influencing the forward armament plans of Chile, Brazil, Peru and Venezuela.

The UN General Assembly has passed a resolution urging the resumption of negotiations—and will probably continue to approve such resolutions in the future. There will be continuing pressure on Britain to comply with the resolution.

IV. Arms control and disarmament

Against these increases in military expenditure, and these various developments in nuclear and conventional weaponry, what progress was made in arms control or disarmament in 1982? The short answer—for the second year running—is none. No new agreements were signed. Whether 1983 will show a better record remains, of course, to be seen: at the beginning of the year there were certainly no signs of any immediate breakthrough at any of the places where arms control was being discussed.

The two central negotiations at Geneva—on eurostrategic nuclear weapons and on strategic nuclear weapons—have already been covered. These two sets of negotiations—and in particular those on European nuclear weapons—are in the spotlight of public attention this year, and rightly so. However, there are other forums where discussions or negotiations on arms control are going on; unfortunately not much public attention is paid to them. A report on the state of play in these other negotiations, or discussions, is a necessary part of the general picture.

There are the long-running negotiations at Vienna on force reductions in Europe; and at Madrid, there has been, for two years now, the Conference on Security and Co-operation in Europe, which has before it a proposal for a European Disarmament Conference. At Geneva there is the continuing role of the Committee on Disarmament. There was a Special Session on Disarmament in New York last summer, and also the normal autumn discussion at the General Assembly. A review of arms control events must include the Swedish government's initiative in proposing a nuclear weapon-free zone on either side of the border in Central Europe—a suggestion based on a proposal of the Independent Commission on Disarmament and Security Issues (known more generally as the Palme

Commission). Although this was a non-governmental report, it has received considerable attention at the United Nations.

The UN Second Special Session on Disarmament

The UN Second Special Session devoted to Disarmament, held in June and July 1982, could hardly have been held at a less propitious time. Several major, and a number of minor, wars were being waged in various parts of the globe. The general atmosphere was one of distrust between the two major powers, who necessarily dominate the disarmament scene.

Insofar as the function of the Special Session was to provide some stimulus to arms control or disarmament negotiations, it must be counted a failure. Some participants, particularly from non-aligned countries, had come with the hope that the Special Session would translate the general strategy of disarmament, outlined in the final document of the First Session, into a sequence of concrete measures to be carried into effect within an agreed time-frame. This was a vain hope; indeed the Session had some difficulty in going as far as to reconfirm what had been agreed four years before. The only tangible results of the Special Session were inconsiderable: first, the enlargement of the United Nations Disarmament Fellowship Programme to provide 25 places instead of 20; and second, the endorsement of the UN World Disarmament Campaign, although the actual amount of money pledged so far by member states to this campaign is very small.

The Special Session did provide an opportunity for heads of state to set out the policies of their countries on arms control and disarmament. Not many new initiatives were presented. One exception was the Soviet Union's announcement of a unilateral commitment not to be the first to use nuclear weapons. The Soviet Union stated that it expected other nuclear states to follow suit, and that, in the formulation of its policy, the Soviet Union would take into account whether other powers followed its example.

There was a notable contrast between the lack of progress in the UN building itself and the massive demonstrations in the streets outside. The Special Session had some effect in bringing home to the public a recognition of the total inadequacy of the current attempts to move towards measures of arms control or disarmament in any of the forums in which these matters are now being discussed.

The General Assembly and the Committee on Disarmament

There were not many substantive developments in either the General Assembly or the Committee on Disarmament. The Committee on Disarmament devoted a lion's share of its meetings to drafting a comprehensive programme of disarmament, which proved to be a labour in vain.

Otherwise some small progress was made in the matter of chemical disarmament, but little else. At the regular session of the UN General Assembly, the resolutions on disarmament were mainly just appeals or solemn declarations, which have been made year after year since the 1960s.

In the negotiations on a chemical weapons convention, the Soviet Union made a concession by agreeing to provide for 'systematic' international on-site inspections for certain purposes—although this concession did not go so far as to accept the United States' requirements for inspection. The United Kingdom stressed the significance of an extensive set of detailed declarations which would be needed for adequate verification of a chemical weapons convention. There appeared to be general agreement that there would have to be a consultative committee as a permanent body for monitoring compliance with the terms of a future chemical weapons convention. A number of unresolved problems still remain.

At the General Assembly a resolution was passed to establish an international mechanism for prompt, competent and impartial investigation of allegations of violations of the 1925 Geneva Protocol, pending formal arrangements to be made within the framework of a comprehensive chemical weapons convention. This decision was prompted by a multitude of allegations put forward in recent years of the use of gas and toxins in armed conflicts. The suspicion of breaches, which have neither been proved nor disproved, weakens confidence in arms control treaties and damages disarmament efforts. The establishment of an effective fact-finding mechanism by the UN may both deter possible violations and also discourage ill-considered charges. In the same vein, the General Assembly recommended that the parties to the 1972 Biological Weapons Convention should hold a special conference to establish a "flexible, objective and non-discriminating procedure" to deal with issues of compliance.

Negotiations in Geneva on a comprehensive nuclear test ban are at the moment blocked, because the United States has formally announced that it is not willing to proceed. This was regarded by many delegations as incompatible with previous commitments. As early as 1963, in signing the Partial Test Ban Treaty, the US government declared its determination to continue negotiations to achieve the discontinuance of all nuclear test explosions. This determination was reiterated in the 1968 Treaty on the Non-Proliferation of Nuclear Weapons. Several delegations referred to an authoritative statement, made by the UN Secretary-General some 10 years ago, that "all the technical and scientific aspects of the problem have been so fully explored that only a political decision is now necessary in order to achieve final agreement". The United States is also unwilling to ratify the 1974 Threshold Test Ban Treaty, and the 1976 Peaceful Nuclear Explosions Treaty; it wishes the treaties to be revised to strengthen the verification provisions, even though at the time of signing the US government was

confident that violations could be detected. Indeed the verification clauses of both treaties are extraordinarily elaborate.

Nuclear testing was intensive in 1982. The number of tests—54—was well above the average of recent years. The United States conducted 17 tests—the highest number since 1970; the Soviet Union conducted 31—the highest number since 1963.

Since 1979, the Committee on Disarmament has been considering the question of an international convention prohibiting the development, production, stockpiling and use of radiological weapons. This has been criticized on the grounds that it bans weapons which no power at the moment is intending to develop, and so is of very limited value. An attempt has been made to broaden the scope of the convention, to include the protection of nuclear facilities from attacks which would cause the release of radioactive material and contamination of the environment. Negotiations at the Committee on Disarmament continue.

Little progress has been made at the CD on negotiations concerned with the prevention of an arms race in outer space. Efforts to set up a working group to discuss the various proposals have so far been unsuccessful.

The General Assembly initiated five studies in 1982. One is to review and supplement the 1975 UN study on the question of nuclear weapon-free zones. The second is to undertake the task of constructing price indices and purchasing-power parities for the military expenditures of states. The third is to carry out a comprehensive study of the military use of research and development. The fourth is to investigate the modalities of an international disarmament fund for development. The fifth is on the consequences of the Israeli armed attack on Iraq's peaceful nuclear installations.

Madrid and Vienna

At Madrid, the Conference on Security and Co-operation in Europe (CSCE) is moving into its third year: at the beginning of the year it was not at all clear whether or not a final document would be forthcoming. A proposal for a European Disarmament Conference features in a draft final document; on that question the main points appear to have been agreed. It is agreed that such a conference would proceed in two stages. The first stage would discuss proposals for confidence- and security-building measures. It is agreed that these measures should be militarily significant, politically binding and verifiable. A follow-up meeting of the CSCE would assess the progress achieved during the first stage and then decide whether to continue with a second stage of arms control and disarmament negotiations. One main issue outstanding is the zone of application for these confidence-building measures. The Soviet Union made a concession in February 1981 to include in the zone the whole European part of the Soviet

Union up to the Urals. The problem is how the West should compensate 'accordingly' for this concession.

The difficulties at Madrid arise not so much from the disarmament section of the draft final document, but on other sections. The Helsinki Final Act covers a wide range of issues in inter-state relations. So the final document of this review conference has to cover the field of human rights and dissemination of information as well as the disarmament conference proposals. In other words, the Madrid discussions embody 'linkage', in which progress towards any kind of arms control proposal is linked to progress in other fields as well. It is this linkage which leads to the problems which have delayed agreement on a European Disarmament Conference.

The neutral and non-aligned states tabled a revised final document on 15 March. This document calls, amongst other things, for the first stage of a European Disarmament Conference to begin in Stockholm on 15 November 1983. This group of states is pressing for an early decision by the conference on this document.

The negotiations at Vienna on force reductions in Europe are approaching their tenth anniversary. Perhaps not surprisingly, their main subject seems a rather antiquated one—an attempt to agree on reductions in the numbers of the armed forces on either side in Central Europe. It is a negotiation which seems to pre-date the realization that military forces these days are highly capital-intensive. It would be more productive to concentrate on the reduction of military hardware, especially major weapons. Nonetheless, of course, an agreement here—indeed any agreement anywhere—could begin to change the atmosphere; one successful negotiation often makes others possible.

At Vienna, the gap between the two sides is the kind of gap which could be bridged without great difficulty if there were political will for settlement on both sides. There is quite a wide area of agreement. It is agreed that the objective is equal common collective ceilings on WTO and NATO ground and air forces: and both sides agree that the number should be 900 000 on either side, of which 700 000 could be ground forces. There are other important points of agreement: reductions can be phased and unequal in size; monitoring posts can be established on East and West European territories as an additional verification measure; the reductions will occur in the Federal Republic of Germany, the Benelux countries, the German Democratic Republic, Poland and Czechoslovakia, and all countries with forces in this area will make force reductions; there will be a consultative committee; and forces which are withdrawn cannot be redeployed in any threatening way.

The remaining problems are problems which *bona fide* negotiations should be able to solve. NATO does not accept the WTO statement of the

numbers of armed forces in the central area; there is a discrepancy which now stands at 170 000 troops. Here, progress has been made in identifying a large part of the reasons for the difference; and on the Western side the NATO numbers do not include the 50 000 French troops in FR Germany, since France is not party to these negotiations. Agreed figures are important for verification purposes and there are problems about the extent of monitoring that would be needed, in addition to verification using satellites. The WTO, though it had agreed to an initial phase where only Soviet and US troops would be withdrawn, requires a firm commitment from the outset that this would lead on rapidly to the reduction of forces of other nations. In 10 years of negotiations, compromises could have been reached on issues of this kind, had both sides shown some determination to reach an agreement.

Other arms control initiatives

In September 1980 the Independent Commission on Disarmament and Security Issues (ICDSI) was launched in Vienna. It was a Commission, under the chairmanship of the then former Swedish Prime Minister Olof Palme, whose structure was modelled on that of the Brandt Commission (the Independent Commission on International Development Issues under the chairmanship of former West German Chancellor Willy Brandt). The members of the Commission were invited by the chairman to serve in their private capacities, and not under instructions from their governments.

It issued its report, under the title 'Common Security: A Programme for Disarmament', shortly before the UN Special Session on Disarmament in June 1982. It presented as its main theme that security can only be obtained by accepting the opponent as a partner in a common search for security. It also presented a programme of action, setting out short-term and medium-term measures. The short-term measures should be implemented within the next two years; the medium-term measures within the next five years.

In December 1982 the Swedish government put forward, in a letter to 28 governments, a proposal to create a battlefield nuclear weapon-free zone in Europe, based on one of the Palme Commission's proposals. The Swedish suggestion was for a zone of this kind covering an area 150 km on either side of the borders in Central Europe. The reactions to this initiative have been mixed.

At a meeting of the Political Consultative Committee of the Warsaw Treaty Organization held in Prague in January 1983, the WTO members reviewed the international situation, and put forward their proposals for the next moves in the field of arms control and disarmament. Included in these proposals was one for the conclusion of a treaty with the member

states of NATO on the mutual non-use of military force and on the maintenance of peace.

Other interested European states would have the right to participate in drafting the treaty and signing it. It would be open for other states of the world willing to join as equal parties.

Appendix A

World nuclear weapon stockpiles[1]

Square-bracketed numbers, thus [1], *refer to the list of references on page LVI.*

The size of nuclear weapon stockpiles is one measure of the success or failure of arms control and disarmament measures. In 1982 several new efforts were made to compute the size of national or world stockpiles.

Calculations of the size of nuclear weapon stockpiles are complicated by several issues. All the nuclear powers keep the size of their stockpiles classified—although the USA has officially admitted that its stockpile is now in the low tens of thousands, somewhat less than the peak of the early 1960s [1].

Second, there are complex questions of what is to be included in the figure. Nuclear weapons include very sensitive components which are themselves affected by the radioactive environment in which they are expected to operate. As a result, the warheads must be frequently disassembled and renovated. Gallagher makes a comparison with a man who has one shirt on, one in the wash and one clean; he argues that for most nuclear weapon systems which are operational there are likely to be at least two extra warheads, one being renovated and one ready to replace the one in use [2].

Apart from the warheads which are part of the daily operational cycle, there are new warheads coming out of the factories; there are obsolete weapons being taken out of service but waiting for disposal (and recycling of the nuclear materials); there are experimental warheads; and there are warheads which are removed from the operational stockpile for routine testing.

For some purposes, it is the number of warheads which are actually operational at a given time which is of interest. But for other purposes—such as verifying actual reductions in nuclear weapon stockpiles—it is important to be able to account for all possible nuclear warheads.

There are two main ways of calculating the size of stockpiles. One is to make an estimate based on the number of nuclear-capable launching systems, about which there is generally speaking more information than there is about the number of warheads. The problem with this is that it is not possible to know how many dual-purpose systems (e.g., aircraft or artillery) would be actually assigned to a nuclear role in a given situation

[1] This appendix was written by Frank Barnaby and Malvern Lumsden.

—or how many *could* be so assigned in extreme circumstances. The military planner (on both sides) is likely to take a 'worst case' position and plan for stockpiles able to make the maximum use of the delivery system.

A second method is to make estimates based on the production capacity of weapon-grade nuclear materials, based on calculations of the quantity of uranium-238 or plutonium required to achieve a critical mass. (Other special materials such as tritium may also be involved.) Clearly this method, too, is sensitive to a variety of assumptions.

Arkin *et al.* [3] attempted to estimate the size of the US nuclear weapon stockpile from 1947 to 1982, on the basis of a variety of open sources. They indicate a massive growth in the years 1955–65, reaching a peak of some 32 000 warheads in 1967 but, with some fluctuation, declining to about 26 000 today. These figures are apparently authorized on a year-to-year basis by the US President in a Nuclear Weapons Stockpile Memorandum. The 1981 Memorandum signed by President Carter authorized a substantial production increase. The 1982 Memorandum, signed by President Reagan early in 1982, approved changes in the mix of warheads and authorized a further modest increase over and above the Carter increases. According to Arkin *et al.*, some 23 000 new nuclear warheads are planned for construction during the next 10 years and a further 14 000 are identified in current research and development programmes through the mid-1990s. The shape of the curve produced by Arkin *et al.* was essentially confirmed in a news release from the US Department of Defense, although actual numbers were not released [1].

As usual, much less information is available about the USSR and other nuclear powers. The Aviation Studies report shows a US superiority *vis-à-vis* the USSR of about 4 : 1 by the end of the 1960s. The figures show a steady Soviet effort to reduce this discrepancy. The result is that, whereas the US stockpile has remained relatively constant and even somewhat diminished over the past 15 years, the Soviet stockpile is steadily increasing, thereby reducing US superiority to less than 2 : 1 in numbers.

Using three different methods, Gallagher estimates figures for British stockpiles that are several times larger than other estimates [4–6]. The Aviation Studies report, which has a much lower figure for the UK, suggests that both China and France have more nuclear warheads than the UK.

US nuclear weapons

Today's US stockpile probably has a total explosive yield equivalent to that of about 9 000 Mt of TNT. This means that the USA has added the equivalent of one Hiroshima bomb (12.5 kt) to its arsenal about every 30 minutes since World War II, that is, one Hiroshima bomb every 30

Table A1. World nuclear weapon stockpiles

		1952	1955	1960	1965	1967	1970	1975	1980	1982
USA	a	400	1 050	3 375	21 338	25 770	28 390	31 802	30 523	30 420
	b	..	..	..	..	..	28 390	31 802	30 523	30 420
	c	1 000	2 000	20 000	31 800	32 000	27 000	28 000	26 000	26 000
	d									"Low tens of thousands"
	f									30 000
	g									31 200
USSR	a	6	340	2 220	4 681	6 343	7 870	11 370	15 170	15 670
	b	..	..	..	..	..	7 870	11 570	15 670	17 470
	e									25 000
	f									17 400
	g									17 800–22 800
China	a	–	–	–	2	9	54	330	730	920
	b	..	..	..	..	..	54	332	740	942
France	a	–	–	1	27	60	110	330	625	720
	b	..	..	..	..	..	134	330	625	720
UK	a	2	20	187	420	479	460	610	720	680
	b	..	..	..	..	..	460	540	600	640
	h									1 700
Total (lowest–highest figures)		**408–1 008**	**1 410–2 360**	**5 783–22 408**	**26 468–36 930**	**32 661–38 891**	**35 494–36 908**	**40 570–44 644**	**43 125–48 278**	**43 950–59 562**

Sources: a. 'Military record of CBR/atomic happenings', *Aviation Studies Atlantic* (London), January 1982.
b. 'Military record of CBR/atomic happenings', *Aviation Studies Atlantic* (London), September 1982.
c. Arkin, W. M., Cochran, T. B. and Hoenig, M. M., 'The U.S. nuclear stockpile', *Arms Control Today*, Vol. 12, No. 4, April 1982.
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minutes for 38 years, day and night, 7 days a week. The USSR has increased the explosive power of its nuclear stockpile to roughly the same level as the US stockpile.

After the first three nuclear weapons ever made were exploded—two over Japan and one during a test—no nuclear weapons existed. Within a year, by mid-1946, the USA had constructed nine more. By mid-1948, the US nuclear stockpile was 50 weapons; by mid-1950, it was at least 290, and by early 1951, about 400 weapons. By 1955, the number of warheads in the US stockpile was 2 000. It then increased at an unprecedented rate until 1967 when it reached 32 000, the all-time record. During the 1970s, the number fluctuated between about 26 000 and 28 500.

Arkin *et al.* break down the number of warheads in the US nuclear stockpile into the various types of nuclear weapon, as of January 1982. The weapons are spread over 25 types—ranging from portable landmines weighing a mere 70 kg, to strategic bombs weighing about 3.6 tonnes. The explosive yields vary considerably—from the equivalent of the explosive power of 10 tonnes of TNT (the yield of the W54 atomic landmine) to the equivalent of the explosive power of 9 Mt of TNT (the yields of the B53 strategic bomb and the W53 Titan II intercontinental ballistic missile warhead). Nuclear warheads are, in fact, available for virtually all types of weapon—strategic and tactical—and for most military roles. Twelve types of nuclear weapon are currently deployed in NATO countries [7].

The numbers of nuclear weapons of different types in the US stockpile vary considerably. The lists compiled by Arkin *et al.* show numbers ranging from 3 500 for the W48 155-mm artillery shell to 65 for the W53 Titan II warheads. The numbers of nuclear bombs deployed total 7 550, spread over five types (B28, B43, B53, B57 and B61). The numbers of tactical and strategic nuclear weapons are now roughly the same—a change from the 1960s when the US stockpile was mainly tactical. About 6 000 tactical nuclear warheads are deployed in NATO countries.

According to Arkin *et al.*, the number of new warheads for the six types now in production will total more than 9 000: the W80 warhead for the air-launched cruise missile, the Mark 12A warhead (W78) for the Minuteman III intercontinental ballistic missile, the W76 warhead for the Trident I submarine-launched ballistic missile, the B61 bomb, the W70 enhanced radiation warhead (neutron bomb) for the Lance missile, and the W79 8-inch enhanced radiation artillery shell. But most significant are the additional 14 types in current research and development: seven of these will be produced over the five years 1982–87 (the W80 for the sea-launched cruise missile, the W81 for the Standard ship-to-air missile, the W82 155-mm artillery shell, the B83 nuclear bomb, the W84 for the ground-launched cruise missile, the W85 for the Pershing II missile and the W87

for the MX intercontinental ballistic missile). Three of these will be produced in 1983 (the B83 bomb and the W84 and W85 warheads).

Looking further ahead, to the late 1980s and 1990s, Arkin *et al.* list another seven types of warhead for production—for anti-submarine warfare weapons, the low-altitude air defence system, the lethal neutralization system, the corps-support weapon system, advanced tactical air-delivered weapons, tactical air-to-surface munitions, and advanced cruise missiles. They estimate that more than 10 000 nuclear warheads will be produced for these future weapon systems. If the Trident submarine-launched ballistic missiles are fitted with manoeuvrable re-entry vehicles, 7 500 more nuclear warheads may be produced.

Four types of nuclear weapon are being or will soon be withdrawn from the US arsenal: (399) W45 atomic landmines, (750) W31 Nike Hercules ground-to-air missiles, (150) B53 strategic bombs, and (65) W53 Titan II intercontinental ballistic missile warheads. Finally, 10 other types will be replaced, and about three others partially replaced.

All in all, projected nuclear warhead production in the USA, from now until the mid-1990s, may involve the production of about 37 000 new nuclear warheads, of which about 23 000 will be constructed by about 1990. Making an allowance for the warheads withdrawn from the stockpile, or replaced in the modernization programme, the number of nuclear warheads will grow from the current 26 000 to almost 32 000 by 1990. By 1990, then, the US arsenal will have grown again to its 1967 record number.

The Arkin *et al.* data show that enhanced radiation neutron warheads figure significantly in current US nuclear plans. They are being produced for 8-inch artillery shells and Lance ground-to-ground missiles and are being developed for 155-mm artillery projectiles, for deployment in 1986. Current plans require the production of neutron warheads for 800 8-inch artillery shells, 380 Lance warheads, and about 1 000 155-mm shells.

Cochran [3] calculates that the current US nuclear weapon stockpile contains 90 ± 15 tonnes of plutonium, 500–700 tonnes of highly enriched uranium, and 60 ± 10 kg of tritium. The new neutron warheads will require unprecedented amounts of tritium (which decays at a rate of 5 per cent a year), and the other new nuclear warheads will require large amounts of new plutonium (the plutonium and tritium taken from withdrawn weapons will not be enough for the new warheads). The plan is, according to Cochran, to increase the production of plutonium and tritium from the current rate of about 1 400 kg of plutonium (equivalent) a year to about 4 000 kg by the mid-1980s. ('Plutonium (equivalent)' measures the amount of a material produced in a reactor in terms of the plutonium production that is displaced. One kilogram of tritium equals 72 kilograms of plutonium (equivalent).) This planned massive increase in

nuclear material production will put a great strain on US military plutonium production reactors and may encourage the USA to seek supplies of plutonium from other countries.

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Part I. The nuclear arms race

1. Long-range theatre nuclear forces[1]

Square-bracketed numbers, thus [1], *refer to the list of references on page 24.*

I. Main issues

In 1983, major decisions will be made about long-range theatre nuclear forces (LRTNFs) in Europe. The stakes are high. The purpose of this chapter is to provide a detailed guide to the issues which have arisen or are likely to arise in the negotiations. Judgements, when given, are of course those of SIPRI.

For the negotiating parties, the short-term military concerns revolve around the Pershing II missile. If it is deployed in Europe, the Pershing II will be one of the most capable counterforce weapons in the US arsenal. It is ideal for use against time-urgent targets such as command, control and communications centres, missiles, quick-reaction alert aircraft and submarines in port.

The Soviet Union has persistently tried to achieve the reduction of US forward based systems (FBSs) in Europe. It would therefore be a major setback for Soviet foreign policy if US LRTN missiles were reintroduced in Europe (for the first time since the Mace B was withdrawn 15 years ago), particularly because it may prove easier to upgrade the number and characteristics of the forces once they are deployed.[2] US Pershing and cruise missiles would reach important targets in the USSR, while Soviet SS-20 missiles do not reach the USA (except for Alaska).

For European countries, new missiles would make a difficult situation even worse. More effective war-fighting weapons—introduced in a major power competition in which Europeans, both East and West, may become the main losers—are clearly damaging to European security. The countries in which they are deployed would be burdened with a number of high-priority nuclear weapon targets, which would make it virtually certain that Western Europe would be drawn into any strategic war between the two great powers. In a European battle, Pershing and cruise missiles may be used against East European countries, and the SS-20s put Western Europe at a risk.

If the negotiations fail and NATO's deployment plan is implemented, Soviet rearmament seems to be a foregone conclusion. The result would be reduced security at higher levels of armament. It would also be a blow to

[1] This chapter was written by Sverre Lodgaard.

[2] The Mace B cruise missile had a range of up to 2 500 km. It was withdrawn in the second half of the 1960s because of its vulnerability to new generations of jet-propelled air defence aircraft.

the other efforts to negotiate nuclear arms control. It would complicate the negotiations on intercontinental strategic weapons and raise perhaps insurmountable political obstacles to the withdrawal of battlefield nuclear arms from Central Europe, another recently reactivated arms control proposal [1].

The essential issues before the Geneva negotiations (called 'Intermediate Nuclear Force (INF) Negotiations' by the USA and 'Talks on the Reduction of Nuclear Arms in Europe' by the USSR) are as follows.

1. It is only because of the pressure of public opinion that there is now a slim chance of success in the LRTNF negotiations—success meaning an actual reduction in the number of nuclear weapons targeted on European countries.
2. There is a political (rather than a military) requirement to agree on some kind of parity, or near-parity, in some reasonably coherent subset of the nuclear weapons involved in the East–West confrontation. In the present state of international tension, it is too much to hope for radical reductions.
3. There are strong arguments for including the French and British nuclear forces on the Western side. They are targeted on the Soviet Union. Inclusion of them would only serve counting purposes, appropriate for an interim negotiation; it would not impose any obligations on Britain and France.
4. A reduction in the number of Soviet warheads back to the level of the SS-4/SS-5 force in 1976, when the first SS-20s were deployed, would similarly improve the chances of success in the negotiations. The *status quo ante* in number of warheads roughly corresponds to Soviet–British/French parity in number of launchers.
5. Even if the French and British forces are counted, it still means that the Soviet Union would have to reduce its total missile force targeted on Europe substantially—by decommissioning not only all SS-4s and SS-5s but also an agreed number of SS-20s along with the infrastructure for them. A Soviet–British/French parity seems within reach. The Soviet Union might be willing to go beyond that, but hardly much farther.
6. The SS-20s that are removed should not be redeployed farther east. An agreement for Europe might be coupled with a freeze on Soviet and US LRTN missile deployments elsewhere.
7. To avoid circumvention of the agreement, the deployment of missiles with ranges of between 500 and 1 000 km should be frozen. Non-circumvention provisions could be established for aircraft as well, since negotiations on aircraft are likely to be deferred. Perhaps the main danger of circumvention comes from sea-launched cruise missiles: there is an urgent need for arms control measures here, because of the problem of verification.

8. If an interim agreement is reached on long-range theatre nuclear missiles, there will then be a case for merging the LRTNF and the START (strategic arms reduction) negotiations: it will be important to move on to further agreements. French and British weapons, which are scheduled to become a much more formidable force in the 1990s, would have to be included in these discussions. Long experience has shown that partial agreements are simply circumvented.

II. Force ratios

Ideally, any comparison of NATO and WTO (Warsaw Treaty Organization) forces should be dynamic and qualitative, based on assessments of survivability, penetrability, reliability, targeting options and employment doctrines, accuracy, exchange scenarios and the endurance of C^3I (command, control, communications and intelligence) facilities. However, attempts at quantifying these factors are bound to be arbitrary, and the whole exercise of very uncertain validity. The overview of LRTN missiles given in table 1.1 is therefore confined to a simple, quantitative force comparison. The Soviet Union has a predominance in the number of *launchers* of the order of 2.5:1, if US figures are accepted. Soviet figures have not been released.

On the assumption that two-thirds of the Soviet LRTN missiles are within striking range of Europe and that each SS-20 missile carries three warheads, the maximum number of *warheads* available for use against Western Europe increased to approximately 850 by the end of 1982 (using US figures)—an increase of about 100 during the year. Actual numbers are somewhat lower because in addition to the MIRVed version of the SS-20 (with three 150-kt warheads), there also seems to be a single-RV (re-entry vehicle) version.

Ballistic missile systems that have been assigned to European missions but are accounted for in the SALT II Treaty—notably Soviet SS-11s, SS-19s and SS-N-5s on Hotel II-class submarines, and US Poseidon warheads allocated to SACEUR (Supreme Allied Commander Europe) for targeting—are not included in the comparison. Neither the United States nor the Soviet Union includes them in official LRTNF estimates. Soviet Yankee-class SSBNs (ballistic missile-equipped, nuclear-powered submarines) may also be targeted on Europe during transit to and from their stations off the east coast of the United States, and at least 120 SS-11s and 60 SS-19s have been deployed at SS-4/SS-5 sites at Derazhnya and Pervomaysk.[3] However, these missiles were originally acquired for

[3] Garthoff indicates that the number of ICBMs designated for the European theatre has been in the range of 180–360 [2].

Table 1.1. Long-range theatre nuclear missiles

Country	Missile designation	Year first deployed	Range (km)	CEP (m)	Warhead(s)	Inventory[a] A	Inventory[a] B	Programme status
USSR	SS-4 Sandal	1959	1 800	2 400	1 × Mt	232	..	Phasing out
	SS-5 Skean	1961	3 500	1 200	1 × Mt	16	..	Phasing out
	SS-20	1976/77	5 000	400	3 × 150-kt MIRV 1 × ?[b]	333	..	Deployment rate approximately 50 per year
	SS-N-5 Serb	1963	1 200	n.a.	1 × Mt	30	18	3 each on Golf II submarines, 6 of which have been deployed in the Baltic since 1976
USA	Pershing II	1983	1 800	40	1 × ? (low-kt)	0		108 launchers to be deployed by 1985
	GLCM	1983	2 500	50	1 × ?[c]	0		464 missiles to be deployed by 1988
UK	Polaris A-3	1967	4 600	800	3 × 200-kt MRV	64		On 4 SSBNs, being replaced by the Chevaline system[d]
	Trident II (D-5)[e]	(1990s)	10 000	250	8 × 355-kt MIRV	0		Replacing the Polaris/Chevaline system from the 1990s, with 64 launchers on 4 submarines
France	SSBS S-3	1980	3 000	n.a.	1 × 1-Mt	18		
	MSBS M-20	1977	3 000	n.a.	1 × 1-Mt	80		On 5 SSBNs
	MSBS M-4	(1985)	4 000	n.a.	6 × 150-kt MRV	0		On the 6th SSBN; total programme, including retrofits: 96 (by 1992)

[a] A: US figures, from *Soviet Military Power* (US Government Printing Office, Washington, D.C., March 1983). B: The Soviet Union released figures for missiles deployed at the end of 1981, but had not published updated figures by the turn of the year 1982/83. Two-thirds of the SS-4s, SS-5s and SS-20s are estimated to be within striking range of Europe.

[b] Some SS-20 missiles are equipped with a single warhead and may therefore have intercontinental range.

[c] The W.84 warhead, with a selectable yield.

[d] Probably with three warheads. Six warheads (MRV), each of 50 kt, have also been indicated.

[e] Range and yield are based on the likely US choice of warheads. Since the UK will supply its own charges, it may choose force specifications which differ from those of the USA (see chapter 2).

missions other than European ones, and have probably been redirected to strategic, intercontinental roles as SS-20s became operational in large numbers. Soviet planners hardly need to divert ICBMs (intercontinental ballistic missiles) to European roles any longer.

British and French forces in the LRTNF category (with ranges of 1 000–5 500 km) are included in the comparison. There are good reasons: they exist, they expand, they are home-based in Europe and they are targeted on the Soviet Union. The French declaratory policy of *tous azimuts* has been abandoned; today, no one seems to dispute the contention that the French force is directed at the USSR (see chapter 2).

For primary LRTN aircraft—with combat radii well over 1 000 km and with low-level, all-weather capability to ensure penetration—the force ratio remains of the order of 2.5 : 1, to the advantage of the WTO. Towards the end of the decade, this advantage is likely to be somewhat reduced—even with the continued production of Soviet Tu-26 Backfire and Su-24 Fencer bomber aircraft at present rates of 30 and 60 per year respectively—as the Tornado enters service and the Tu-16 Badgers and Tu-22 Blinders reach the end of their serviceable lifetimes [3a].

The official figures for the aircraft sector are still widely different. Apart from the public relations debate over numbers, and other tactical considerations which enter into these calculations, the disparities reflect a variety of difficulties in counting LRTN aircraft. There are bound to be arbitrary elements in any estimate, and it is unrealistic to expect that the negotiators at Geneva can solve these problems before the end of the year. Therefore, they are well advised to concentrate on the urgent missile issues up to December 1983, which is the prescribed date of initial operational capability (IOC) for the Pershing II and the ground-launched cruise missile (GLCM).

Missile characteristics and deployment plans

The SS-20 is a ballistic missile using inertial guidance to hit its target. It depends on prepared launch positions, and has an accuracy (CEP, or circular error probable) of about 400 m. Technically, more than one missile can be fired from the same launcher. However, the rather heavy SS-20 missile releases intense heat during launch, so another missile can probably not be fired for several hours. In wartime conditions, reloading may therefore not be a viable proposition. There is, furthermore, no public evidence to show that the Soviet Union is actually fielding reload missiles (although allusions to that effect are made [4]).

The Pershing II is terminally guided: the accuracy achieved by its RADAG (radar area guidance) system is 10 times greater than that of the SS-20, and the best of any ballistic missile to date. It does not depend

on presurveyed or physically planned launch positions. The US suggestion to deploy one reload missile per launcher was turned down by the West German government. Tentative plans now call for having only enough disassembled spare parts on hand to make sure that 108 missiles are operational at any time.

The first tests of the Pershing II were unsuccessful. By the end of 1982, the US Army adopted a reduced testing programme of 18 flights to meet the date of IOC (December 1983).[4] This deadline has become a political dictate, and will quite possibly be observed even if the technology is still imperfect at the time. The maximum range of the missile is usually estimated to be 1 800 km. However, the Soviet Union claims it to be 2 500 km, and US sources say that the exact range is a classified figure [7]. The figure is important: with a range of 1 800 km the missile cannot reach Moscow, while 2 500 km is more than enough to target on all C^3I installations around the Soviet capital. Indications are that C^3I facilities will be high-priority targets for the Pershing II.

The GLCM depends on pre-surveyed, but not physically planned launch positions. The TERCOM (terrain contour matching) system makes it about as accurate as the Pershing II. The maximum range is 2 500 km and infrastructure preparations are being made at Greenham Common (UK) and Comiso (Italy). The designated deployment area(s) in the Federal Repubic of Germany had not been announced by the beginning of 1983. However, *some* preparations to receive cruise missiles were going on in all the five countries originally designated to receive them [8].

When NATO's so-called dual-track decision was made, FR Germany stressed that new missiles would be allowed on West German soil only if at least one other continental non-nuclear state accepted them as well. In addition to this principle of *non-singularity*, the government in Bonn also emphasized that missile deployments should start at the same time in the countries that agreed to host them. The principle of *simultaneity* was tied to the date of IOC.

The first condition was met when the Italian government agreed to permit the deployment of 112 GLCMs in Italy. The second principle was put to a test in 1982, when the United States floated a suggestion to begin deployment of transporter-erector-launchers (TELs) for cruise missiles in Britain already in May 1983, more than six months before the date of IOC. In the view of the West German government, no part of the new weapon systems need be deployed earlier than two months ahead of IOC, i.e., by October 1983 at the earliest. The Social Democrat opposition took the view that the new systems should be withheld as long as negotiations were going on in Geneva. However, at the end of 1982, the timing of

[4] The programme should be completed by September 1983. Enough money had been appropriated for the test missiles and another 21 for deployment [5, 6].

TEL deployments in Great Britain still seemed to be an open issue, depending on British and US preferences.

The principles of non-singularity and simultaneity are linked. Since the condition of non-singularity refers to another *continental* state, it is important that deployments in FR Germany and Italy take place at the same time. (The Netherlands and Belgium may or may not accept new missiles on their soil, but in any case would not be able to meet the December 1983 IOC.) However, a delay in the preparations of GLCM infrastructure at Comiso might not cause any great problem. Transfer of new systems for stocking in some neighbouring area, while waiting for the base to be ready, would probably satisfy the West German requirement for simultaneity.

III. Arms control positions

The Soviet moratorium

On 16 March 1982, President Brezhnev stated that the Soviet leadership had decided "to introduce unilaterally a moratorium on the deployment of medium-range nuclear weapons in the European part of the USSR" [9]. The moratorium would be in force either until an agreement was reached with the USA, or until such time as US leaders "actually go over to practical preparations to deploy new Pershing II missiles and cruise missiles in Europe". In spite of progressing infrastructure work in Western Europe throughout 1982, this hedging statement has not been invoked. If it has any meaning at all—which is not clear, since the SS-20 programme may already have been completed in accordance with the original plans—it may be invoked if TELs for new missiles in Western Europe are deployed. Launchers were the counting units at SALT (the Strategic Arms Limitation Talks), and remain so in Soviet LRTNF calculations.

On 18 May 1982, Brezhnev stated quite categorically that no medium-range missiles will be deployed additionally where the FRG and other West European countries lie within their range [10]. For the first time, it was publicly announced that the moratorium would apply also to missiles deployed east of the Urals. On the same occasion, Brezhnev made it clear that the moratorium also envisaged stopping the construction of launching sites for new missiles. However, the Soviet Union never specified *when* the missile deployments would be halted. Nor did it say when the infrastructure work would stop.

The United States and other Western countries, alleging continued deployment of SS-20s throughout 1982, have accused the Soviet Union of not living up to its promises. If the moratorium implied that the Soviet

Union would deploy no more than it had in the pipeline at a certain stage, and only complete the sites at which work had begun, these charges may not be valid. On the other hand, it would be stretching the meaning of the word 'moratorium' to allow it to include work in the pipeline. Leaving aside interpretations, there is no way an outsider, without access to satellite photographs, can make a judgement on this matter.

Part of the moratorium controversy was, moreover, due to some confusion regarding its area of application—although more for the public than for the negotiators at Geneva. For instance, new missiles deployed in the vicinity of Novosibirsk would not reach FR Germany and other Western countries, according to Soviet indications of the range of the SS-20 (4 000–4 500 km); but they would do so according to the US range estimate (5 000 km).

By the end of 1982, the SS-20 arsenal provided a more effective coverage of Eurasian targets than the SS-4/SS-5 force did by 1976, when the first SS-20s were deployed. The number of warheads had increased by more than 300, and the counter-military potential (CMP) was greater because the SS-20 is six times more accurate than the SS-4 (which always accounted for the bulk of the SS-4/SS-5 force).[5] Moreover, the solid-fuelled SS-20 scores higher on readiness; it is mobile and therefore less vulnerable, and consequently a capable war-fighting weapon. However, if the SS-11/SS-19 missiles in Derazhnya and Pervomaysk are taken into account and most of them have been redirected to intercontinental missions by now, the number of warheads targeted on Western Europe may have remained approximately constant. In any case, it is not implausible to assume that the moratorium roughly coincided with the completion of the SS-20 programme, and therefore had no substantial impact on the size of it. It may have been announced relatively early, in conveniently vague terms, to get more political mileage out of it.

The Soviet position

At Geneva, the Soviet negotiators tabled a proposal to reduce the number of LRTNFs to 600 on each side by the end of 1985, and to 300 by 1990. Aircraft as well as missiles were included, and the reduction zone was to extend from "the Arctic ocean to Africa, from the mid-Atlantic to the Urals" [11]. Within this zone, new types of LRTNFs would be prohibited, including, of course, cruise and Pershing missiles. Since British and French forces were to be included in the aggregate level of 300 units, US LRTNFs

[5] $\text{CMP}=\frac{\text{Yield}^{2/3}}{(\text{CEP})^2}$. CEP is the radius of a circle within which half of the warheads are expected to fall. As CEPs become very low, the CMP of particular weapon systems tends towards infinity.

would, in effect, be eliminated. By 1990, there are likely to be 178 British and French LRTN launchers. With phasing in of Tornado and Mirage 2000N aircraft from 1982 and 1988 respectively, the ceiling would soon be reached. Elimination of US forward based systems in Europe has been an objective of Soviet foreign policy which they have persistently pursued.

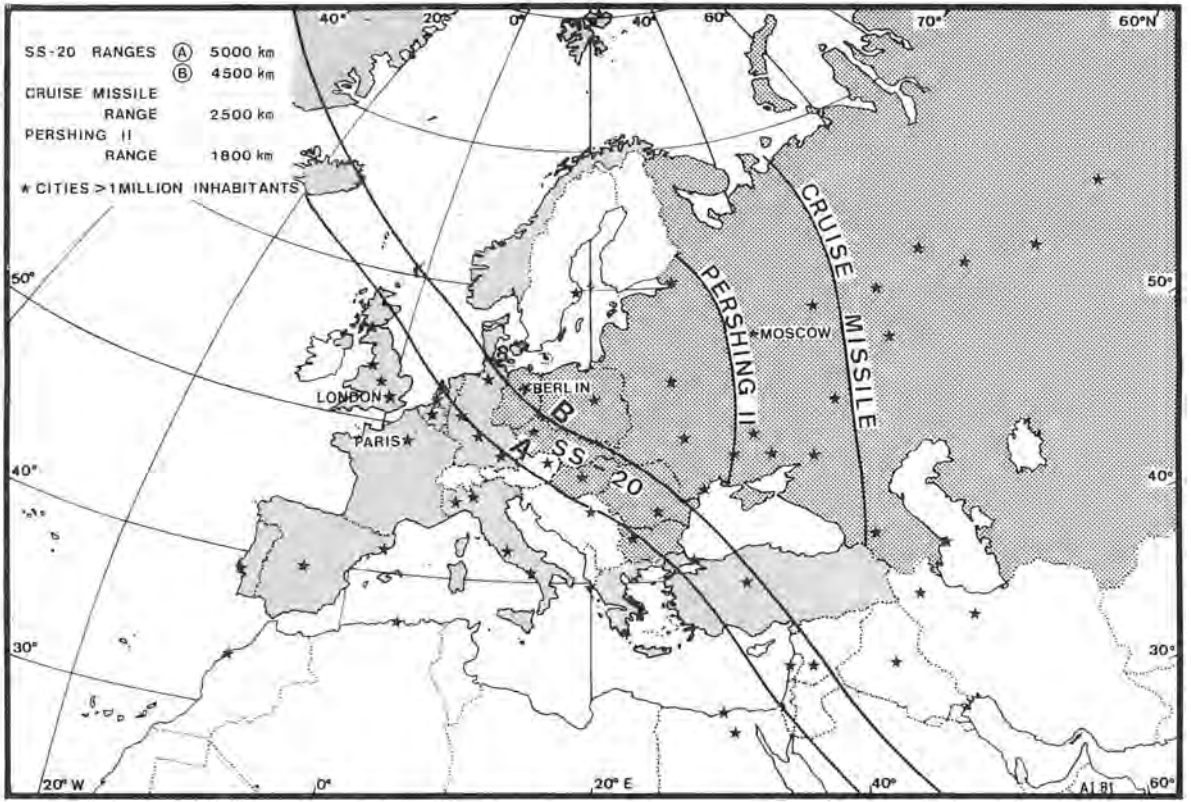
It should be emphasized, however, that the burden of reduction of LRTN aircraft would be greater for the USSR than for the West, since the current force ratio is of the order of 2.5 : 1. The main problem for the USSR would be the Su-24 Fencer, of which about 415 would be available in their European inventory by the end of 1982. The Fencer has a combat radius of 1 700 km, exceeding that of the Tornado and the Mirage 2000N. Soviet sources, however, claim that the combat radius of the Fencer is less than 1 000 km. Thus, the proposal to reduce systems to an overall level of 300 by 1990 may have been based on the inclusion of Backfires alone on the Soviet side, and F-111 aircraft on the Western side.

On 21 December 1982, General Secretary Andropov declared that the Soviet Union was prepared to remove hundreds of LRTN missiles, including several tens of SS-20s, so that the number of Soviet missiles would equal the French and British total. In addition, LRTN aircraft should be reduced to equal levels, but the Soviet Union seemed no longer to insist on treating missiles and aircraft jointly [12]. Rather, Andropov opened the possibility of a compromise between the quest for a comprehensive negotiation and for expeditious treatment of the urgent missile issues—for a staged process where the aircraft sector is brought in at a later date.

The offer to remove hundreds of missiles primarily refers to the remaining SS-4s and SS-5s. They are likely to be scrapped. The offer to remove several tens of SS-20s confirms that the Soviet Union is prepared to include missiles east of the Urals in the European calculus; if not, such a reduction would not be necessary to come down to the combined level of French and British forces. This is consistent with Brezhnev's statement of 18 May 1982 on the moratorium.

More precisely, it seems that the Soviet Union is willing to count all missiles west of 80° East under the European ceiling. With a range of 4 500 km, an SS-20 missile deployed on that meridian west of Novosibirsk would not reach FR Germany (but could reach the flanks of NATO, see figure 1.1). To negotiators at the Conference on Security and Co-operation in Europe (CSCE)—knowing how difficult it has been to get Soviet acceptance, in principle, to enlarge the potential area of application for confidence-building measures (CBMs) beyond 250 km into the Soviet Union up to the Urals—this move would appear substantial (see chapter 19). The flanks apart, all missiles within striking range of important targets in Western Europe are included in the count. Norwegian and

Figure 1.1. Maximum reach of SS-20 missiles deployed in the area of Novosibirsk (around 55° N 80° E). The curves for cruise and Pershing missiles show their reach from FR Germany and Italy. Both the 5 000-km range (claimed by NATO) and the 4 500-km range (closer to assertions by the USSR) for the SS-20 are shown on the map



Turkish territories bordering on the Soviet Union are unlikely to be targeted by SS-20s deployed in the middle of Siberia.

However, with a maximum range of 5 000 km, the 'within striking range of Europe (or FRG)' criterion would set the line east of Novosibirsk. The difference is significant, because there are reportedly some 50 SS-20s deployed around Novosibirsk [13]. However, it may not be easy to gain Soviet acceptance of the 5 000 km figure. "You say the range of your missile is less than 5 000 km, but we know better" is not a contention which any self-respecting power is likely to accept. Further, SS-20s deployed between the Urals and Novosibirsk are all in a swing position, targetable against China, South-West Asia and the Middle East as well as against Europe. To count them all under a European ceiling is hardly an accurate reflection of military reality. It seems hardly reasonable, therefore, to attempt to move the line of demarcation even farther east.

While the 1960s-vintage SS-4s and SS-5s are likely to be scrapped, it is unclear whether, or to what extent, the "tens of SS-20s" will be moved farther east or decommissioned (kept in stock and for testing, or dismantled). The latter would be an historic act: during 20 years of arms control negotiations there has never been any real disarmament (except possibly for the Biological Weapons Treaty).[6] In any case, there are strong arguments against shifting the missiles to Eastern Siberia.

Removal of the missiles and their launchers should be accompanied by elimination of the infrastructure serving them. If that were done, deployment of more SS-20s for use against Europe would hardly be a practical proposition in time of crisis or war. Transport of SS-20s from Eastern Siberia to positions within range of Europe is an even more remote proposition.

In his speech on 21 December, Andropov reiterated the Soviet proposal to withdraw "all kinds of medium-range nuclear systems directed towards Europe . . . as well as [all] tactical weapons"—the Soviet 'zero option' [3b]. He also repeated the suggestion to reduce systems to a level of 300 by 1990. The new proposal may be considered in conjunction with that suggestion. A reduction of Soviet LRTN launchers to match the number of French and British launchers would allow for 122 LRTN aircraft (if the sixth French SSBN is incorporated and the Golf II-class submarines are decommissioned). On the assumption that Badgers and Blinders are phased out during the 1980s, this would permit continued deployment of Backfires for another two to three years (at the present rate). And assuming a staged negotiating process, there would still be time to negotiate.

[6] A borderline case was provided by the SALT I Interim Agreement. In a Protocol to that Agreement, the USA and the USSR agreed that, up to the specified ceilings, additional SLBM launchers might become operational "as replacements for equal numbers of ballistic missile launchers of older types deployed prior to 1964 or of ballistic missile launchers on older submarines". Time-limits were stipulated for the dismantling of old launchers to be replaced by SLBMs [14].

The NATO position

The US/NATO position did not change during 1982. The United States did not depart from the 'zero option' announced by President Reagan on 18 November 1981. The Western position remained that the USA will cancel the deployment of cruise and Pershing missiles if the Soviet Union dismantles all SS-4, SS-5 and SS-20 missiles, regardless of their location.

The West has always wanted to concentrate on land-based LRTN missiles in the first phase. Limitations should apply both world-wide and at the regional, European level. However, since the 'zero option' also requires the dismantling of SS-20s deployed in Eastern Siberia, as a condition for dropping cruise and Pershing deployments in Western Europe, there would be no land-based LRTN missiles left for global negotiations.

The NATO governments maintain that French and British forces should not be taken into account at the Geneva talks. At the Franco–German summit meeting in Bonn on 21–22 October 1982, Chancellor Kohl and President Mitterrand reaffirmed this position [15], and the British government adheres to the same view. However, in several domestic constituencies, there was a growing body of opinion that they should be included in the data base. In the NATO Standing Consultative Group, the view was put forward a long time ago that some allowance should be made for the existence of these forces. The West German Social Democratic Party also came out in favour of it when they expressed their support for Paul Warnke's proposals (see pages 20–21).

When the negotiations started, the Reagan Administration proposed warheads on missiles as units of account. In addition to warheads on launchers, warheads on reload missiles would be included as well. Nevertheless, the common NATO position has always been to count warheads on launchers, and this is still the policy of the Western alliance. If the USSR does not field reload missiles for its SS-20 launchers, and the West German opposition to Pershing reloads remains firm, the difference is of no practical consequence.

The possibilities for verification are an obvious factor in choosing between warheads and launchers. From that point of view, launchers are clearly to be preferred. On the other hand, it is bombs and warheads that kill, not launchers or missiles; on that argument, warheads would be best. The Soviet Union has also indicated that it is willing to take warheads into account.

If progress is made in the talks, the LRTNF negotiations must sooner or later be combined with the negotiations on strategic systems (START): recent proposals to reduce intercontinental systems also emphasize overall limits on warheads as well as on launchers. So, it can be argued, the

LRTNF negotiations should do the same, since it would make it easier to harmonize any limitations agreed in the two negotiations.

However, at the present stage, a merger of the two negotiations would be counterproductive. To halt and reverse the deployment of LRTN missiles is an urgent matter; there would be no chance of doing this in time if the negotiations were merged. Neither the USA nor the USSR has tabled proposals which explicitly or substantively tie the two negotiations (although the USSR has indicated that it might withdraw from the START table as soon as new missiles arrive in Western Europe). But informal meetings of members of the two negotiating teams have been arranged, and some flexibility in the handling of SALT provisions and new strategic arms reduction proposals (see chapter 3) may facilitate an early LRTNF accord. It may be appropriate to continue in this manner throughout 1983.

The United States and some other Western governments have suggested that negotiations might continue beyond December 1983, i.e., after the deployment of cruise and Pershing missiles had begun. Combined with early deployment of TELs, this might defuse public opinion somewhat and make deployment of the first missiles seem less dramatic. However, there is strong opposition to such a course in West European countries: and there is no certainty that the Soviet Union would continue negotiations, once deployment had begun. If the missile build-up is to be stopped and reversed, it seems prudent to act on the assumption that time is short.

The NATO meetings held at the end of 1982 confirmed support for the 'zero option'. However, Secretary General Luns told a news conference that "we never said [the zero option] was the only solution" [16]. British Defence Secretary Nott told reporters that other proposals should be examined if the zero option proved not to be a realistic goal. Later, President Mitterrand also suggested a compromise. The government of FR Germany, which has a greater stake in this issue than any other European government, was determined to deploy new missiles, but only if the USA does all it can to negotiate an agreement with the USSR.[7]

Initially, it appeared that the United States was unwilling to go along with this idea of modifying its negotiating stance; however, by the time the negotiations were resumed (27 January 1983) there were some rather uncertain signs of change.

The communiqué from the defence ministers meeting of the Nuclear Planning Group on 30 November 1982 said that "in the absence of a concrete arms control agreement", deployment of GLCMs and Pershing IIs would begin according to schedule at the end of 1983 [18]. The foreign ministers, meeting on 9–10 December, used somewhat more cautious

[7] "The Germans see the decision as a dual-track one. They insist that the United States do all it can to negotiate an agreement banning those weapons" [17].

wording: deployments would begin according to schedule "in the absence of concrete results" [19]. In effect both communiqués stated that missile deployment would follow automatically, barring major achievements at Geneva.

IV. Arms control options

How to deal with French and British forces

It is only because of the pressure of public opinion that there is now a chance—albeit slim—of a satisfactory outcome to the Geneva negotiations on LRTNFs: satisfactory meaning an outcome which reduces rather than increases the number of nuclear weapons. If there had been no pressure, quite possibly there would have been no negotiations at all; alternatively, an agreement might have been reached which levelled up the number of weapons, instead of levelling them down. For the negotiators at Geneva have been working from the principle of 'negotiating from strength', and that strategy has never been conducive to arms restraint [20]. If there is now a possibility of such restraint, it arises from public attention and concern.

However, at a moment when relations between the two great powers are tense—more so than at any time since the Cuba crisis and the advent of arms control—it would be naive to expect a radical turn towards disarmament. In trying to negotiate a limit on LRTN missiles which level these forces *down* to parity, it is therefore necessary to establish a data base which approaches numerical equality in some respect. This is unfortunate, because numerical equality or parity is very difficult to negotiate and because there is no military necessity for it. However, it must be accepted that these essentially political negotiations are about parity.

The forces to be included in the data base must be interrelated, and constitute a reasonably coherent subset of the overall East–West force relationship. At the same time, however, the scope of the negotiations must be such that the demand for reductions comes within range of the realistic. A key issue then is the treatment of French and British forces. Even if they are taken into account, the Soviet Union would have to make considerable reductions. But Andropov's latest offer represents a departure from previous Soviet claims that parity already exists, and suggests that an equitable solution is within reach. Without making any allowance for French and British missiles, an agreement in Geneva would not be on the cards.

The USA and the USSR can obviously not negotiate the size or composition of third country forces. The present 'euro-missile controversy' was, moreover, not caused by the UK and France. However, the USA and the USSR can allow for the existence of the West European forces without

subjecting them to limitations. Indeed, it would not be the first time that British and French forces have been taken into account: during SALT I, allowance was made for British and French missile-firing submarines when determining the maximum number of US and Soviet SSBNs (44 and 62 respectively) [21].

There have been several objections to the inclusion of French and British forces. First, it is argued that the USSR should not be permitted to establish a counterweight to the arsenals of all other nuclear weapon states. That would be tantamount to granting hegemony to the Soviet Union. However, the French and the British forces exist, expand and are targeted on the Soviet Union. So it is impossible to maintain that they do not represent additional complications for Soviet military planning. They are, furthermore, home-ported in Europe, and both France and the United Kingdom are members of NATO. In time of peace, the British SSBNs are allocated to SACEUR for targeting purposes. They are logical components of a European settlement.

Second, it is argued that the Soviet Union has about 8 800 bombs and warheads on strategic delivery vehicles, most of which can also be used against Western Europe. In addition, it has a number of systems, with ranges of less than 1 000 km, which also lend themselves to strategic uses and deep interdiction, especially when forward based. These should be sufficient for all conceivable purposes; LRTN missiles are therefore superfluous. There is a great deal to be said for this view. However, preparations for protracted nuclear war—which is declaratory policy in the United States and probably the policy of the Soviet Union as well—lead to demands for many more weapons than present inventories contain. Furthermore, while the demand for parity may be militarily meaningless (and requests for precisely matching systems ridiculous), it is still a political requirement that is hard to ignore in negotiations.

In practice, even a great power may have to live with fewer weapons directed at others than others have directed at it. But it will not readily agree to codify inferiority in numbers or in other easily perceived and politically sensitive indicators of military strength. The US Congress criticized the Administration for accepting certain numerical asymmetries in the SALT I Treaty, and demanded equal ceilings in SALT II. The Soviet Union is unlikely to be willing once more to defer its claim for some accounting of the French and British forces (as it did during SALT II).

Third, inclusion of French and British forces has been objected to on the grounds that the doctrines guiding the use of these forces are different from Soviet LRTN doctrines. French and British forces are targeted on Soviet population and industrial centres, while Soviet missiles are counterforce targeted. However, the distinction is far from watertight. Some Soviet missiles are almost certainly countervalue targeted. And even when

directed at military targets, they may do great damage to towns and cities, given the population density in Western Europe and given that many military targets are close to population centres. Collateral damage actually leaves little incentive for France and Britain to adopt counterforce targeting (see chapter 2). Conversely, British and French weapons fired at Moscow and other Soviet cities are likely to knock out significant military facilities.

US–British targeting co-ordination also enters into consideration, as does the British plan to purchase Trident II missiles. These missiles are potent counterforce weapons. Still, the bulk of the warheads may be countervalue targeted. But operational plans for using them will always be highly classified information, so it will be hard to say.

When the SALT I Treaty was signed, the Soviet Union had an estimated 2 500 warheads on missiles and bombers. The United States had 5 700. Most of the US force was probably counterforce targeted, more so than that of the Soviet Union. Yet doctrinal differences are not known to have been a major obstacle to that accord. Indeed, if doctrinal symmetry were made a prerequisite for arms control agreements, reduction of nuclear arms would become exceedingly difficult.

Fourth, there seems to be a good deal of hypocrisy in the US arguments on this matter. Imagine that Brazil and Mexico were allied to the Soviet Union; that they had nuclear forces, on a scale similar to French and British forces, targeted on the United States; that Brazil had its own force expansion programme, and Mexico had contracted to buy a follow-on version of the SS-20 for deployment in the 1990s; and that the Mexican forces were assigned to a Soviet commander for targeting purposes. Would the US government not take them into account? Would it hold to the view that a counterweight to those forces would be tantamount to granting the United States hegemony, and therefore illegitimate?

The US Defense Guidance for the period 1984–88, signed by the Secretary of Defense, indicates the opposite. Noting that nuclear weapons may proliferate, the Defense Guidance reportedly states that "As nuclear capabilities spread, additional measures will be required to protect United States forces and interests". It goes on to say that nuclear engagements with adversaries other than the Soviet Union are unlikely to require large missiles of the kind presently aimed at the USSR. Instead, the Guidance particularly directs the Marine Corps to "take the lead in developing a nuclear operations concept for its AV-8B [Harrier II]" [22].

Parity in launchers

An accord matching Soviet LRTN launchers against those of Britain and France has the advantage of being verifiable.

The US Administration does not consider national technical means of verification to be adequate. A greater Soviet willingness to provide data for the verification of future arms control agreements is required. The Soviet Union does not exclude other forms of verification [23].

The series of figures for Soviet SS-20 deployments released by the United States in recent years testify to the effectiveness of national technical means. In particular, the assertions about Soviet missile deployments after the moratorium indicate that the mobile yet large SS-20 can be monitored effectively. Other means of verification would, by comparison, be of marginal utility. However, at times of high tension and low trust, back-up procedures are of some psychological and political importance. Co-operative measures to facilitate monitoring by national means, verification by challenge, or other forms of on-site inspection may contribute to agreement.

Since a solution based on parity in launchers presupposes that a certain number of SS-20s within striking range of Europe are removed, the infrastructure which at present supports those missiles must also be removed. This is easily monitored by satellite. The same applies to French and British launchers: they would not be subject to limitations, but their numbers can easily be ascertained.

There is a strong objection simply to redeploying the SS-20s farther east: there is no 'Asian security' requirement for more Soviet missiles targeted on Japan, China or other countries in South-East Asia. The Soviet Union could make a statement of intent on deployments in Eastern Siberia: if this were done, a number of worst-case assumptions could be avoided.

Even better, the USA and the USSR might agree to freeze the deployment of LRTN missiles outside the area covered by the European agreement. At present, such a freeze would first of all apply to SS-20s, GLCMs and Pershing missiles; in the future, it could become part of a much more comprehensive freeze on nuclear arms. In a sense, a freeze would be more satisfactory than dismantling the SS-20s that are removed from positions within reach of Europe; dismantling those missiles would still leave the Soviet Union with an open production line (if it so wished), non-deployed stocks of SS-20s (as is usually the case whenever new missiles are deployed in significant numbers), and no limit on future deployments in Eastern Siberia. A halt in missile deployments is, moreover, easier to verify than dismantling. Obviously, it would be desirable to see some actual dismantling of nuclear missiles, too, in addition to a freeze on deployments. But substantial moves of this kind towards arms control and disarmament are unlikely to be made on a unilateral basis.

For the Soviet Union, there is a lesson to be drawn from what has happened. For more than two years after the first SS-20s were deployed,

and for many months after NATO's deployment plan was elaborated, the Soviet Union made no major political move to allay the fears in Western countries, or to prevent speculation on the ultimate size of the programme from being used to legitimize Western rearmament [3c]. If the Soviet Union fails to show moderation and political sensitivity in its missile plans for Eastern Siberia, there may be a growing demand for deployment of GLCMs and Pershing missiles in Asian countries as well. Also, US LRTN missiles could reach important targets in Siberia from Alaska.

Parity in warheads

The number of warheads—and consequently the capability to inflict destruction—is no longer closely tied to the number of launchers or missiles that are available. By placing several warheads on each missile, equivalent megatonnage can be considerably increased. This goes equally for MRVed and MIRVed missiles. By improving the accuracy of the re-entry vehicles, the counter-military potential increases exponentially.

Therefore, the rationale for using warheads as units of account in arms control negotiations is growing stronger. SALT II established a sub-ceiling for MIRVed systems, and certain limitations on the maximum number of re-entry vehicles per missile. Demands for stricter restraints on warheads have been raised in both negotiations at Geneva. However, the exact number of warheads that are deployed on delivery vehicles cannot be ascertained. One would therefore have to aim at agreed upper limits and, in effect, rough parity in warheads combined with parity in launchers.

There is a complex issue which arises, in the count of warheads, from the distinction between MIRVs and MRVs. MIRVs—multiple independently targeted re-entry vehicles—should obviously be counted separately. MRVs—multiple re-entry vehicles—cannot be independently targeted, but simply spread out, thus increasing the area of destruction. The question is whether—to take an example—a MRV with three warheads should be counted as three or one. This makes a good deal of difference to the calculation of warhead parity: it illustrates once more how unfortunate it is that political negotiations are locked onto the search for this elusive concept.

MRVs as one warhead

First, we may take the case in which MRVs are listed as one warhead. Since most of the submarine-launched missiles on the British and French side have or will soon get MRVs, this substantially reduces the tally on that side. Parity can then be obtained at the same level of SS-20s by taking the 400 US Poseidon warheads allocated to SACEUR into the data base. This has been proposed by former US SALT negotiator Paul Warnke,

Table 1.2. British, French, US and Soviet nuclear warhead count

	Launchers	Warheads		Launchers	Warheads
British Polaris SLBMs	64	64	Soviet SS-20 IRBMs	178	534
French SLBMs	96	96	Soviet SS-N-5 SLBMs	30	30
French IRBMs	18	18			
US Poseidon SLBMs	40	400			
Totals	**218**	**578**		**208**	**564**

and the idea was welcomed by the West German Social Democratic Party [24]. The figures would then be as in table 1.2.

By the time the Soviet Union has effected the reductions, the sixth French submarine will be operational (or very close to it); it is therefore included in the calculation. Since the 400 Poseidon warheads are already accounted for in SALT, the United States would be allowed to compensate accordingly. This legal-technical modification of the SALT II Treaty should, in itself, not be any major obstacle to agreement.

A solution along these lines could be taken to symbolize US commitment to the defence of Western Europe. However, it makes no difference to operational planning in which negotiations the Poseidon warheads are counted. US war plans for Europe are quite unlikely to be affected by the arms control context chosen for them.

There is a complication for the future if this counting rule is chosen. The UK, and possibly France, have plans for replacing MRVs with MIRVs. An agreement now which uses this counting rule would be likely to be upset as the UK and France increased their number of independently targeted warheads: there would be Soviet demands for compensation.

MRVs as multiple warheads

The alternative is to count all warheads on MRVed missiles. There is a good deal to be said for this approach. French and British missiles are primarily 'countervalue targeted'—that is, targeted on cities. For this purpose, an MRV warhead is as good (or as bad) as a MIRV warhead. For there is no great problem in penetrating Soviet defences—Moscow is the only city with any anti-ballistic missile defence, and the Soviet Union has not even built up those defences to the level permitted by the US–Soviet ABM agreement of 1972.

If each re-entry vehicle is counted separately, an agreement which made the number of Soviet launchers equal to those of the UK and France would lead to approximate parity also in warheads. Assuming that the

sixth French SSBN is operational by 1985, the French and British forces may amount to 386 warheads on 178 launchers, assuming three warheads on the Chevaline, or a maximum of 578, assuming six. The same number of SS-20 launchers means a maximum of 534 warheads for the Soviet Union. By the early 1990s, before the British Trident system is scheduled to be operational, five French SSBNs will be equipped with M-4 missiles carrying 6 MRVs. This may lead to 706 warheads (or more if the Chevaline has more than three warheads) for the UK and France combined (see chapter 2). In equivalent megatonnage, the two West European forces would then be almost twice as powerful as the Soviet SS-20 force. However, the French programme may not proceed entirely on schedule; less than half of the SSBNs would be on station; and the others might not be ready to go to sea immediately. In comparison, the entire Soviet SS-20 force will probably be ready for use at short notice. Reduction of SS-20 launchers to equal those of the British and the French, and an upper limit of three warheads per (SS-20) missile, may therefore be considered an equitable solution for the rest of this decade.

Status quo ante

In one important respect, an accord reducing Soviet LRTN launchers to the level of British and French forces means a return to the *status quo ante*: the number of warheads on Soviet SS-20s would be roughly equal to that on SS-4s and SS-5s targeted on Europe in 1976, when the first SS-20s were deployed. For this calculation it is assumed that all SS-20s carry three warheads, and that no reload missiles will be fielded. The total megatonnage in the SS-20s would be less than one-sixth of the megatonnage in the SS-4s and SS-5s in 1976, and the equivalent megatonnage less than one-third, whereas the counter-military potential would be higher because of improved accuracy. Since the SS-20 is far less vulnerable than its predecessors, the pressure for early use is reduced.

For Western Europe, the main objective is to reduce Soviet LRTNFs as much as possible, and enough to take deployment of cruise and Pershing missiles off the agenda. A Soviet–British/French parity in number of launchers, corresponding to the *status quo ante* in the Soviet number of warheads, seems within reach. Should some further reduction be what is needed to cancel NATO's deployment plans, the Soviet Union might be willing to go slightly below that level. However, the modalities of the corresponding Soviet missile withdrawals—the other main issue—also has to be agreed.

Inclusion of French and British forces in the 'counting rules' does not imply any formal limitation on those forces. However, if their size is used to determine the limits on Soviet LRTNFs, the prospect of further increases

is likely to create political pressure from other European countries on the UK and France to abstain from force expansion. That is no bad thing. At the moment, the French and British Administrations appear to take the view that they can proceed to expand their nuclear weapon capacities with no reaction on the Soviet side. This is not a realistic assumption.

V. For the longer term: a more comprehensive negotiation

An agreement to limit LRTN missiles may also comprise a freeze on Soviet SS-12/22s and West German/US Pershing IA/IIs (Pershing II short-range, in development), to prevent circumvention. The range of the SS-22 is close to 1 000 km, and that of the Pershing IA, about 740 km. Western sources claim that the number of SS-12/22s is slowly increasing, approaching 150 launchers. FR Germany and the United States operate a total of 180 Pershing IAs on West German soil. These are the only missile types with ranges of between 500 and 1 000 km. A rather symmetrical basis therefore exists for instituting a freeze on them.

Non-circumvention provisions may be established for LRTN aircraft too, since real negotiations of aircraft are now likely to be deferred to a later stage.

On the Western side, the United States might proceed to deploy larger numbers of nuclear-tipped, land-attack SLCMs if the GLCM programme is cancelled. The first SLCMs are scheduled for deployment on attack submarines in 1984. Before NATO's dual-track decision of 12 December 1979, there was much discussion of sea-basing *versus* land-basing of cruise missiles. In fact the United States went for both. No one can veto the deployment of cruise missiles in international waters, whereas land-basing is dependent on acceptance by the host countries. Apart from stopping GLCM deployments, a high priority in Soviet arms control policy is therefore to ban or sharply curtail SLCMs for land attack.

The air-launched cruise missile (ALCM) may be of less immediate concern to the negotiations—although its general impact on arms control endeavours is great. It was accommodated by the SALT II Treaty, and the first squadron of B-52s with ALCMs became operational in December 1982 [25]. The USSR probably plans to acquire air-launched cruise missiles of its own.

Should the current US plans for wide dispersal of SLCMs be implemented, effective verification may well become impossible. Substantial limitations on this technology are therefore fundamentally important for the future of arms control. For verification purposes, the distinction between zero and one is crucial: thus, an absolute prohibition of nuclear-tipped, land-attack SLCMs would be of great value. Given that nuclear

and conventional cruise missile airframes are virtually identical, conventionally armed land-attack SLCMs may consequently have to be dropped as well. The recently announced delay in this and other SLCM programmes (the new IOC is set for September 1985) provides more time for arms control endeavours in this sector [26].

The SLCM is a borderline case connecting the negotiations in Geneva on theatre and intercontinental nuclear weapons. If progress is achieved, there are strong arguments for combining the two sets of talks. First, intercontinental systems can be used over shorter distances as well. All the targets that can be struck by Soviet and US theatre systems can be targeted by intercontinental systems, too. A reduction of LRTNFs will therefore lose much of its significance if intercontinental systems are allowed to increase unchecked. Second, experience suggests that negotiations which stop after agreement on some particular category of weapon has been reached are futile in the long run because the parties begin to expand other forces not covered by the partial agreement [24]. It is therefore important that the LRTNF negotiations should soon overlap with the strategic arms talks, and also lead on to systems of shorter range, that is, expand both up and down the ladder.

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2. British and French eurostrategic forces[1]

Square-bracketed numbers, thus [1], *refer to the list of references on page 40.*

I. Forgotten arsenals?

The NATO decision in December 1979 to 'modernize' the alliance's medium-range nuclear forces in Europe [1a] stirred up a debate on nuclear weapons unequalled since the early 1960s. Yet, surprisingly, comparatively little attention has until quite recently been paid to two truly 'eurostrategic'[2] forces, the British and the French.

In the UK, authorities have deliberately kept a low profile about their strategic nuclear forces, stressing the NATO commitment. This has been aided by the relatively small resources devoted to the Polaris force, and its low 'visibility'. The operating costs of the current SSBN fleet (ballistic missile-armed, nuclear-powered submarines) is around 2 per cent of the defence budget [3a], but the huge acquisition costs connected with the replacement programme have led to arguments against it, based on calculations of opportunity costs [4].

In France, the tendency has been the opposite—to emphasize the independent nature of the force in a rather nationalistic manner. Although French nuclear forces cost much more than those of the UK, the French national consensus on their desirability has in recent years been extended to include the greater part of the political left.

These two national nuclear forces have now become fully accepted within the NATO alliance. In 1962, the then US Secretary of Defense McNamara said that limited nuclear forces, operated independently, were dangerous, expensive, prone to obsolescence, and lacking in credibility [5]. This contrasts with President Reagan's letter to Prime Minister Thatcher of 11 March 1982, where he states that "the readiness to provide these systems [Trident IIs] is a demonstration of the great importance which the United States Government attach to the maintenance by the United Kingdom of an independent nuclear deterrent capability" [6]. The North Atlantic Council, at its meeting in Ottawa in 1974, declared that the British and French nuclear forces were "capable of playing a deterrent role of their own contributing to the overall strengthening of the deterrence of the Alliance . . ." [7].

[1] This chapter was written by Per Berg.

[2] The term 'strategic' is here taken to include nuclear weapons within the range category 1 000–5 500 km, more generally known as long-range theatre nuclear forces (LRTNFs) [1b]. Of course, strictly speaking, to speak of 'tactical' *vs* 'strategic' weapons is nonsensical [2a].

At the Geneva LRTNF negotiations, one of the crucial issues is whether, and if so in which way, to take the British and French nuclear forces into account.[3] This chapter describes the present character of these forces and the plans for their future.

The next two sections discuss the rationales put forward by those who have argued for independent nuclear deterrence. Readers who simply wish to know the present and possible future force structures should turn to page 34.

II. Force rationales

This section discusses only the *strategic* rationales behind these forces, and not the more general political motives: it is the strategic rationales which are most relevant for explaining the present force structures.

Why did Great Britain and France establish these forces in the first place? Could they not depend on the US nuclear 'umbrella'? Are the British and French nuclear forces really large enough to matter? After all, the highest estimates of the total British stockpile of nuclear warheads put it in the 1 000–2 000 range [8], and the French number is likely to be lower since they put less emphasis on tactical nuclear weapons. A conservative UN estimate puts the total number of nuclear weapons in the world at more than 40 000 [9], the vast majority of which belong to the United States and the Soviet Union. The disparities are even larger for 'strategic' nuclear weapons: if one includes the long-range missiles and the Mirage IV medium bombers, the total number of deliverable warheads for the UK and France combined is approximately 300, whereas SIPRI estimates that the United States and the Soviet Union by mid-1982 had a total of more than 18 000 warheads in this category [1c].

In order to understand why, despite the US nuclear guarantees to Western Europe and the gross inferiority in nuclear capabilities, the present British and French governments still wish to maintain, at some cost, their own independent nuclear forces, one must examine the concept of *deterrence*. This short discussion is not an endorsement of the doctrine: it has, of course, been heavily criticized, particularly in Great Britain, on grounds of morality and credibility. Further, it has been argued that it is, as it were, a 'doctrinal licence' for virtually any country to acquire nuclear weapons.

Deterrence is a psychological mechanism by which one tries to restrain an opponent from pursuing certain policies out of fear of the consequences. Although this idea of deterrence is certainly not new [10], serious theorizing

[3] See chapter 1.

about it is largely a product of the nuclear age. According to this theory, an aggressor will choose to attack only if the expected gain from such an action outweighs the likely penalties of expected counteractions, as well as those of doing nothing. The effectiveness of deterrence is therefore dependent upon the potential aggressor's own calculations of the costs and benefits. With the enormous destructive potential of today's thermonuclear weaponry, prudence would encourage both parties to a conflict to base their planning on 'worst case' assumptions; this would have the greatest implications for the would-be aggressor, since the onus of initiating a process that might lead to Armageddon lies with him. In the words of one observer, "In a conventional world, one is uncertain about winning or losing. In a nuclear world, one is uncertain about surviving or being annihilated" [11a].

Thus, *uncertainty* is very important. This could be used by the deterrer by withholding certain information about his physical capabilities of destruction. As Mr Falkley, Assistant Chief Scientific Adviser (Nuclear) of the British Ministry of Defence, put it to the Defence Committee of the House of Commons: "There is always a tendency I think when you are making an assessment of somebody else's capability to think that they are taller than they actually are. I believe that that tendency to exaggerate the other side's capability is of advantage in a deterrent context" [12a]. The value of uncertainty may also be exploited to try to reinforce the credibility of carrying out one's potential threat, even to the extent of introducing a certain element of irrationality—"the threat that leaves something to chance" in another observer's parlance [13].

Any policy of deterrence has to set out *who* is to be deterred, *how*, and from doing *what*. For Great Britain and France, there can be little doubt that the nation to be deterred is the Soviet Union, even though there was talk in France of a defence '*à tous azimuts*'—which was abandoned in 1969 when the development of intercontinental ballistic missiles was postponed indefinitely [14]—and the British Defence White Paper of 1965 mentioned deterring China [15].

In its proposed deterrent counteraction, a nation may threaten either to reduce the probability of the aggressor achieving his objective (deterrence by denial) or to increase his costs (deterrence by punishment).[4] Put somewhat simplistically, this corresponds roughly to the distinction between counterforce and countervalue targeting. However, even if counterforce nuclear exchanges were kept below the city targeting threshold [17], the collateral damage suffered by civilians in such densely populated and comparatively small nations as Great Britain and France would make this

[4] This dichotomy is Snyder's [16a]. Waltz distinguishes between dissuasion by defence and dissuasion by deterrence [11b].

a rather meaningless distinction, and thus leave little incentive for France and Britain to adopt counterforce targeting in the hope of Soviet reciprocity. Besides, their present force structures are basically unsuited for this purpose, lacking both flexibility and accuracy.

The actions to be deterred may be either nuclear attacks on one's home territories (basic deterrence) [18], or nuclear attacks on the territory of allies or non-nuclear attacks (extended deterrence).[5] President Valéry Giscard d'Estaing made the following statement at a press conference on 26 May 1980: "En ce qui concerne l'utilisation de l'armement nucléaire, il y a toutes sortes de situations et d'hypothèses possibles. Nous ne sommes pas ici pour les énumérer. Mais il y a un point central dans notre dispositif, c'est que *toute attaque nucléaire sur le sol de la France appellerait automatiquement une riposte stratégique nucléaire*" [20].

The NATO doctrine of flexible response implies British acceptance of extended deterrence. However, flexible response really refers more to tactical nuclear weapons than to the strategic weapons discussed here. In France there was some talk by Giscard d'Estaing's Chief of Staff General Méry of an 'enlarged sanctuarization' (*sanctuarisation élargie*) extending deterrence beyond French borders [21], but once again the issue was linked to theatre nuclear weapons, as it was during the Franco–German summit in Bonn in October 1982.

For strategic weapons, logic would imply a doctrine of basic deterrence—that is, limited to one's own country. The British and French forces lack the size and flexibility necessary for extended deterrence—using nuclear weapons to defend territory other than one's own—and in an age of mutual assured destruction the credibility of extending deterrence is low: this is a basic premise for the establishment of independent nuclear deterrents in the first place. The element of uncertainty will always, however, extend deterrence to some extent: the Soviet Union may never be fully assured that, say, destruction of the British Army of the Rhine would not be met by a general nuclear strike, however low the probability.

The main strategic rationale, therefore, behind the British and French nuclear forces is that of deterring the Soviet Union from carrying out nuclear attacks upon their home territories by threats of unacceptable punishment.

[5] Kahn uses the terms Type I and Type II deterrence [19].

III. Force requirements

In order to be effective, the deterrent threat must be *credible*, both psychologically and physically. What demands does this put on the deterrent posture, keeping in mind that credibility resides "ultimately in the mind of the beholder" [2b]? Again, this is a discussion of the force requirements for credibility *as seen by the proponents of the doctrine of deterrence.*

The need for *psychological* credibility—that the deterrent threat would be carried out if necessary—explains why British and French governments considered they needed an independent[6] nuclear deterrent. Why should the United States commit suicide to take revenge on the Soviet Union on behalf of France or Great Britain? This is the logic behind Great Britain's arguments for a 'second centre' of decision making. Even if the British do not doubt that the USA would honour its nuclear guarantees, the Soviets might. Mr John Nott, when Secretary of State for Defence, said in the House of Commons that:

> While we have every confidence in the American strategic guarantee, again we have to look at Soviet perceptions. It is possible that, at some time in the future, in circumstances that are very different from those prevailing now, a Soviet leadership might calculate, however mistakenly, that it could risk or threaten a massive nuclear attack on Europe without involving the strategic forces of the United States.
>
> If the Soviets are ever tempted to make such a horrendous miscalculation, the existence of an immensely powerful nuclear force in independent British hands . . . will be an enormously complicating factor and a powerful argument for Soviet caution. [23]

Earlier, Nott had stated that Great Britain's independent strategic nuclear force was meant "to convince Soviet leaders that, even if they thought that at some critical point in a developing conflict the US would hold back, the British strategic force could still inflict a blow so destructive that the penalty for aggression would have been raised too high in relation to the gains they could hope to make" [24].

As regards *physical* credibility, there is a great deal of work which attempts to establish criteria for the *minimum* capability necessary. The calculations involve such concepts as counter-military potential (CMP), circular error probable (CEP), and equivalent megatonnage (EMT), taking into account such variables as penetrability, target structures, exchange scenarios, and so on.

[6] 'Independence' is of interest here primarily as regards the decision to use these nuclear forces (not technological and logistic independence in constructing and maintaining them). Ultimately, this resides with the head of state of each country [22]. Officially, the British forces are committed to NATO, and assigned to SACEUR for targeting purposes, but, as was made clear by the Nassau Agreement of December 1962 on the sale by the United States to Britain of Polaris missiles, this does not apply when "Her Majesty's Government [decides] that supreme national interests are at stake . . ." [15b]. It is, of course, "only where supreme national interests are at stake that the question of whether or not to use nuclear weapons arises at all" [2c].

The element of uncertainty is very large, and to try to 'compute' the costs of a nuclear war could be missing the point [25]. However, some estimate, however approximate, of the 'optimal' size of the forces obviously has to be made. The question 'how much is enough?' must be answered. Unfortunately, the minimum force levels necessary to support a doctrine of basic deterrence for medium powers have been confused with the US requirements for mutual assured destruction (MAD). After assuming office as US Secretary of Defense, Robert McNamara tried to establish criteria for the 'assured destruction' (defined as unacceptable damage sustained) of the Soviet Union in a second strike [26]. These criteria ranged from a 20 to 33 per cent destruction of the population and a 50 to 67 per cent destruction of industry [27], which could be achieved by approximately 400 one-megaton-equivalent warheads delivered to the targets [28].

The force level necessary to mete out this level of punishment is much higher than that available to Britain and France. If one, once again, takes only the missiles and the Mirage IV medium bombers, the *total* equivalent megatonnage (calculated in the equation $EMT = Y^{2/3}$, where Y = nominal yield in megatons) of the British and French forces is at present approximately 170 EMTs, or less than half the assured destruction criteria (not taking account of survivability, reliability or penetrability). However, in the deterrence calculation supposed to be carried out by the potential aggressor, the acceptable cost is related to expected gains. This is the line of reasoning in the French concept of 'proportional deterrence', or *dissuasion du faible au fort*. This was adopted as official policy in the *Livre Blanc* of 1972 [29], and confirmed by the present Defence Minister Hernu when he stated in the *Assemblé Nationale* last November that "notre dissuasion est celle, rigoureuse, du faible au fort" [30]. Not only is the damage that France (or Great Britain) can inflict on the Soviet Union out of proportion to the potential gain of occupying or destroying France (or Great Britain), but the smaller country—with less capability of absorbing damage—will allegedly be more likely to unleash its surviving retaliatory forces, thus increasing credibility.

There are those who claim that even a small force would suffice. The minimum requirement has tended to include a 'Moscow criterion', i.e., the capability to destroy Moscow, despite its ABM (anti-ballistic missile) defences. The current improvement of the British Polaris force by the Chevaline system has been motivated by its ABM-defeating qualities—with hardening, penetration aids and manoeuvrability (although without full MIRV capability) [31]. Mr Quinlan, as Deputy Under Secretary of State (Policy and Programmes), said that "[the] essence of the Chevaline system is that it is an ABM-defeating system . . . ensuring that the Soviet Union continues to be unable to get sanctuary for Moscow and surrounding

areas" [12b]. This, incidentally, provides evidence of the independent nature of the British deterrent force, since Moscow must be targeted by US weapons.

Physical credibility—still following the arguments of the proponents of deterrence—requires a high degree of certainty that the warheads will arrive on target. There are three requirements for this: 'pre-launch survivability' (that the weapon platform is not destroyed before the weapons can be launched); reliability of the whole weapon system; and the ability of the warhead eventually to penetrate enemy defences. Missiles best meet the last two criteria; submarines provide the best pre-launch survivability. For medium-size nuclear powers, pre-launch survivability will be most important, since it influences the adversary's willingness to attempt a disarming first strike; so far as penetrability is concerned, the country at the 'receiving' end will almost always assume that some warheads will get through.

Aircraft do not score very well on the last two of the requirements, and—unless they are kept on very quick reaction alert or airborne—they do not score very well on the first, either. However, they are more flexible; they may be recalled and retargeted after launch and can attack 'targets of opportunity'; and they add to the complexity of the opponent's calculations. Their penetrability will increase considerably with nuclear air-to-surface missiles (ASMs), even short-range ones. Cruise missiles fall somewhere in between; however, based on submarines they are not cost-effective.[7]

All told, unless there are breakthroughs in either anti-submarine warfare (ASW) or ballistic missile defences (BMD), it is argued that a nuclear deterrent force based on SSBNs does provide physical credibility. The minimum size of such a force, it is suggested, is probably that which can sustain one submarine on patrol at all times. With improved maintenance cycles, this could be a force of three SSBNs [12c], although this would leave very little leeway for accidents, and so on.

An often neglected aspect of the force structures is that of C^3I (command, control, communications and intelligence) [33]. With counter-city targeting, there is no great problem with target acquisition—the location of cities is, after all, well known—but there is a need for secure communications with SSBNs. Redundancy will help: an aggressor will hardly risk suicide on the assumption that *all* lines of communication have been severed.

To sum up this line of reasoning from proponents of deterrence, the force requirement for an invulnerable, minimum, basic deterrent seems to be the ability to keep one SSBN on patrol at all times.

[7] Smart compares 17 submarines armed with 24 cruise missiles each to 5 ballistic submarines, each with 16 missiles with 3 MIRVs [32].

When one considers the credibility of the independent French and British deterrents, one should also take into account the triggering effect upon the USA and the USSR. Snyder notes two kinds of triggering: 'emotional'—the USA would be so shocked by a Soviet strike against Western Europe as to respond 'in kind'—and 'attritional'—the Soviet Union would be so weakened after a nuclear exchange with France or Great Britain as to render a US attack profitable [16b]. Whereas both possibilities seem remote, they do add to the uncertainties of the deterrence calculus. Another possible 'coupling' effect is that the Soviet Union might not be able to find out where incoming SLBM warheads came from, and might therefore be forced to assume that they were US warheads and act accordingly.

These, then, are some of the rationales—and the arguments about them—which are used by the proponents of an independent nuclear deterrent for the UK and for France.

IV. Force structures

The French *force de dissuasion* (or *force de frappe*) maintains, at least nominally, a full strategic triad, including both submarine-launched and land-based ballistic missiles and bombers. The smallest component is the 1st *Groupement de Missiles Stratégiques* (GMS) located on the Plateau d'Albion, near Avignon, in southern France. Two squadrons of intermediate-range SSBS (*sol–sol balistique stratégique*) S-3 missiles, with 1-megaton thermonuclear warheads and a range of more than 3 000 km, are already operational. Besides the increased range and yield, the S-3 has improved penetration capabilities [34]. Even though these missiles are vulnerable to the new generation of more accurate Soviet missiles, they

> still play a role by putting every potential aggressor within the range of the IRBMs before a dilemma: either the aggressor threatens France's territory without having first destroyed those missiles and therefore risks the destruction of some of his population and economic centers; or he destroys those missiles at the same time he launches his overall offensive, but in so doing he reveals his determination, thus justifying reprisals by French SLBMs. [35]

In addition, it is argued that the IRBMs (intermediate-range ballistic missiles) in silos help provide 'sanctuarization' of French territory by being the only French weapons which cannot be destroyed by conventional means. This may result in the force being maintained even after the mobile S-X missile replaces the Mirage IV bomber at the turn of the century.

Both countries, France increasingly and Britain almost exclusively, rely heavily on the submarine-based missiles of their SSBN forces. The four British Resolution-class SSBNs replaced the V-bombers as the British

nuclear deterrent in 1968. Their Polaris SLBMs (submarine-launched ballistic missiles)—delivered by the United States under the Nassau Agreement—carry three British-designed warheads, probably of 200 kt each. This MRV (multiple re-entry vehicle) capability gave an increased area of destruction for the purpose of attacking cities. These warheads are being replaced by the Chevaline system, whose ABM-defeating qualities rest mainly in hardening, manoeuvrability and penaids (penetration aids), but also include the development of new warheads. Little is known about these, although their yield is likely to be 150 kt or less (they are being tested in the USA under Partial Test Ban Treaty restrictions), and the number on each missile could well be three, as in the older system.[8] The Chevaline system does not afford a complete MIRV (multiple independently targetable vehicle) capability—that is, it cannot attack different targets with warheads from the same 'bus'—but the warheads can spread over a larger area than the system it replaced.

The British government has published documents explaining both the choice of Trident I (C-4) [37] and, later, Trident II (D-5) [38] as successor system to the Polaris/Chevaline from the 1990s. Whereas Trident I was motivated both by technical arguments and as a hedge against further ABM developments, it was made clear that there was no need for additional capabilities, and the Trident II was chosen in order to maintain commonality with the United States for a longer period. It has been decided to build four SSBNs, each with 16 launchers for the Trident II missile. A new warhead will be developed—this was made clear during the Defence Committee's meeting at Aldermaston in November 1980 [12e]—but apart from this, further details on the size of the programme are deliberately kept secret. Mr Nott, while confirming that the same warhead will be used for Trident II as had been planned for Trident I, said that:

> We have never announced publicly, nor would we wish to do so, the number of missiles we will be purchasing, any more than we would wish to say publicly the number of warheads that we are contemplating putting on those missiles, although . . . our plans at the moment do not envisage a greater number of warheads in total than we were contemplating putting on C4. I think we must keep the actual number of missiles and warheads a matter of extreme confidence because, as I repeat, we are in the business of deterrence . . . [39]

Thus, for the purpose of deterrence calculations, and indeed for the purpose of calculating its own 'parity', the Soviet Union would have to assume the worst case: 896 MIRVs—based on the SALT limitation of 14 warheads, more are possible—as compared to the present force which can only cover 64 different targets.

[8] This is the understanding of the International Institute for Strategic Studies [12d]. The often quoted estimate of six warheads was based on earlier IISS calculations [3b]; numbers as low as two have been given [36].

The French FOST (*Force Océanique Stratégique*) at present operates five SNLEs (*sous-marins nucléaires lanceurs d'engins*), each with 16 MSBS (*mer–sol balistique stratégique*) M-20 SLBMs, with a range of some 3 000 km and a one-megaton warhead. The sixth SSBN, *l'Inflexible*, was launched last June and should become operational in 1985, armed with 16 MSBS M-4s. There is some confusion as to the actual capabilities of the M-4 missile; it is probably—like the Chevaline—of an improved MRV type, without full MIRV capability. It carries six 150-kt warheads, with a range of some 4 000 km. The oldest SSBN, *le Redoutable*, will keep its

Table 2.1. British and French submarine-launched ballistic missiles

Country	Designation	Year first deployed	Range (km)	Warhead(s)	Inventory	Programme status
UK	Polaris A-3	1967	4 600	3 × 200-kt MRV	64	On 4 SSBNs, being replaced by Chevaline system[a]
	Trident II (D-5)[b]	(1990s)	10 000	10 × 335-kt MIRV	0	Replacing the Polaris/ Chevaline system from the 1990s, with 64 launchers on 4 submarines
France	SSBS S-3	1980	3 000	1 × 1-Mt	18	
	MSBS M-20	1977	3 000	1 × 1-Mt	80	On 5 SSBNs
	MSBS M-4	(1985)	4 000	6 × 150-kt MRV	0	On the 6th SSBN; total programme, including retrofits: 96 (by 1992)

[a] Probably with three warheads. Six warheads (MRV), each of 50 kt, have also been indicated.
[b] Range and yield are based on the likely US choice of warheads. Since the UK will supply its own charges, it may choose force specifications which differ from those of the USA.

Table 2.2. British and French ballistic missile-armed, nuclear-powered submarines (SSBNs)

Country	Designation	Pennant number	Laid down	Launched	Operational	Main armament (SLBM)
UK	Resolution	S 22	1964	1966	1967	16 × Polaris A-3
	Repulse	S 23	1965	1967	1968	16 × Polaris A-3
	Renown	S 26	1964	1967	1968	16 × Polaris A-3
	Revenge	S 27	1965	1968	1969	16 × Polaris A-3
France	le Redoutable	S 611	1964	1967	1971	16 × MSBS M-20
	le Terrible	S 612	1967	1969	1973	16 × MSBS M-20[a]
	le Foudroyant	S 610	1969	1971	1974	16 × MSBS M-20[a]
	l'Indomptable	S 613	1971	1974	1976	16 × MSBS M-20[a]
	le Tonnant	S 614	1974	1977	1980	16 × MSBS M-20[a]
	l'Inflexible	–	1980	1982	(1985)	16 × MSBS M-4

[a] To rearm with MSBS M-4 by 1992.

M-20s; the others will convert to the M-4 by 1992. It has been decided to build a seventh SSBN, to reach operational capability in the mid-1990s. It will be armed, at least initially, by an improved version of the M-4, since the proposed new M-5 missile, probably MIRVed, will not be operational until the late 1990s at the earliest.

With the phase-out of the Vulcan bombers in 1982, the only medium bombers left in Western Europe are the French Mirage IVAs. The FAS (*Forces Aériennes Stratégiques*) of the *Armée de l'Air* currently operates two wings of these aircraft, each with three squadrons with an authorized strength of four aircraft each. Out of a total of 62 Mirage IVs built, some 33 remain in the bomber role, with another 14 for training, reconnaissance and in reserve. More than 15 Mirage IVs will continue in service after 1985 [40], replacing their free-fall AN-22 nuclear bombs with the ASMP missile. The *air–sol moyenne portée* is a ramjet-powered air-to-surface missile with a range of 100–300 km (depending on launch height) and a 150-kt warhead, with some 100 to be produced [41]. It will become operational on the Mirage IV from 1985–86, later also on the Mirage 2000N and, eventually, on the Super Etendard.

The Mirage IV will eventually be replaced not by another bomber, but by a mobile ballistic missile, the S-X, to be operational by the end of next decade. The programme has not yet been fully defined, but may involve 100 single-warhead or 33 triple-warhead missiles.

The French tactical air force (*Force Aérienne Tactique*) operates—as part of the tactical nuclear forces (*Armament Nucléaire Tactique*)—three squadrons of Jaguar As and two squadrons of Mirage IIIEs in the nuclear role, equipped with AN-52 25-kt free-fall bombs. The Mirage IIIEs will be replaced from 1988 with Mirage 2000Ns; the first 15, out of a total which may reach 200, have been ordered. In addition, three squadrons of Super Etendards are operational with the naval air force (*Aeronautique Navale*), capable of carrying AN-52s (and, ultimately, the ASMP). Although of limited range, their basing mode (aircraft carriers) gives them —like the British Sea Harriers—great flexibility.

With the phase-out of the Vulcans, the airborne element of the British nuclear strike forces consists mainly of four squadrons of Jaguars and three of ageing Buccaneers, the latter rapidly being replaced by the Tornado (some will be retained in the maritime strike role). The first Tornado squadron became operational on 1 June 1982. While not a direct replacement for the Vulcans, the low-altitude and all-weather interdiction capabilities of the Tornado make it eminently suited for nuclear strikes within its range restrictions. There are also a number of nuclear-capable Sea Harriers with the Fleet Air Arm, and the RAF will replace its non-nuclear Harriers with nuclear-capable Harrier IIs (AV-8B) from 1986. British aircraft are currently limited to free-fall nuclear bombs, but the

Table 2.3. British and French nuclear-capable aircraft

Country	Designation	Year first deployed[a]	Combat radius (km)[b]	IFR[c]	Inventory UE[d]	Inventory Total[e]	Programme status
UK	Tornado GR.1 (IDS)[f]	1982	1 400	Yes	24	100[g]	220 programmed (incl. 68 dual-control trainers)
	Buccaneer S.2	1962	1 400	Yes	36	80[h]	Being replaced by Tornado; incl. 20 in maritime strike role
	Jaguar S GR.1	1973	1 200	Yes	48	100[i]	Excl. Jaguar B T.2 trainers (30 delivered)
	Harrier GR.5 (AV-8B)	(1986)	900	Yes	0	0	Total programme: 60
	Sea Harrier FRS.1	1979	600	Yes	15[j]	26	14 on order
France	Mirage IVA	1964	1 600	Yes	24	33	Plus 14 for training, reconnaissance and reserves
	Mirage 2000N	(1988)	1 400	Yes	0	0	First 15 will be operational by 1988; total programme may reach 200
	Jaguar A	1973	1 200	Yes	45	118	Excl. 22 Jaguar E trainers
	Mirage IIIE	1961	1 000	No	30	105	Excl. 14 Mirage IIIBE trainers; being replaced by Mirage 2000N
	Super Etendard	1979	700	Yes	36[j]	64	Total programme: 80

[a] Date for deployment of first version.

[b] Ranges assume a high–low–high mission profile (with low-level, high-speed final approach to the target), maximum external and internal fuel, but no in-flight refuelling, and that the payload includes external nuclear ASMs where applicable. The ranges of the ASMs are, however, not added to that of the aircraft.

The given ranges are *maximum* combat radii, which might be reduced by the need for evasive action, fuel reserves (for landing and loitering), external ECM equipment (which reduces fuel load and increases aerodynamic drag), more demanding mission profiles to increase penetration and survivability, etc.

[c] In-flight refuelling capability (including 'buddy'-refuelling from other fighters).

[d] Unit Equipment: number of aircraft in nuclear-dedicated squadrons according to the tables of organization and equipment (TO&E).

[e] Total numbers include all aircraft of types that are considered dual-capable, covering aircraft in the maintenance cycle.

Trainers are excluded (save dual-control version of aircraft that are two-seaters in their basic version), and reconnaissance aircraft (unless they are basic versions equipped with pods).

Actual numbers of nuclear-configured, mission-ready aircraft are substantially lower.

[f] Tornado GR.1 is the British designation for the Panavia Tornado IDS (interdiction/strike version).

[g] Approximate number, includes aircraft in OCUs (operational conversion units) and the TTTE (Trinational Tornado Training Establishment).

[h] Actual number probably lower due to fatigue problems.

[i] Based on six squadrons of strike/attack and ground support aircraft and two squadrons of pod-equipped reconnaissance aircraft. A total of 140 have been delivered.

[j] Not primarily nuclear-dedicated.

possibility of equipping the Tornado with cruise missiles—possibly a version of the Sea Eagle anti-ship missile—has been studied [42].

Both Great Britain and France realize the force-multiplying potential of in-flight refuelling (IFR) capabilities, increasingly so after long-range operations in Africa and the South Atlantic. France has decided to re-engine its 11 surviving C-135F tankers, and 10 of the 25 new Transall (C.160NG) transports will be equipped as tankers, with another 5 capable of rapid conversion if required. Great Britain's current IFR fleet consists of 22 Victors, rapidly supplemented during the Falklands/Malvinas conflict by the conversion of 6 Vulcans and 4 Hercules (C-130) transports. The Vulcans will be phased out as the 9 additional VC.10s (4 standard and 5 Super VC.10s) are converted to tankers. In addition, 6 Lockheed Tristars will be used as tankers/transports.

Naturally, the vulnerable C^3I systems are surrounded with much secrecy. When asked: "How much confidence do you have in preserving such invulnerability as at present exists between your communications patrol headquarters and submarines on patrol?" Mr Quinlan, then Deputy Under Secretary of State (Policy and Programmes), answered: "Some of the means of communication are ones which involve vulnerable installations, but we have many ways of communicating with submarines in normal or in emergency circumstances, and our main defence is not the invulnerability of any single system but the multiplicity of systems available to us—we have the freedom of redundancy" [12f]. France has decided to develop a hardened strategic communications network, Ramsès (*réseau stratégique maillé*). From 1987, four specially equipped Transall aircraft will be able to communicate with the submarines, the so-called Astarté programme (*avion-station relais de transmissions exceptionelles*).

V. The future

By the end of the next decade, the present force improvement plans could theoretically leave Britain and France with a total of more than 2 000 nuclear warheads that can be delivered to Soviet territory.[9] This is clearly more than required for a minimum basic deterrent posture. If the START negotiations result in a reduction of the strategic nuclear warheads to, say, 5 000 each, this total of 2 000 would represent 40 per cent of the Soviet arsenal. In order to compensate for the ballistic missile warheads alone, the Soviet Union would need to deploy more than 500 SS-20s within

[9] Including four Trident II SSBNs with a maximum of 896 warheads, six French SSBNs with a total of 576 M-4 warheads, plus one with 16 M-20s, 18 S-3 and 100 S-X IRBM warheads, and more than 500 nuclear-capable aircraft. Actual numbers deployed could very well be less, mainly dependent on the uncertainties concerned with the Trident II and S-X programmes.

striking range of Western Europe. This would hardly be in the interest of either Great Britain or France, or for that matter the other European countries. Rather, the parties involved should restrain their own build-up.

The crucial decision is whether or not to MIRV the SLBMs. With a doctrine of basic deterrence and with counter-city targeting, there seems no good case for multiplying the number of independent targets which can be destroyed.[10] Prospects of a foolproof anti-ballistic missile system seem remote, and in any case ABM defences can be defeated as easily by other penetration aids as by multiplying the number of independently targetable warheads. Thus, for the purpose of basic deterrence, MRV makes as much sense as MIRV.

To believe that Great Britain and France could continue to increase the number of their warheads targeted on the USSR without any reaction from the Soviet Union is an illusion. British and French nuclear forces must at some point be brought into arms control negotiations, and the sooner the better: the potential increase of these forces may pose significant complications and problems for future East–West arms control efforts.

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[10] In 1970, the 10 largest Soviet cities contained 8.8 per cent of the total population and 25 per cent of the industrial capacity, and the 50 largest cities contained 19.1 and 40 per cent, respectively. Thereafter, doubling the number of cities to 100 only increased these numbers to 24.8 and 50 per cent [43].

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3. Intercontinental nuclear weapons[1]

Square-bracketed numbers, thus [1], *refer to the list of references on page 67.*

I. Main issues

The Strategic Arms Reduction Talks (START) between the United States and the Soviet Union opened in Geneva in June 1982. A new round of the negotiations began in February 1983.

The essential issues concerning the intercontinental, or strategic, nuclear weapon confrontation between the USA and the USSR, are as follows.

1. The need for strategic arms control is urgent. The technological developments which are going on in intercontinental nuclear weapon systems are provocative: the increases in accuracy which are giving these weapons high counter-military potential are particularly dangerous. These developments could provide a temptation to make a pre-emptive move—for example, if one side, for reasons which might or might not be well-founded, believed that the other side was preparing to attack.

2. It is hard to imagine that a strategic nuclear war could be controlled for any long period of time. Investments in command, control and communications facilities for waging protracted nuclear war are likely to be futile. Such notions as winning or prevailing are also meaningless; there will only be losers left. The role of nuclear weapons boils down to that of basic deterrence; for that purpose, all that is required is sufficiency—that is, enough nuclear weapons to survive a first strike and to inflict severe damage on the other side. For deterrence, a fraction of the present inventories of intercontinental nuclear weapons would be enough. The strategic arms reduction talks at Geneva should therefore aim at radical reductions.

3. The SALT II accord provides a good point of departure. While the United States has declined to ratify the accord, both sides have promised to observe its provisions. The limits stipulated cover all categories of strategic systems—land-based, sea-based and air-based.

4. As in the negotiations on long-range theatre nuclear forces, both sides will, unfortunately, be looking for some kind of rather strict numerical parity. This is a political, not a military, requirement. The nuclear balance, in short, is not delicate. There are a great many agreements which could be reached that would not leave one side vulnerable to the forces of the other.

[1] This chapter was written by Simon Lunn, adviser to the President of the European Parliament, and Jefferson Seabright, Director of the Military Committee, North Atlantic Assembly. The views expressed in section I of this chapter are those of SIPRI.

For example, an agreement to superimpose on the SALT II agreement a 50 per cent cut in the limits set out there would not damage security on either side. One main reason why negotiations have been so difficult lies not in any military requirement but in a political requirement for parity.

5. Overall limits should be established not only on launchers, but also on the number of deliverable warheads. In view of the asymmetry in missile throw-weight, the warhead limits need not be the same for both parties.

6. Present plans for deployment of cruise missiles indicate a leap forward in the number of deliverable strategic warheads. Limits are therefore important, and a complete ban on sea-launched cruise missiles (SLCMs) is essential for allowing effective verification of future agreements.

7. The START and long-range theatre nuclear forces (LRTNF) negotiations are linked. Intercontinental weapons can be used over shorter distances as well, for regional missions, and LRTNFs deployed close to the border of a great power have obvious strategic implications for that power. Also, to avoid circumvention, it would be desirable to combine the two negotiations once an interim agreement on LRTNFs in Europe has been reached (chapter 1).

II. Divergent approaches

Although the achievements of the first two SALT (Strategic Arms Limitation Talks) agreements were modest in scope, the negotiations made considerable progress in reconciling the very different objectives and interests of the United States and the Soviet Union. Most importantly, they established an agreed framework on the fundamental parameters of the strategic relationship on the basis of which future negotiations could tackle the complex issues of real reductions and qualitative constraints. Yet in spite of this progress the prospects for strategic arms control in the 1980s remain distinctly uncertain. The main reason for this pessimism is that the mutual understanding so painstakingly constructed during the SALT II process has been dissipated.

The current divergence of approach is about the nature of the strategic balance; it derives from a different assessment of the value and utility of specific strategic systems. The Reagan Administration believes that, largely as a result of the SALT process, the strategic balance has shifted against the United States. In particular, US officials argue that the SALT process has failed to correct a fundamental asymmetry between US and Soviet strategic forces which has destabilizing implications—namely, the Soviet superiority in heavy land-based missiles.

It has long been accepted that the specific characteristics of land-based missiles, notably their high accuracy, short flight times and assured

penetration, give them particular value as counterforce weapons: that is, they are well suited to destroy the enemy's hardened military assets. Because of this, land-based missiles have been accorded a higher value than submarine-launched missiles or bombers which were, for a long time, not considered valid for use against hard military targets [1]. However, it was always obvious that as delivery systems became more accurate, land-based fixed missiles would become more vulnerable: that is, it would be possible, in theory, to hit a fixed point with a rather high degree of certainty. As land-based missiles were capable of the greatest accuracy, they were at once the threat and the potential victims.

The introduction of MIRVs (the placing of more than one warhead on a single missile), combined with the advances in accuracy, was considered to have created a new and unstable situation by dramatically increasing the first-strike potential of land-based missiles. Now it is argued that one side could effectively destroy the other's land-based potential using only a small proportion of its own force, while retaining significant strategic forces in reserve. This would leave no credible option of retaliation. In other words, technological advances and the inherent vulnerability of fixed silos have introduced a degree of instability because a situation now exists in which one side could see an advantage in striking first.

Because the Soviet Union has a greater number of heavy land-based missiles, a number of US analysts have suggested that these developments have given the Soviet Union a decisive advantage. In theory, the Soviet Union could initiate a first strike against the US land-based missile force using only a small proportion of its own force and retaining the rest to deter US retaliation. Left with nuclear systems capable of striking only industrial or civilian targets (and soft military installations) a US President, it is argued, would be deterred from counter-action. Analysts further argue that the perception of nuclear superiority would give the Soviet Union a decisive edge in any international crisis.

The concept of land-based vulnerability is based on purely theoretical calculations involving hypothetical exchange ratios and uncertain performance criteria. It is subject to so many uncertainties[2] that many officials believe it should be beyond rational consideration. They believe that it represents the most extreme end of the 'worst case' scenario, and should not be allowed to dominate force planning.

The notion that an imbalance in nuclear weaponry could be used to gain political advantage has been echoed on both sides. Referring to the political ramifications of vulnerability, the US Joint Chiefs of Staff have commented that it could affect the Soviet perception of the military balance in such a way that it will embolden them to act with less restraint in international affairs and to exploit instability in the Third World. Similarly,

[2] For a discussion of the vulnerability issue, see the *SIPRI Yearbook 1982*, chapter 3.

Soviet Major-General Staradubov has said that the USSR considers it is dangerous if the United States is superior in some types of arms since the USA could exploit superiority for political purposes, and from that it would not be a very long way to conflict.

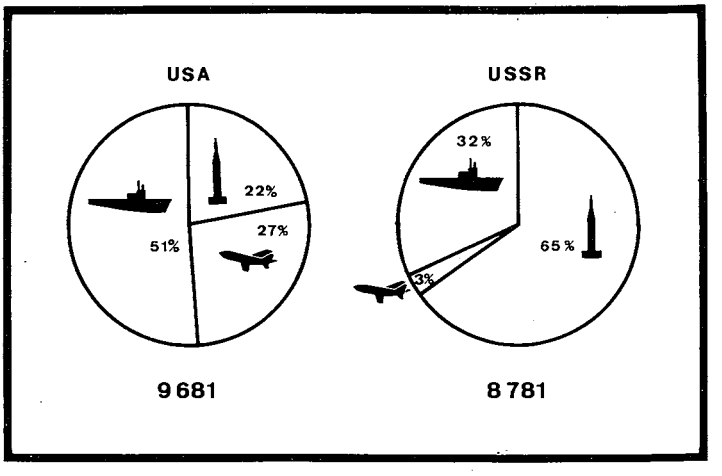
However, the two sides differ crucially on the concept of balance and what constitutes an exploitable advantage. The US view that land-based missiles pose a particular threat is not shared by the Soviet Union, which seeks instead to assure a rough balance across the entire spectrum of forces. These critical differences explain why, despite the compelling political and economic pressures for arms control, little progress has as yet been made at Geneva.

III. The strategic balance: force comparisons

The composition and characteristics of the strategic nuclear forces of the United States and the Soviet Union differ widely, reflecting the divergent historical, technological and geostrategic factors that have influenced their development. Both sides deploy land-based intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs), and long-range bombers carrying nuclear bombs and missiles. The United States is also in the process of introducing nuclear-armed cruise missiles into its strategic arsenal. However, the two sides have chosen to structure their forces in very different ways (figure 3.1).

The Soviet Union has historically placed greater emphasis on its land-based ICBM forces, which constitute approximately half of the total

Figure 3.1. Distribution of the land-, air- and sea-based nuclear warheads of the USA and the USSR



Soviet strategic launchers, 65 per cent of total Soviet warheads and 70 per cent of the throw-weight. US ICBMs also constitute about half the total number of US strategic launchers, but only 22 per cent of warheads and 33 per cent of throw-weight.

With limited access to warm-water ports, the Soviet Union has relied less on SLBMs than has the United States, although the Soviet submarine force is being modernized. Nonetheless, Soviet submarines are judged to be considerably noisier than US submarines, thus making them more vulnerable to anti-submarine warfare (ASW). Through its geographic advantage and its technological superiority, the United States is considered to be substantially ahead of the Soviet Union in ASW. The Soviet Union deploys only 15–20 per cent of its submarine force at any one time, owing largely to problems of serviceability.[3] By contrast, the United States maintains about 50 per cent of its strategic submarine force on patrol at all times.

The long-range bomber forces of both the United States and the Soviet Union are approximately 20–25 years old. The Soviet Union has fewer aircraft and few of those are maintained on alert. The US strategic bomber force has been continually modernized and will be complemented by the addition of long-range cruise missiles. The Soviet Union has, however, placed much greater emphasis on air defence than has the United States.

Measurement of the strategic nuclear capability of the United States and the Soviet Union has traditionally been made by comparing static as well as dynamic measures of strategic capability. Static measures include such categories as (*a*) strategic nuclear delivery vehicles (SNDVs), (*b*) re-entry vehicles (RVs), (*c*) throw-weight (or payload), and (*d*) equivalent megatonnage. According to these static indices the strategic nuclear forces of the United States and the Soviet Union are as set out in tables 3.1 and 3.2.

Static measures, however, do not provide any indication of how the respective strategic nuclear forces would compare in a hypothetical scenario of engagement. Dynamic measures are arrived at by postulating how forces would perform under various conditions and include such measurements as 'hard target kill'[4] and 'time urgent hard target kill' capabilities and various simulated counterforce exchange ratios—for example, the number of warheads surviving a first strike or a first strike and retaliation. The US Joint Chiefs of Staff place particular importance on four numbers: total weapons, total equivalent megatonnage (EMT),

[3] Whereas the 20 US SSBNs at sea at any one time are regarded as invulnerable to Soviet ASW capabilities, the 9 or 10 Soviet SSBNs normally on station are continuously monitored by US ASW forces (see reference [2]).

[4] Hard-target-kill potential is a function of accuracy and yield which provides an indication of lethality or the ability to destroy 'hardened' structures such as missile silos and command centres.

Table 3.1. US strategic nuclear weapon delivery capability, as of end 1982

Delivery vehicle	Number of delivery vehicles deployed	Number of warheads per delivery vehicle	Total delivery capability (number of warheads)	Total delivery capability (Mt)
Land-based (ICBMs)				
Minuteman II	450	1	450	540
Minuteman III	250	3	750	128
Minuteman III (Mk 12A)	300	3	900	302
Titan II	51	1	51	459
Sub-total	*1 051*		*2 151*	*1 429*
Sea-based (SLBMs)				
Poseidon C-3	304	10[a]	3 040	122
Trident I (C-4)	240	8	1 920	192
Sub-total	*644*		*4 960*	*314*
Air-based (strategic bombers)				
B-52:	316			
Bombs		4[b]	1 264	1 745
SRAMs		12	1 114	
ALCMs[c]		12	192	
Sub-total	*316*		*2 570*	*1 745*
Total	**2 011**		**9 681**	**3 488**

[a] Average figure. The Poseidon C-3 has been flight-tested with a maximum number of 14 RVs.
[b] Operational loading. Maximum loading per aircraft may be 11 bombs, each of about one megaton.
[c] The first squadron of B-52Gs carrying ALCMs. Operational by mid-December 1982.

weapons capable of destroying military targets, and weapons capable of destroying military targets quickly. "These are hard mathematical things that can be associated with actual force capabilities" [3].

Simulated force exchange ratios are highly dependent on assumptions about such performance criteria as readiness, reliability, and command and control, which to say the least are highly questionable. The reliability of one of the key criteria in these assessments, that of accuracy, is frequently overstated [4, 5].

US strategic forces

The Reagan Administration took office convinced that the SALT process had been totally disadvantageous to the United States. Reagan officials referred to the 1970s as 'the decade of restraint' during which the United States 'stood still' and permitted the Soviet Union to build its forces to a position of superiority. This was confirmed by the President himself when he stated that "on balance, the Soviet Union does have a definite margin

[5] The precise position of the Reagan Administration on the issue of superiority is unclear. Although the President and some of his advisers refer to a position of Soviet superiority, the 1982 Department of Defense Posture Statement states: "While the era of superiority is long past, parity not United States inferiority has replaced it."

Table 3.2. Soviet strategic nuclear weapon delivery capability, as of end 1982

Delivery vehicle	Number of delivery vehicles deployed	Number of warheads per delivery vehicle	Total delivery capability (number of warheads)	Total delivery capability (Mt)
Land-based (ICBMs)				
SS-11[a]	260	1	260	260
SS-22 (MRV)	260	3	780	260
SS-13	60	1	60	36
SS-17	30	1	30	180
SS-17	120	4	480	360
SS-18	58	1	58	1 160
SS-18	175	8	1 400	1 260
SS-18	75	10	750	375
SS-19[b]	60	1	60	600
SS-19	300	6	1 800	990
Sub-total	*1 398*		*5 678*	*5 481*
Sea-based (SLBMs)				
SS-N-5	18	1	18	18
SS-N-6	102	1	102	71
SS-N-6 (MRV)	256	2	512	179
SS-N-8	289	1	289	231
SS-N-17	12	1	12	9
SS-N-18	40	7[c]	1 680	336
SS-NX-20	20	10	200	40
Sub-total	*937*[d]		*2 813*	*885*
Air-based[e] *(strategic bombers)*				
Tu-95 (Bear)	100	2	200	200
Mya-4 (Bison)	45	2	90	90
Sub-total	*145*		*290*	*290*
Total	**2 480**		**8 781**	**6 656**

[a] According to *Soviet Military Power* (US Government Printing Office, Washington, D.C., March 1983), the total number of SS-11s is 550.
[b] According to *Soviet Military Power* (1983) the total number of SS-19s is 330.
[c] Average number. The SS-N-18 is reportedly deployed in three different versions.
[d] *Soviet Military Power* (1983) claims that the total number of Soviet SLBMs now exceeds 950.
[e] The upper limit stipulated by SALT II is 156.

of superiority" in strategic forces.[5] The expressions 'decade of restraint' and 'standing still' are misleading. Although during the period in question the United States did not increase its overall number of launchers, it carried out a very considerable modernization programme, including the deployment of the Minuteman III, the Poseidon C-3 and the Trident C-4 missiles, which greatly increased the US warhead total. Between 1970 and 1980, the warheads in the Soviet strategic force increased from about 1 800 to 6 000 while those in the US strategic force rose from 4 000 to 10 000. A range of other qualitative improvements were also carried out which considerably improved the capabilities of the US strategic force [6]. For the Reagan Administration, the cause for greatest concern was the asymmetry in heavy land-based missiles. The SALT II Treaty was seen as

legitimizing US inferiority and was rejected as being fatally flawed.[6] The assumption on which the Administration's policies were based was that US military strength had declined relative to that of the Soviet Union and that deterrence was threatened. Priority was therefore given to redressing the perceived imbalance through an ambitious modernization programme. Arms control negotiations could only be contemplated on the basis of renewed US strength.

Defense Secretary Weinberger, citing the need to end the decline of US strategic capabilities as well as to ensure deterrence during the proclaimed 1985–86 period of vulnerability, outlined the Reagan Administration's programme for strategic force modernization in October 1981. In his testimony before the Senate Armed Services Committee on 5 October 1981, Weinberger noted five key elements: (*a*) improvements in command and control; (*b*) modernization of manned strategic bombers; (*c*) deployment of new submarine-launched missiles; (*d*) improved accuracy and survivability of land-based missiles; and (*e*) improvements of strategic defences.

The Reagan programme reasserts the importance of and the need to modernize the three legs of the US strategic triad. Modernization of the air-breathing leg is to include deployment of 100 B-1B bombers beginning in 1986, as well as development of the advanced technology (or 'stealth') bomber (ATB) beginning in 1989. A total of 3 800 cruise missiles are to be deployed on B-52G/H and B-1B bombers, beginning with a squadron of 16 B-52Gs in December 1982. The sea-based strategic deterrent is to be enhanced through deployment of the Trident D-5 missile, which has greater accuracy and throw-weight than its predecessor, the Trident C-4. In addition, several hundred nuclear sea-launched cruise missiles are to be deployed on general-purpose submarines beginning in 1984.

The most notable aspect of the US programme concerns the plans to deploy two missiles, the MX and the Trident II (D-5), both of which will have greatly improved silo-killing capability. This development has already begun to concern US legislators.

ICBMs

The current US ICBM force consists of 51 liquid-fuelled Titan IIs, initially deployed in 1963, which are to be deactivated [7], 450 Minuteman IIs with single warheads, and 550 Minuteman IIIs each with 3 warheads. Three hundred of the Minuteman III are being modernized with the addition of the Mk-12A warhead, whose greater yield and increased accuracy will provide greater hard-target-kill capability.

US analysts and officials have long argued that the land-based element

[6] Despite rejecting the SALT II Treaty, the Reagan Administration has said that it will abide by its terms as long as the Soviet Union does the same.

of the strategic triad is weakening, firstly because it cannot match the growing Soviet counterforce capability, and secondly because it is vulnerable to a Soviet first strike. Modernization of the US land-based missile force is centred on the production and deployment of the MX missile. The MX missile has been under study and development for 10 years and the Air Force has studied more than 30 different basing modes for it. None, however, has met with general support.

Having rejected the Carter Administration 'multiple protective shelter' basing proposal for a force of 200 MXs, President Reagan announced his plan for ICBM modernization on 22 November 1982. Renaming MX 'Peacekeeper', Reagan called for deployment of 100 missiles in a 'closely spaced basing' (CSB) or 'Dense Pack' formation at Warner Air Force Base in Cheyenne, Wyoming, beginning in late 1986.[7] The missiles would be deployed in a north–south column of silos (1 × 14 miles) 1 800 feet apart.[8]

However, Dense Pack has itself met with considerable opposition on the grounds that the Soviet Union could develop means to overcome it. In December 1982, the US Congress voted to cut $988 million for production of the MX pending a review of the Dense Pack basing mode to be completed by spring 1983.[9] Following this Congressional action, President Reagan appointed a bipartisan commission to "review the strategic modernisation programme with particular focus on our land-based intercontinental ballistic missile system and basing alternatives for that system" [9].

The debate over Dense Pack has highlighted the problems inherent in attempting to modernize the land-based missile force, and particularly those affecting the MX. It raises a number of complex issues, including: the future of the air–land–sea triad; the relationship between counterforce capability and survivability; the relationship of arms control to arms procurement; and the choice between counterforce strategies and the more traditional concept of deterrence based on mutual vulnerability.

The major issue in the MX debate concerns the rationale for the new missile. Is the MX required to provide the United States with a counterforce capability to match the supposed capability of the Soviet Union, or to ensure the survivability of the US land-based missile force? The distinction

[7] The US Air Force has planned to have the first 10 MX missiles deployed and ready for launch by December 1986, and all 100 missiles operational by 1989. However, DoD officials have indicated that uncertainty over the basing mode and development problems will mean a delay in the 1986 IOC. The initial flight test was expected in March 1983 [8].

[8] The theory underlying Dense Pack is that in a Soviet attack on a closely spaced MX silo field, the first Soviet nuclear warhead detonation would destroy or deflect the additional incoming warheads meant to destroy all 100 MX missiles. This effect is termed 'fratricide' and would theoretically guarantee the survivability of the MX because the Soviet Union would be denied the high degree of certainty required to engage in a first strike.

[9] The fact that the 1983 Appropriations Bill contained $2.5 billion for continued research and development suggests that Congressional opposition is focused on the basing plan rather than on the missile itself.

is important because it has a critical influence on the characteristics of the missile.

A number of officials in the Reagan Administration have stressed the importance of the missile as a counterforce weapon, that is, its ability to threaten the Soviet land-based force. Other officials have stressed that the most important requirement is invulnerability; therefore it is the basing mode rather than the missile that should have priority.

In its current MX programme, the Administration appears to be pursuing the dual objectives of counterforce and survivability with equal vigour. Unfortunately, as several analysts have pointed out, the characteristics required for a land-based counterforce capability are not consistent with those required for invulnerability: "the MX is too large and too heavy to be readily adapted to either mobility or concealment" [11]. Furthermore, because it is such a capable system and because it cannot be survivably based, it would be destabilizing as "it packs too much capability into too few highly attractive aim points" [11]. As a result of these apparently inherent contradictions several analysts have suggested that the Administration scrap the MX programme and concentrate on developing a smaller, more survivable single-warhead ICBM (SICM) [11, 12].

The question of MX basing has also demonstrated the difficulty of reconciling proposals for making land-based missiles survivable with arms control requirements. The Dense Pack scheme has been criticized on the grounds that it violates the SALT I and SALT II accords which state that "each party undertakes not to start construction of additional fixed ICBM launchers". However, US officials have replied to these suggestions by saying: "It is in no way contradictory to the object and purpose of the Salt agreements ... or the specific provisions ... concerning fixed launchers" [13]. They claim that because MX is designed to be transported from one vertical silo to another and carries its launch equipment with it in a cannister, the missile's underground silo is for protection against attack and cannot be defined as a launcher.[10] However, as there are only 100 such silos and 100 such missiles, this explanation has not satisfied the critics. One of the problems in this dispute is that neither SALT agreement established a precise definition of what constitutes a launcher. However, many observers believe that the relevant clause in SALT II must be taken to refer to the construction of new silos: otherwise it would have very little meaning. For their part, Soviet officials have made it quite clear that the deployment of MX in the Dense Pack formation "runs counter to one of the central provisions of the Salt II accords—an obligation not to create additional silos for intercontinental missiles" [15].

[10] "In fact these [dense pack] launchers are not fixed. The hole in the ground is fixed, but the launcher moves with the missile" [14].

In addition to the requirements of modernization, justification for the MX has frequently been argued in terms of its relationship with the START talks in Geneva. Administration officials have consistently argued that the United States must negotiate from strength and that the MX is essential to any US negotiating position. There has been speculation that the United States would be willing to use MX as a bargaining chip and would be willing to forgo deployment in return for Soviet concessions. However, the track record of this approach is hardly impressive. Both MIRVs and cruise missiles were, at one time, justified as bargaining chips. Today the United States and the Soviet Union have over 14 000 MIRVed warheads and the United States plans to deploy more than 8 000 air-, ground- and sea-launched (nuclear and conventional) cruise missiles [16].

Statements by Reagan Administration officials indicate that the MX is not to be bargained away. Rather than use MX as a bargaining 'chip', they intend to use it as bargaining 'leverage'. They suggest that deployment of MX will create greater incentives for the Soviet Union to agree to real reductions. "The Peacekeeper's capabilities will provide the Soviets with a strong incentive for deep reductions in their nuclear arsenal . . . since their large ICBM force will have little utility against [closely spaced basing]" [17].

START negotiator Edward Rowny has commented that MX is an integral part of the US deterrent force on which the US START position is based. President Reagan himself confirmed this when at a press conference on 15 December 1982 he stated that "even if we got the reduction of arms which we are seeking . . . this would not be the missile that would be taken out of circulation".

SLBMs

The current US SLBM inventory includes: 19 Poseidon ballistic missile submarines (SSBNs) with 304 Poseidon C-3 missiles; 12 Poseidon SSBNs with 192 Trident I (C-4) missiles; and 2 Trident (Ohio-class) SSBNs with 48 Trident I (C-4) missiles. The Trident SSBN has more (24 instead of 16) and larger missile tubes than the Poseidon, is significantly quieter and will have an increased time at sea on patrol. A total of 15 Ohio-class SSBNs are to be constructed. During 1980–81, 10 Polaris SSBNs each equipped with 16 Polaris SLBMs were withdrawn from service. The C-4 missile increases SLBM range from 4 600 to 7 800 km, and this increases tenfold the area Soviet anti-submarine forces must cover in order to locate the SSBN. It also offers significant improvements in accuracy (a CEP of 1 000 feet, it will eventually have stellar mid-course correction) and yield (from 40 kt to 100 kt), which will increase the utility of the system in limited strategic options.

The Trident II (D-5) missile is under development as a follow-on missile for the entire Trident submarine force. The Reagan Administration has announced that it will accelerate development of the D-5 and begin deployment in 1989. The D-5 will carry a nominal 14 RVs per missile against 8 for the C-4, and will provide a further increase in SLBM range to 10 000 km at full payload. The increase in throw-weight allows the increase in warhead numbers to be accompanied by the development of a precision-guided RV.

Most analysts believe the D-5 will give the US SLBM force a hard-target-kill capability for the first time.[11] According to the DoD, "Trident submarines armed with Trident II missiles will provide a capability to attack the full spectrum of targets from a reliable and enduring platform" [19]. According to one analyst, "Although the United States has not announced it publicly, the Trident will also allow her to retaliate for a strike on her land-based ICBM force by using her SLBM. It will eliminate any possibility that the USSR could destroy so many of her ICBMs that the United States could only retaliate with slow flying bombers or cruise missiles or by launching relatively inaccurate SLBMs at area targets with large population" [6].

In order to further expand the limited strategic option (LSO) capabilities of the US Navy, nuclear-armed sea-launched cruise missiles will be deployed on attack submarines (12 per boat) beginning in FY 1984.

Bombers

The current bomber force consists of 75 operational B-52Ds, 151 B-52Gs, 90 B-52Hs and 60 FB-111As (not SALT-accountable). The United States plans to phase out B-52Ds in the near future, some B-52Gs in the late 1980s and FB-111As in the early 1990s. The later model B-52s are to be retained as stand-off cruise missile carriers into the 1990s.

The major near-term bomber modernization is the plan to deploy 3 700 air-launched cruise missiles (ALCMs) on B-52G/Hs and the B-1B strategic bomber. The first squadron of B-52Gs was equipped with ALCMs in December 1982; each of the 16 aircraft can carry 12 cruise missiles externally. The B-52H will carry up to 20 and the B-1B up to 22 ALCMs.

The United States plans to produce 100 B-1B strategic bombers starting in 1986, and in the 1990s to develop and deploy a Stealth bomber.

[11] According to recent press reports, the Navy has requested additional money in the 1984 defence budget in order to fit the D-5 with a W-87 warhead that will provide a yield equivalent to 475 kt, rather than 335 kt for the same warhead planned for the MX. It is claimed that the heavier warhead would give a kill probability of 88 per cent against Soviet silos hardened to resist bombardment of up to 7 200 psi, considerably better than the warheads originally planned for the Trident II [18].

Cruise missiles

The United States plans to introduce a substantial number of cruise missiles on a wide range of platforms: bombers, attack submarines (mentioned above) and 464 ground-launched missiles in Europe. There are also plans to deploy conventional long-range land-attack and anti-ship Tomahawk cruise missiles on surface vessels, notably the CG-47-class cruisers, the DD-963-class ships and the four Iowa-class battleships that are being reactivated. Each ship will be equipped with 32–60 submarine-launched cruise missiles (SLCMs), and 75 per cent of these missiles will be designed for strikes against land targets [6].

C^3I

Increased emphasis on command and control and strategic defence are also elements of the Reagan Administration's strategic modernization programme. Both are directed at providing greater survivability and endurance for US strategic forces in the event of conflict. Secretary Weinberger's 1982 Defense Guidance, which provides strategic planning guidelines for defence budgets 1984–88, outlines the need to develop an 'enduring sustainability' of forces in order to fight a protracted nuclear war.

ABMs

Strategic defence has been the subject of keen interest in connection with enhancing the survivability of land-based ICBMs. The US Army has been engaged in the research and development of an endoatmospheric nuclear/low-altitude defence system (LOADS) which could be deployed with the MX beginning in 1988. Work is also under way on a non-nuclear exo-atmospheric ballistic missile interceptor system, as well as space-based directed-energy weapons. Should the vulnerability of US land-based ICBMs to a Soviet first strike not be mitigated through arms control or a survivable basing mode or both, it is quite possible that some form of ballistic missile defence will be pursued.[12]

Soviet strategic forces

The Soviet Union has undertaken sweeping strategic force modernization programmes throughout the 1970s. More than half of the Soviet Union's 1 398 intercontinental ballistic missile sites have been rebuilt to accommodate the SS-17, SS-18 and SS-19 ICBMs. Extensive modernization of warhead design and guidance has resulted in a greater number of re-entry

[12] The second five-year review of the 1972 ABM Treaty took place in November–December 1982. No modifications to the Treaty resulted, although either side may abrogate the Treaty with one year's notice.

vehicles deployed on Soviet strategic ballistic missiles through the addition of multiple independently targetable re-entry vehicles (MIRVs). Modernization of sea-based strategic forces includes deployment of the MIRVed SS-N-18 SLBM with Delta-class SSBNs during the late 1970s, and the SS-NX-20 is thought to be ready for deployment with the Typhoon-class SSBN by the mid-1980s [20]. General Secretary Andropov announced recently that the Soviet Union had tested a long-range cruise missile, presumably a weapon similar to the US long-range cruise missile, which could be deployed on submarines off the coasts of the United States [21].

According to a study published recently in Washington [22], the number of competing design bureaux in the Soviet Union and frequent design problems account for the larger number of missile types in Soviet strategic forces compared with US forces. It also notes that the Soviet Union has had difficulty in developing solid-fuelled systems, both for land-based and submarine-launched missiles. The first attempt in the 1960s, the SS-13 ICBM, ran into serious technical problems and only 50 were deployed. The next generation saw development of the SS-16, which was to be a mobile, solid-fuelled, three-stage ICBM. It, too, developed problems and was never deployed, although its first two stages became the SS-20 intermediate-range mobile missile. Almost all present Soviet missiles are liquid-fuelled, which makes them less easy to handle and less reliable (but does enhance their throw-weight).

Land-based forces

ICBMs continue to dominate Soviet strategic forces, accounting for more than one-half of the total of strategic launchers, 65 per cent of warheads and 70 per cent of total throw-weight. Geography has played a major part in determining this emphasis, which has been reinforced by constraints on Soviet technology and the history and bureaucratic structure of the Soviet armed forces. "The technologies of land based missiles—propulsion systems, guidance systems, command and control, among others were probably more manageable than the more complicated technologies of sea-based missiles" [23].

The Soviet Strategic Rocket Force consists of 580 SS-11, 60 SS-13, 150 SS-17, 308 SS-18 and 300 SS-19 ICBMs. Most of the SS-17s, SS-18s and SS-19s are MIRVed, and completion of modernization of those systems is expected to take place in the early 1980s. The SS-18, which is capable of delivering 8–10 warheads at 11 000 km, is considered to pose the greatest pre-emptive threat to the US ICBMs [20].

It has been reported that the Soviet Union is currently testing a new solid-fuelled ICBM, perhaps to be deployed in a mobile basing mode. This new light-to-medium ICBM was flight tested from Plesetsk on 26 October 1982. Some US officials believe that it may be a fifth-generation

follow-on to the SS-17 or SS-19, or possibly a mobile booster designed to replace the SS-16. Analysts also consider it likely that the SS-17 and SS-19 may be converted to solid fuel [24, 25].

Soviet ICBM accuracy is reported to have reached 300 m (for the SS-19) and is expected to approach 150 m by 1985. "This would reduce or eliminate the Soviet need to allocate 2 RV per United States ICBM in counter force strikes" [6].

Minister of Defence Ustinov has stated that if the United States proceeds with deployment of the MX, "the Soviet Union will deploy in response a new ICBM of the same class and its characteristics will not be inferior to those of the MX in any way" [26].

SLBMs

The Soviet submarine-launched ballistic missile force consists of 62 submarines of the Hotel, Delta and Yankee classes, deploying a total of 950 SS-N-5, SS-N-6, SS-N-8, SS-NX-17, and SS-N-18 SLBMs with nearly 2 000 nuclear warheads. Over 30 SSBNs have been produced since the mid-1970s. A new class of SSBN, the Typhoon, with 20 missile tubes, was launched in 1980 and is expected to deploy the SS-NX-20 SLBM. The SS-N-18 missile on Delta III submarines has demonstrated the Soviet ability to give its SLBMs seven MIRVs and a range of 6 500 km. While the initial launches of the SS-NX-20 were failures, the Soviet Union "seems to be making enough progress with the SS-NX-20 to deploy a SLBM with 12 RV, and 8 300 km range and accuracies substantially higher than 0.3 nm by the mid-1980s" [6].

Bombers

The Soviet Union has no tradition of a strategic bomber force. Its long-range bomber force consists of 156 aircraft that are 25 years old, very few of which, if any, are maintained on alert [23]. Only 3 per cent of Soviet strategic weapons are carried on bomber aircraft. Soviet strategic Long-Range Aviation consists of 150 Tu-95 Bear and M-type Bison aircraft, as well as approximately 70 Backfires (not SALT-accountable). The Bear and Bison were both introduced in the mid-1950s and are capable of combat ranges of 11 000 and 8 800 km, respectively. The Backfire was introduced in the mid-1970s; it has a combat range of approximately 6 000 km and is capable of nuclear strike missions. Its role as a strategic, i.e., intercontinental, bomber was a source of controversy during the debate on SALT II, and an understanding attached to the SALT II Treaty limited its production rate to 30 per year. A new swing-wing Soviet strategic bomber, similar in design to the B-1 and known as Blackjack, is reportedly under development. Deployment is expected to begin in 1987, and may result in 50–75 new bombers by the end of the decade, according to one

report [27]. However, there have in the past been reports of a new Soviet bomber which proved to be false alarms.

Air defence

PVO Strany ('Air Defence of the Homeland') is responsible for the air defence of the Soviet Union, and includes some 2 500 aircraft, approximately 5 000 early-warning and air defence radar installations, and 10 000 strategic surface-to-air launchers at over 1 000 sites within the Soviet Union. Four ABM launch complexes, with ABM-IB/Galosh interception missiles and associated radar, are located near Moscow, as permitted by the 1972 ABM Treaty and 1974 Protocol. Half of the Galosh systems have been dismantled, and it is expected that they will be replaced with a modernized ABM interceptor.

IV. Arms control

Following the Soviet invasion of Afghanistan, the already faltering SALT process came to an abrupt halt as President Carter withdrew the Treaty from the Senate. However, both the USA and the USSR indicated that they intended to abide by the terms of the unratified SALT II Treaty. This undertaking was renewed by President Reagan when he took office, despite his rejection of the Treaty.

Hence both sides continue to maintain their strategic force levels at ceilings compatible with SALT II, and both have taken the necessary action to ensure that modernization does not infringe the Treaty. For example, the United States has not deployed 50 Minuteman III missiles in place of existing Minuteman IIs because their multiple nuclear warheads might have violated SALT II [10]. It has retired Polaris submarines to accommodate the new Trident SSBNs, and it has modified the B-52s equipped with ALCMs in order to permit verification. Similarly, the Soviet Union has not tested or deployed strategic forces in violation of the terms of the SALT II Treaty.[13]

However, both sides are pursuing research, development and production of new weapon systems, and several areas (for example, the deployment of cruise missiles, work on mobile missiles and the potential development of ABM systems) could easily undermine the current situation of mutual restraint. As noted above, the Soviet Union has made it clear that it considers the Dense Pack basing mode proposed by the Reagan Administration for the MX to be a violation of the SALT II prohibition on the

[13] In accordance with SALT II, Soviet Ambassador Dobrynin informed the State Department of a recent Soviet missile test and described it as the one new missile Moscow is allowed under the SALT II provisions [24].

construction of additional fixed ICBM launchers. For its part the United States has charged that Soviet encrypting of telemetry test data during recent ICBM and SLBM flight tests may violate SALT II.

After a period of 18 months in office, President Reagan announced that the United States was willing to commence negotiations with the Soviet Union on strategic nuclear arms.

The US START proposal

Speaking at Eureka College on 9 May 1982, President Reagan announced that the United States would propose a "practical phased reduction plan" in the START talks with the Soviet Union. According to Reagan, the US goal in START would be to achieve equal ceilings at much lower levels of force, while reducing "significantly the most destabilising systems—ballistic missiles, the number of warheads they carry and their overall destructive potential".

In the first phase of START, ballistic missile warheads would be reduced to equal levels at least one-third below current levels. To enhance stability, no more than one-half of those warheads would be land-based. In the second phase of START, the United States would seek an equal ceiling on ballistic missile throw-weight at "less than current United States levels".

On 13 May 1982 President Reagan announced a more specific proposal for a phased reduction of strategic weapons. In the first phase, both sides would be limited to 5 000 nuclear warheads deployed on no more than 850 intercontinental ballistic missiles and submarine-launched ballistic missiles. No more than 2 500 warheads could be deployed on land-based ICBMs. In the second phase, both sides would achieve equal aggregate throw-weight at a level no greater than that of the current US forces.

The Reagan START proposals are consistent with the preoccupation of the President and his advisers with what they regard as the inadequate achievements of the SALT process. They represent a significant departure from the terms agreed under the SALT II Treaty. The main differences are: partial limits instead of overall ceilings, seemingly leaving bombers and cruise missiles aside in the first phase; a stronger focus on ballistic missile warheads in addition to missiles as the unit of account; substantial reductions in ballistic missile launchers and warheads, particularly the land-based component; proposals for equal limits on throw-weight also designed to reduce the Soviet land-based threat; and a strong emphasis on more effective verification measures.

Ballistic missiles, particularly ICBMs, form the centrepiece of the negotiating proposal because in the view of Administration officials they pose a specific and immediate threat to strategic stability. Neither bombers

nor cruise missiles are mentioned, although Administration officials have stated: "We are prepared to treat bombers and other strategic systems in an equitable manner in the context of our phased approach. At the same time, ballistic missiles pose a greater threat to stability than do these slow flying clearly second strike systems and should be accorded appropriate priority in the negotiations" [28].

Unofficial sources have speculated on a number of possible linkages in the US negotiating position: if the Soviet Union wishes to include bombers and ALCMs the United States will raise the question of Backfire and Soviet air defences; the United States wants an upper limit of 350–400 bombers with no limit on the bombs to be carried; discussion of SLCMs would mean the inclusion of short-range Soviet SLCMs which could reach US cities when launched off the coast; the United States is willing to limit but not eliminate the Trident and MX in return for Soviet reductions [29].

One of the major ambiguities in the US position concerns the linkage between phase one and phase two. It is not clear whether these will be negotiated as separate agreements or as a single overall agreement. Clearly the choice will be of significance for the speed of the negotiations as it would mean resolving the complex and contentious issue of throw-weight.[14]

The Reagan Administration has also insisted upon more effective verification measures in START. While SALT relied exclusively upon 'national technical means' (NTM) (photo-reconnaissance and electronic intelligence) to verify compliance, the United States has proposed that START verification measures go beyond NTM to include "co-operative measures, data exchanges and collateral restraints", perhaps including intrusive measures such as on-site inspection. President Reagan also called for confidence-building measures with the Soviet Union in a speech on 22 November 1982, including prior notification of ICBM/MRBM test launchings, advance notice of major military exercises, exchange of data on strategic nuclear forces and possible improvements in the 'hotline' communications system between Washington and Moscow.

In order to achieve the levels proposed by the United States in phase one of START—that is, 5 000 warheads on no more than 850 ICBM/SLBM launchers with no more than 2 500 warheads on ICBMs—reductions in the current levels on either side would be required (table 3.3).

The selection of warheads as the unit of account has given the US proposal an equitable appearance since both sides would make approximately equal reductions. The United States would have to reduce 393 more warheads than the USSR in order to reach the 5 000 limit. However,

[14] In a reference to this issue, Secretary of State Schultz is reported to have stated: "Persons who have said the President will be content to let throw-weight limits wait for a second stage agreement have misrepresented the President" [30].

Table 3.3. Reductions required for the US and the Soviet START proposals

	US forces	Soviet forces
US proposal (phase I)		
Total warheads	7 128 to 5 000: −2 128	6 735 to 5 000: −1 735
ICBM and SLBM launchers	1 564 to 850: −714	2 415 to 850: −1 565
ICBM warheads	2 152 to 2 500: +348	5 302 to 2 500: −2 802
Soviet proposal		
All delivery vehicles	1 940 to 1 800: −140	2 650 to 1 800: −850

within the limitations, the Soviet Union is required to make major concessions in numbers of missiles, particularly in land-based systems. It would be forced to reduce 851 more ballistic missile launchers than the United States and would have to reduce 2 802 ICBM warheads, whereas the United States could increase its ICBM warheads by 348. "The most decisive impact of the proposal is that the Soviet Union would have to scrap all of its 1 398 land-based missiles with the exception of 250 modern SS-18s or smaller missiles with the equivalent number of warheads" [31].

The US proposal would therefore force the Soviet Union to dramatically restructure the nature and composition of its strategic nuclear forces. US officials have confirmed that this objective is inherent in the US proposal:

> A second charge is that the United States proposal would force the Soviet Union to restructure its strategic forces away from the traditional Soviet reliance on ICBM. This is true but is it bad for the Soviet Union? . . . the vulnerability of land based missiles is a matter over which both sides should be concerned . . . A primary attribute of the United States proposal is that it will force a relative shift away from ICBMs, resulting in a less destabilising force structure on both sides. This is in the Soviet interest as well as our own. [28]

The acceptability of the START proposal to the Soviet Union rests on the Soviet Union endorsing the US interpretation that the growing vulnerability of land-based missiles on both sides represents the greatest threat to stability and must therefore be given priority in the negotiations.

Furthermore, the Soviet Union will have to accept that, under the US proposal, Soviet strategic force planning and procurement programmes would have to be substantially modified, whereas by contrast the United States would be able to pursue its major strategic programmes. The Reagan proposal would obviously require certain trade-offs in US strategic force structure. The modernization of US land-based forces could take place, allowing the United States to replace its Minuteman force with the MX, maintain and add to the Minuteman III force, or mix the two systems, increasing its land-based counterforce warheads from

1 650 to 2 500. The United States would be required to reduce the numbers of its submarine-launched missiles.

The degree to which older systems would have to be retired in order to permit planned strategic modernization programmes depends to a certain extent on the number of MXs or Tridents to be deployed, and the number of RVs which will be carried. Should the MX carry 10 RVs, the currently planned development of 100 MXs would represent 1 000 of the 2 500 RV limit for land-based ICBMs, the remainder likely to be taken up by Minuteman III with Mk-12A. However, the more land-based ICBMs and RVs deployed, the fewer will be the SLBMs permitted. Given the high weapon loading of the Trident SSBN (24 missiles, 8–10 RVs per missile), this would result in a smaller number of submarines. The maximum number of Trident submarines currently planned is 15; START limits and budgetary constraints will probably limit the size of the force to 10 or 12. This will inevitably mean a drastically lower number of submarines at sea at any time than the current figure of 18–22. Although the United States has maintained a lead in anti-submarine technology over the Soviet Union, the reductions in the number of submarines place this most critical element of the US deterrent at greater risk [31].

The Soviet Union could also rationalize its strategic force mix within the Reagan proposal limits, including the maintenance of the SS-18 and deployment of the Typhoon SSBN. One estimate of possible US and Soviet force levels under the Reagan proposal is given in table 3.4.

A number of alternative proposals have focused on the destabilizing nature of MIRVed launchers. One proposes replacing all land-based MIRVed ICBMs with single-warhead ICBMs, and another proposes a phased elimination of all MIRVed ICBMs by 1994 [32]. Reverting to single-warhead ICBMs on both sides would reduce the number of available hard-target-kill RVs, while maintaining the same number of aim points.

The Soviet Union has welcomed the US willingness to resume talks on strategic arms reductions as a step in the right direction, but Soviet officials have been highly critical of the actual terms of the US proposal. A Tass article on 4 June 1982 denounced the Reagan proposal, noting the 'structural differences' in the US and Soviet arsenals. The article pointed out that the US proposal would permit deployment of the MX and Trident II, while making no mention of B-1 or cruise missiles, and it criticized the contention that land-based missiles are more destabilizing than sea-based missiles. Soviet officials do not appear to accept US arguments concerning land-based missiles and stability,[15] and they reject

[15] "It is absurd to maintain that Soviet intercontinental ballistic missiles are allegedly the source of instability and should above all be subjected to major cuts whereas the strategic arms of the United States, not only those which already exist but also future ones, are supposed to even have a 'stabilising effect' " [34].

Table 3.4. Estimated US and Soviet ballistic missile warheads, according to the Reagan START proposal

US missiles		Number of warheads	Soviet missiles	Number of warheads
ICBMs				
70 Minuteman III (3 Mk-12)		210	300 S-19 (6 warheads)	1 800
300 Minuteman III (3 Mk-12A)		900	70 SS-18 (10 warheads)	700
100 MX (10 Mk-12A)[a]		1 000		
Sub-total	*470*	*2 110*	*370*	*2 500*
SLBMs				
288 Trident II (10 Mk-12A)		2 880	60 SS-N-20[b] (on 3 Typhoon SSBNs)[c]	600
			240 SS-N-18[d] (on 15 Delta IIIs)	1 680
			64 SS-N-17[e] (on 4 SSBN-Xs)	64
			108 SS-N-8[e] (on 9 Delta Is)	108
Sub-total	*288*	*2 880*	*472*	*2 452*
Total	**758**	**4 990**	**842**	**4 952**

[a] The number of warheads each MX ICBM and Trident II SLBM would carry under the Reagan START proposal has not been disclosed by the Department of Defense. In the projection shown, it is assumed that each missile would carry 10 Mk-12A warheads.
[b] Assumes 10 warheads per missile.
[c] The USSR could deploy more Typhoon SSBNs than shown. However, to do so they would have to retire some additional Delta-class SSBNs not to exceed the aggregate number of SLBMs and SLBM-launched RVs. The USSR could also deploy a new submarine (SSBN-X, equipped with 16 SS-N-17 SLBMs) to replace Delta I and Delta II SSBNs. Here it is assumed that Delta II SSBNs (not shown in the table) have been replaced by SSBN-Xs.
[d] Assumes 7 warheads per missile.
[e] Assumes 1 warhead per missile.
Source: Tinajero, A. A., *President Reagan's START Proposal: Projected United States/U.S.S.R. Ballistic Missile Forces* (Congressional Research Service, Library of Congress, Washington, D.C., 9 June 1982).

totally the notion that the United States can dictate Soviet force structure. Finally, Soviet officials have not disagreed with the numbers presented by the United States but argue that, as agreed in SALT II, a rough balance exists, although not in all categories of weapon system.

In a speech to the League of Young Communists in Moscow in May 1982, President Brezhnev did not reject the Reagan initiative but defined Soviet conditions for arms control negotiations: firstly, talks should pursue the aim of limiting and reducing strategic arms rather than being a cover

for the continued arms race and the breakdown of what he termed parity; secondly, both sides should conduct themselves "with due regard for each other's legitimate security interests and strictly in accordance with the principle of equality and equal security"; and thirdly, in an obvious reference to SALT II, the Soviet leader emphasized that the positive achievement of earlier talks should not be overlooked, since the coming negotiations could not start from scratch [34].

The Soviet proposal

A Soviet counter-proposal was presented in Geneva prior to the mid-August recess. Press reports [35] indicated that the Soviet Union had responded with a proposal to freeze forces immediately and to reduce to 1 800 missiles and bombers each, with the condition that the United States does not deploy any new missiles in Europe.

A more detailed account of the Soviet position was given in an authoritative *Pravda* article of 2 January 1983. The article stated that the Soviet Union would propose: (*a*) a phased reduction of heavy bombers, land-based and sea-based intercontinental ballistic missiles to a total of 1 800 on each side; (*b*) reduction of warheads to an equal agreed level; (*c*) a freeze on further deployment of US forward-based systems (FBSs) within range of Soviet territory; (*d*) the prohibition of all cruise missiles with a range in excess of 370 miles (the 600-km cruise missile range limit established in the SALT II Protocol); (*e*) a ban on heavy bombers and aircraft carriers in agreed zones adjoining the territories of the two sides; (*f*) prior notification of large-scale exercises of heavy bomber and FBS aircraft; and (*g*) safe zones for submarines, in which ASW activities would be prohibited. The suggested cuts are similar to those proposed by President Carter in 1977, and by Senator Jackson in 1974/75 (see *SIPRI Yearbook 1982*).

The Soviet proposals reflect the Soviet view that a situation of rough parity exists, the belief that either side should be free to deploy the mix of systems that it considers necessary, and the desire for the negotiations to proceed from the framework established by SALT II. In order to achieve the common ceiling of 1 800 strategic nuclear delivery vehicles, the Soviet Union would be required to make larger reductions—850 as against 140 (table 3.3). Observers have noted that as the Soviet proposal represents a reduction of 25 per cent below the SALT II level, it indicates a reciprocal Soviet interest in substantial reductions.

The Soviet proposal differs very much from that of the United States. The insistence that limitations follow the pattern established in SALT II means that the proposal fails to meet the US requirement for an emphasis on land-based systems, the number of warheads that they carry and their

destructive potential. However, the USSR has indicated a willingness to limit the overall number of warheads.[16]

US officials in Geneva have suggested that the major Soviet objective is to achieve limitations on cruise missiles. They argue that the Soviets believe they cannot stop the Trident and they do not want to trade their large missiles to halt the MX. Their main interest therefore will be in limiting the present US cruise missile programme while they build up their own [36]. This view was given some credence by the comments of Soviet Major-General Starodubov, who emphasized that no arms control agreement "will be of any value" if the United States starts a cruise missile race while seeking a reduction in the number of heavy missiles [36].

The US reaction to the Soviet proposal has been cautious but moderately positive. US Under-Secretary of Defense Ikle commented that "They seem somewhat less reluctant now [to pursue deep cuts] and to that extent I'd say they now appear relatively serious about the negotiations" [37]. However, while optimistic about the seriousness of the negotiations, US officials do not accept the details of the Soviet approach. They reject the use of SALT II as a basic starting-point, the notion of a freeze, and the inclusion of what are seen as theatre nuclear forces.

Verification

The importance of verification[17] in strategic nuclear arms control has grown dramatically over the past decade. Negotiated limits on qualitative as well as quantitative capabilities have increased the need for and complexity of verification of compliance. The political importance of the verification issues was amply demonstrated during Senate consideration of the SALT II agreement in 1979.

The Reagan Administration has repeatedly stated the vital importance it attaches to adequate verification measures in any future arms control agreement with the Soviet Union. Alleged Soviet violation of previous arms control agreements, as well as the growing difficulty of verification of qualitative limitations on strategic nuclear capabilities, have been presented as reasons for more robust verification measures in START.

A further reason for more stringent verification provisions lies in the problem of 'break-out', especially at dramatically reduced strategic force levels. As the number of strategic systems on both sides decreases, so too does the number required to alter the balance. Thus, the incentive for

[16] The USSR has proposed an unspecified limit on warheads and bombs within which they want to count all 3 800 prospective US ALCMs [36].

[17] Verification is not an absolute term, but refers to the degree of confidence in the adequacy of monitoring capabilities to collect information upon which assessments of compliance may be made. For a more complete discussion, see reference [38].

cheating or 'break-out' is increased, and with it the need to ensure adequate verification measures.

SALT II relied exclusively upon national technical means for monitoring and verification. The Reagan Administration has stated quite clearly on a number of occasions that NTM alone will not provide adequate verification of START. Certain intrusive measures going beyond NTM and co-operative measures[18] will be required, according to US officials.

The SALT II agreement contained a number of important verification elements such as the use of launchers as the 'unit of account' for reductions; counting rules for the number of MIRVs (any missile is assumed to deploy the maximum number of MIRVs with which it has been tested); the use of functionally related observable differences (FRODs) to aid monitoring of dual-use systems; and a prohibition of the encryption of telemetric missiles flight data.

Clearly the adoption of new units of account as proposed by the Reagan Administration will pose new problems for the verification process.

Soviet officials are reported as having confirmed that the Soviet Union will accept "reasonable verification measures" to supplement national technical means of verification [39]. However, it is questionable whether US and Soviet views will accord as to what constitutes a "reasonable" verification measure.

The START and LRTNF talks

Given US advantages in the air-breathing leg of the strategic triad—bombers and cruise missiles—it is natural that the Soviet position includes limitations on both. While the inclusion of bombers may not be difficult to accommodate, the issue of cruise missiles raises the inevitable question of US forward-based systems and the relationship of START to the parallel LRTNF, or INF, discussions (see chapters 1 and 2).

Throughout the SALT I and SALT II negotiations, the Soviet Union raised the issue of forward-based systems and compensation for third country threats in connection with strategic limitations. FBSs, in the Soviet definition, included all nuclear systems which could strike the Soviet Union and were to be considered 'strategic' for that very reason. The United States consistently rejected inclusion of FBSs and compensation. However, they entered the negotiations indirectly—through the unequal limits of the SALT I Interim Agreement (linked to compensation for British and French forces, at least by the USSR) and the 'heavy missile/FBS' trade-offs established at Vladivostok in 1974.

[18] Co-operative measures may be defined as actions taken by one side to enhance the ability of the other side to adequately verify compliance with a negotiated agreement. Functionally related observable differences in SALT II could be characterized as a negotiated co-operative measure.

Foreign Minister Gromyko, at a press conference on 21 June 1982, drew attention to this long-standing Soviet concern by reminding journalists that at the time of the signing of SALT II, "the Soviet Union made an official statement, that during future talks, when a SALT III Treaty was being prepared the Soviet Union would raise the question of forward based systems. The American side acknowledged it. It was on this basis that the sides reached accord".

Hence the Soviet proposals create a degree of overlap with the LRTNF talks. Soviet officials have created linkage of another sort by suggesting that if NATO LRTNF deployments take place as scheduled, it might mean an end to strategic arms control negotiations. However, despite the evident parallelism between the two negotiations, a Soviet official, asked if the Soviet Union favoured combining the two sets of negotiations, replied, "A merger would be impossible at this stage, but there is a direct link" [21].

Historically, both sides had envisaged theatre nuclear systems and FBSs being included in some fashion in a SALT III negotiation. The 12 December 1979 NATO communiqué concerning the decision to deploy 572 LRTN missiles while simultaneously pursuing arms control stated that arms control efforts would be pursued within the context of SALT III, although it has not been decided how this would be achieved. However, the fact that the Reagan Administration came under pressure to commence negotiations on LRTNFs before it had finalized its position on strategic arms negotiations meant that LRTNF negotiations commenced independently. Yet the employment and in some cases deployment considerations are indistinguishable. This has led to arguments for combining the two sets of talks, perhaps by establishing a common ceiling with freedom to mix.[19]

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4. Changing pressures on the non-proliferation regime[1]

Square-bracketed numbers, thus [1], *refer to the list of references on page 95.*

I. Introduction

To prevent the further spread, or proliferation, of nuclear weapons, the world has come to depend upon a loosely knit non-proliferation regime. This regime has successfully survived its first decade. Now a long and potentially troublesome future lies before it. How is the spread of nuclear weapons to be held in check in the 1980s and beyond as more states expand the industrial nuclear bases which they might use to make these weapons? The future existence and effectiveness of this regime cannot be taken for granted.

The purpose of this chapter is to briefly describe the regime, identify and discuss changing pressures upon it, outline today's proliferation situation, and speculate upon changes in the early 1990s. Next it will consider the responses of nuclear supplier states, both collectively and, in certain cases, individually, and of the International Atomic Energy Agency (IAEA). It concludes with some speculation about future pressures on the regime and some likely responses.

II. The non-proliferation regime

As nuclear power became a technological reality in the 1960s and began to expand widely into commercial use in the 1970s, there was renewed concern that this could lead to the further spread of nuclear weapons. To avoid this, the leading nuclear energy states erected the non-proliferation regime. Today the world depends upon a loose structure of treaty commitments, verified by international inspection, not to acquire nuclear weapons; informal and voluntary understandings of nuclear supplier states to limit certain nuclear exports, to require safeguards for others, and to limit their nuclear co-operation to the least dangerous nuclear technologies; bilateral agreements between some nuclear supplier states and their clients; and a general predisposition against nuclear weapons. The regime continues to evolve in response to pressures of world trends and events, and the responses of major nuclear states to them.

[1] This chapter was written by Warren H. Donnelly, Senior Specialist, Congressional Research Service, Library of Congress, Washington, D.C. The opinions expressed are those of the author and do not necessarily reflect any official policy of his professional affiliation.

No-nuclear-weapons pledges

Central to the non-proliferation regime is the idea of pledges not to make or test nuclear weapons.

Three treaties form a major part of the regime and stand as a substantial, although still incomplete, barrier to further nuclear weapon spread. Two of them commit their parties not to make or acquire these weapons, and to permit international inspection to verify that materials for nuclear power are not diverted to make nuclear weapons. The third pledges its parties not to test nuclear weapons in the open environment, although underground tests can continue. In chronological order, these are: (*a*) the Partial Test Ban Treaty; (*b*) the Treaty for the Prohibition of Nuclear Weapons in Latin America (Treaty of Tlatelolco); and (*c*) the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) [1]. Among these, the term for the NPT ends in 1995. At that time a conference of its parties is to decide whether to continue the treaty indefinitely, or to extend it for an additional period or periods.

Protection of nuclear materials

The latest addition to the non-proliferation regime is the Convention on the Physical Protection of Nuclear Materials, which was adopted in Vienna in October 1979 and is still awaiting necessary ratification by member states. It provides guidelines for physical protection of nuclear materials during international shipments and seeks to establish a general framework for co-operation among states in the recovery and return of stolen nuclear material. Further, it defines certain actions involving nuclear material as serious offences to be punished under national laws, and provides for extradition [2a].

The nuclear supplier guidelines

Another major part of the regime is a set of informal understandings, voluntarily adopted and published by most nuclear supplier states, that is, the Nuclear Supplier Group (NSG). In essence an international gentlemen's agreement, the guidelines call for restraint in supplying the means for enrichment or reprocessing to non-nuclear weapon states (i.e., sensitive nuclear exports) and specify that many items in nuclear commerce be placed under IAEA safeguards in the importing states.

In 1976, the Group, meeting secretly in London, reached a consensus that was communicated to the IAEA, made public in 1978, and has not been withdrawn or modified since. The NSG guidelines remain a set of identical, voluntary undertakings to use restraint in the transfer or retransfer of sensitive nuclear technology, equipment and materials. Participating supplier states have agreed to require certain conditions for

export of items specified in a 'trigger list'. (The guidelines and the trigger list are reproduced in the SIPRI publication *Agreements for Arms Control* [1a].)

Bilateral agreements

The regime also comprises a set of bilateral agreements for nuclear co-operation and supply required by some nuclear supplier states. These sometimes impose conditions beyond those required by the NPT and the nuclear supplier guidelines. For instance, Australia and Canada both require that reprocessing of irradiated uranium supplied by them, and use of the plutonium recovered from it, be within the limits of a national programme submitted to them for prior approval. The Soviet Union demands that spent fuel of Soviet origin be returned to the USSR.

The United States probably has the most detailed set of bilateral conditions and requirements for nuclear co-operation and supply, including many post-export controls, or prior consent rights. Probably the most controversial from the viewpoint of the European Atomic Energy Community (Euratom) and Japan is US insistence on case-by-case approval for reprocessing US-controlled spent fuel or for its transfer to another country for reprocessing, and for the subsequent use of the recovered plutonium. An internal consideration in US decisions on reprocessing is whether there would be timely warning of diversion. The Reagan Administration has indicated it would consider giving blanket, or programmatic, approval for reprocessing and plutonium use for states with advanced nuclear power programmes that do not present a proliferation risk. As a *quid pro quo*, it expects renegotiation of existing agreements for co-operation to tighten some of their controls. At the time of writing, discussions were in progress with Japan about such programmatic approval, although some members of Congress strongly opposed any move from case-by-case approval.

The International Atomic Energy Agency and its safeguards

The operating arm of the non-proliferation regime is the International Atomic Energy Agency, which was envisioned in the Atoms for Peace proposal of President Eisenhower in 1953. Established in 1957, its charter is an international statute that specifies a twofold purpose: to promote nuclear energy, and to establish and administer safeguards to ensure that peaceful nuclear energy is not used to further any military purposes. At its 26th General Conference in 1982, the Agency's Director General described it in the following terms.

The Agency is essentially a mechanism through which governments interact with the help of an international secretariat. It is an instrument where knowledge and experience can be pooled, where division of labour can be agreed to, where guidelines, standards and conventions can be worked out and agreed upon, laying down norms which rest upon accumulated international knowledge and experience. It is a channel for technical assistance in applications of nuclear science and technology, including nuclear power. It is an instrument which can offer States international safeguards—verifying the peaceful nature of their nuclear installations and thereby creating confidence. [3]

The Agency's early years saw a slow growth in safeguards, which accelerated after the United States began to arrange for the Agency to inspect US nuclear exports in other countries. Safeguards nonetheless remained a lesser function until the coming of the Treaty of Tlatelolco and the NPT; both of these treaties assigned to the Agency the responsibility to verify by inspection the no-nuclear-weapons pledges of these treaties. Such verification is expected to build confidence that nuclear energy is not misused.

International safeguards are barely a decade old, spanning scarcely one-quarter of the nuclear era. It would be unreasonable to expect from them either perfection or more than was intended. The Agency is not an international police agency. It cannot protect nuclear materials and facilities against misuse. Its safeguards cannot control the future policies of states, but only verify present activities. The Agency cannot physically prevent anything, but only report diversions. Yet its safeguards are unique. It is the first time in history that sovereign states have invited an international organization to perform inspections on important installations within their territories.

Some may doubt that IAEA safeguards can provide reasonable assurance that today's nuclear fuel cycles can be kept separate from the production of nuclear weapons. Many would doubt their adequacy for commercial use of plutonium. However, the Agency and most of its principal members clearly expect that safeguards for commercial production and use of plutonium can be made adequate. Many members continue research and development to improve safeguard equipment and systems with this in mind.

If IAEA safeguards are intended to detect diversions large enough to make an arsenal of nuclear weapons, then it appears reasonable to expect that such diversions would be detected. If, however, the test is unfailing detection of enough material over a long period to make one nuclear explosive, then doubts can be expected.

Whether IAEA safeguards and national accounting systems will be ready for large-scale commercial production and use of plutonium is not yet evident. Fortunately, the pace towards commercial use of plutonium has slowed so much that there will be more time to improve the safeguards.

On the other hand, if British, French and Japanese expectations for commercial reprocessing are fulfilled, by the end of the 1980s there could be a substantial increase in the world's inventory of separated plutonium, with much of it to be found in bulk form at fuel fabrication plants, in storage and in transit.

To give some idea of the quantities of plutonium that could be involved, it was estimated in 1980 that as much as 50 tonnes of separated plutonium could be on hand by the year 2000. At 10 kg per explosive, this amount could produce 5 000 warheads. Even if INFCE overestimated by a factor of three, more than 15 tonnes might still be available, which would pose a formidable task for the IAEA.

The International Nuclear Fuel Cycle Evaluation (INFCE)

The International Nuclear Fuel Cycle Evaluation can be considered part of the regime in that it contributed to the predisposition against nuclear weapons. INFCE addressed technical and institutional aspects of the possible misuse of the nuclear fuel cycle. In so doing, it established a base line of understanding that can be useful for years to come.

The central observation of INFCE was that:

> The construction and planned misuse of fuel cycle facilities is not the easiest nor the most efficient route to acquire materials for the manufacture of nuclear weapons. However, if facilities handling a significant amount of weapons-usable materials are already established, their misuse might well, in some circumstances, be a feasible path to obtaining materials for nuclear weapons. In addition, the technology and know-how acquired in nuclear power programmes, though not directly related, could be drawn on for a subsequent nuclear weapons programme. To that extent, the possibility of misuse of such materials, technology and facilities entails a proliferation risk, which must be balanced against any economic, environmental, energy strategy and resource utilization advantage they may have. [4a]

In addressing ways to minimize the danger of proliferation, the INFCE report said:

> In summary, technical measures have a powerful influence on reducing the risk of theft, but only a limited influence on reducing the risk of proliferation. It is judged that safeguards measures are more important than the technical measures. Potentially more important than technical measures are the institutional measures. [4b]

Four categories of technical options were identified. These included:

> . . . measures to reduce the presence of weapons-usable materials in separated form in the fuel cycle; measures to use radioactivity to protect those materials from diversion; measures to protect them by the use of physical barriers; and the use of lower enrichment for research reactor fuels. [4b]

III. Changing pressures on the non-proliferation regime

The non-proliferation regime has to function in a world of continuing political, economic, ideological and technological changes. Also, it must deal with the awakening aspirations of the peoples of poor nations, to whom the advantages of electricity are increasingly apparent. Some of these changes will tend to support the non-proliferation regime, to improve and strengthen it. Others will work against it.

The following brief identification of factors likely to put or change pressures upon the non-proliferation regime is presented not as a detailed analysis but rather as an indication of the kinds of event and trend that can affect the future shape of the regime and its effectiveness.

But first, two matters merit attention. These are the definition of proliferation, and the alternative approaches of prevention and management.

The importance of definitions

The definition of proliferation is the starting-point for the consideration of ways to avoid the spread of nuclear weapons. If proliferation is defined as the actual testing and production of nuclear explosives and weapons by more states, then the era of the non-proliferation regime so far has been surprisingly calm. The test by India in 1974 has not led to a nuclear arsenal. No other tests by non-nuclear weapon states have been confirmed, although a satellite detected what may have been a low-yield nuclear explosion over the sea in the South Atlantic on 22 September 1979 [2a], and another may have taken place on 16 December 1980 [5].

If proliferation is defined to include the spread of the ability to make nuclear weapons quickly, however, then the past decade takes on a more sombre hue. Measured by their technological and industrial bases, many states are closer to nuclear weaponry now than they were when the NPT took effect in 1970. Why did the NPT opt for the narrow definition? In retrospect, it is clear there would have been no treaty if non-nuclear weapon states had been required to limit their nuclear industries to the least sensitive nuclear materials, facilities and technologies.

Prevention *versus* management

Another factor likely to affect the future non-proliferation regime is the balance of influence between those who would prevent the spread of nuclear weapons, or of the industrial base that could be used quickly to make them, and those who would manage the proliferation, that is, learn to live with it and to control the weapons if prevention is not successful.

Preventers draw little distinction between a single weapon test by a non-nuclear weapon state and an effort to produce a nuclear arsenal. The focus is on prevention of both tests by new countries and the spread of sensitive nuclear technologies and facilities, particularly the commercial production and use of plutonium.

Managers of proliferation are more ready to accept the spread of sensitive nuclear technologies, materials and equipment to some, but not all, non-nuclear weapon states. They look to a mixture of measures on one hand to build confidence that a nation's interests will not require nuclear weapons, while on the other to keep sensitive nuclear technologies, materials and facilities away from states with little economic or industrial reason to have them.

In reality, much current thinking lies between the polar positions of the rigorous preventers and the pragmatic managers. While less exciting, a reasonable approach would seek to combine elements of each. Should plutonium come into commercial use, the balance would logically tend to shift towards management.

Factors supportive of the regime

A number of factors appear to support the non-proliferation regime. These include:

1. A *de facto* freeze on the number of nuclear weapon states. Despite growing nuclear industrial bases in many non-nuclear weapon states, no new states are known to have acquired nuclear arsenals since the NPT took effect and only one new state, India, is known to have tested a nuclear explosive since then.

2. No terrorist use. Similarly, there have been no reports of terrorist use of nuclear materials, although the belief that terrorists could make nuclear explosives gave much impetus to non-proliferation policy in the late 1970s. However, there have been terrorist attacks on nuclear facilities, notably in Spain.

3. A slow-down in nuclear power. Hard economic times in most countries since the oil embargo of 1973–74 have slowed the demand for nuclear power, decelerated the earlier pace of nuclear development and pushed back the expected time for commercialization of the breeder with its attendant large-scale production and use of plutonium.

4. Weakness in world nuclear industries. Many nuclear industries are getting weaker because of idle production capacity. Few, if any, new domestic orders are in sight, while hopes for a handful of orders from Third World countries are likely to be contingent upon favourable loans by would-be suppliers. The weakness of the nuclear industries decreases

proliferation risks to the extent that these industries are unable to finance development of plutonium.

5. Nuclear difficulties of threshold states. Some states suspected of an interest in acquiring nuclear weapons are beset by problems likely to slow their nuclear activities. India faces continuing economic and technical difficulties in completing its nuclear power plants. In Brazil, the nuclear power programme is delayed, and there is dissatisfaction with West German enrichment technology. Economic and political problems in Argentina following the Falklands/Malvinas conflict might equally encourage or deflate nuclear ambitions. Pakistan's progress in enrichment and reprocessing is uncertain. These difficulties provide many reminders that the acquisition of a nuclear capability is not a simple matter.

6. Diminished use of highly enriched uranium (HEU). The simplest route to nuclear weapons is via highly enriched uranium. Prospects for large-scale production and use of this material have dimmed, however. It has fallen into disfavour as a commercial nuclear fuel, and many nations are working to convert research reactors from HEU to fuels of lower enrichment.

7. Continued supplier restraint. None of the nuclear supplier states has withdrawn its voluntary acceptance of NSG guidelines for restraint in the export of enrichment and reprocessing technology, and both France and FR Germany have announced a prospective, but not retroactive, moratorium on exports of reprocessing plant and technology.

8. A continued predisposition against nuclear weapons. The general world view that further spread of nuclear weapons is undesirable continues. INFCE provided a comprehensive expression for this general feeling. Moreover, recent and continuing movements against the deployment of new types of nuclear weapon and for a freeze on their testing and production have reinforced this predisposition.

9. Continued improvement in safeguard technologies. The principal nuclear power states continue to co-operate with the IAEA in research and development to improve safeguard technologies.

Factors likely to weaken the regime

For almost every factor supportive of the non-proliferation regime, one or more can be found to weaken it. Weakening factors include the following:

1. Continued wars. The unhappy facts that several local wars were being fought in 1982 and that conventional arms sales set new records may make some governments more interested in nuclear weapons as an attractive and comparatively inexpensive way to ensure their national security, or to influence their neighbours.

2. Tensions between the great powers and others. The increasing tension between the USA and the USSR has reduced their ability to work together. Some states may therefore decide that they will have to rely more upon their own military strength to offset the decreasing ability or will of these countries to preserve the peace.

3. Doubts about security assurances. Similarly, some states rely upon promises by the USA or the USSR to come to their aid if threatened. To the extent to which such pledges appear less credible, the client states may feel pressure to provide for their own defence by acquiring a nuclear arsenal.

4. Hold-outs from no-nuclear-weapons pledges. While most nations have taken the no-nuclear-weapons pledge of the NPT, or the Treaty of Tlatelolco, some adamantly refuse. Notable examples are Argentina, Brazil, India, Israel, Pakistan and South Africa.

5. No progress in nuclear disarmament. The NPT commits the major powers to negotiate on effective measures to cease the nuclear arms race at an early date. Many non-nuclear weapon states complain that while they are expected to honour their no-nuclear-weapons pledges, the United States and the Soviet Union can delay disarmament with impunity. For the time being, they intensify their nuclear weapon build-up, and so do other nuclear weapon states. This issue figured importantly in the virtual impasse at the second NPT Review Conference in 1980.

6. Continued development of nuclear power technologies. Since 1970 there has been continuing and significant progress in developing and demonstrating the technologies of breeding plutonium from uranium and using that plutonium for nuclear fuel. Demonstration and prototype breeders have been built in France, the UK and the Soviet Union. In the United States the Reagan Administration plans to complete a prototype breeder. Japan, too, is pressing forward in breeder development. India pursues breeder development in an effort ultimately to convert thorium, which it has in abundance, into fissionable uranium-233. Moreover, the United States as part of its military applications of nuclear energy is developing new processes for separating isotopes of uranium and of plutonium which if successful could greatly increase the production of weapon-usable materials [6].

7. Further spread of sensitive technologies. The early 1980s has seen the willingness of some nuclear supplier states to supply enrichment technology to Australia. Also, before Mexico's sudden economic problems deferred its nuclear power prospects, there were indications of potential Mexican interest in importing reprocessing and enrichment technology, and of some suppliers to furnish them.

8. Challenges to verification of no-nuclear-weapons pledges. International inspection to verify no-nuclear-weapons pledges is a central feature of the NPT. However, both official and unofficial doubts have been

expressed about their present and future effectiveness and ability to give timely warning of diversions. Israeli doubts about IAEA safeguards were given as one reason for its attack upon Iraq's large research reactor in June 1981. For almost two years, the IAEA has been unable to keep track of the amount of plutonium produced at the Kanupp nuclear power station in Pakistan.

9. Existence of unsafeguarded facilities. In four non-nuclear weapon states, not all nuclear installations are under safeguards. Unsafeguarded facilities include some in operation or being built which have some capacity to make weapon-grade materials.

10. Politicization of the IAEA. During the 1970s, the United Nations has become increasingly riven by political disputes between blocks of nations, most notably between industrial and Third World countries. Controversies prevented the second NPT Review Conference in 1980 from issuing a concluding statement.

Politicization of the Agency reached a high point when its General Conference denied the credentials of Israel's delegation in September 1982, causing the United States and other countries to withdraw their delegations and the United States to reassess its future participation in the Agency. Not until 22 February 1983 did the USA resume relations with the IAEA.

11. Changing definition of proliferation. When the NPT was negotiated in the mid-1960s, proliferation meant the testing or acquisition of nuclear explosives. By the mid-1970s, however, the working definition had changed implicitly, mainly in the United States, to mean acquisition not only of nuclear weapons but also of facilities and materials which could be directly used to make nuclear weapons. 'Latent proliferation' became the matter of concern.

12. Agitation against supply restrictions. Third World states continue to agitate against the voluntary guidelines of nuclear supplier states which restrict Third World access to sensitive technology, materials and equipment.

Adding up the factors

To evaluate the changing pressures upon the non-proliferation regime is a subjective matter. It appears to the author that the balance of forces opposing the regime is rather greater than the balance sustaining it.

IV. Comparing potential proliferation risks

Once a state attains the capacity to produce weapon-usable materials its future nuclear behaviour is constrained only by no-nuclear-weapons pledges, effective inspection to verify compliance with these pledges, and the absence of pressures that would overcome any commitments.

Unfortunately, consideration of threshold states can become an exercise in finger pointing and in speculation about motivations. Moreover, their identity can change with time. In the 1960s proliferation risks were seen mainly in the major industrial states. Now, in the 1980s, many see these risks in less industrial countries.

Many observers see worrisome prospects for the spread of nuclear weapons to Argentina, Brazil, India, Israel, Pakistan and South Africa, and in the future South Korea and Taiwan. Others would add Iran, Iraq and Libya. The nuclear industrial bases of these countries range from substantial in Argentina, India and South Africa to virtually nil in Iraq and Libya. Israel has had a significant plutonium production capacity for 20 years and a reprocessing capacity for some 15 years.

A common characteristic of six of these states (Argentina, Brazil, India, Israel, Pakistan and South Africa) is their refusal to take the no-nuclear-weapons pledge of the NPT or of the Treaty of Tlatelolco or to put the latter into effect. India has several unsafeguarded nuclear reactors and reprocessing plants. Israel has an unsafeguarded reactor and reprocessing facility, and South Africa has an unsafeguarded enrichment plant. Pakistan has an unsafeguarded fuel fabrication facility in operation, and enrichment and reprocessing plants under construction (see table 4.1).

The governments of some of these countries have shown an interest in nuclear weapons which makes their future course difficult to predict. However, most of them have disclaimed nuclear weapon intentions, although some have reserved the right to make nuclear explosives for peaceful purposes.

The case of Pakistan illustrates how sensitive the non-proliferation regime is to backing by the supplier states, both in spirit and in letter. Belgo-Nucléaire assisted in the construction of the unsafeguarded fuel fabrication plant at Chashma; Norway provided 800 kg of zirconium alloy for fuel rods (to be used at the Kanupp reactor), shipped in two loads of 400 kg each so as not to trigger IAEA safeguards.[2] Pakistan's ability to fabricate some nuclear fuel from its own resources has made the safeguarding of the power reactor uncertain since 1981. In some cases, transfers of technology and equipment to Pakistan for purposes of reprocessing and enrichment are reported, despite likely supplier awareness of the end use of the items. While not necessarily contrary to the letter of supplier obligations, some of these transactions were hardly in accordance with the spirit of the agreed restraints.

To illustrate the relationship between nuclear capability and intention, the present nuclear industrial bases of 23 non-nuclear weapon states,

[2] Quantities exceeding 500 kg, especially designed or prepared for use in a reactor, shall be safeguarded [7]. The Norwegian shipments were probably made in two different calendar years.

Table 4.1. Nuclear facilities not subject to IAEA or bilateral safeguards, as of 31 December 1982[a]

Country[b]	Facility	Indigenous or imported	First year of operation
Argentina	(Reprocessing plant at Ezeiza)	Indigenous	*c*
India	Apsara research reactor	Indigenous	1956
	Cirus research reactor	Imported (Canada)[d]	1960
	Purnima research reactor	Indigenous	1972
	Fuel fabrication plant at Trombay	Indigenous	1960
	Fuel fabrication plant, CANDU-type fuel elements, at the Nuclear Fuel Cycle Complex, Hyderabad	Indigenous	1974
	Reprocessing plant at Trombay	Indigenous	1964
	Reprocessing plant at Tarapur	Indigenous	1977
Israel	Dimona research reactor	Imported (France/Norway)[e]	1963
	Reprocessing plant at Dimona	Indigenous (in co-operation with France)[f]	..
Pakistan[g]	Fuel fabrication plant at Chashma	Indigenous (in co-operation with Belgium)[h]	1980
	(Reprocessing plant near Islamabad)	Indigenous (drawing on design information furnished by Belgo-Nucléaire)	Status unknown
	(Uranium enrichment facility at Kahuta)	Indigenous (based on import of technology and equipment from a variety of countries)	Status unknown
South Africa	Enrichment plant at Valindaba	Indigenous (in co-operation with FR Germany)[i]	1975

[a] Significant nuclear activities outside the five nuclear weapon states recognized by the NPT. The list is based on the best information available to SIPRI.

[b] Brazil also has a couple of unsafeguarded facilities, but they appear to be insignificant.

[c] Nearing completion. So far the plant has not been submitted to design review and subsequent safeguards implementation by the IAEA.

Argentina is not known to possess spent fuel free from safeguards; therefore, the facility is likely to come under safeguards whenever fuel from Argentine reactors is reprocessed.

[d] The reactor is of Canadian origin; an initial heavy water supply came from the USA.

[e] French-supplied reactor running on heavy water from Norway.

[f] Assistance by Saint Gobain Techniques Nouvelles.

[g] For almost two years, the IAEA has been unable to keep adequate track of the plutonium produced at the Kanupp power reactor outside of Karachi. The reasons are twofold: use of indigenously produced fuel rods (from the unsafeguarded fuel fabrication plant) which, in the Kanupp-type reactors, could be continuously changed without turning the reactor off, and requested improvements in safeguard technologies awaiting Pakistani acceptance. However, progress has been achieved in Agency negotiations with Pakistan for more effective safeguard techniques.

[h] Assistance at an early stage by Belgo-Nucléaire.

[i] Co-operation between STEAG (FR Germany) and UCOR (South Africa).

widely different in these characteristics, are compared in table 4.2. In table 4.3 the prospective nuclear capabilities of eight of these states non-party to the NPT are given for 1995, the year the future of the NPT, and with it that of the regime, will be decided. Tables 4.2 and 4.3 experiment with a subjective index of the nuclear capabilities of the countries listed.

The next four tables experiment with these and additional indices to suggest the present and future proliferation status of various states. For nine states of current concern, tables 4.4 and 4.5 combine the indices of the two previous tables with a new index to suggest pressures for nuclear weapons and produce two new indices: one to indicate prospects, at present and in 1995, for a nuclear test; the other to suggest prospects for production of nuclear weapons for these years. Table 4.6 then ranks these states by the present nuclear test index, while table 4.7 ranks all 23 states by a future weapon production index. All of these indices, it must be emphasized, are subjective. They reflect the author's best judgement based on information in the open literature.

Examination of these tables supports the common-sense conclusion that proliferation risks depend upon a combination of the desire to get them and the ability to make them. So it is not surprising that countries listed high in table 4.7 include those with a strong motive but a lesser industrial base as well as states with less motive but strong capability. This suggests that while proliferation risks would be reduced were the former to turn their interests elsewhere, the risks surely would increase if the latter were to increase their desire for atom bombs. Since the world and its nations continue to change, states presumed to be 'safe' today may not be safe a decade or so hence.

V. Collective response of the nuclear supplier states

The voluntary, informal agreement among the major nuclear suppliers to exercise restraint and to require common conditions for certain nuclear exports was itself a response to the concerns of the early 1970s.

Events of the late 1970s and early 1980s have put new pressures upon this part of the regime. Questions about supply of non-nuclear items capable of use in nuclear facilities, that is, dual-use or grey area items, and about a requirement for full-scope safeguards are evident but have yet to produce visible change.

Looking ahead further into the 1980s, it seems likely that this part of the non-proliferation regime will continue. Probably it will not be made much more restrictive, because the Third World has kept up a continuing barrage of opposition to any new restrictions. These states charge that the nuclear supplier restraints violate their rights under the NPT to

Table 4.2. Comparison of present nuclear industrial bases of 23 selected non-nuclear weapon states, 1982

State	Nuclear power (MW(e))[a] in operation, 1981	Enrichment capacity	Breeder development	Reprocessing capacity	Plutonium fuel plans	Heavy water capacity	Technical personnel	Nuclear capability index (subjective)	
								Test	Produce
Argentina	335	No	No	Not yet[b]	Yes	UC	Some	3	0
Australia	0	No[c]	No	No	No	No	Some	0	0
Belgium	1 664	No	Some	Minor[d]	Some	No	Good	1	0
Brazil	0	UC	No	No[e]	Some	No	Some	0	0
Canada	5 494	No	No	No	No	Some	Strong	2	1
Cuba	0	No	No	No	No	No	Minor	0	0
Egypt	0	No	No	No	No	No	Minor	0	0
FR Germany	8 606	No[f]	Yes	Minor	Yes	No	Strong	2	2
India	809	No	Yes[g]	Yes	Yes	Some	Good	3	1
Iran	0[h]	No	No	No	No	No	Minor	0	0
Iraq	0	No	No	No	No	No	Minor	0	0
Israel	0	No	No	Minor	No	No	Strong	4	2
Italy	1 999	No	Some	No	Some	No	Some	1	0
Japan	14 994	No[i]	Yes	Yes[j]	Yes	No	Strong	2	1
Libya	0	No	No	No	No	No	Minor	0	0
Netherlands	501	Some	Some	No	Some	No	Some	1	0
Pakistan	125	UC	No	UC	Unknown	No	Some	1	0
South Africa	0	Some	No	No	No	No	Some	2	1
South Korea	564	No	No	No	No	No	Some	1	0
Spain	1 973	No	No	No	No	No	Some	1	0
Sweden	6 415	No	No	No	No	No	Good	2	0
Taiwan	2 159	No	No	No	No	No	Some	1	0
Yugoslavia	0	No	No	No	No	No	Some	0	0

[a] *Source: Nuclear Engineering International*, August 1982, p. 3.
[b] Argentina has a prototype reprocessing plant nearing completion.
[c] Australia is planning to build an enrichment plant.
[d] Belgium has a prototype reprocessing plant that is at present shut down, but it may be reopened.
[e] Brazil ultimately expects to get reprocessing assistance from FR Germany.
[f] FR Germany is active in Urenco enrichment and is planning to build its own plant.
[g] India's long-range plan is to breed ^{233}U from thorium.
[h] Iran has several partially completed large nuclear power plants, but construction stopped with the revolution.
[i] Japan is planning a large enrichment plant. It has a small experimental plant in operation.
[j] Japan has a working prototype reprocessing plant and is planning a commercial reprocessing plant.
UC = Under construction.
Index rating scheme: 5 = advanced, 4 = strong, 3 = moderate, 2 = some, 1 = slight, 0 = none.

Table 4.3. A speculative comparison of future nuclear industrial bases of eight non-nuclear weapon states non-party to the NPT, 1995

State	Estimated operational nuclear power (MW(e))[a]	Enrichment capacity	Breeder capacity	Reprocessing capacity	Commercial plutonium use	Heavy-water capacity	Technical personnel	Nuclear capability index (subjective)	
								Test	Produce
Argentina	2 826	No	No	Notable[b]	Perhaps	Yes	Good	4	2
Brazil	3 116	Some	No	Minor	No	No	Good	3	1
Cuba	816	No	No	No	No	No	Some	0	0
India	2 129	No	Perhaps	Some	Perhaps	Some	Good	4	2
Israel	600	No	No	Some	No	No	Strong	4	2
Pakistan	1 062	Perhaps	No	Perhaps	No	No	Some	3	1
South Africa	1 842	Some	No	No	No	No	Good	3	2
Spain	15 184	No	No	No	No	No	Good	2	1

[a] *Source: Nuclear Engineering International*, August 1982, p. 3.
[b] A large pilot plant should be in well established operation.

Index rating scheme: 5=advanced, 4=strong, 3=moderate, 2=some, 1=slight, 0=none.

"participate in the fullest possible exchange" of equipment, materials and technology for peaceful uses of nuclear energy. The Third World claims that the suppliers are trying to create a cartel to restrict access to nuclear technologies and delay their industrialization.

On the other hand, in 1980 the International Nuclear Fuel Cycle Evaluation, in which the Third World took part, recognized reasons why

Table 4.4. A speculative comparison of present proliferation potential of selected non-nuclear weapon states, 1982

State	Nuclear weapon pressure index[a]	Test capability index[b]	Test risk index[c]	Production capability index[b]	Production risk index[d]
Argentina	3	3	9	0	0
Brazil	2	1	2	0	0
India	3	3	9	1	3
Iran	3	0	0	0	0
Iraq	3	0	0	0	0
Israel	3	4	12	2	6
Libya	4	0	0	0	0
Pakistan	4	1	4	0	0
South Africa	2	2	4	1	2

[a] Subjective rating on a scale of 0–4: 0=none, 1=slight, 2=some, 3=moderate, 4=strong.
[b] Index rating scheme: 5=advanced, 4=strong, 3=moderate, 2=some, 1=slight, 0=none.
[c] Product of pressure index and test capability index (range: 0–20).
[d] Product of pressure index and production capability index (range: 0–20).

Table 4.5. A speculative comparison of future proliferation potential of selected non-nuclear weapon states, 1995

State	Nuclear weapon pressure index[a]	Test capability index[b]	Test risk index[c]	Production capability index[b]	Production risk index[d]
Argentina	3	4	12	2	6
Brazil	3	3	9	1	3
India	3	4	12	2	6
Iran	3	1	3	0	0
Iraq	3	1	3	0	0
Israel	3	4	12	2	6
Libya	4	1	4	0	0
Pakistan	4	3	12	1	4
South Africa	2	3	6	2	4

[a] Subjective rating on a scale of 0–4: 0=none, 1=slight, 2=some, 3=moderate, 4=strong.
[b] Index rating scheme: 5=advanced, 4=strong, 3=moderate, 2=some, 1=slight, 0=none.
[c] Product of pressure index and test capability index (range: 0–20).
[d] Product of pressure index and production capability index (range: 0–20).

Table 4.6. Selected states ranked by present nuclear test index*

State	Present nuclear test index	Party to NPT or Tlatelolco Treaty	Unsafeguarded facilities	Plutonium sources		Reprocessing	Enrichment
				Weapon grade	Reactor grade		
Israel	12	No	Yes	Yes	No	Yes	No
Argentina	9	No	Yes	No	Yes	UC	No
India	9	No	Yes	Yes	Yes	Yes	No
Pakistan	4	No	Yes	No[a]	Yes	UC	UC
South Africa	4	No	Yes	No	Yes	No	Yes
Brazil	2	*b*	UC	No	Yes	No	No
Iran	0	Yes	No	No	No	No	No
Iraq	0	Yes	No	No	No	Minor[c]	No
Libya	0	Yes	No	No	No	No	No

UC=under construction.

* From table 4.4.

[a] Pakistan's small nuclear power plant could be run to produce weapon-quality plutonium.
[b] Has signed and ratified the Tlatelolco Treaty but not put it into force.
[c] Laboratory scale.

Table 4.7. A speculative ranking of 23 selected states by future nuclear weapon production index, 1995

State	Plutonium sources		Reprocessing	Enrichment	Production risk index[a]
	Weapon grade	Reactor grade			
Argentina	No	Yes	Yes	No	6
FR Germany	Small	Yes	Yes	Yes	6
India	Small	Yes	Yes	No	6
Israel	Small	No	Yes	Perhaps	6
Japan	Small	Yes	Yes	Possible	4
Pakistan	Perhaps	Yes	Yes	Perhaps	4
South Africa	Small	Yes	No	Yes	4
Brazil	No	Yes	Perhaps	Perhaps	3
Australia	Small	Perhaps	No	Perhaps	2
South Korea	No	Yes	No	No	2
Sweden	Small	Yes	No	No	2
Taiwan	No	Yes	No	No	2
Belgium	Small	Yes	Perhaps	No	1
Canada	Small	Yes	No	No	1
Italy	Minor	Yes	No	No	1
Netherlands	Small	Yes	No	Yes	1
Spain	No	Yes	No	No	1
Cuba	No	Perhaps	No	No	0
Egypt	No	Perhaps	No	No	0
Iran	No	Perhaps	No	No	0
Iraq	Perhaps	No	No	No	0
Libya	No	Perhaps	No	No	0
Yugoslavia	No	Yes	No	No	0

[a] Product of pressure index and production capability index (range: 0–20).

suppliers might wish to impose controls. But it also recognized the concern of consumer states. INFCE said:

> It was recognized that governments are not likely to give up the responsibility of intervening in supply arrangements when they perceive it to be necessary from the point of view of their national or international interests. Nevertheless, consumer countries have been acutely concerned by these interventions, especially when, as has sometimes been the case, they reflect unilateral changes in agreed conditions of supply, and even more so when the action has had a retrospective aspect. Supplier governments, however, generally place great importance on the achievement of non-proliferation objectives and are not willing to supply, or continue to supply, nuclear materials in circumstances that do not adequately respect those objectives. [4c]

This conflict between goals of the nuclear supplier states and of the Third World gave rise to plans for the forthcoming UN Conference for the Promotion of International Co-operation in the Peaceful Uses of Nuclear Energy (PUNE) to be held in Geneva.

Looking at the situation for voluntary understandings among the suppliers in 1982, it appears that:

1. No suppliers have withdrawn their voluntary commitments, nor do any appear likely to.
2. There is little interest in resuming meetings because of anticipated Third World charges that such meetings would constitute further efforts to establish a nuclear cartel and otherwise restrict access to nuclear power technologies.
3. Some redrafting of the lists of nuclear exports may require safeguards for more dual-use, or grey area, items.
4. While the United States can be expected to press other suppliers to require full-scope safeguards for their nuclear co-operation, the success of this effort remains to be seen.
5. There is little prospect that the voluntary guidelines will be replaced soon by agreements arising out of the IAEA's Committee on Assurances of Supply.
6. The Supplier Group is likely to be the target of criticism and further opposition at the coming PUNE conference.
7. The US policy of keying nuclear co-operation to the state of nuclear technology and the proliferation risks posed by other countries may be seen by some suppliers as reason for them to exercise similar flexibility in their own decisions on nuclear co-operation.

On the whole, there appears little reason to expect major changes in the nature of the voluntary suppliers agreement, although the present commitments are unlikely to be disclaimed.

Looming on the horizon is the prospect that several other countries may become notable suppliers. Argentina, India and South Africa are already able to supply some nuclear products and materials. However, they are not now part of the supplier group and their attitude towards the controls on nuclear co-operation suggests that they would be less demanding than are the major suppliers.

VI. Additional responses of individual suppliers

Going beyond the collective response of the nuclear supplier states to events of the 1970s, three states felt pressures to take additional unilateral action. These were Australia, Canada and the United States. All three required either full-scope safeguards or NPT membership as a condition for their nuclear co-operation. Each has cut off nuclear exports to states that would not agree, with some cut-offs temporary and others of longer duration. Within each state there is substantial public support for vigorous non-proliferation policies.

Australia

Australia is a major potential supplier of uranium and perhaps of enrichment services. In addition to its requirement for NPT membership, the Australian policy for nuclear co-operation is notable for its recent readiness to grant blanket consent for reprocessing of uranium of Australian origin in a specifically defined nuclear fuel cycle, with agreement in advance to reprocessing for energy use or for spent fuel management, and case-by-case consideration of requests for other peaceful, non-explosive purposes, including research [8]. Australia held up uranium exports to Euratom member states until agreement could be worked out on conditions for co-operation.

Canada

Canada is a major supplier of uranium and heavy water. Historically, it has maintained a strong anti-proliferation export policy. Following India's test in 1974, Canada immediately suspended all nuclear co-operation with that state. In 1976, when it was unable to induce India to agree to strengthened safeguards, Canada permanently embargoed exports of nuclear material and equipment to India. The following year, Canada also stopped uranium exports to nations unwilling to accept stronger non-proliferation conditions.

In 1976, Canada announced a requirement for full-scope safeguards and also for back-up safeguards if IAEA safeguards should become unavailable. In 1981 Canada and Euratom agreed upon an arrangement for blanket approval for reprocessing of Canadian-supplied uranium within the Community, thereby ending the earlier requirement for case-by-case approval.

The Canadian government has made clear that it gives first priority to the prevention of nuclear weapon proliferation and that it is prepared to accept the commercial consequences of this policy.

The United States

Until the early 1970s, the United States was the leading supplier of nuclear power plants and enrichment. Now it has no new export orders for nuclear power plants and its share of enrichment supply has dropped from a virtual monopoly to a fraction of orders in the West.

The United States requires full-scope safeguards as a condition for nuclear exports.[3] At the time of writing, this requirement had caused the

[3] The safeguards required under the US Nuclear Non-Proliferation Act are *de facto* full-scope safeguards, meaning application of safeguards to all nuclear facilities on the territory of a non-nuclear weapon state at the time of an export, but without any legal obligation to put new facilities under safeguards. In comparison, the *de jure* full-scope safeguards required by the NPT commit the member states to submit all present and future nuclear activities to safeguards.

suspension of US nuclear co-operation with Argentina, Brazil, India, Israel and South Africa. The many statutory US non-proliferation conditions and their unilateral imposition, sometimes retroactive, have generated resentment among many states. These new US conditions did not appear until the Carter Administration, for US reaction to India's 1974 test was mild and produced only a short cut-off of nuclear assistance.

In the Nuclear Non-Proliferation Act of 1978, Congress clearly linked nuclear power with proliferation, saying that "proliferation of nuclear explosive devices or of the direct capability to manufacture or otherwise acquire such devices poses a grave threat to the security interests of the United States and to continued international progress toward world peace and development" [9]. Congress considered it imperative to increase the effectiveness of international safeguards and controls on US nuclear assistance so as to prevent proliferation and to get other nations to agree to similar policies.

The Act placed statutory requirements on US nuclear exports, required full-scope safeguards, and directed the President to undertake negotiations to establish an International Nuclear Fuel Authority to assure a reliable supply to states agreeing to certain non-proliferation policies. Also, he was to negotiate agreements with other nations on common nuclear export policies that, among other things, would require full-scope safeguards, the placing of existing enrichment and reprocessing facilities under "effective international auspices and inspection", and the maximum possible limitation of the numbers of such facilities, located and managed so as to minimize proliferation and environmental risks.

President Reagan outlined his non-proliferation policy in July 1981, observing that, in the final analysis, the success of US non-proliferation efforts depends upon its ability to improve regional and local stability and to reduce those motivations that can drive countries towards nuclear explosives. "This calls for a strong and dependable United States, vibrant alliances and improved relations with others, and a dedication to those tasks that are vital for a stable world order" [10]. Of six basic guidelines outlined by the President, four directly relate to nuclear trade and co-operation. These four indicate that it is the policy of the Administration to: (*a*) continue support of the NPT and the Treaty of Tlatelolco; (*b*) view material violation of either treaty and any nuclear explosion with "grave concern"; (*c*) support and work with other states to strengthen the IAEA and international co-operation to reduce proliferation risks; and (*d*) continue to inhibit sensitive transfers of nuclear technology, equipment and materials, particularly where dangers of proliferation demand. In addition, becoming a reliable nuclear supplier is essential to US non-proliferation goals.

In October 1981 President Reagan lifted the indefinite ban of the

previous Administration on commercial reprocessing activities in the United States, and proposed full funding of the Clinch River Breeder Demonstration.

Most recently, in June 1982, the State Department confirmed that it would consider programmatic approval for reprocessing abroad of US-controlled uranium and the use of plutonium recovered therefrom, as an inducement to renegotiation of existing agreements for nuclear co-operation with Japan and Euratom. Later, it was stated that the United States would consider transfer of reprocessing technology to Japan and Euratom under certain circumstances.

Over the course of six years and three presidents, parts of US non-proliferation policy changed towards more denial and constraints as a way to limit the world-wide spread of reprocessing and, to a lesser extent, enrichment. The Ford and Carter Administrations favoured uniform action, treating all countries the same, whereas, in the name of 'new realism', the Reagan Administration would tailor its decisions to individual circumstances.

VII. Pressures on the IAEA

Since the International Atomic Energy Agency is very much the creation and creature of its member states, it comes as no surprise that its response to pressures of the 1970s mirrors the interests and differences of its members. The Agency has had to chart a course to compensate for currents that would carry it towards technical assistance for those members who want help in their uses of atomic energy and nuclear power on one hand, and currents that would take it towards non-proliferation functions, safeguards and inspection desired by the major powers and nuclear exporters on the other.

Pressures on the IAEA in the early 1970s were dominated by the impetus of the NPT and its great expansion of the Agency's safeguard function, and by the rise of interest in nuclear power that followed the oil crisis of 1973–74. By the late 1970s world-wide recession and declining prospects for rapid nuclear power growth made members reluctant to increase their funding of the Agency. Also, by the 1980s new pressures appeared as the Third World and non-aligned states began to organize their efforts to influence the Agency's activities, and some states tried to use the Agency as yet another stage upon which to advance their general political goals. Bloc politics to influence the Agency's technical functions were to be expected. However, turning the Agency into a new battlefield for external political matters, or politicization, is something else. If unchecked, politicization could damage the Agency and undermine the credibility of its safeguards.

The responses of the Agency to the trends and events of the 1970s have been both to expand its technical assistance, and to establish a new system of international inspection to verify adherence to the NPT. Increases in the Agency's budget provide one measure of its response. In 1970, the year that its new NPT responsibilities began, the total IAEA budget was $12 million, of which about $1.3 million (about 10 per cent) was for safeguards. For 1983, the Agency's regular budget estimate is $92.8 million of which $30.9 million, almost one-third, is for safeguards.[4]

IAEA committees

Much of the Agency's policy and guidance comes from committees of experts from member states: these provide examples in miniature of pressures at work on the Agency. The work of three committees in particular can directly affect the non-proliferation regime. Their subjects include, respectively, international plutonium storage, international spent fuel storage, and assurances of nuclear supply.

The Committee on International Plutonium Storage sought to address the continual problem of keeping plutonium out of mischievous hands. In 1978 it set out to study this matter, including possible activation of a long dormant provision of the Agency's charter which contemplated the storage of excess plutonium under IAEA auspices. Five years later the committee appears to be deadlocked. Conflicting interests confound the definition of criteria for the release of plutonium from storage to use, illustrating once more the inability of an international body to act when opposing pressures are closely balanced.

International storage of spent fuel would reduce the risk of plutonium recovery for explosive purposes. In 1979 a committee of experts from member states was established to look into this matter. The subject is complex, no state wants to host such storage, and there are no dominating pressures to achieve this. The committee has not yet concluded its deliberations.

The Committee on Assurance of Supply was established in June 1980 to discuss and make recommendations on issues of international nuclear supply. In part it reflects INFCE's equating of assurance of supply with assurance of keeping non-proliferation commitments. Here again, opposing pressures are at work. Nuclear supplier states, while sharing a common desire that their nuclear supplies and assistance not be used for nuclear weaponry, are not fully agreed about what changes to make in present

[4] Note that these figures do not take into account the high inflation during these 13 years, so the increase in level of effort financed by the 1983 budget is considerably less than simple comparison would indicate. The Agency also receives additional voluntary contributions from some members, which are usually for technical assistance and do not appear in the regular budget.

conditions for supply. The importing states, which by and large are in the Third World or the non-aligned bloc, have as their primary concern assurances that the necessary nuclear materials, equipment and technology will be available when needed and at reasonable prices. To complicate things, some of the present or potential suppliers are also importers, for example FR Germany and Japan. This committee too is deadlocked, with little prospect for agreement on notable changes.

Three years after INFCE's plenary conference, efforts to improve important parts of the non-proliferation regime are at virtual stalemate. Opposing pressures come from several camps: (*a*) those states which would further constrain co-operation in sensitive nuclear activities and put sensitive nuclear items under international control; (*b*) those which argue that safeguards on imports plus national statements of good intention provide enough non-proliferation assurances; and (*c*) those who oppose in principle any limitation of their access to nuclear assistance. The rough balance of competing pressures in these microcosms leads to inaction. Many see in this a source of potential weakness for the non-proliferation regime for the 1980s. There are doubts that the regime has enough support to become stronger, and this at a time when most of the advanced nuclear power states still officially expect to produce plutonium commercially and use it for nuclear fuel.

Safeguards

The IAEA response to pressures in the 1970s in performing its safeguards function has been notable but incomplete. On the positive side, the Agency successfully created a capable new safeguard system of inspection, materials accounting, containment and surveillance to verify the no-nuclear-weapons pledges of NPT states.[5] It continues to work for further improvement of its safeguards.

On the negative side, political and financial factors have not allowed full use of the inspection rights negotiated in the Agency's safeguard agreements. The pace of securing further improvements has been slow, so much so that more effective safeguards may not be ready by the time that some expect plutonium to come into widespread commercial use. Others would argue that safeguards for this fuel can never be made effective enough. On the other hand, the slow-down in nuclear power growth and possibilities of a marked increase in risks seen in plutonium could postpone

[5] For technical reasons, there will always be some discrepancies between figures in accounts for quantities of weapon-usable materials in bulk form and inventory figures derived from sampling, analysis of samples, and statistical analysis of this data. To provide other assurance that there have been no diversions, IAEA safeguards also call for physical barriers to keep unauthorized personnel away from nuclear materials (containment) and observation between inspections of places where such materials are stored, often by conventional or TV cameras (surveillance).

the 'plutonium economy', or even obviate it, with a consequent reduction of pressures to improve safeguards. As one senior IAEA official has pointed out, it is no surprise that even NPT states will accept inspections only under clearly stated legal and technical constraints derived from international consensus and specified in safeguard agreements. In the same vein, the effectiveness of the Agency's safeguards depends upon the co-operation of state officials and the operators of their nuclear facilities.

The continued refusal of some states to join the NPT and the existence of some sensitive nuclear facilities not under IAEA safeguards have not helped matters. In 1981, 12 non-nuclear weapon states which were not party to the NPT had nuclear facilities. In 8 of them, all substantial nuclear activities known to the Agency were covered by existing IAEA safeguard agreements. However, in 4, unsafeguarded facilities able to produce weapon-usable material were operating or under construction. Nevertheless, the Agency estimated that about 98 per cent of the nuclear activities in all non-nuclear weapon states were under safeguards.

As for the effect of these safeguards, the Secretariat's report for 1981 said it had not detected any anomaly which would indicate the diversion of a significant amount of safeguarded nuclear material—or misuse of facilities or equipment subject to safeguards—for the manufacture of any nuclear weapon or other nuclear explosive or to further any other military purpose. However, in the case of two nuclear power plants in non-nuclear weapon states, the Agency was not in a position to perform adequate verification pending implementation of certain technical measures.[6] IAEA negotiations with Pakistan offer prospects for some safeguard improvement there.

Another doubt about safeguards came in December 1981 when the Chairman of the US Nuclear Regulatory Commission advised Congress as follows:

> As a general observation, the IAEA possesses the strengths and weaknesses characteristic of international organizations. Its strength lies in its ability to serve as a forum in which the member nations can work cooperatively toward international standards governing the use of nuclear energy. It has served to highlight the necessity for international safeguards to protect against diversion of civilian nuclear materials. As an international institution, the IAEA is unique in providing for onsite inspection in member countries. Its weakness is that, in practice, it cannot enforce the standards agreed upon by its members. It is hesitant to act against a member state, it accepts many constraints imposed by member states on inspections, and its senior officials

[6] This observation by the Agency was a clear warning to the world that an unsatisfactory condition exists for the non-proliferation regime. The two states were presumably India and Pakistan. Yet there was little visible international response—no unilateral or collective action of any consequence to get the two states involved to accept the Agency's attempts to upgrade its safeguards in their countries. A clear and public warning was given, but the world continued business as usual.

tend to be overly cautious about facing important issues. All in all, because of these weaknesses, it appears the IAEA safeguards system may no longer be adequate in some instances. [11]

Recent encouragement for IAEA safeguards came in a statement by the Soviet Minister of Foreign Affairs at the UN on 15 June 1982 that the USSR was ready to place some of its nuclear installations under IAEA safeguards [12]. The UK, France and the USA previously had voluntarily placed some of their civil nuclear facilities under safeguards.

On the whole, the response of the Agency's safeguard system to changing external pressures has been to adjust and adapt to their realities. This may come as a disappointment to those who would have the Agency withstand and rise above the complex currents that swirl within its governing bodies and its Secretariat. But the Agency can do no more than its members permit, and can act only in ways acceptable to them. The contemporary importance and influence of smaller states in international organizations seem to increase a trend towards limitation, even stalemate.

In the absence of a well organized and predominant pressure for improved safeguards, and with some disinterested or contrary-minded member states, the Agency has to settle for decisions and policies of a lowest common denominator. Without such pressure, the 1980s are likely to see continuing doubts about IAEA safeguards. Should confidence in them be undermined, the credibility of safeguards will obviously be at risk (thereby threatening the non-proliferation regime itself).

VIII. Conclusion

The non-proliferation regime is not an unyielding, inelastic structure that can withstand the pressures of world trends and events. Rather it is somewhat malleable and responsive to them.

Looking ahead to the 1980s and beyond, new pressures can be expected that, unless offset by concerted action by its members, can weaken the regime. Clearly, the regime cannot strengthen itself. New strength can come only from its adherents, nuclear suppliers and users alike. How much future support will be forthcoming will depend upon the value that the peoples and their governments attach to a strong regime, and the price they are willing to pay for it.

If there is to be a new realism in thinking about how to avoid the further spread of nuclear weapons, it will have to begin with a recognition that the regime in all of its parts is a creature of its adherents and is constrained to respond in ways influenced by their continued interests. So efforts to strengthen the regime will have to be directed as much towards its member states as towards the regime itself.

The work of the nations that laboured in the 1960s and 1970s to create the regime will have to continue lest it fall into disrepair and disrepute. A great burden was imposed on mankind by that first atomic test at Alamogordo in 1945, one that can never be safely laid down.

Whether, or to what extent, the regime will stem the spread of nuclear weapons is hard to predict. But without it the risks and fears of nuclear weapon proliferation would be multiplied.

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5. Nuclear explosions[1]

By December 1982 the total number of nuclear explosions carried out since 1945 had reached 1 375. The USA and the USSR are responsible for 1 200 explosions, while the remaining 175 were conducted by France, the United Kingdom, China and India.

Nuclear testing activities in 1982 were intensive: the 54 tests exceeded by 10 the annual average for the preceding 19 years, that is, since the signing of the 1963 Partial Test Ban Treaty (PTBT) prohibiting atmospheric but allowing underground explosions.

The nuclear weapon powers were not equally active. China has not tested since 1980. The United Kingdom conducted only one explosion in 1982, while France reduced the number of its tests by 50 per cent as compared to 1981. The USA and the USSR—the two states engaged in developing a new generation of nuclear warheads for new delivery vehicles —conducted most of the tests.

For the USA, the number of tests in 1982 (17, of which one was a double explosion) was the highest since 1970. The USSR carried out more explosions in 1982 (31) than in any other year since 1963 and 10 more than in 1981. As many as 16 explosions were conducted outside the known Soviet weapon testing sites in East Kazakhstan and on Novaya Zemlya in the Arctic Ocean. New weapon testing sites may have been set up in the Soviet Union. It is also possible that the explosions in question served non-weapon purposes. But even so-called peaceful nuclear explosions provide weapon-related information.

All explosions in 1982 were carried out underground, in conformity with the PTBT. As in previous years, allegations were made that some Soviet explosions had exceeded the 150-kiloton limit set by the 1974 US–Soviet Threshold Test Ban Treaty (TTBT). No conclusive proof of infractions has been provided. The exact determination of the yield of underground explosions requires knowledge about the environment in which the explosions were carried out, as well as about explosions previously conducted at the same site. However, the exchange of information necessary to establish a correlation between yields of explosions at specific sites and the seismic signals produced, as envisaged in the TTBT, has not taken place, pending ratification of the Treaty. Ratification has been delayed due to the position taken by the United States.

[1] This chapter was prepared by Ragnhild Ferm.

Appendix 5A

Nuclear explosions, 1982 (preliminary data)

Note

1. The following sources were used in compiling the list of nuclear explosions:

(*a*) US Geological Survey,
(*b*) US Department of Energy,
(*c*) Hagfors Observatory of the Research Institute of the Swedish National Defence, and
(*d*) press reports.

2. Events marked with an asterisk * may be part of a programme for peaceful uses of nuclear energy in view of their location outside the known weapon testing sites.

3. m_b (body wave magnitude) indicates the size of the event; the data have been provided by the Hagfors Observatory of the Research Institute of the Swedish National Defence.

4. In the case of very weak events, it is impossible to distinguish, through seismological methods alone, between chemical and nuclear explosions.

Date (GMT)	Latitude (deg)	Longitude (deg)	Region	m_b
USA				
28 Jan	37.091 N	116.051 W	Nevada	6.1
12 Feb	37.224 N	116.463 W	Nevada	5.5
12 Feb	37.348 N	116.316 W	Nevada	5.8
17 Apr	37.017 N	116.010 W	Nevada	4.4
6 May	37.117 N	116.127 W	Nevada	4.3
7 May	37.069 N	116.045 W	Nevada	6.0
16 Jun	37.114 N	116.017 W	Nevada	
24 Jun	37.236 N	116.370 W	Nevada	5.9
29 Jul	37.126 N	116.109 W	Nevada	4.8
5 Aug	37.084 N	116.007 W	Nevada	6.1
11 Aug	37.190 N	116.048 W	Nevada	
2 Sep	37.020 N	116.016 W	Nevada	
23 Sep[a]	37.212 N	116.207 W	Nevada	5.2
23 Sep	37.175 N	116.088 W	Nevada	5.1
29 Sep	37.091 N	116.045 W	Nevada	
12 Nov	37.024 N	116.032 W	Nevada	
10 Dec	37 N	116 W	Nevada	5.2
USSR				
19 Feb	49.809 N	78.102 E	E Kazakh	5.4
25 Apr	49.889 N	78.976 E	E Kazakh	
11 Jun	50 N	78 E	E Kazakh	4.7
25 Jun	49.783 N	78.197 E	E Kazakh	5.0
4 Jul	50.047 N	78.799 E	E Kazakh	7.0
12 Jul	50 N	78 E	E Kazakh	4.6
30 Jul	62 N	113 E	Central Siberia*	5.0
31 Jul	47 N	48 E	W Kazakh*	4.0

Date (GMT)	Latitude (deg)	Longitude (deg)	Region	m_b
23 Aug	50 N	78 E	E Kazakh	5.0
28 Aug	47 N	48 E	W Kazakh*	4.0
31 Aug	49.901 N	78.834 E	E Kazakh	6.3
31 Aug	47 N	48 E	W Kazakh*	4.6
4 Sep	50 N	78 E	E Kazakh	4.1
4 Sep	69.175 N	81.691 E	NW Siberia*	5.2
15 Sep	50 N	78 E	E Kazakh	5.1
21 Sep	49.909 N	78.229 E	E Kazakh	5.5
25 Sep	64.311 N	91.859 E	Central Siberia*	4.7
1 Oct	47 N	48 E	W Kazakh*	4.0
10 Oct	61.555 N	112.833 E	Central Siberia*	5.3
11 Oct	73.368 N	54.532 E	Novaya Zemlya	6.3
16 Oct	47 N	48 E	W Kazakh*	5.4
16 Oct	47 N	48 E	W Kazakh*	5.3
16 Oct	47 N	48 E	W Kazakh*	5.5
16 Oct	47 N	48 E	W Kazakh*	5.6
27 Oct	47 N	48 E	W Kazakh*	4.0
21 Nov	55 N	50 E	S Ural*	4.4
29 Nov	55 N	50 E	S Ural*	4.1
30 Nov	47 N	48 E	W Kazakh*	4.5
5 Dec	50 N	78 E	E Kazakh	7.1
25 Dec	50 N	78 E	E Kazakh	4.9
26 Dec	50 N	78 E	E Kazakh	6.7
UK				
25 Apr	37.256 N	116.422 W	Nevada	5.6
France				
20 Mar	22.088 S	138.805 W	Mururoa	
27 Jun			Mururoa	
1 Jul			Mururoa	
21 Jul			Mururoa	
25 Jul			Mururoa	

[a] Double explosion.

Appendix 5B

Nuclear explosions, 1945–82 (known and presumed)

I. 16 July 1945–5 August 1963 (the signing of the Partial Test Ban Treaty)

USA	USSR	UK	France	Total
293	164	23	8	**488**

II. 6 August 1963–31 December 1982

a atmospheric
u underground

	USA		USSR		UK		France		China		India		
Year	a	u	a	u	a	u	a	u	a	u	a	u	Total
6 Aug–31 Dec													
1963	0	14	0	0	0	0	0	1					**15**
1964	0	28	0	6	0	1	0	3	1	0			**39**
1965	0	29	0	9	0	1	0	4	1	0			**44**
1966	0	40	0	15	0	0	5	1	3	0			**64**
1967	0	29	0	15	0	0	3	0	2	0			**49**
1968	0	39[a]	0	13	0	0	5	0	1	0			**58**
1969	0	28	0	15	0	0	0	0	1	1			**45**
1970	0	33	0	12	0	0	8	0	1	0			**54**
1971	0	15	0	19	0	0	5	0	1	0			**40**
1972	0	15	0	22	0	0	3	0	2	0			**42**
1973	0	11	0	14	0	0	5	0	1	0			**31**
1974	0	9	0	19	0	1	7	0	1	0	0	1	**38**
1975	0	16	0	15	0	0	0	2	0	1	0	0	**34**
1976	0	15	0	17	0	1	0	4	3	1	0	0	**41**
1977	0	12	0	16	0	0	0	6	1	0	0	0	**35**
1978	0	12	0	27	0	2	0	7	2	1	0	0	**51**
1979	0	15	0	29	0	1	0	9	0	0	0	0	**54**
1980	0	14	0	21	0	3	0	11	1	0	0	0	**50**
1981	0	16	0	21	0	1	0	11	0	0	0	0	**49**
1982	0	17[b]	0	31	0	1	0	5	0	0	0	0	**54**[c]
Total	**0**	**407**	**0**	**336**	**0**	**12**	**41**	**64**	**22**	**4**	**0**	**1**	**887**

[a] Five devices used simultaneously in the same test are counted here as one explosion.
[b] Two devices used simultaneously in the same test are counted here as one explosion.
[c] The data for 1982 are preliminary.

III. 16 July 1945–31 December 1982

USA	USSR	UK	France	China	India	Total
700	500	35	113	26	1	**1 375**

6. Nuclear weapons and the new peace movement[1]

Square-bracketed numbers, thus [1], *refer to the list of references on page 125.*

I. Introduction

In 1982, over one million Europeans demonstrated in several large gatherings for peace and against nuclear weapons, and on 12 June over half a million people gathered in New York City in what was probably the largest peace demonstration ever held. Meanwhile, in the United Nations, government representatives achieved less at the Second Special Session on Disarmament than they had at the first in 1978 (see chapter 17).

The growth in the past few years of the new popular movements for peace and disarmament is one of the political events of our time. Their influence has to be taken into account in any discussion of the success or failure of arms control negotiations. In some countries—the UK and the Netherlands—the policies put forward by these movements have, to a significant extent, been adopted by one of the major political parties. In the United States, nine states held a referendum—the largest of its kind in US history—on a nuclear 'freeze' as advocated by an important sector of the US peace movement; a majority approved the freeze in eight of the nine states. More generally, governments now consider that they have to appeal to public opinion, on military matters, much more than they ever did before. For example, both the Pentagon and the Soviet Ministry of Defence have produced well-illustrated booklets to show that world peace is threatened by the military deployment of the Soviet Union and the United States, respectively [1, 2].

This chapter documents the public's increased fear of nuclear war, and provides some information on the rise of the new movements. It discusses what brought about these changes—showing, for instance, that there is no simple relationship with the increase in the world's nuclear stockpiles. It looks at the variety of movements that now exist in this area; and at the end of the chapter it considers some of the government responses, actual and potential, to these new movements.

II. Public fear of nuclear war and support for nuclear disarmament

Public opinion polls show that the fear of nuclear war has increased markedly in recent years. For example, in a Swedish poll in 1973, 55 per

[1] This chapter was written by Malvern Lumsden.

cent expressed fear of nuclear war; in 1982, the figure was 78 per cent [3]. In a 14-nation sample in another poll, estimates of the probability of a world war in the next 10 years ranged from 29 to 47 per cent (figure 6.1) [3].

In a recent eight-nation poll in Western Europe and the United States, the "Soviet military build-up" was considered "most responsible for international tension" in all countries except France and Spain. But US military policy or "US aggressive policies towards the Soviet Union" or "superpower activities in the Third World" were ranked as the second biggest worry in every country except the United States [4]. In general, the polls in Western Europe suggest a lack of confidence in the two great powers.

There continues to be considerable public support for arms control and disarmament. As early as 1950, a majority of US respondents in a poll supported arms control negotiations with the Soviet Union. They were asked the question: "Do you think we should try again to work out an agreement with Russia to control the atomic bomb before we try to make the hydrogen bomb?". Forty-eight per cent said Yes, 45 per cent No, and 7 per cent had no opinion [5].

More recently, a summary of an international survey conducted on behalf of the Atlantic Institute and a number of major newspapers concluded:

> Americans who attach importance to dialogue with the Soviet Union and greater Western cooperation outnumber those who believe in greater emphasis on the military.
>
> Arms control is believed to be at least as important for security as the military balance with the Soviet Union in all countries, including the United States. "Productive arms control" was especially important to the Norwegians and Dutch, followed by the French and West Germans.
>
> In the United States, military balance with the Soviet Union, a Reagan administration priority, was ranked in the poll as a minor element in security. [4]

The summary concluded that, while the threat of war and nuclear weapons were major concerns, "inadequate defence emerged as the least important source of concern in every country".

A series of opinion polls in the United States on the issue of a nuclear freeze show overwhelming public support [5]. This is in spite of the fact that since the late 1970s Americans, as well as West Europeans, have tended to see the USA as lagging behind the USSR in the nuclear arms race [5, 6]. Opinion polls in the countries affected by the NATO decision on new nuclear missiles indicate majorities of the public opposed to the stationing of the new missiles. In the UK, 50 per cent opposed the government's decision to "allow the American government to base cruise missiles on British soil" in an April 1981 survey, while 41 per cent supported the decision. In the previous September, 49 per cent had supported the decision while 43 per cent opposed it [7].

In FR Germany, 39 per cent in May 1981 opposed the deployment of new intermediate-range missiles on West German soil, while 29 per cent

supported the deployment. One-third were undecided. A question explicitly coupling deployment to the requirement to engage in disarmament talks with the Soviet Union produced 50 per cent in favour and 20 per cent against [7].

In Belgium, in a September 1980 poll [7], 42 per cent opposed the installation of US missiles on Belgian territory while 26 per cent were in favour.

In the Netherlands, 68 per cent opposed and 28 per cent supported, in April 1981, the siting of cruise missiles in that country. A survey the previous autumn showed 53 per cent opposed to the presence of nuclear weapons on Dutch soil and 39 per cent in favour [7].

From the Netherlands and the United Kingdom there is evidence of a substantial and perhaps growing minority supporting *unilateral* nuclear disarmament. In September 1980, two polls in the UK gave figures of 21 and 28 per cent supporting unilateral disarmament. In October and November, following a Labour Party Congress in which nuclear disarmament was a major issue, the polls showed a rise to 35 and 41 per cent. (In September 1982, the Labour Party Congress voted with a two-thirds majority in favour of unilateral British nuclear disarmament.) A poll in the Netherlands in April 1981 showed 38 per cent in favour of the West disarming unilaterally [7].

It should be emphasized that these questions related specifically to the issue of nuclear weapons. All the poll evidence shows a majority of the population in favour of maintaining defence expenditures at approximately current levels (rather than either reducing or increasing them) and for remaining in NATO, even though there appears to be a significant minority, particularly amongst educated young people, favouring a more neutralist position and increased military expenditure [7].

III. The peace movement

Origins

It was some time after the detonation of the first atomic bombs before there were substantial popular movements for nuclear disarmament—although there were early warnings of the dangers. The Franck Report of 1945, for example, pointed to some of the problems even before the bombs were exploded [8]. The Council for a Liveable World was formed by American scientists in 1946, largely out of concern for nuclear weapons. By 1949, while the USA still had a monopoly of nuclear weapons, it was clear that they were mainly aimed at the Soviet Union and it is therefore not surprising that the USSR should encourage efforts such as the World Council of Peace (1949) and the Stockholm Appeal against atomic weapons (1950).

Figure 6.1(a). Selected indicators of public opinion on nuclear war

Responses in 14 countries to the question: "What is the probability that a world war will break out within the next 10 years?" (November 1981)

Country	Mean probability of war in next 10 years (%)[a]
Australia	46.4
Austria	29.3
Brazil	39.2
Canada	45.4
Denmark	36.8
France	39.3
FR Germany	41.0
Italy	31.7
Japan	43.9
Spain	44.6
Sweden	32.0
Switzerland	35.5
UK	33.5
USA	47.2

[a] A figure of 50 per cent means that the respondent considers it is even odds that there will be a world war.

Source: Gallup International, cited in *SIFO Indikator* (Stockholm), No. 7, 18 May 1982.

Responses in West European countries to the question: "How would you assess the chances of a world war breaking out in the next 10 years?" (1971, 1977 and 1980)

	War certain or more than 50–50 chance		
Country	1971 (%)	1977 (%)	1980 (%)
EEC	..	14	34
Belgium	8	21	33
Denmark	..	10	18
France	12	14	42
FR Germany	11	13	25
Ireland	..	14	31
Italy	13	14	32
Luxembourg	7	11	15
Netherlands	11	17	24
UK	..	13	39

Source: Commission of the European Communities, cited in de Boer, C., 'The polls: our commitment to World War III', *Public Opinion Quarterly*, Vol. 45, 1981, pp. 126–34.

US responses to the question: "If we should happen to get into an all-out nuclear war, what do you think your own chances would be of living through it?" (1961, 1963, 1981)

	1961 (%)	1963 (%)	1981 (%)
"Very good"	9	5	5
"Just 50–50"	44	40	32
"Poor"	47	56	60

Source: Gallup, from *Public Opinion*, August/September 1982, p. 35.

Figure 6.1(b). Selected indicators of public opinion on control of nuclear weapons

US responses to the question: "Would you favour or oppose a freeze on the production of nuclear weapons in both the United States and the Soviet Union?" (June 1982)

In favour (%)	Oppose (%)
83	17

Source: NBC News/Associated Press, 14–15 June 1982, cited in *Public Opinion*, August/September 1982, p. 39.

Responses in six West European countries to a question about the best way for a country to improve its security (March 1981)

Country	By 'arms control' (%)[a]	By 'strengthening military forces' (%)[b]
France	50	18
FR Germany	35	21
Italy	60	22
Netherlands	44	21
Norway	35	35
UK	40	31

[a] "By pushing harder for arms control negotiations to try to reduce military forces on both sides."
[b] "By strengthening its military forces to help NATO maintain a balance of military power with the East."

Source: US International Communications Agency, cited in Adler, K. and Wertman, D., 'Is NATO in trouble? A survey of European attitudes', *Public Opinion*, August/September 1981, pp. 8–12, 50.

By the late 1950s, there was increasing public concern about the dangers of radioactive fall-out from nuclear weapon tests. One aspect of this was that it did not much matter from whose tests the fall-out came—it became possible to take a 'neutralist' position with regard to nuclear weapons. The result was the emergence of scientists' groups (such as the Pugwash Movement following the Russell–Einstein Appeal of 1955 [8]), peace research institutes, and their international organ, the International Peace Research Association (1964), and mass organizations (such as the Campaign for Nuclear Disarmament in the UK and the Committee for a Sane Nuclear Policy in the USA).

It was against this background of public concern—expressed, for example, in the form of the Aldermaston marches in the UK—that negotiations were begun in Geneva, leading to the adoption of the Partial Test Ban Treaty in 1963 [9, 10]. The treaty, by driving most subsequent testing underground, essentially solved the problem of fall-out. Since this was the issue on which the anti-nuclear weapon movements had based much of their case, most public concern about nuclear weapons evaporated.

Many of the leaders of the nuclear movements became engaged in the anti-Viet Nam War movement during the latter part of the 1960s. Concern about nuclear weapons continued to be expressed by small groups of experts, but the mass movements dwindled away.

Recent developments

It seems that much of the impetus behind the recent growth in the peace movements has come from new organizations rather than the traditional peace organizations—although general-purpose peace organizations have also recorded an increase in membership. And in a few cases—for example, the Swedish Peace and Arbitration Society (founded in 1883)—an older organization has itself taken the lead in the new peace movement.

By 'general-purpose' peace organizations is meant those which deal with other issues as well as those specially related to nuclear weapons. Many of these organizations have a religious or humanitarian basis. Some of them are specifically pacifist while many are not, seeking rather to promote peace and international understanding by a variety of means ranging from the development of international law to the 'twinning' of local communities.

Without wishing to diminish the role of the traditional bodies, it is the new 'correlation of forces' that makes the current peace movement of interest: a correlation which includes anti-nuclear groups, environmentalists, churches, professional groups, and trade unions. The groups are so numerous and varied that a comprehensive listing would be impossible; the groups mentioned here are meant to be illustrative only.

The movements in Western Europe began with concern about specific nuclear weapon proposals—concern first about the neutron bomb and the proposed stationing of cruise and Pershing missiles in Europe. However, ideas have moved on—notably in the Netherlands—towards a wider programme of denuclearization in Europe; this has been accompanied by serious studies of the possibilities of non-nuclear defence. The movements are in general not pacifist but anti-nuclear weapon movements, supporting national defence with conventional arms and not being opposed to continued membership of NATO.

Nuclear disarmament movements

In the 1950s and 1960s nuclear disarmament movements were active in a number of countries. These organizations concentrated on the question of nuclear weapons without taking a stand on more general questions of disarmament or peace. Some of them were umbrella organizations promoting the nuclear issue within a broad range of affiliated political,

religious, pacifist and other organizations. Others were individual membership organizations.

The development of the Campaign for Nuclear Disarmament (CND) in the United Kingdom provides an interesting case study (table 6.1). In the early 1960s the CND was able to mobilize tens of thousands of people to participate in the marches from the British nuclear weapon factory at Aldermaston to Trafalgar Square in London. A national membership scheme was only introduced in 1967, presumably in an effort to rally a hard core of members at a time when mass interest in nuclear weapons was withering away. For 10 years membership fluctuated between 2 000 and 3 000 members. Then in 1977 membership began to increase exponentially, reaching 41 000 in 1982. The number of local groups increased from 50 in 1970 to 1 000 in 1982.

Table 6.1. Indicators of growth in the Campaign for Nuclear Disarmament (CND) in the UK, 1960–82

Year	National membership	Expenditure (£)	Employees	Local groups	Affiliated organizations	Annual print of *Sanity*[a]
1960	[b]	..	..	..	..	..
1970	2 120	..	5	50	..	73 210
1971	2 047	8 077	4	..	..	..
1972	2 389	..	4	..	68	..
1973	2 367	8 635	4	..	140	31 590
1974	2 350	..	4	..	..	..
1975	2 536	..	3	60	158	..
1976	2 965	11 495	3	..	..	..
1977	2 618	15 007	3	..	..	42 000
1978	3 220	16 957	3	..	..	42 000
1979	4 287	21 509	4	150	..	48 000
1980	9 000	26 415	5	300	..	60 000
1981	20 000	327 100	11	700	..	140 000
1982	41 000	640 500	25	1 000	1 000	660 000

[a] *Sanity* is the organization's magazine.

[b] CND was not organized as an individual membership organization until 1967, a period of declining public interest in nuclear weapons. At its peak in the early 1960s, the CND, if it had registered individual members, would probably have reached the low tens of thousands.

Source: General Secretary, CND, personal communication, 7 July 1982.

The timing suggests that the initial resurgence in membership resulted from the debate on the so-called 'neutron bomb'. But the big increase occurred after the NATO decision of 12 December 1979, which concerned the stationing of cruise missiles in the United Kingdom. At the same time, the British government decided upon a massive programme of modernization of its strategic nuclear forces. The CND advocates unilateral British nuclear disarmament, a policy now adopted by the opposition Labour Party.

In Britain, and in some other countries, there has been a remarkable development in that many local governments have passed resolutions declaring their areas 'nuclear-free'. Local government opposition appears to have been the main reason why the British government cancelled a planned nation-wide civil defence exercise during the autumn of 1982. Even the Greater London Council has officially launched a policy to "Make London Nuclear Free". A banner with this slogan was put outside the city hall, facing the Ministry of Defence and the Houses of Parliament; the council organized a day of workshops on putting the policy into practice and invited peace groups to a reception [10].

In Norway, the Campaign Against Nuclear Weapons which had existed in the early 1960s died out altogether, perhaps because Norway does not have nuclear weapons of its own. However, it is a member of NATO, and the 1979 decision contributed to the spontaneous growth of a new nuclear disarmament movement, *Nei til Atomvåpen* (No to Nuclear Weapons), in the months preceding the NATO decision. Once the decision was made, the movement developed a full-fledged national organization which now has some 300 local groups amongst a population of only four million. The Norwegian movement supports the notion of a nuclear weapon-free zone in the Nordic area.

In Denmark, the No to Nuclear Weapons organization, a counterpart to the Norwegian organization of the same name, developed in January 1980, following the December 1979 NATO decision, and now has about 45 local groups.

In Belgium, a Flemish- and French-speaking alliance of organizations was set up after October 1979 in response to the plan to station the new missiles on Belgian soil. It has organized a series of demonstrations and other actions to arouse public opinion, mobilizing tens of thousands of people.

In the Netherlands (see also page 115), the very widespread opposition to the new nuclear weapons is organized through a broad range of religious, political, trade union and other organizations rather than through a specifically nuclear disarmament organization. The same applies to FR Germany (see also page 113) where there is also a great range of very active peace and anti-nuclear groups, rather than a single local organization. Hundreds of thousands of people have participated in large-scale demonstrations. On 12 December 1982, demonstrations were held at 20 nuclear weapon sites and 30 other military centres.

In Italy, although there have been a number of large-scale peace demonstrations, these have usually been planned by organizations affiliated to political parties, usually the Communist or Socialist Parties. However, in Sicily, following the Italian government's decision on 7 August 1981 that the new NATO missiles would be stationed at Comiso, more than

100 local committees against the missiles were formed within a short time. A demonstration assembled 30 000 people. The Communist Party was the only one to support the demonstration, but at least half the demonstrators were not organized through any political party—an unusual event in Italy.

In France, which possesses its own nuclear weapons, there has been little opposition. The Mitterand government has taken a strong stand on modernizing France's own nuclear weapons and in supporting the NATO decision. Even the Communist Party has supported the building of a seventh French nuclear missile submarine, though it also organized a large peace demonstration in Paris. Nevertheless, a more specifically nuclear disarmament movement appears to be emerging in France. The *Comité pour le Désarmement Nucléaire en France* (CODENE) was formed on 1 February 1982, an outgrowth of the efforts of a number of organizations since 1980. Following the election of President Mitterand, the Larzac farmers and their supporters were able to celebrate victory over the French Army in its attempts greatly to increase the size of the training grounds [12]. An "Appel du Larzac" was issued at a celebratory gathering of 3 000 people in the summer of 1981, suggesting that the movement focus attention on the elimination of nuclear weapons and calling for the establishment of a broad-based campaign within the framework of the European nuclear disarmament movement.

For the first time, a European campaign, European Nuclear Disarmament (END), has emerged within the past few years. It is not a membership organization but attempts to co-ordinate and promote joint efforts in all European countries. A small 'research conference' was held in 1981. In July 1982 the first European Nuclear Convention was held in Brussels. A special effort is being made to establish contacts with individuals and groups in Eastern Europe.

In the United States, the Committee for a Sane Nuclear Policy (SANE) has existed for many years, while a vast range of other groupings, such as, for example, Ground Zero, have taken up nuclear weapon issues in one way or other. The Freeze campaign (Nuclear Weapons Freeze Campaign Clearinghouse) is one of the most notable recent developments. The basic idea has now been accepted as a policy platform by a large number of US organizations concerned about nuclear weapons.

Japan, the only country in which nuclear weapons have been used in war, is in some respects a special case; it has had a large anti-nuclear movement for years. However, a real anti-nuclear organization was not established until 1955, following the death of a Japanese fisherman from fall-out from the Bikini Atoll hydrogen bomb test in 1954. In 1963, the Japanese Council Against Atomic and Hydrogen Bombs (Gensuikyo), took a position distinguishing between 'capitalist' and 'socialist' nuclear testing, and as a

result lost a large body of its members who established a separate organization, the Japan Congress against A- and H-Bombs (Gensuikin). While the former receives much of its support from the Japanese Communist Party, the latter is supported by the SOHYO (the biggest trade union organization in Japan), the Socialist Party of Japan (the largest opposition party), the Komeito Party (a small but influential Buddhist party), and the Social Democratic League (the smallest party in Japan but one very concerned with disarmament and nuclear issues). In 1978 and again in 1982, the Gensuikyo and the Gensuikin collaborated in activities leading up to the UN Special Session on Disarmament. In 1978 they collected 20 million signatures; in 1982, 36.7 million.

According to Gensuikyo, their movement has been rather stagnant in the period from 1970 to 1982, at least in terms of the numbers of affiliated organizations (100–120) and the number of paid employees (10–12). Several Japanese peace researchers have also pointed to the stagnation resulting from the association of the anti-nuclear movements with the main opposition political parties, at a time of increasing conservatism and nationalism in Japan. On the other hand, there are a number of new efforts emerging to break out of the grip of party politics. In spite of these difficulties, the Japanese nuclear disarmament campaigns mobilized 200 000 people at Hiroshima in March 1982 and 400 000 in Tokyo in May, suggesting trends similar to those in Europe.

Although Japan is not affected by a particular issue, like the 1979 NATO decision on Pershing II and cruise missiles, the first Trident I SLBM was deployed in the Pacific in 1979. It is being realized that the Pacific Ocean is increasingly becoming a site for nuclear weapons, particularly SLBMs, and from 1984 for the new sea-launched cruise missiles. Petropavlosk is a home port for the new Soviet Delta- and Typhoon-class submarines while the USA has built a port for the new Ohio-class Trident III submarines at Bangor, Washington state, on the other shore of the Pacific.

The people on the islands of the Pacific have long had cause to protest against the testing of nuclear weapons by outside powers, with in some cases disastrous consequences. The movement for a Nuclear Free Pacific has been in existence since the 1960s and brings together representatives not only from the various island groups but also from Japan, Australia and New Zealand.

Physicians and other professional groups

The Medical Association for the Prevention of War in the UK has been in existence for many years, holding regular conferences. However, in the past few years a number of new doctors' organizations and other professional groupings have sprung up, more specifically devoted to the prevention of nuclear war.

In the United States, a group of medical doctors in the Boston area decided to revive an older organization, Physicians for Social Responsibility, and arranged a public meeting with eminent speakers on the potential dangers of the nuclear industry. The meeting was called for 29 March 1979—the very day of the accident at the power station at Three Mile Island, Harrisburg, Pennsylvania. This dramatic event and its sequels gave the physicians' meeting and their organization massive press coverage.

A number of eminent physicians were more concerned by the possible dangers of nuclear war. A two-day symposium on the medical consequences of nuclear war was held in Cambridge, Massachusetts in February 1980 and in March a full-page open letter on the danger of nuclear war, addressed to President Carter and President Brezhnev, was published in the *New York Times*, signed by an impressive list of physicians. Brezhnev responded on 20 March 1980, in a letter published in *Pravda*. The White House telegraphed a response on 25 April.

In August 1980, at the XXXth Pugwash Conference on Science and World Affairs, held at Breukelen, the Netherlands, medical doctors from many countries (including Brazil, Chile, Czechoslovakia, Egypt, Finland, France, Kenya, the Netherlands, Nigeria, Poland, the UK, the USA, the USSR and Venezuela) issued a warning based on medical and other scientific data about the dangers of nuclear war. They concluded, *inter alia*:

> Medical disaster planning for nuclear war is futile. A nuclear war would result in human death, injury and disease on a scale that has no precedent in history, dwarfing all previous plagues and wars. There is no possible effective medical response after a nuclear attack . . . [13]

In December 1980, three US and three Soviet physicians met in Geneva to launch a joint effort to prevent nuclear war. (Subsequently, the same group met in Moscow for an unprecedented one-hour unedited television discussion of the dangers of nuclear war, transmitted all over the Soviet Union in July 1982. A slightly edited version has been produced for US public television channels.)

One result of these international initiatives was the emergence of doctors' groups against nuclear weapons in many other countries, and the formation of International Physicians for the Prevention of Nuclear War. This organization held a widely publicized congress in April 1981 [14] with more than 100 participants from Canada, the Federal Republic of Germany, France, Israel, Japan, the Netherlands, Norway, the Soviet Union, Sweden, the United Kingdom and the United States. The conference issued a direct appeal to physicians of the world to inform themselves about the dangers of nuclear war and to use their influence to strengthen the movement of physicians to prevent nuclear war. A second congress was held in Cambridge, England in 1982.

The doctors' movement—which includes members at the top of the US and Soviet medical establishments—has had an influence beyond the confines of the profession. One measure of this is the rapidly growing number of other professional groups which are organizing to prevent nuclear war—engineers, lawyers, teachers, journalists, psychologists, architects, authors and so on.

There is also a resurgence of interest among academics. Peace research, arms control and international security courses have been taught at a number of universities since about 1960. But in the last couple of years there has been an enormous growth in the number and variety of such courses, particularly at US colleges. In early 1982, the American Council on Education and the Association of American Colleges sponsored a conference on "The Role of the Academy in Addressing the Issues of Nuclear War". In February 1982, a new group, United Campuses to Prevent Nuclear War, was formed to promote academic interest in the subject; it claims contacts on more than 500 campuses. In some other countries Teachers for Peace groups have sprung up. In the UK, the National Union of Teachers voted in favour of a motion calling for nuclear disarmament.

In addition, there is growing activity within trade unions and student organizations. For example, the health workers' trade union in Sweden has financed a book and other material which it is using as a basis for starting study circles all over the country. The International Union of Medical Students has recently taken several initiatives on nuclear weapons.

The environmental movement

By 1972, when the UN Conference on the Environment was held in Stockholm, there were already a large number of non-governmental organizations concerned with environmental issues. The possible effects of war on the environment were at the time a current issue, due to the Viet Nam War [15], and the issue was given due consideration at the 'alternative' conference in Stockholm, though kept off the agenda of the main conference.

The environmental impact of war and preparations for war, particularly nuclear war, has continued to concern environmentalists. The international journal *Ambio* devoted a special issue to the topic in 1975 and in 1982 published a double issue on the possible environmental impact of nuclear war. *Environmental Conservation* has published a number of papers on environmental aspects of nuclear war. The Swedish Environmental Council, attached to the Ministry of Agriculture, invited a group of international scientists to contribute to a symposium on Environment and War in Stockholm in 1981 [12]. SIPRI has published a number of studies on these issues [15–17].

By the late 1970s environmental groups focused much of their attention on the possible hazards resulting from the civilian use of nuclear energy. Although some pointed to the links between nuclear energy and nuclear weapons, the environmental organizations tended initially to avoid the issue of weapons. Substantial campaigns against the civilian use of nuclear energy developed in a number of countries.

However, several events served to emphasize the links between civilian and military uses of nuclear technology, particularly in the USA. Deaths apparently resulting from radiation exposure among former soldiers who had participated in nuclear tests in the USA in the 1950s led to a number of court cases and the formation of the National Association of Atomic Veterans. The various plans for using enormous areas of land for basing the MX missile system also aroused considerable local opposition.

Internationally, various incidents have served to emphasize the linkage between civilian nuclear programmes and the real threat of nuclear weapon proliferation: the detonation of a nuclear 'device' by India in 1974; the disputes between Pakistan and its various nuclear technology suppliers; the Israeli attack on the Iraqi reactor; and so on. Greenpeace, as its name suggests, is an international environmental organization which is also involved in peace issues. Members have attempted to interfere with French nuclear weapon testing in the Pacific. In 1982, a Greenpeace group visited Leningrad and released balloons with peace slogans. Another group occupied the Swedish Embassy in Paris to protest about Swedish shipments of radioactive fuel to France for reprocessing.

In FR Germany, an environmentalist political party, the Greens, has played a leading role in the opposition to new nuclear missiles and other nuclear weapons in Germany.

The consumption of natural and human resources for military activities, both in peace and war, has been given considerable attention in UN studies of disarmament and development [18]. The UN is now engaged in a large-scale "system-wide" study of environmental issues, and as part of this effort the UN Environment Programme, in association with SIPRI, will be carrying out specific studies on the impact of military activities.

A preliminary survey carried out by SIPRI as a contribution to the UN study on disarmament and development [12] revealed many instances of conflict between local environmental groups and military forces as the latter attempt to extend training areas. In France the case of Larzac became a national issue and has been described as the French Army's most protracted war.

There are thus a variety of reasons for environmentalists to concern themselves with military and nuclear weapon issues. Conversely, an ecological perspective, particularly with respect to the rational and just use of the world's resources, is increasingly being adopted by peace organizations.

Women's peace groups

There are those who believe that women have a special role to play in peace activities. Veteran peace campaigner and Nobel Peace Prize winner Philip Noel-Baker wrote a number of messages of support to the Women for World Disarmament, an organization associated with the United Nations Association of Great Britain and Northern Ireland, in which he referred to a "special power to create opinion. [Women] form their children's thinking far more than any school . . . Women, by the very nature of their lives, know that violence is irrational and wrong. They can end the monstrous violence of modern armaments and war . . ."

Some recent events in Scandinavia give some support to this view. A proposal by a group of women to march from Copenhagen to Paris in 1981 received a great deal of media attention. Women for Peace groups in support of the march sprung up all over Scandinavia and hundreds of people participated in the six-week march. This was followed up by a massive peace rally in Gothenburg, Sweden in May 1982, and by a march from Sweden to Minsk, USSR in the summer of 1982. The latter raised considerable debate: on the one hand it was argued that the marchers would be compromised by 'collaborating' with the Soviet authorities; on the other hand, it offered an opportunity to show the Soviet people that people in the West are genuinely concerned about nuclear weapons.

Another development in which women have played a prominent role is a remarkable snowballing of peace programmes on Swedish radio and television, which has led to extensions abroad. A film actress and a television producer took the initiative in proposing a day of peace programmes which, after initial scepticism was overcome, became a week, and finally resulted in an unprecedented volume of programmes throughout the autumn of 1982. A considerable international effort also achieved some noteworthy success.

In the UK, on 12 December 1982 some tens of thousands of women from Britain and Europe surrounded the Greenham Common air base, where—if negotiations at Geneva fail—cruise missiles are due to be sited. A small group of women had camped outside the base for well over a year, despite legal action and imprisonment. The idea of women's peace camps has spread to other military bases in the UK, as well as to the Netherlands and Sicily.

Religious organizations

Faced with the complex moral issues raised by war and nuclear weapons, many religious denominations have in the past chosen to accept the positions of national governments. There are, however, notable exceptions.

And in recent years some religious organizations have played an active role in opposing nuclear weapons.

In Japan, the Buddhists have been particularly active in opposing nuclear weapons and promoting peace. In the United States, some sections of the Catholic Church have taken a position opposing nuclear weapons, as have some sections of other denominations. Together with traditionally pacifist denominations, like the Society of Friends (Quakers), religious organizations have played a major role in the current peace movement in the USA. In the United Kingdom, a working group of the Church of England has come forward with controversial nuclear disarmament views.

It is in the Netherlands that the Inter-Church Peace Council (IKV) has had a particularly important role to play in the movement opposing nuclear weapons. The Council was founded in 1966 and now has a significant political impact; its views on nuclear weapons appear to have been adopted by the Social Democratic Party which, although in opposition, is now the largest party.

In the GDR, church groups have taken a number of initiatives to promote peace and disarmament under the slogan *Frieden schaffen ohne Waffen* (Make Peace without Weapons). More than 20 000 badges with the slogan have been distributed, despite a government ban. Some 5 000 people met in a Dresden church for an anti-war meeting in February 1982, and about 3 000 met in June in Berlin. This church-based peace movement appears to be far larger than the independent peace groups in other East European countries—notably Hungary and the USSR (page 116).

Trade unions

Another significant thread in the current peace movement is that of trade unions, many of which have recently demonstrated much more interest in peace issues.

To some extent, some of this new interest may be explained by the general climate of opinion, in turn reflected by members' motions within trade unions. However, there are also other perspectives. In the last resort, it is the workers in the factories and their white collar associates in the design bureaux who produce the weapons and whose jobs are therefore closely tied to the arms race. Whereas in the past trade unions have tended to avoid disarmament issues because of the threat to jobs, recently they have been active in promoting a search for alternatives.

Thus, the International Metal Workers Federation—which no doubt counts among its members a substantial proportion of those who actually build the world's weapons—has distributed widely a study of the relationship between arms and employment, giving prominence to studies suggesting that more employment could be generated by civil expenditure rather than by military.

The trade unions associated with the British company Lucas Aerospace have had, by their investigation of an impressive list of alternative, 'socially useful products', a great impact on many people, if not on the directors of the company. They demonstrated that the skills and equipment represented by modern armament industries could be employed in a highly productive manner in other important sectors such as transportation, medicine and energy. The widespread interest created by these proposals has no doubt had its impact on trade union interest in disarmament.

The apparent contrast between government cut-backs in various civil expenditures and, in some cases, great new military investments may also have had its impact on trade unions at a time of economic recession and very high unemployment.

An apparently new development is the concern of trade unions potentially involved in another aspect of the arms race—that of the potential effects of nuclear war. The health workers trade union in Sweden has carried out a campaign to inform members about the potential danger to health of nuclear war.

Eastern Europe

The countries of Eastern Europe all have official peace organizations. In the Soviet Union, for example, there is the Soviet Peace Committee, the Soviet Peace Foundation, the Soviet Pugwash Committee, the Soviet Research Council on Peace and Disarmament and the Committee for European Security and Co-operation. In addition, organizations for youth, women, war veterans and other groups sometimes participate in peace-related activities. The organizations have both internal functions and foreign relations functions. Thus, according to *Soviet Weekly* (7 August 1982), on the eve of the UN Special Session on Disarmament, more than 60 million Soviet citizens participated in more than 20 000 'anti-war demonstrations'; one adult in three donates voluntarily to the Soviet Peace Fund.

What distinguishes these activities from peace demonstrations in the West is that while the latter tend to be critical of their own governments' policies, those in the East are not. They support the official line, essentially that "we want peace, it is the other side which forces the arms race upon us", and there is no overt criticism of their own military sector.

In Central Europe, there are indications of increasing support for the notion of nuclear disengagement, involving *both* great powers. In Hungary, a demonstration of 10 000 young people on 12 December 1981 called for a nuclear-free Europe (apparently including the European parts of the USSR).

In several parts of Eastern Europe there are signs of increasing non-official peace activity. The well-known East German scientist, the late

Robert Havemann, wrote an open letter to President Brezhnev on the eve of his visit to Chancellor Helmut Schmidt. The letter was originally signed by 25 East Germans and about 100 West Germans and called for the withdrawal of the occupying forces from both parts of Germany as a contribution to avoiding the risk of nuclear war. Havemann was also a co-author of the "Berlin Appeal", launched in January 1982 by Rainer Eppelmann, a priest in East Berlin. The appeal calls, *inter alia*, for a nuclear-free Europe and raises questions about military education in schools (recently introduced in the German Democratic Republic) and other issues. The appeal is now believed to have been signed by several thousand people. A campaign to convert "swords into ploughshares" has reached quite significant proportions in the GDR, particularly within the Protestant church.

In the Soviet Union, an independent peace group was founded on 4 June 1982 in Moscow. The policy of the group is reflected in its name, the Group to Create Confidence between the USA and the Soviet Union. "Public opinion in favour of nuclear disarmament and for a freeze on world nuclear weapons arsenals must be complemented by understanding between nations, especially between the USA and the Soviet Union", wrote the leader of the group, Sergei Batovrin, who was at the time forcibly confined to a psychiatric hospital by the authorities [19]. (He was released after more than a month, after considerable protest by Western peace activists. One member of the Moscow group was also allowed to leave the country and demonstrated for the release of Batovrin outside the Soviet Mission in New York).

In Czechoslovakia, spokesmen for Charter 77, including Dr Jiri Hájek, who was Foreign Minister at the time of the Prague Spring in 1968, have addressed a statement to state authorities as well as to the Czech Peace Council, the Christian Peace Conference (which has its headquarters in Prague) and Pacem in Terris in which they argue that peace and human rights are indivisible:

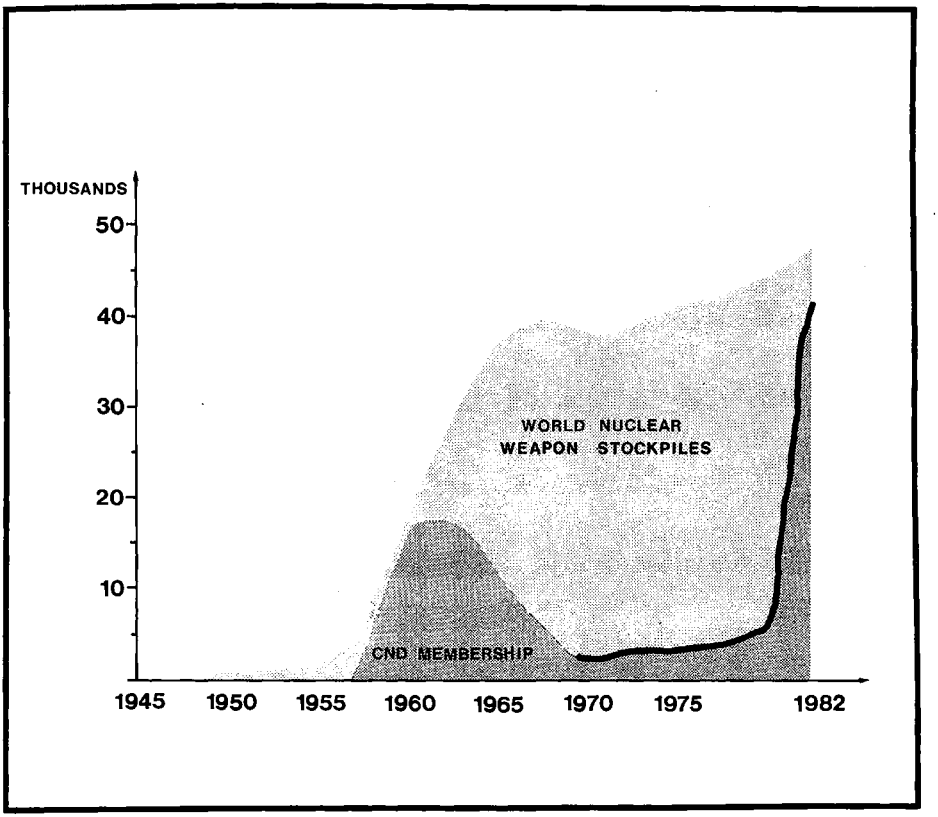
> Our continent faces the threat of being turned into a nuclear battlefield, into the burial ground of nations and of its civilization which gave birth to the very concept of human rights, amongst which the right to live occupies the supreme place. It is difficult to regard as champions of these rights, including the right to live and to be free from the fear of war, those who only criticise their ideological opponents, and rival powers for violating these rights while they themselves tolerate such violations . . . [20]

IV. Nuclear weapons and public concern

It might be assumed that the membership of groups opposed to nuclear weapons would grow in line with the world stocks of these weapons: as the world nuclear weapon stockpile rose, more and more people would

question the process and look for some alternative approach to security. As figure 6.2 shows, this is not in fact what happened. Indeed, just at the time—in the 1960s—when the nuclear weapon stockpile was rising very fast indeed, the first anti-nuclear weapon movements were dwindling away.

Figure 6.2. The growth of nuclear weapon stockpiles compared with the membership of a typical peace movement, the CND: 1945–82[a]



[a] Figures for world nuclear weapon stockpiles are derived from national totals in the following sources: 'Military record of CBR/atomic happenings', *Aviation Studies Atlantic*, January 1982; 'Military record of CBR/atomic happenings', *Aviation Studies Atlantic*, September 1982; Arkin, W. M., Cochran, T. B. and Hoenig, M. M., 'The US nuclear stockpile', *Arms Control Today*, Vol. 12, No. 4, April 1982.

Figures for CND membership from 1970 were provided by the General Secretary of the CND. The CND established a membership register for the first time in 1967, but was in the early 1960s a very significant movement (the curve prior to 1970 represents the order of magnitude in the absence of precise figures).

A number of possible reasons can be advanced for this rather curious connection—or disconnection—between rising stockpiles and diminished public concern. First, these stockpile numbers were not—and indeed still

are not—widely known. They do contain a certain amount of estimation, particularly for Soviet stocks of tactical nuclear warheads, but the general trend is not in dispute. However, most people were simply unaware of what was going on.

Secondly, the conclusion of the Partial Test Ban Treaty in 1963 took a good deal of wind out of the sails of the anti-nuclear weapon movements, since one of the main issues on which they had campaigned was the radioactive fall-out from atmospheric tests. The Partial Test Ban Treaty certainly led to a reduction in radioactive fall-out: it did not lead to any reduction in the number of tests.

Thirdly, from the early 1960s up to the Viet Nam War, the relationship between the United States and the Soviet Union appeared to be improving: and even during the Viet Nam War it proved possible to continue negotiations about nuclear weapons. During the 1960s there was perhaps a fairly general impression that—so far as nuclear weapons were concerned—there was a kind of plateau, or a fairly stable state of mutual deterrence. There was no general awareness of the new technological developments in nuclear warheads, delivery systems, and guidance systems; these developments, by improving the accuracy of the systems and in other ways, were leading the military increasingly to regard nuclear weapons as potential war-fighting weapons.

Finally, in the late 1960s and early 1970s, it was the Viet Nam War which largely preoccupied the concerns of many people in Western countries who might otherwise have been in anti-nuclear weapon movements.

The resurgence of the peace movements in the West can be dated from around 1979: and this resurgence was, initially, a West European rather than a US phenomenon. There were a number of events which acted as triggers. The proposal made in 1977—later withdrawn—to consider the introduction of the enhanced radiation weapon (the neutron bomb) into the European theatre, began to make nuclear weapons a live issue in Europe again. At a time when there were increasing public doubts in Europe about the possible hazards of civil nuclear energy programmes, the notion of a new bomb which produced enhanced radiation was not well received. In addition, the neutron bomb was severely criticized by many experts as threatening to lower the nuclear threshold.

The NATO 'twin-track' decision of December 1979—to install new nuclear missiles in Western Europe with a range which could reach the Soviet Union, unless there were successful negotiations on 'long-range theatre' or 'intermediate' nuclear weapons—was probably the most important stimulus to anti-nuclear weapon activity. It was a unique kind of decision. The date of the envisaged deployment of the weapons was some years away; this gave opponents time to organize, and also a specific goal to work for. Further, since the deployment decision was linked to a

commitment to negotiate with the Soviet Union, it made the idea of arms control negotiations unusually respectable.

There had been a prior warning that it was important, if possible, to avoid widespread public discussion of these nuclear issues. In the mid-1970s the Defense Nuclear Agency of the US Department of Defense commissioned a study from the Stanford Research Institute on political attitudes in Europe to the introduction of new nuclear weapons. The study concluded:

> Efforts must be made, therefore, to involve larger segments of the governmental bureaucracies in Europe in the discussions on nuclear weapons modernization and on the capabilities of the new systems, and to involve European political leaders in the dialogue on NATO force modernization to an even greater extent than heretofore. The building of "coalitions" among bureaucracies on both sides of the Atlantic to support the modernization effort would be helpful, as would the expansion of contacts between the defense bureaucracies and specific "publics" in the media, in the university communities, and elsewhere. Eventually attempts can be made to involve wider political audiences, especially local government officials. [21]

However, more general public debate was to be avoided:

> For the immediate future, however, we believe that a wider public debate needs to be avoided. As the history of the "Carte Blanche", the ADM, the "mini-nuke", and even the "neutron bomb" controversies shows, the process of issue formation in public debates tends to result in a vast oversimplification of complex problems, and in the presentation to the public of highly technical issues in sensationalistic terms. If proposals for modernization of NATO's tactical nuclear force should prematurely catch the attention of wide public audiences on both sides of the Atlantic, the very options which should result from the reform effort may be foreclosed. [21]

Governments, it may be noted, do not feel particularly inhibited about presenting 'highly technical issues in sensationalistic terms' when it comes to 'presentation of the threat'.

The worsening relations between the United States and the Soviet Union from 1979 onwards intensified concern in Europe about the risks of a nuclear war. In December 1979 the Soviet Union invaded Afghanistan; and the SALT II Treaty, signed in Vienna in June 1979 after seven years of negotiation, was not put to the US Senate for ratification.

At the turn of the decade there were a number of developments which added fuel to the fire. President Carter's decision of 1978 to postpone production of the neutron bomb was reversed, and the decision was taken to proceed to the production stage. There were a number of public references to the possibility of 'limited nuclear war'; this sounded to European ears (with some justification) very like 'nuclear war limited to Europe'. Very belatedly, many people in Europe realized for the first time that NATO's doctrine of flexible response meant that NATO was prepared to be the first to use nuclear weapons in Europe. This, then, was probably

the sequence of developments which led to the remarkable rise of movements in Europe opposed to nuclear weapons.

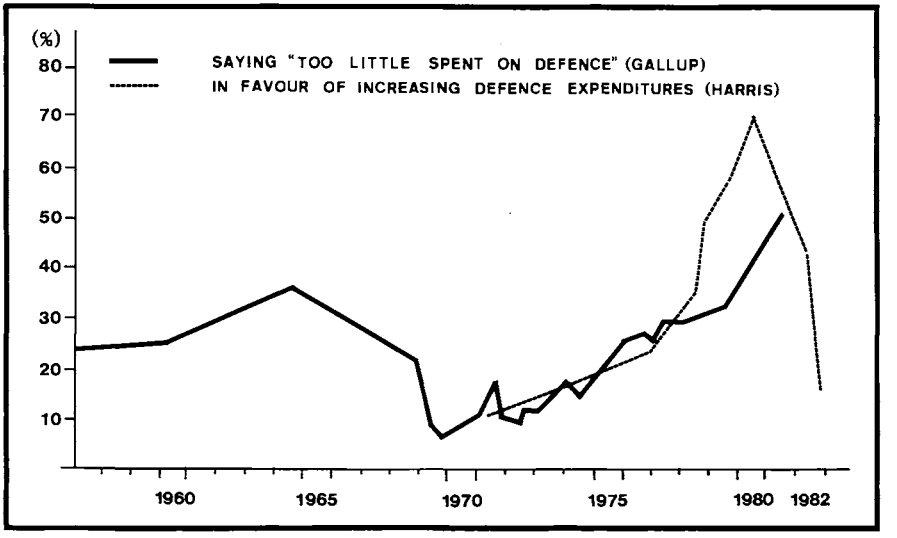
In the United States, the timing of the development of new peace movements was different: the nature of their concern was different as well. As figure 6.3 shows, opinion polls suggest that right through the 1970s there was increasing public enthusiasm in the United States for defence expenditure, culminating in 1980 with some 70 per cent of respondents saying that they were in favour of raising it. During the 1970s the US national image had suffered one assault after another: defeat in Viet Nam; humiliation in Iran; and a perception of a more aggressive posture on the part of the Soviet Union, particularly after the invasion of Afghanistan. Further, there had been a very successful campaign to suggest that the Soviet Union was in the process of acquiring all-round military superiority. It was against this background that President Carter decided, towards the end of his term, to increase military expenditure in real terms; the Reagan Administration pushed the figure higher.

It is probable that the military services guessed that this degree of popular enthusiasm for increased military spending would not last; for that reason they were anxious to get early approval and authorization for a wide range of new weapon programmes. In this assumption—that public opinion would swing against military spending—they were right. Indeed, the swing back has been remarkable both for its size and for its rapidity. It took a decade for the percentage of respondents in favour of increased defence expenditure to rise from 10 to 70 per cent. It took just two years for the percentage to fall back again to 17 per cent; in the same period the percentage favouring actual cuts in defence expenditure rose from 21 to 54 per cent [22]. Some part of this change might simply be because military spending is now much higher than it was two years ago: but this is probably only a small part of the explanation.

The reasons for this massive change in public opinion are necessarily matters of surmise. The proposition that the Soviet Union had some meaningful military superiority has come under increasing critical scrutiny; in particular, the suggestion that the Soviet Union had some first-strike capability against the United States has proved difficult to defend. The growth of the peace movements in Europe was widely reported and discussed in the United States; this will have had some effect in stimulating US concern. The figures of the US stockpile of nuclear weapons, and of the proposed renewal of that stockpile, became more widely known. It seemed to many people legitimate to question whether a further increase of some thousands in the number of nuclear warheads was an acceptable route to a more peaceful world.

To this must be added an economic factor. The US Administration, in addition to its objective of increasing military spending, also had the

Figure 6.3. Trends in US public attitudes on defence spending



Sources: Kriesberg, L. and Klein, R., 'Changes in public support for U.S. military spending', *Journal of Conflict Resolution*, Vol. 24, No. 1, March 1980, pp. 79–111; de Boer, C., 'The polls: our commitment to World War III', *Public Opinion Quarterly*, Vol. 45, 1981, pp. 126–34; *Business Week*, 15 November 1982, p. 14.

objective of reducing the share of total government spending in the national product, and of bringing down the budget deficit. Consequently, while military spending's share of the national product was due to rise, the share of other government spending—in particular on welfare payments—was due to fall. Thus the increase in military spending was seen as a direct cause of reductions in social expenditure of all kinds. Consequently teachers, social workers, health workers and recipients of public grants all saw the increase in military spending as a threat to their job security and to their standards of living. This may help to explain why these groups were so prominent in the massive demonstration of 12 June in New York City.

V. Government responses to the peace movements

Governments can ignore small peace movements: no response is needed. Once these movements get to a certain size, however, they can no longer be ignored, and that is the case now in both Western Europe and the United States. In the Soviet Union, the government feels no particular need to reply to any criticism of its nuclear weapon policies, since no such criticism is published.

There are many possible responses: this section comments briefly on three of them. The government can characterize the peace movements as naïve and/or subversive. Second, the government can intensify the presentation of the arguments for its existing policies, stressing in particular the threat from the other side. Finally, some measure of partial acceptance —sometimes essentially of a cosmetic nature—may serve to reduce the popular concern which gives rise to the peace movements.

So we can distinguish three government approaches to the peace movements. In the first, peace campaigners can be represented as good-hearted but naïve, ruled by emotion rather than reason. Another, 'harder' approach is to represent them as being controlled, knowingly or unknowingly, by persons sympathetic to the policies of a potential enemy.

During 1982, the stand taken by US Administration spokesmen towards the nuclear freeze campaign was primarily of the first kind. It was to welcome their concern; to say that the goal sought by the nuclear freeze campaign was the same as that of the Administration; and to hope that, when emotion was replaced by a more reasoned approach, the campaigners would see that the Administration's own view of the problem was the better one. Thus the US Secretary of Defense, Mr Weinberger, in reply to the question: "How do you account for the spectacular rise of the anti-nuclear movements in this country?" replied:

> It's the simplest thing in the world. Nobody wants a war, least of all a nuclear war. There are a growing number of persons in this country who feel that if they express this desire, that will prevent a war from occurring. We understand the goal and we agree with it. But we just think a more effective way to prevent war is to be strong enough to deter an attack. So we and the nuclear-freeze movement are in total agreement on the goal. We differ only on the means. [23]

Former ACDA Director Eugene Rostow, commenting on the peace movements, said: "I think we all share the premises of those movements and that is horror of nuclear war and an earnest desire to prevent nuclear wars of all kinds. We think the . . . methods proposed . . . are not designed to achieve these ends, but to encourage and perpetuate the Soviet drive for power". However, "the influence of such demonstrations in Europe has been helpful in stirring up discussions and debate about these infinitely important problems" [24]. The chief US disarmament negotiator, Edward Rowny, also said: "There is no disagreement between their goals and our goals. My hope is . . . that the emotion, which is well-meant, and I don't disparage that . . . will be replaced by a more reasoned approach to it" [25].

The similarity of these responses suggests that the respondents were using a common brief. There is no attack on the peace movements as 'aiding the enemy'; the approach is rather to say that the goals of the movements are worthy goals, shared by the Administration. The only difference

is an implied rather minor difference over means—and here the hope is expressed that reason will triumph over emotion.

However, there has been a suggestion from the President that the US peace movements have been infiltrated by—or, in more extreme form, manipulated by—Soviet agents; the House Select Committee on Intelligence, however, did not support the accusation of 'manipulation' [26]. In the Soviet Union, a Tass commentator has referred to the newly formed unofficial peace group as a 'Trojan horse' whose appearance has been stage-managed by Western secret services to discredit the official Soviet Peace Committee [27].

The approach of the British government has been to rely more heavily on allegations of Soviet involvement. The chairman of the Conservative Party is reported as saying that Soviet funds are being poured into the Campaign for Nuclear Disarmament [28]; the British Minister for the Armed Forces quoted a figure showing that the Soviet Union was spending £6 million a year in subsidizing West European peace movements [28]. No evidence was forthcoming for either of these statements.

Governments have also reacted by intensifying the presentation of the arguments for their nuclear weapon policies. Mainly this has involved reiterating that the Soviet Union has an all-round military superiority, in the intercontinental nuclear balance, in long-range theatre (or intermediate) nuclear weapons, and in conventional forces. By the appropriate selection of material, it is always possible to make a plausible case of this kind [29].

The third approach is to weaken the impetus of the peace movements by making some—possibly cosmetic—concessions of some kind, as with the Partial Test Ban Treaty of 1963. Could the same kind of thing happen again? The agreement to start negotiations is, of course, a move of a kind in the direction of arms control: it can, however, be a cosmetic gesture, if there is little genuine will to reach an agreement.

Obviously the European peace movements would, rightly, consider it a great triumph if in fact an agreement is reached by which new intermediate-range land-based missiles are not deployed in Western Europe. Indeed it is difficult to see anything less than this reducing the strength of these movements. It is an open question—if such an agreement were reached—whether this development would serve to strengthen or weaken the peace movement. It can be argued that, if this happened, many people might feel that they had achieved what they set out to do, and would turn their attention to other causes. Alternatively, success in this field might strengthen the determination to continue the campaign against other nuclear weapons in Europe.

In the United States, it may be that the Administration will be forced to abandon one or other of its proposed new nuclear weapon systems—such

as the new land-based MX missile, now known as 'Peacekeeper'. It is conceivable (though unlikely) that it might make a virtue out of necessity, and represent this as a major concession to the nuclear freeze movement. However, the abandonment of just one of the proposed new systems would not be enough to prevent the renewal and possible further increases in the US stocks of nuclear warheads.

VI. Conclusion

Any discussion of the prospects for arms control and disarmament must include an assessment of the prospects for the peace movements: the actors in the drama are no longer restricted to national governments and international institutions. It will be important, therefore, to continue to study the rise or decline of these movements, and to trace their influence, through political parties and in other ways, on political decisions.

One consequence of the existence of these movements is that—compared to five years ago—far more people are aware of the nuclear weapon issues now in debate. Cruise missiles, Pershing IIs, SS-20s, and MX missiles are terms which are now to be found in the vocabulary of a great many people in the West. Nuclear weapon issues are now matters of public debate, and are likely to remain so. Major decisions about nuclear weapons can no longer, in the West, be taken in secret—as has happened on a number of occasions in the past.

Perhaps the best indicator of the success or failure of these movements will be the trend in the world stockpile of nuclear warheads. At the moment the prospect is still of a further substantial increase in that stockpile. It will be a measure of the success of the peace movements if that trend can be checked and eventually reversed.

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Part II. World armaments

Chapter 7. World military expenditure and production

Introduction / NATO / The United States / The United Kingdom / France / Smaller NATO countries / Japan / The Soviet Union / China / World military expenditure, 1973–82 / Sources and methods for the world military expenditure data / Military expenditure series: a comparison of five Latin American countries / The burden of defence: the case of Israel

Chapter 8. Military prices

Introduction / Concepts / Current deflation practices in various countries / Product improvement

Chapter 9. Military research and development: some aspects of its resource use in the USA and the USSR

Introduction / US expenditure on military research and development / Military R&D in the USSR: some pointers to the scale of and trends in resource use

Chapter 10. Anti-tank missiles

Introduction / Anti-tank weapons today / The future / Conclusion

Chapter 11. The trade in major conventional weapons

Introduction / The flow of arms: general trends / Some supplier policies / Aggregate tables of the value of the trade in major weapons with the Third World, 1963–82 / Register of the arms trade with industrialized and Third World countries, 1982 / Register of licensed production of major weapons in industrialized and Third World countries, 1982 / Sources and methods for the world arms production and trade data

Chapter 12. Soviet arms exports

Introduction / Soviet production and exports / The export of modern weapons / Soviet arms trade policy / The role of WTO allies / Soviet export licensing

Chapter 13. French arms trade: the economic determinants

Introduction / Economic stages of arms transfer growth / Conclusions

Chapter 14. Chemical and biological warfare: developments in 1982

Introduction / Allegations of CBW / Developments in the field of CBW armaments / Developments in the field of CBW disarmament / The conclusions section of the Report of the Group of Experts to Investigate Reports on the Alleged Use of Chemical Weapons

Chapter 15. The military use of outer space

Introduction / Reconnaissance satellites / Reusable space transportation systems / Anti-satellite tests / Issues at UNISPACE 82 / Conclusions / Tables / Nuclear power sources on satellites in outer space

7. World military expenditure and production[1]

Square-bracketed numbers, thus [1], *refer to the list of references on page 158.*

I. Introduction

There is no doubt that the rise in world military expenditure is accelerating —a warning sign. It is never wise to put too much weight on the figure for one single year: it is better to look at the trend over a number of years.

The acceleration can be seen quite clearly if the movement during the period 1978–82 is compared with that of the period 1974–78. The past four years show a rate of increase (in volume terms) of nearly 4 per cent a year (3.8 per cent). That compares with a figure of just over 2 per cent a year (2.2 per cent) in the previous four-year period (figure 7.1).

The provisional estimate for 1982 shows a particularly high figure—a volume increase for world military spending of almost 7 per cent (6.9 per cent). This is, of course, liable to revision, and the figure contains a good deal of estimation. However, if the comparison is restricted to those countries for which 1982 estimates exist, the figure is still a high one—indeed rather over 7 per cent. So it is probable that the eventual revised figure for 1982 will still show it as a year when world military expenditure rose very fast.

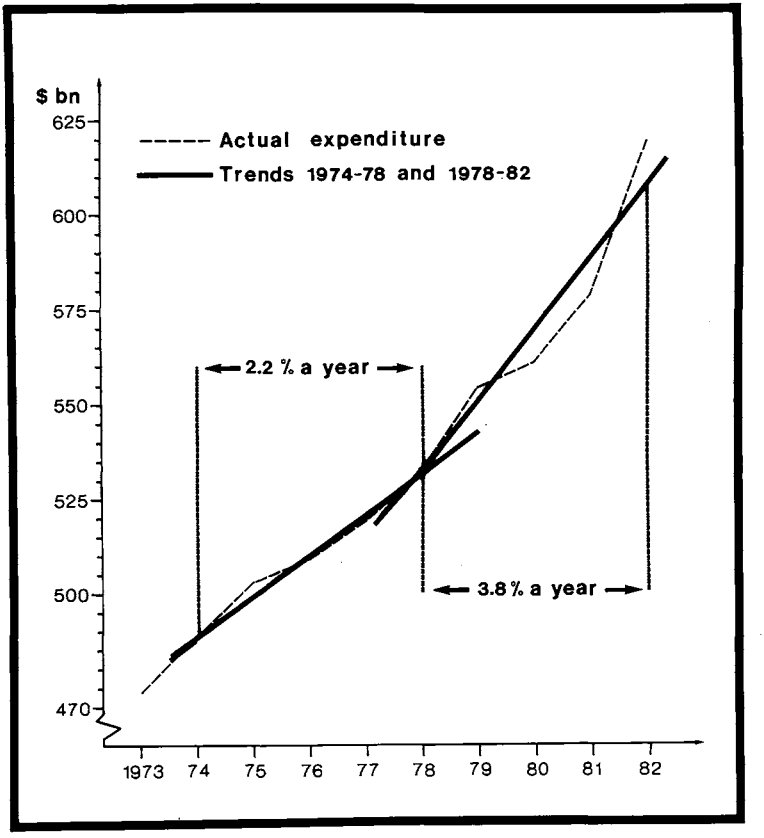
A good part of the acceleration is explained by the change in trend in the United States. The peak figure was at the height of the Viet Nam War, in 1968. After that, military spending in the United States dropped, in real terms, until the middle of the 1970s, and then stayed roughly constant up to 1979. Since 1979 it has been rising fast. Again, the figure for a single year can be misleading: the increase from 1979 to 1982, using NATO's standardized figures, is a volume rise of 22 per cent—an average of 7 per cent a year.

However, the change in the United States is not the whole story. Military spending has been very buoyant in recent years in large areas of the world. It has been increasing at a rate in excess of 4 per cent a year (from 1978 to 1982) in the Middle East, South Asia, the Far East (excluding China), Oceania and Latin America. The CIA estimate for the volume trend in the Soviet Union, which until recently had been for a figure of 3–4 per cent a year, has apparently been brought down to 2 per cent a year for the past six years.

The other areas of the world which have not joined in this rapid increase over the past four years consist of Western Europe (both NATO Europe

[1] This chapter was written by Thomas Ohlson and Rita Tullberg, assisted by Elisabeth Sköns.

Figure 7.1. The acceleration in world military expenditure[a]



[a] 1980 prices and exchange-rates.

and non-NATO countries), China and—on rather doubtful statistics—Africa.

The latest SIPRI estimate for the size of world military spending, in current 1982 dollars and for the year 1982, is $700–750 billion.

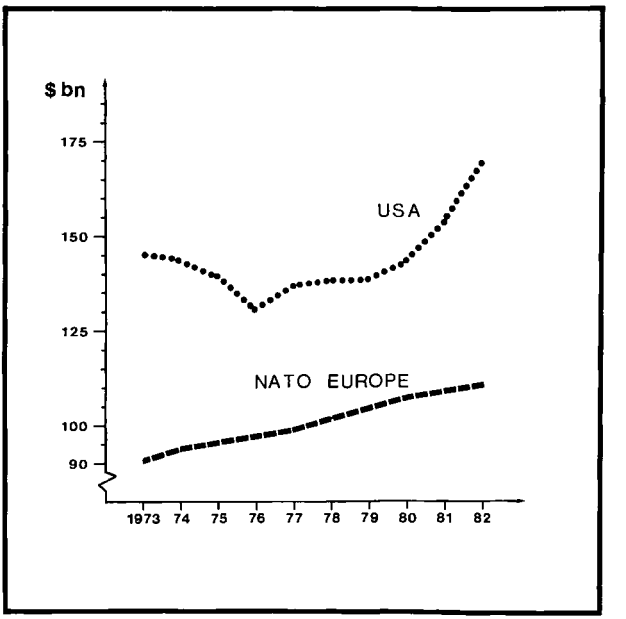
This chapter concentrates on what is happening in the main industrial countries of the world.

II. NATO

Expenditure

The gap between the military spending of the United States and that of NATO Europe has been widening (figure 7.2); it seems likely that it will get wider still. It is true that in the 1970s, up to 1979, US military spending was

Figure 7.2. Military spending of the United States and NATO Europe[a], 1973–82



[a] 1980 prices and exchange-rates.

constant or falling, while that of NATO Europe was rising steadily. By 1979, NATO Europe's spending had reached some 75 per cent of that of the United States. By 1982, within three years, that proportion had fallen substantially, to 65 per cent. In the past three years, the United States has begun a major rearmament programme; NATO Europe has not. The United States has accounted for four-fifths of the total increase in NATO countries' military spending over the past three years.

The analysis of NATO military spending in this section—and in table 7.1—is based on NATO's own standardized figures for military expenditure. They are adjusted for inflation by using consumer price indices, since a sensible way of looking at the burden of military expenditure is to consider the 'opportunity cost'—the civil resources which are forgone. If 'military input' price indices were used instead, the increases in volume shown in the table would in general be smaller.

There seem to be only two countries in NATO Europe—the UK and Italy—which have paid any effective attention to the 3 per cent volume target which NATO originally set over five years ago (table 7.1). Nor is there much prospect that the target will be met in NATO Europe in 1983. Finance ministers have continued to win out over defence ministers. European governments are preoccupied with their budget deficits: their

Table 7.1. NATO countries: estimated volume increases in military expenditure

Country	Annual, or average annual percentage increases					Size of military spending in relation to USA (USA = 100)[a]
	'Pre-target': From 1972–74 average to 1976–78 average	'Post-target': From 1976–78 average to 1982	1979–80	1980–81	1981–82	(1982)
United States	−2.0	4.6	3.7	7.0	10.2	*100*
Canada	3.9	2.2	3.5	1.7	7.0	*3*
All NATO Europe	2.3	2.2	2.7	0.8	2.3	*65*
of which						
FR Germany	1.0	1.3	1.2	1.6	−0.5	*16*
France	3.8	2.6	2.2	2.5	0.4	*16*
UK	0.3	2.9	8.1	−5.6	7.6	*16*
Italy	−0.4	4.6	4.6	2.1	5.0	*6*
Netherlands	3.4	1.1	−2.7	1.0	−0.1	*3*
Belgium	5.1	0.6	1.9	0.9	−6.7	*2*
Turkey	16.0	1.4	−5.3	23.5	11.3	*2*
Greece	14.4	0.2	−13.5	18.3	−1.3	*2*
Denmark	3.2	−2.4	1.0	1.1	..	*1*
Norway	4.1	2.5	1.1	1.0	2.7	*1*
Portugal	−13.5	0.9	8.5	−0.5	−2.8	*<½*
Luxembourg	5.8	5.1	16.4	3.2	−1.5	*negligible*

[a] Based on 1982 military spending figures, at 1982 prices and exchange-rates.

Source: Appendix 7A, table 7A.2.

main concern is to try to reduce these deficits in order to lower interest rates. (Whether this is good economic analysis is another matter.) Although they tend to agree that, theoretically, an increase in military spending would be a good idea, they do not consider it a good idea for their own countries at the present time.

The military expenditure trends in France, the UK and the smaller NATO countries are discussed below in separate sections. For FR Germany there were no particularly notable developments in 1982. Military spending has risen very little, in real terms, during the past three years. The Christian Democratic Union (CDU) had, when in opposition, criticized the defence budget as inadequate. However, the new CDU/Christian Socialist Union (CSU)/Free Democratic Party (FDP) government has in fact given priority to reducing the budget deficit: the 1983 military budget proposal has been only slightly revised, and there will probably be little if any real growth in West German military spending in 1983.

The divergent trends, as between the United States and its European allies, obviously add to the strains within the NATO alliance. A number of

US politicians, both individually and in groups, visited Europe during 1982 asking, to quote one such group: "why Europeans, much closer to the Soviet Union, appear far less concerned about the 'Soviet threat'. The short-hand answer: 'We are here and they are there', identifies the puzzle but does not resolve it. Proximity to Soviet military power should lead to greater concern, according to the logic of the American question. But clearly it does not . . ." [1] (see also [2]). In general, it is clear that most European governments are much more doubtful than the USA about substantial increases in military expenditure as the best route to European security. They do not consider the Soviet threat to be either so powerful or so imminent as to require them to change their economic strategies.

NATO strategy

NATO thinking about its strategy in Europe is showing signs of change. Under the rather euphemistic label of 'flexible response', present NATO doctrine implies a readiness for NATO to be the first to use nuclear weapons in Europe. That doctrine is coming under increasing challenge from academics, politicians, religious leaders and the more concerned well-informed public.

In a now famous article in *Foreign Affairs*, four eminent Americans concluded that the doctrine's "cost to the coherence of the Alliance and its threat to the safety of the world are rising, while its deterrent credibility declines" [3]. In a report on NATO made last year to the Senate Armed Services Committee, Senator Sam Nunn commented: "The heart of NATO's problem is that it has a military strategy that cannot be implemented . . . under conditions of strategic parity, a NATO nuclear response to nonnuclear Soviet aggression in Europe would be a questionable strategy at best, a self-defeating one at worst" [2a]. In addition to this pressure from the opponents of the first use of nuclear weapons there is also pressure from the anti-nuclear movements in Western Europe, which not only oppose the first use of nuclear weapons, but are also against any nuclear weapon deployment.

These criticisms of NATO strategy for the use of nuclear weapons are beginning to have their effect on military thinking. In recent statements the NATO Supreme Commander, General Bernard Rogers, has not gone so far as to accept the idea of 'no first use'; he has, however, gone so far as to suggest that, with appropriate expenditure on conventional forces, the strategy could be changed to one of 'no early use' of nuclear weapons. For this purpose, he has put in a demand that NATO countries should raise their target figure for the annual rise in military expenditure from 3 per cent to 4 per cent. If that were done, NATO might dispense with most of its 6 000 short-range nuclear weapons for battlefield use. General Rogers

is on record as saying "The anti-nuclear groups want the same things as I do" [4].

This recent elaboration of NATO strategy is sometimes referred to as 'deep strike' (incorporated in the broader US concept of 'Airland Battle'). Again in the words of General Rogers, it involves "exploiting Western technological superiority to provide us the means to target and destroy with conventional weapons the Warsaw Pact follow-on forces before they can reach the line of contact" [5]. Soviet military doctrine, it is said, calls for waves of attackers to flow to the front, taking the place of Soviet front-line units that fall back as they are exhausted. The deep-strike strategy calls for an array of new offensive conventional weapons to meet an adversary where his attack begins; that is, to strike at air bases, airfield runways, second- and third-wave armoured formations, command posts, fuel depots, choke points and other so-called high-value targets deep within the territory of the WTO countries.

This strategy capitalizes on recent advances in conventional weapon technology: the application of micro-electronics to enhance the front-line units' ability quickly to collect, handle, distribute and act on information about the enemy; and the substantially increased lethality of conventional weapons carrying improved munitions that can be delivered from existing platforms.

The weapon delivery systems and ammunitions and submunitions to implement such a strategy are already being developed. The French Matra Durandal anti-runway bomb and the West German MBB MW-1 dispenser will become operational in 1983–84, and the British JP-233 airfield attack munition programme is also in the final stages of development. These and other first-generation weapons suitable for deep strikes are mostly intended for attack on stationary targets in the rear, such as runways. Some of them (MW-1, JP-233) can also carry so-called 'area denial' submunitions. The present programmes are mainly of European origin. The next generation, involving air- and ground-launched delivery missiles carrying precision-guided submunitions with active homing devices, will emphasize an anti-armour capability.

The following description of the US Assault Breaker system illustrates how these new weapons function and their total dependence on adequate targeting techniques:

Assault Breaker is a complex weapon system, requiring the successful completion of 11 steps in the ground-launched version. An aircraft carrying the *Pave Mover* radar orbits behind the forward edge of the battle area and (1) surveys a designated area. Information from the radar is transmitted (2) to a data-processing station on the ground where it is (3) analysed to find potential targets. This information is (4) used by the battlefield commander to decide what targets to engage. The radar then tracks those targets and (5) missiles are launched. The weapon (6) flies to the submunition-dispensing point. For moving targets, the radar (7) tracks the missile and target before the

submunitions are dispensed. The radar also (8) provides position updates to the missile. When it is over the target array, the missile (9) releases its submunitions, which (10) acquire and (11) fly to their targets before detonating. [6]

This suggested strategy, involving as it should reduced reliance on tactical nuclear weapons, is of course a possible future development, not a present reality. As of now, the tactical nuclear weapons are still there.

Such a deep-strike strategy, exploiting advances in guidance technologies and conventional missiles, might be compatible with the idea of a nuclear weapon-free zone either side of the border between NATO and WTO territories. Other implications it might have for arms control and disarmament moves are yet to be examined.

There are, of course, many other proposals for non-nuclear defence. The importance of this particular idea lies in the fact that NATO is giving it serious consideration. However, if it does require from NATO European countries a 4 per cent real growth in military expenditure, it hardly seems politically feasible at present.

III. The United States

A considerable rearmament programme is under way in the United States. In the calendar years 1980, 1981 and 1982 the volume of outlays has risen (according to the NATO figures given in table 7.1) by 3.7 per cent, then 7.0 per cent, and in 1982 by a provisional figure of 10.2 per cent. US rearmament, therefore, is not just a matter for the future: it has already gone a long way.

The budget for the fiscal year (FY) 1983 (1 October 1982 to 30 September 1983)—which has been approved by Congress—continues this rapid rate of growth. The increase in the volume of outlays is put at 9.5 per cent (table 7.2). The figure could conceivably be higher, since the Administration is requesting $1.6 billion in additional supplemental funds for 1983, most of it in an attempt to overturn past congressional action in blocking some production of the Pershing II and MX missiles.

The military budgets for the next four years are equally ambitious (table 7.2). The projected volume rise in outlays in 1984 is even higher than that for 1983. If the whole long-term programme were to go through according to the Reagan Administration's plans, by 1988 military spending in the United States would have almost doubled in volume within a decade.

The US Administration's justification for this formidable programme is by now familiar. To take one example, the Secretary of Defense, in a statement before one of the congressional committees, said: "The 20-year Soviet military buildup, coupled with the collective failure of the United

Table 7.2. US Administration budget estimates for FYs 1983–88 (as of 31 January 1983)
Figures are in $ billions.

	1983	1984	1985	1986	1987	1988
Total obligational authority						
Total, current prices	240.5	274.1	322.4	357.2	389.1	425.2
Total, constant (1984) prices	249.3	274.1	304.6	321.1	333.2	346.6
Percentage change	*8.7*	*10.0*	*11.1*	*5.4*	*3.8*	*4.0*
Outlays						
Total, current prices	208.9	238.6	277.5	314.9	345.6	377.0
Total, constant (1984) prices	216.4	238.6	261.6	282.3	295.1	306.7
Percentage change	*9.5*	*10.3*	*9.6*	*7.9*	*4.5*	*3.9*

Source: Secretary of Defense Caspar W. Weinberger, *Annual Report to Congress, Fiscal Year 1984* (US Government Printing Office, Washington, D.C., 1983).

States and our allies to make a sufficient response, has resulted in a dangerous shift in the global military balance. This global military balance has shifted against us because the Soviet Union has out-invested and out-produced us for at least a decade" [7]. The presentation was accompanied by charts showing US estimates of the extent to which the Soviet Union had out-produced and out-invested the United States in recent years.

The qualifications which should be made to this assessment are also familiar. Dollar comparisons of US and Soviet military spending are of dubious validity. Simple comparisons of numbers of weapons produced (even if US intelligence estimates of Soviet output are accepted as accurate) make insufficient allowance for differences in technological sophistication. Whereas the United States sees the Soviet Union as virtually its sole potential enemy, the Soviet Union has, as potential adversaries, not only the USA, but also NATO Europe, China and Japan.

Congress and the economic consequences

The 1984 budget proposal, however, is unlikely to get through Congress without some major changes. At the time of writing, the debate is in its early stages; but by February 1983 congressional committees had indicated a strong disinclination to approve so large an increase. The Senate Budget Committee, for example, requested the Secretary of Defense to supply a paper setting out the results of a reduction in the real growth of military spending in FY 1984 to 8 per cent, 6 per cent, or 4 per cent, as compared with the 10 per cent figure in the budget presentation. However, it seems on balance probable that, even after congressional action, there will still be a substantial further rise in the volume of outlays in FY 1984.

The much stronger opposition in Congress this year to the increase in military spending follows the sharp change in public opinion in the past

two years. Between autumn 1980 and October 1982, an opinion poll showed a fall in the proportion in favour of increased military spending from 71 to 17 per cent and a rise in the percentage favouring an actual decrease from 6 to 24 per cent [7]. The public may think that expenditure has now been increased enough. It may be somewhat sceptical of the Reagan Administration's claim that US forces are much weaker than those of the USSR. There is also a widespread view that rising military expenditure is one of the causes of the economic recession.

Congressional and other criticism is indeed concentrated on the economic—and particularly the budgetary—consequences of the rearmament programme, perhaps to an excessive extent. In the 1960s, it was possible for the USA to devote on average some 8–9 per cent of its gross domestic product to defence, without noticeable damage to the economy, so it is not easy to argue that the same percentage now would be inevitably very deleterious. The more valid criticisms concern the national security justifications for the rearmament programme. The crucial question is not whether the USA can afford the military programme, but whether it should. However, it is quite clearly the economic issue which is predominant in the current arguments.

The Reagan Administration came into power with a set of irreconcilable objectives—to increase military spending, to reduce taxes and to reduce the budget deficit. It has proved impossible to square this circle: the budget deficit is expected to rise to the record level of $208 billion in FY 1983, and to be almost as high—$189 billion—in FY 1984. It is these budget deficits which are the main preoccupation of the critics, since there is a widespread belief in the virtues of a balanced budget. The second main concern is that the increase in military expenditure is leading directly to a cut-back in welfare spending.

The fear that the rapid rise in military spending will bring inflation with it is less prominent now than a year ago, since with high unemployment the rate of inflation (the year-on-year change at the end of 1982) has come down to 4.5 per cent. However, there is still the possibility of some 'bottleneck' inflation in the military sector. If the procurement plans set out in the five-year programme were to be fulfilled, the key defence industries—producing items such as aircraft, tanks, missiles, military electronics, semiconductors and communications equipment—would have to sustain annual increases in output, over five years, in a range from 15 to 25 per cent [8]. This could well bring localized wage and price rises; however, with the present level of unemployment, this is unlikely to lead to any significant acceleration in the general rate of inflation.

Furthermore, there is the argument about the effect of military expenditure on US competitiveness in the world market. A large and rapidly growing military procurement sector, it is argued, absorbs a considerable

amount of skill and expertise, both in the research and development (R&D) area and in the production process. If the USA devotes some 8 per cent of its domestic product to the military sector—as against 3 per cent for its European allies and 1 per cent for Japan—it will find its world market share falling for more technologically advanced civil products.

The Administration's reply to these criticisms is to argue—in this context, though not in others—an essentially Keynesian case: that expenditure in the military sector creates jobs, and that reductions in military expenditure will increase unemployment. The Secretary of Defense constantly repeats that each billion dollars of military expenditure creates 35 000 jobs. In the coming debate, a good deal will depend on the performance of the US economy. The Administration's forecast is of a recovery in output to the end of 1982, accompanied by low inflation. If in fact that does occur, the economic criticism may well become more muted.

Strategy and procurement

In addition to the economic criticism, there have been calls for a clearer statement of the strategic thinking underlying the rearmament programme. In Senate hearings on the 1983 defence budget, Secretary of Defense Weinberger outlined the new global strategy as follows:

> Basically, it is founded on the concept that we can no longer [rely] on the idea that there would be a short conventional war period which would escalate rapidly to nuclear war because we don't have that degree of nuclear superiority that we had all through the 1950's and 1960's and even into the 1970's . . . This has led us to feel that we should have more mobility, more airlift, that we have to improve and increase naval strength substantially and that we have to improve and strengthen our ability to carry on conventional war for a longer period of time than we had previously thought. That is the basis of the strategic concept that we are using. [9a]

This, however, is more or less identical to what he said a year earlier. The conclusion remains: if this is a strategy, then it is not a very detailed one. The statement seems rather tuned to a procurement programme which had already been decided on—a programme which could be briefly summarized as 'more of everything'.

The key words of the five-year programme are expansion, modernization, readiness and sustainability. The increase in spending on conventional weaponry is centred on a greatly expanded Navy; over the five fiscal years 1983–87 about 39 per cent of the total obligational authority (TOA) requested for the armed services is to be allocated to the Navy. The corresponding figures for the Air Force and the Army are 34 and 27 per cent, respectively. The total strength of the US Navy is now scheduled to be 650 ships in the early 1990s. The shipbuilding programme is shown in table 7.3.

Table 7.3. The US Navy shipbuilding programme, FYs 1983–88

Type	Designation	Description	Number of ships						
			1983	1984	1985	1986	1987	1988	1983–88
Trident SSBN	Ohio-class	Ballistic missile submarine	1	1	1	1	1	1	6
CVN	Nimitz-class	Aircraft carrier	2	–	–	–	–	1	3
SSN-688	Los Angeles-class	Attack submarine	2	3	4	4	5	5	23
CG-47	Ticonderoga-class	Cruiser	3	3	3	3	2	2	16
CGN-42	Virginia-class	Cruiser	–	–	–	–	1	–	1
DDG-51	–	Destroyer	–	–	1	–	3	5	9
DD-963	Spruance-class	Destroyer	–	–	–	–	–	1	1
FFG-7	O. H. Perry-class	Frigate	2	2	2	3	3	–	12
MCM	Avenger-class	Mine countermeasure ship	4	4	4	–	–	–	12
MSH	–	Minehunter/sweeper	–	1	–	4	4	4	13
Other (new construction)			3	3	6	13	9	11	45
Total (new construction)			17	17	21	28	28	30	141
Reactivation/conversion/SLEP[a]			7	6	5	3	4	3	28
Total			**24**	**23**	**26**	**31**	**32**	**33**	**169**

[a] Service Life Extension Program.

Sources: Department of Defense Authorization for Appropriations for Fiscal Year 1983, Part 1, p. 228; *Defense Daily*, 7 February 1983.

The entire naval programme for FY 1983—except funding for one of the Trident submarines—was eventually approved by Congress. It is argued that the Soviet naval programme, which has been building up the ocean-going capability of the Soviet Navy over the past two decades (see section VIII) is a threat to areas and sea lanes of vital strategic and economic importance to the United States. The US Secretary of Defense states: "We are determined to restore and maintain maritime superiority over the Soviets" [9b]. Secretary of the Navy Lehman goes on to explain what is meant by this:

> Maritime superiority means that we must be capable—and be seen as capable—of keeping our access secure to areas of our vital interest, and must be able to do this in the face of the most determined opposition. Maritime parity with our adversaries—a stalemate—is unacceptable because it is we who depend on the seas. In short, maritime superiority for the US is a national objective—a security imperative, an essential condition for the success of any national security strategy. [9c]

Admiral Hayward, then Chief of Naval Operations, US Navy, further clarifies the definition: "Maritime superiority means the ability to prevail in conflict . . . In conjunction with other US military and allied forces, our naval forces must be capable of destroying or neutralizing enemy maritime power wherever it may exist" [9d].

There is, obviously, a link between the naval build-up and the emphasis on enhanced power projection capacity, on the one hand, and the Rapid Deployment Joint Task Force (RDJTF), on the other. Much of the increased defence spending planned for the next five years will go on equipment, supplies, military construction, and air- and sea-lift capability, partly intended for the RDJTF. The basic US philosophy behind this is to deter Soviet aggression and to protect US interests in South-West Asia. It is also argued that the United States must be capable not only of responding to a Soviet attack in the Middle East, but also of simultaneously striking back at other areas of Soviet vulnerability.

On 1 January 1983, the RDJTF became a unified command directly organized under the Joint Chiefs of Staff under the title "Central Command". The force includes elements from all four services—for example: two airborne divisions, a mechanized infantry division, an air cavalry combat brigade, a reinforced Marine division including an aircraft wing, three aircraft carrier battle groups, five squadrons of anti-submarine (ASW) patrol aircraft, and seven Air Force tactical fighter wings. Total combat manpower is approximately 220 000 Army soldiers and Marine infantry. Increased funding is also allocated to means of transportation by sea and by air, and to extensive pre-positioning of equipment and stores on board ships and at bases. The construction of base facilities in Kenya, Somalia, Oman and on Diego Garcia continues, and expansion of the base at Ras Banas in Egypt will probably start in 1983.

Table 7.4. Planned production of selected weapon systems in the United States, FYs 1982–85

Designation	Description	1982	1983	1984	1985
Aircraft					
B-1B	Bomber	1	7	10	34
F-14 Tomcat	Fighter	30	24	24	24
F-15 Eagle	Fighter	36	39	48	72
F-16 Fighting Falcon	Fighter	120	120	120	120
F/A-18 Hornet	Fighter	63	84	84	92
AV-8B Harrier	Fighter	12	21	32	48
Armoured vehicles					
M-1 Abrams	MBT	700	855	720	720
M-2/3 Bradley	MICV	600	600	600	600
DIVAD Sergeant York	SP-AAG	50	96	130	132
Missiles					
BGM-71 TOW(I)	ATM	12 674	13 000	20 200	21 028
AIM-9M Sidewinder	AAM	2 500	2 420	2 150	1 000
AIM-7M Sparrow	AAM	1 287	1 450	1 330	844
AGM-65(IIR) Maverick	ASM	200	900	2 600	6 019

Source: Defense Daily, 7 February 1983.

Table 7.4 presents some of the figures for the planned production of aircraft, armoured vehicles and missiles.

The procurement share of the budget is increasing, while the share of spending on operations and maintenance (the budget item that corresponds to the 'readiness' objective) is declining (table 7.5).

In fact, the rise in procurement spending will be greater under the present build-up than was the case during the Viet Nam War. This reflects the fact that Congress, up to the beginning of 1983, had not made significant cuts in the so-called 'big-ticket' items. The reductions that were made in the FY 1983 defence budget were achieved by cutting and stretching the procurement of less important weapon systems, and by reducing expenditures on operations, maintenance and personnel. The costly items—such as aircraft carriers, the Trident submarine, the B-1 bomber and the major fighter aircraft programmes—were approved. The only two items so far

Table 7.5. Procurement and readiness in US defence spending, FYs 1981–86

Percentages based on current dollar estimates (TOA).

Item	1981	1982	1983	1984	1985	1986
Operations and maintenance (readiness)	31.3	29.4	27.5	27.0	25.5	25.4
Procurement	27.1	30.5	33.4	34.3	37.1	38.2

Sources: Department of Defense Authorization for Appropriations for Fiscal Year 1983, Part 1, p. 414; *Defense Daily*, 2 February 1983.

held back are the MX and the Pershing II missile. The funding of the MX missile will depend a great deal on the findings and recommendations of the Presidential Commission due to report in spring 1983. Congress has also been concerned with the poor test results of the Pershing II.

By approving a long list of new weapon systems, Congress reduces its future freedom of choice. Future defence budgets will to a large extent be consumed by procurement commitments agreed to in previous years. Once money has been appropriated for 'big-ticket' items and their production has begun, the arms build-up acquires a built-in momentum and it is very difficult to slow down the rise in the volume of outlays, or halt the programmes half-way to completion. The Congressional Budget Office estimates that almost 40 per cent of the defence budget in 1987 will be allocated to weapon systems ordered in the past. When the approximately 50 per cent for fixed costs such as salaries and pensions is added, there is a very restricted 'freedom of choice' margin in which to cut, amend or otherwise change defence spending. A group of Democratic former Pentagon officials point out that the emphasis on procurement will create a "bow wave" of high, locked-in costs in future years that will squeeze out funding for adequate readiness [10]. This situation occurs partly because it is tempting for Congress to make cuts where they are immediately visible in order to reduce budget deficits. The tendency then is to make cuts in items such as spare parts, fuel ammunition repair facilities, and so on: expenditure on procurement is at the expense of operational readiness.

IV. The United Kingdom

The United Kingdom is the only one of the three major West European powers (the UK, France and FR Germany) which is increasing its military spending on a substantial scale. On NATO estimates, British military spending has risen just over 3 per cent a year, in volume, over the period 1979–82. The military budget for the 1983 fiscal year seems likely to be around £16 billion—probably a 6 per cent volume increase on the previous fiscal year. Of that, perhaps some 3 per cent can be attributed to the Falklands/Malvinas war. Without the Falklands/Malvinas war British military spending is on a 3–4 per cent growth path: the cost of the war is superimposed on that rising bill. Military expenditure in 1983/84 is likely to rise to its highest share of GDP since the late 1960s, before the withdrawal from east of Suez.

Polaris–Chevaline–Trident

During 1982, the Ministry of Defence came under criticism from the House of Commons Public Accounts Committee for failing to live within its

budget, for very inaccurate early estimates of project costs, and in particular for its handling of the Chevaline project to upgrade Polaris missile warheads [11]. The original 1972 estimate for a five-year development programme was £175 million. Ten years later, in 1982, the total cost at current prices was put at £1 billion—which, after allowing for inflation, represents much more than a doubling in real terms. The Committee was particularly critical of the secrecy surrounding this project, and the failure to inform Parliament of what was going on:

> In the case of the Chevaline a major project costing £1 000 million [in current prices] continued for over ten years without Parliament being in our view properly informed of its existence and escalating costs. Expenditure each year was included in the normal way in the Defence Estimates and Appropriation Accounts; *our criticism is that the costs were not disclosed, and that there was no requirement that they should be disclosed.* Incidental and oblique references to a Polaris enhancement programme made in Parliament or to Parliamentary committees in our view do not provide sufficient information for Parliament to discharge its responsibility to scrutinise major expenditure proposals and to exercise proper financial control over supply. [12]

The government has decided, for the successor system to Polaris, to acquire the Trident II(D-5) missile—a missile which is much more accurate than is needed for purposes of deterrence (see chapter 2). The terms of the purchase, according to the Minister of Defence "protect us completely from development cost escalations" [13]. The original cost estimate of the Trident programme in 1980 was £5 billion. In September 1982 it was put at £7 billion, a 20 per cent increase.

The Tornado

The cost of the Tornado programme now stands at £11 400 million. Britain is purchasing two versions, 220 of the basic interdictor/strike (IDS) aircraft and 165 of the air defence version (ADV). The unit cost of the former was put at £10.12 million in September 1979; the first aircraft, four years delayed, was delivered in July 1980. The unit cost of the ADV version was put at £14.3 million in September 1980; it is currently estimated that the first production aircraft will be delivered in January 1984 [14].

There is now a good example in Europe of what is known as the 'follow-on imperative'; aerospace companies are already planning the new aircraft to fill the gap after the run-down of the Tornado programme. Government support has now materialized for a new twin-engined single-seat fighter, the Agile Combat Aircraft (ACA), to replace the Phantom and the Jaguar. The British government is discussing joint financing with Italy and FR Germany; it is expected to spend £50 million on initial development.

Expenditure estimates

In March 1982, even before the Falklands/Malvinas war, the forward plans for public expenditure showed a much sharper rise for military

spending than for social, or welfare spending. Between the 1981 and 1984 fiscal years, the increase for military spending (at current prices) was put at 30 per cent, compared with 20 per cent for health expenditure and 9 per cent for expenditure on education. Even so, the forward programme —with its heavy expenditure on the Tornado and (later) on Trident— embodied major cuts in the number of major operational warships [15, 16].

Before the Falklands war, the roles of the armed forces were defined as (*a*) the maintenance of an (independent) nuclear deterrent; (*b*) the direct defence of the UK; (*c*) a continental commitment to NATO; and (*d*) a maritime commitment to NATO mainly in the Eastern Atlantic. Inevitably, the Falklands war has given new emphasis to a fifth role, an 'out-of-area' presence.

The Navy naturally pressed its case for more resources; their claims could not be completely ignored. The Minister of Defence was able to resist a Treasury demand that the four lost warships be replaced by the cheaper Type 23 frigates which would come into service in the 1990s, rather than by Type 22 ships of the Broadsword class which would be ready within four years. Four ships which would have been placed on stand-by, two in 1984 and two in 1985, will now remain in the front-line fleet for those years.

Otherwise there have been few concessions to the Navy. The theme is still that the UK must shift towards maritime aircraft and submarines: "We must go for smaller, less expensive and less vulnerable surface platforms" [17].

However, more generally the Falklands/Malvinas war has given rise to a great deal of new procurement. The opportunity is now being taken to justify orders made before the hostilities started, to speed up programmes in the pipeline, to replace lost equipment with more advanced designs, and to use the Falklands as a justification for extensive new purchases.

A major problem during the war was the refuelling of short-range aircraft on journeys from Ascension to the Falklands. At the time, Vulcan, Nimrod and Hercules aircraft were adapted to this role. VC-10 transport aircraft have been converted to tankers and six Tristars bought from British Airways for tanker and transport duty. Since a squadron of Phantom fighter aircraft has been based in the South Atlantic, 12 additional Phantom F-4J aircraft will be bought from the USA for air defence duties in the UK. All aircraft and helicopter losses will be replaced plus an additional seven Sea Harriers, six Sea King helicopters with an airborne early-warning capability, two extra Gazelles and five extra Chinook helicopters. Procurement of anti-radar missiles, improvements in tactical reconnaissance capability and the early acquisition of advanced Sea Eagle missiles has also been announced. In addition, the development of the Type 23 frigate has been approved. The first order will be placed in 1984. A modern point defence system for all carriers, Type 42 destroyers and three assault ships

will be provided. Three destroyers and a patrol ship, previously due for disposal, will be retained in service. The *Invincible* will not be sold to Australia and the shut-down of Portsmouth dockyard is delayed. Problems of communications arose during the war and the acquisition of a new military satellite with terminals in all major surface ships is planned, to improve the flow of signal traffic. Ship defence systems will be improved, as will the survivability of ships struck by enemy fire. On the ground, additions are to be made to the 5th Infantry Brigade, improving its parachute capabilities and ability to perform outside Europe. Twenty-four additional Rapier fire units will be purchased. Additional stocks of ammunition and other equipment are being procured for basing on the Falklands/Malvinas, since it was found that rates of usage were higher than anticipated. A sizeable garrison is to be maintained on the islands, requiring a heavy commitment of manpower, equipment and infrastructure (see chapter 16). The level of logistics support maintained for "out-of-area" operations will also be increased [18, 19].

In the words of the December White Paper, "we shall now be devoting substantially more resources to defence than had been previously planned" [19]. These are not, however, to be switched from the NATO and home front effort and indeed the Ministry of Defence is at pains to stress that quite aside from the Falklands element, the real growth of defence spending will be 3.3 per cent in fiscal year 1983. Estimated expenditure for fiscal year 1983 has now grown from £15 298 million to £15 900 million, including a 'Falklands element' of £624 million and a net reduction of £22 million. The current government has agreed to fund the Falklands costs separately from the defence budget and the Prime Minister is reported as having reassured NATO parliamentarians in London in November that defence spending could not be sacrificed to the needs of the welfare state [20]. Future costs will inevitably depend on the political solution reached over the Falkland Islands' sovereignty. In the current impasse, it is possible to make the following projection of costs for the period April 1982–March 1986:

	£ million	Fiscal year
"Cost of war", garrison and re-equipment to Sep 1982 (announced Oct 1982) [21, 22]	700	1982
Garrison Sep–Mar 1983 (estimate) [23]	250	1982
Equipment (announced Nov 1982)	200	1983
Garrison (announced Nov 1982)	424	1983
Equipment (announced Oct 1982) [22]	700	1984–85
Garrison (estimate) [23]	750	1984–85
	~3 000 in 4 years	

V. France

Military expenditure in France has been increasing at a rate of some 3 per cent a year in real terms, over the past decade. It is possible that this rise may, perhaps temporarily, have come to a halt. NATO provisional figures show hardly any increase in 1982 (table 7.1); and the new budget announced in October 1982 suggests no rise in 1983 either [24]. In another break with the past, the government's defence policy was subject to a vote of censure in the National Assembly and the 1983 budget was rejected by the Senate for the first time in the history of the Fifth Republic, that is, since 1959 [25, 26]. It was felt that the budget was too low to maintain a credible deterrent effect.

The French attitude to nuclear weapons and nuclear forces—on the part of both the public and the politicians—seems different from that in any other West European country. In the UK, the Defence Minister is always anxious to reassure Parliament that Britain's nuclear deterrent takes only 3 per cent of the defence budget. In France, the nuclear deterrent is a major budget priority. Nuclear forces accounted for 13.8 per cent of the defence budget in 1982; that percentage is due to rise to 14.5 per cent this year. Nuclear weapons make up one-third of the weapon procurement programme [27].

The intention in 1983 is for a particularly rapid increase in spending on tactical nuclear weapons (table 7.6). The 1983 budget allows for the development of a new land-based tactical missile, Hades, to replace Pluton, the purchase of 15 Mirage 2000N aircraft adapted for carrying nuclear air-to-surface missiles, and—in the strategic field—the construction of M4 multiple-warhead missiles for the country's missile-firing submarines [27]. M. Hernu, the French Defence Minister, commented "Anyone who tells me he prefers a division of soldiers to a missile-launching submarine is living in the wrong era" [28].

However, cuts were made in the 1982 budget as late as October 1982. The army lost 47 AMX-10 reconnaissance vehicles and 26 155-mm AUF-1

Table 7.6. Procurement budget for the French nuclear forces

Figures are in million French francs.

	Authorizations			Credits		
	1982	1983	Change (%)	1982	1983	Change (%)
Strategic nuclear forces	19 287	21 023	+9	16 189	17 833	+10
Tactical nuclear forces	848	4 059	+379	735	1 467	+100
Total	20 135	25 082	+25	16 924	19 300	+14

Source: Sénat, France, *Rapport Général sur le Projet de Loi de Finances pour 1983*, 1982.

artillery pieces, the Navy's Atlantic New Generation aircraft (for maritime patrol and ASW) was blocked, and an order for 25 Mirage 2000C aircraft was cancelled. The project to launch military reconnaissance satellites was postponed indefinitely [29].

Following leaks that the review of defence expenditure for the period 1984–88, due in the spring of 1983, would include major personnel reductions and cuts in funds earmarked for equipment, the conventional forces made clear their resentment over the priority given to the costly nuclear programme. M. Hernu found it necessary to appease his critics by promising to reshape the army and equip it so as to emphasize mobility, with airborne and helicopter units, an expeditionary corps for overseas deployment and a greater anti-tank capacity [30, 31]. The development of a new battle tank for the 1990s, the AMX-40, was also announced.

VI. Smaller NATO countries

Three of the smaller European NATO countries—Belgium, the Netherlands and Denmark—have in effect contracted out of the obligation to raise their military spending in real terms. None of the three has shown any significant rise in military spending in recent years, and there is not much prospect of any such rise in the next fiscal year either.

In *Belgium*, on NATO's provisional figures, military spending fell quite sharply in 1982 (in real terms). The government is preoccupied with the need to reduce the budget deficit by curbs on public expenditure. The Ministry of Defence's requests for fiscal year 1983 have been cut back by some 5 per cent. The budgeted increase in military spending in 1983 is 7.5 per cent in money terms—zero growth at most in real terms.

In the *Netherlands*, military spending—in real terms—has been virtually constant for some years now. Again, the general atmosphere is one of harsh spending cuts. The budget for fiscal year 1983 is said to allow for 2 per cent real growth in military spending, but there could well be further economies which could mean another year with no real rise.

Denmark, like Belgium and the Netherlands, has not increased military expenditure in the past three years, and seems most unlikely to do so in the future. The official NATO estimate for 1982 is not yet available: it seems quite probable that it will show a fall in real military spending in 1982.

On the other hand, two of the other smaller NATO countries—Norway and Canada—have begun to increase their military budgets (in real terms). In *Norway*, this was one of the consequences of the change of government in October 1981: the 1982 estimated rise was just under 3 per cent, and the 1983 budget provides for a 3.5 per cent rise with full price compensation.

The original plan was for a 4 per cent increase, but some 55 million crowns were transferred to strengthen civil preparedness.

Canada has been criticized by the United States in recent years for the low level of its military budget; in the spring of 1982 the US Ambassador was rebuked by Canada's Defence Minister for overstepping the mark in criticism of this kind. Past increases in the Canadian defence budget came through in actual outlays last year: NATO figures (which have also been revised upwards for past years) show a significant rise in 1982 (table 7.1). Forward plans for the 1983–84 and 1984–85 fiscal years originally showed increases of 14 and 10 per cent respectively (in money terms). However, there has been some cut-back in those figures.

Greece, although a member of NATO, is predominantly concerned not with the threat from the Soviet Union but with the threat from Turkey. Greece now has a 10-year rearmament programme, including substantial purchases from a number of other countries; however, Greece is negotiating for a considerable share for local manufacture. The year-to-year movements of military expenditure are somewhat erratic. *Turkey* is engaged in attempts to reduce its budget deficit: a significant part of its military spending is covered by US military aid.

Over a number of years the USA has maintained an unofficial, but tacitly understood, 7:10 Greek–Turkish military aid ratio (table 7.7). Since 1980 the amount of US military assistance provided to Turkey has doubled to a

Table 7.7. US Foreign Military Sales financing assistance to Greece and Turkey, FYs 1979–84

Figures are in $ millions.

	1979	1980	1981	1982	1983	1984
Greece	140	145	176	280	280	280[c]
Turkey	175	203	250	400[a]	400[b]	755[c]

[a] This figure of $400 million includes $343 million in Foreign Military Sales (FMS) financing and $57 million in another category, the Military Assistance Programme (MAP).
[b] This figure of $400 million includes $290 million in Foreign Military Sales financing and $110 million in the military assistance programme category, both appropriated under a Continuing Resolution Authority. An additional "supplemental" amount of $65 million has been requested for Turkey in FY 1983 but requires special congressional approval which seems doubtful.
[c] Both figures for Greece and Turkey in FY 1984 are the amounts proposed to Congress by the Reagan Administration. The $755 million for Turkey includes $525 million in foreign military sales financing and $230 million in military assistance programme funds.

Note: Turkey has also received during this period assistance called Economic Support Fund (ESF) aid from the USA which is part loan and part grant aid. This assistance provides budgetary support and therefore can be used for either economic or military purposes. This assistance has increased sixfold during this period from a level of $50 million in FY 1979 to $300 million in FY 1982.

Source: Congressional Presentation Documents for Security Assistance Programs for FY 1982, FY 1983, and preliminary FY 1984 tables.

level of $465 million for FY 1983. Turkish military authorities insist that they need to double the figure again, to some $1 billion annually, to modernize their armed forces and so to meet their NATO responsibilities. The US Administration's proposals for FY 1984 go a good way towards meeting the Turkish request. For Greece, on the other hand, the Administration proposes no change. The Greek government had in its party platform the phasing out of US bases in Greece. Negotiations are now going on to find some interim arrangements acceptable to both the USA and NATO; until they are concluded, it is unlikely that military aid to Greece will be raised.

VII. Japan

Various changes and events in recent years—particularly in 1982—have created a climate in Japan which is more favourable to military spending: the rather fragile domestic consensus against a substantial Japanese arms build-up seems to be weakening. (Not that Japanese military expenditure is negligible now—it ranks fifth among the Western industrial countries.)

Up to now, there have been a number of barriers to radical increases in Japanese defence spending and arms production:

1. Article 9 of the Japanese constitution forbids the maintenance of military forces, as well as any other war potential. This article is today interpreted as meaning that Japan's Self-Defence Forces (SDF) may only be used in defence of Japanese territory. There must be no military co-operation other than with the USA.
2. The Japan–USA Security Treaty of 1960 gives the USA a major responsibility for defending Japan in time of war.
3. In 1976, the government decided not to allow military expenditure to exceed 1 per cent of the gross national product.
4. In 1967, the so-called 'triple principle' against arms exports was introduced. This principle banned the export of weapons to (*a*) communist countries, (*b*) countries subject to UN arms embargoes, and (*c*) countries likely to become involved in an international dispute. In 1976, this was expanded into a total ban on the export of weapons, military-related equipment or arms production technology of any kind to any country.

Now there are strong pressures—both internal and external—against these barriers.

The main pressure for change comes not so much from any autonomous movement in public opinion, but from the USA. US pressure to this end is not new; however, it is now stronger and more precisely elaborated than

before. The demand for a faster and more substantial military build-up is now made more specific: for example, the USA suggests that Japan should equip itself militarily to extend its surveillance and defence of air and sea routes out to 1 000 nautical miles from its shoreline. Secondly, the USA has indicated that it wishes to intensify its co-operation with Japan in such matters as exercises, manoeuvres, joint defence plans and military technology. This includes a request for sales to the USA of Japanese advanced technology with military applications. Thirdly, the USA is looking for a greater Japanese contribution to the security needs of the Pacific–Asia region in general, and closer co-operation with such neighbouring states as the five ASEAN countries and South Korea.

There are several reasons for these demands on Japan. There is the growing strength of the Soviet Pacific Fleet, and the deployment of Backfire bombers and SS-20 missiles in the East Asian part of the USSR. The Soviet Pacific Fleet has about twice the tonnage of the US 7th fleet and the Japanese Maritime SDF combined. It includes 1 Kiev-class aircraft carrier, about 120 submarines, more than 90 missile-armed cruisers, destroyers and frigates, and 45 corvettes and fast attack craft [32, 33a].

The economic argument is possibly a stronger one. US politicians and businessmen are constantly pointing to the link between Japan's low military posture and its enormous trade surplus with the USA—about $20 billion in 1982. In the words of Senator Carl Levin: "Linkage of the trade and defense issues isn't logical but it's actual and human. If you're getting pushed around on trade, and the other guy isn't using the dollars he makes to defend himself while you're spending money to defend him, it just makes the feeling that much stronger" [34].

Japan is highly uncertain about how to respond to these US pressures, because it has no clearly articulated picture of its own security needs. There is certainly fear of increased Soviet strength in the region. The oil crises have made Japan aware of its dependence on a steady flow of oil from the Middle East. Japan observes on the one hand some thinning out of the US naval presence in the Western Pacific and on the other hand the Soviet acquisition of the important naval base of Cam Ranh Bay in Viet Nam. Furthermore, China—now that it has improved its own relations with the USA—no longer disapproves of US–Japanese military co-operation; Chinese opposition to any strengthening of Japan's defence forces has declined. Finally, of course, the Japanese government sees the link between trade issues and military issues, and is anxious to keep to the minimum restrictions on its exports to the USA. One of the few external pressures *against* compliance with US wishes is the fear in other Asian countries—such as the Philippines and Indonesia—of a strong Japanese military sector.

A number of politicians and opinion leaders in Japan would not be unhappy to succumb to US pressure, since they themselves would like to

see a larger Japanese military effort. A prominent observer of the Japanese scene has commented that:

> ... there has been a notable increase in both the frequency and candor with which opinion leaders assert the desirability of an independent defence capability, some even advocating the acquisition of nuclear weapons. A number of politicians and business leaders are now urging a vast expansion of the nation's military spending, as are some prominent private-sector labour unions. Revision of the Constitution (the so called "no war clause") has gained renewed salience as an explicit political issue within the ruling party. Taken singly, these developments might not appear alarming. There have always been individuals and groups in Japan that have sought large military forces, military and political independence from the United States, and a constitutional revision to permit active rearmament. Yet, there is something worrisome about the fact that those advocating substantially increased Japanese military power are now speaking out more openly, more forcefully and more persistently than ever before, and are paid increasingly serious attention. [35]

The move to revise the constitution to deal with the so-called "no war clause" (which needs a two-thirds majority in the Diet) has the support of the present Prime Minister, Mr Nakasone. An influential group, founded by 50 members of the ruling party in the Diet, is also seeking to revise the US–Japanese Security Treaty to make it more bilateral and less harmful to Japanese national pride. In a number of ways, the Japanese government is moving in the direction desired by the United States.

Thus the transfer of technology with potential military uses is now authorized. The US request involves high-speed integrated circuits for complex microchips, fibre optics, and so-called 'stealth' paint—a radar-absorbing plastic for use on aircraft and missiles. This is an exception to Japan's stated arms exports policy.

Japan has also agreed to the deployment of 48 F-16 fighter–bombers to the Misawa air base in the north of Japan's main island, Honshu. At present, the only US Air Force combat aircraft on Japanese territory, approximately 70 older F-4 Phantoms, are based far to the south on the island of Okinawa, and on the aircraft carrier *Midway* based at Yokosuka near Tokyo. The deployment of the F-16s, to be started in 1985, will also entail an increase of 3 500 US military personnel in Japan over the present level of approximately 40 000.

Throughout 1982, the USA and Japan conducted very frequent joint military exercises; this included electronic warfare and combat surveillance training with Japanese personnel on board US Air Force AWACS aircraft.

On military expenditure also Japan has made concessions to US pressure. According to SIPRI figures, which are corrected for inflation and adjusted to a calendar year basis, Japanese military spending was growing, in volume, at an annual rate of 6 per cent a year in the period 1970–79. In both 1980 and 1981 the rate of increase slowed down; but provisional figures for 1982 suggest a volume rise of 5 per cent, and—after intervention

by the new Prime Minister—the proposed figure for fiscal year 1983 was increased from 5.1 per cent to 6.5 per cent. Further, the five-year defence plan, announced in July 1982, called for an annual increase in real terms of between 6.3 and 8 per cent. If this programme goes ahead, it seems virtually certain that the '1 per cent of gross national product' limit will be broken.

Table 7.8. The 10 largest Japanese defence contractors in FY 1981[a]

Manufacturer	Total value ($ millions)	FY 1980 rank	Products
Mitsubishi Heavy Industries	420.8	1	Fighter, transport and trainer aircraft; armoured vehicles; missiles; submarines, destroyers and frigates
Kawasaki Heavy Industries	241.6	3	Transport and ASW aircraft, helicopters; missiles; submarines and destroyers
Mitsubishi Electric Corporation	234.4	4	Electronics; missiles
Ishikawajima–Harima Heavy Industries	143.6	2	Submarines, destroyers, frigates; aircraft engines
Toshiba Corporation	128.8	5	Electronics; missiles
Hitachi Shipbuilding	68.8	–	Electronics, radars; frigates, minesweepers, support ships
Nihon Electric Company	65.6	6	Electronics, radars
Mitsui Shipbuilding	61.6	–	Destroyers, frigates
Komatsu Corporation	54.8	–	Armoured vehicles, artillery
Nihon Steel Company	53.2	–	Minesweepers

[a] Other prominent contractors usually included in this list are Fuji Heavy Industries (building helicopters and light aircraft), and Sumitomo Heavy Industries (producing destroyers, frigates and support ships).

Sources: Jane's Fighting Ships 1982–83, pp. 255 *ff*; *Jane's All the World's Aircraft 1981–82*, pp. 141 *ff*; *Interavia Airletter*, No. 9983, 20 April 1982, p. 5; *Maritime Defence*, October 1982, p. 1365; *Industrial Review of Japan*, pp. 72–75.

Under the new plan, subject to annual approval of the Finance Ministry and a Defence Agency revision after three years, total weapon procurement is well above the level agreed upon in 1977. For example, the acquisition of F-15 Eagle fighters and P-3C Orion ASW patrol aircraft will be 50 per cent above what was previously decided. The programme's emphasis on enhanced naval, air defence and anti-submarine capabilities is in line with US suggestions. When the programme is completed in 1988, the Maritime SDF (accounting for 40 per cent of total spending), will have 60 destroyers, 15 submarines, 103 other vessels and 185 aircraft, including 72 P-3Cs. The Air SDF, with 32 per cent of the resources, will have a total of 395 combat aircraft, including 138 F-15s. The Ground SDF will, among other major

weapons, have 1 314 main battle tanks, 796 armoured cars and 418 aircraft, mainly helicopters. During the five-year period, Japan also intends to develop a variety of new weapon systems. These include a jet trainer, a main battle tank, a surface-to-ship missile with 'stealth' capacity, a portable surface-to-air missile, an anti-tank missile and an anti-aircraft gun to be mounted on tank chassis.

VIII. The Soviet Union

It is, of course, most unfortunate that discussion of military developments in the Soviet Union has to depend so much on Western material, and so little on material coming from the Soviet Union itself. In the absence of Soviet material, there is little choice in the matter. Furthermore, Western discussions of what is going on in the Soviet Union tend to be more concerned with long-term trends than with the events of a particular year.

The long-term trends and general characteristics of the Soviet military sector seem to have changed little from 1982. Whereas there is no doubt about the change in trend in the United States—from a slow fall in real military spending in the early 1970s to a rapid rise in the past four years—there is no evidence of any such change in the Soviet Union. The picture is rather of a steady, not particularly rapid, upward trend. The calculation of the average increase in volume cannot be made precisely. It relies very heavily on converting quality changes in weapons into volume estimates, and such calculations embody a good deal of arbitrary judgement.

There is little doubt that military spending is a heavier burden on the Soviet economy than on the US economy. The USSR's national product is substantially smaller than that of the USA; its military forces are probably roughly commensurate. Further, whereas the US economy, in common with those of other Western industrial countries, is running with a large margin of unemployed labour, the Soviet economy is experiencing a labour shortage. The opportunity cost of military spending—the amount of civil output forgone—is much higher in a fully employed than in an under-employed economy. A phrase in one of President Brezhnev's last speeches recognizes the importance of economic as well as military strength, implying some trade-off between the two: "Policy is effective only when it relies on the *economic* and military strength of a state" [36] (emphasis added).

There is no sign that the upward trend in military spending is moderating in the Soviet Union. On the other hand, the economic growth rate has been slowing down. The estimate for the measure of Soviet output which corresponds to the Western definition of gross national product appears to have risen only 2–3 per cent a year in the past two years.

Military output and deployment

The US Defense Intelligence Agency's estimates of Soviet output[2] (table 7.9) show continuous high levels: they do not indicate any significant upward or downward trend in aggregate numbers. (The increase in the volume of Soviet military spending on procurement, shown in many US estimates, must depend almost entirely on rather arbitrary estimates of quality changes.) However, the output figures for certain individual weapon systems do show a change: the production of tanks and other armoured vehicles declined by 1 000 units from 1980 to 1981, while the production of guided anti-tank missiles almost doubled from 1977 to 1981. The number of intercontinental ballistic missiles has fallen in recent years, while the figures for sea-launched cruise missiles show a significant increase.

Several new models of Soviet aircraft with enhanced offensive capabilities have been reported during 1982 (table 7.10). On power projection, the USSR continues the construction of a navy with ocean-going capacity. During 1982, there were frequent reports of the construction of a 60 000- to 70 000-ton nuclear-powered aircraft carrier at the Nikolayev Shipyard in the Black Sea. This shipyard is also building three cruisers of a new class—substantially larger than the Kara-class—designated Blackcom-1 in the West. Other major surface combatants currently in production include:

	In service	Under construction
Kiev-class aircraft carrier	3	1
Kirov-class missile cruiser	1	1
Sovremennyj-class missile destroyer	2	3
Udaloy-class ASW destroyer	2	4

It is also believed that the construction of Krivak-class frigates and Grisha-class corvettes is still continuing [33b].

A note on technology

Evidence continues to support the proposition that, while the Soviet Union has numerical superiority, it is inferior in advanced military technology. Recently, US weapon designers conducted a comparative analysis of US and Soviet design practices over the past 40 years. In electronics—the key component of Western technological superiority in weaponry—the study found that the initial Soviet utilization of different generations of electronic components lagged behind that of the United States by 10–15 years (figure 7.3). It seems that proven components, rather than new ones, are used in the design of Soviet electronic systems.

[2] Not all these items are for the Soviet armed forces: some are for export.

Table 7.9. US Defense Intelligence Agency estimates of Soviet output of certain military items, 1977–81

Military item	1977	1978	1979	1980	1981
Ground forces matériel					
Tanks	2 500	2 500	3 000	3 000	2 000
Other armoured fighting vehicles	4 500	5 500	5 500	5 500	4 500
Towed field artillery	1 300	1 500	1 500	1 300	1 500
Self-propelled field artillery	950	850	250	150	200
Multiple rocket launchers	550	550	450	300	400
Self-propelled AA artillery	300	300	300	200	200
Towed AA artillery	250	100	–	–	–
Aircraft					
Bombers	30	30	30	30	30
Fighters/fighter-bombers	1 200	1 300	1 300	1 300	1 350
Transports	400	400	400	450	350
Trainers	50	50	25	25	10
ASW	10	10	10	10	..
Helicopters	900	650	700	750	750
Missiles					
ICBMs	300	200	200	200	200
IRBMs	100	100	100	100	100
SRBMs	200	250	300	300	300
SLCMs	600	600	700	700	750
SLBMs	175	225	175	175	175
ASMs	1 500	1 500	1 500	1 500	1 500
SAMs	50 000	50 000	50 000	50 000	53 500
ATGMs	35 000	35 000	40 000	50 000	60 000
Naval ships					
Submarines	13	12	12	13	9
Major combatants	12	12	11	11	9
Minor combatants	55	50	50	60	45
Auxiliaries	6	4	7	5	5

Source: Allocation of Resources in the Soviet Union and China—1982, Statement of Lt. General James A. Williams before the Joint Economic Committee (Defense Intelligence Agency, Washington, D.C., 29 June 1982).

The standardization in Soviet weapon systems appears to reduce system development risk and improve producibility and reliability. However, it also restricts technical innovation and system performance. These deficiencies are offset, in part, by highly skilled designers who are often able to conceive clever design solutions using obsolescent components. [37]

The evidence from the war in the Lebanon supports this general contention. Ninety-two Syrian advanced MiG fighters were shot down during the war—the majority of them in air-to-air combat with Israeli F-15 and F-16 fighters armed with AIM-9L Sidewinder missiles. Nineteen SA-6 and four SA-8 surface-to-air missile sites were destroyed by the Israeli Air Force, while Israeli losses reportedly totalled only two or three F-4 Phantom fighters. Of course this was not simply a consequence of the

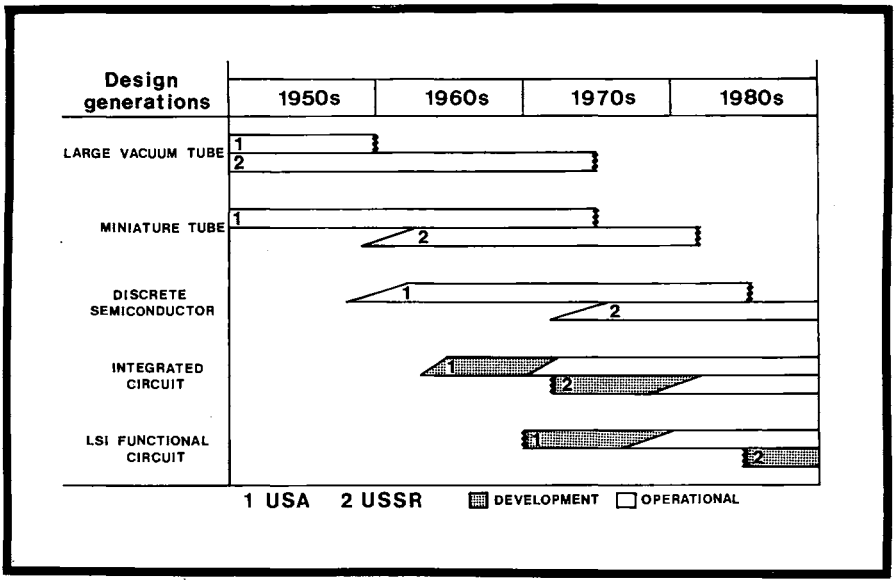
Table 7.10. New Soviet military aircraft reported in Western sources

Designation	Description	Western name	Operational	Comment
MiG-25	Fighter/recce	Foxhound	Yes	New version with look-down/ shoot-down radar
MiG-29	Multirole fighter	Fulcrum	(1985)	Look-down/shoot down radar; similar to US F-18 fighter
Su-27	Fighter/interceptor	–	(1984)	Look-down/shoot-down radar; similar to US F-15 fighter
Su-25	Ground attack	Frogfoot	Yes	One squadron in service in Afghanistan; similar to A-10
..	Strategic bomber	RAM-P; Blackjack-A	(1986)	Similar to US B-1B bomber[a]

[a] Some past reports of a new Soviet strategic bomber—for instance in the *US Department of Defense Annual Report* for fiscal year 1977—have proved to be premature.

Sources: International Defense Review, September 1982, p. 1147; *Interavia Airletter*, No. 10062, 11 August 1982; *Aviation Week & Space Technology*, 7 June 1982, p. 54; *Flight International*, 21 August 1982.

Figure 7.3. US and Soviet introduction of various generations of military electronics



Source: International Defense Review, June 1982, p. 712.

equipment. Superior tactics, a better trained air force, and excellent co-ordination of early-warning and electronic warfare capabilities may have been more decisive for the Israeli victory than the quality of the equipment itself. In general, however, the judgement can be accepted of the analyst who concluded, in comment on the Lebanese war: "There is no indication that the Soviets can keep up in arms quality, however hard they try" [38].

The Reagan Administration is engaged in an effort both to curtail the leakage of US defence technology to the WTO countries and to reach an agreement with NATO European countries to curb exports of so-called dual-purpose technology. These measures, if effective, will obviously be something of a handicap to the Soviet Union in its efforts to narrow the technological gap.

IX. China

Reports from China so far in 1982 are largely concerned with the modernization of the armed forces and with attempts to separate the army's military and civil activities. The part played by the army in civilian construction, the production of consumer goods and food, and the provision of education and medical services is still highly regarded. However, spokesmen for the military have called for a more streamlined force, reduced in size, better trained for combat duties and less involved in non-military tasks; but the cost of training and equipping the Chinese armed forces to modern standards would be prohibitive, and military modernization is still said to take fourth place after the modernization of industry, agriculture and science.

Despite an 11 per cent increase in total government expenditure planned for 1983, military spending is budgeted to remain steady in nominal terms at 17.9 billion yuan, following a 6 per cent nominal rise in 1982. Table 7.11 gives the official Chinese budget in current prices. When adjusted for inflation, a pattern emerges of a big rise between 1977 and 1979, and then a return to the 1977 level of spending.

In face of growing disquiet among leaders of the Peoples' Liberation Army and the appointment of a new Minister of Defence, General Zhang, who was more in tune with their wishes, an increase in the defence budget had been expected. However, it is generally accepted that military R&D and at least some equipment costs are not included in the official defence budget, and General Zhang may find the resources he needs for his modernization programme under other budget headings [39].

Two significant technological advances were noted during 1982. In June, China announced that it is developing a three-stage liquid-fuelled rocket

Table 7.11. The official Chinese military budget, 1977–83

	1977	1978	1979	1980	1981	1982	Forecast 1983
Military expenditure (billion yuan)	14.9	16.8	22.3	19.4	16.9	17.9	17.9
Inflation rate (percentage change from previous year)		*+0.7*	*+1.9*	*+7.5*	*+2.6*	*+4.0*	*+5.0*
Volume index (1977=100)	100.0	112.0	145.2	118.0	100.3	102.1	97.2

Sources:

For military expenditure

1977–79: Joint Economic Committee, US Congress, *China under the Four Modernizations* (US Government Printing Office, Washington, D.C., 13 August 1982); *Report on the Final State Accounts for 1980 and the Implementation of the Financial Estimates for 1981*, delivered at the Fourth Session of the Fifth National People's Congress on 1 December 1981.

1982–83: *Far Eastern Economic Review*, 10 December 1982.

For consumer price inflation

1978–81: *International Financial Statistics Yearbook* (IMF, 1982).

Estimates for 1982–83: *Far Eastern Economic Review*, 10 December 1982.

In appendix 7B, the conversion rate of $1=0.5 yuan is used.

capable of launching satellites into geostationary orbit [40]. Such a satellite could have important military implications for communications, early-warning and meteorology. In October, news came of the successful test-firing of a ballistic missile (unarmed) from a submerged submarine. Only four other countries have such delivery systems—the UK, France, the USA and the USSR. China's Luda-class destroyers are to be refitted with British Sea Dart surface-to-air missiles, together with more sophisticated electronics. These changes gave rise to speculation that the navy was being singled out for special attention so that it could meet not only the challenge of Viet Nam over certain disputed areas of the South China Sea but also that of the Soviet Union's Pacific Fleet [41, 42]. However, to take up such a challenge would involve a major diversion of resources from the other modernizations.

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Appendix 7A

World military expenditure, 1973–82

For the sources and methods for the world military expenditure data, see appendix 7B. For the conventions used in the tables and for footnotes, see page 174. *This appendix was prepared by Elisabeth Sköns and Rita Tullberg.*

Table 7A.1. World military expenditure summary, in constant price figures

Figures are in US $ million, at 1980 prices and 1980 exchange-rates. Totals may not add up due to rounding.

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
USA	145 237	143 583	139 241	131 702	137 104	138 001	138 776	143 974	154 036	169 691
Other NATO	94 751	97 592	99 550	101 540	103 177	106 909	109 276	112 286	113 256	116 056
Total NATO	239 988	241 175	238 791	233 242	240 281	244 910	248 052	256 260	267 292	285 747
USSR	[118 800]	[120 700]	[122 600]	[124 200]	[126 100]	[128 000]	[129 600]	[131 500]	[133 700]	[135 500]
Other WTO	9 356	9 800	10 554	10 991	11 391	11 707	11 876	12 034	12 262	[12 780]
Total WTO	[128 156]	[130 500]	[133 154]	[135 191]	[137 491]	[139 707]	[141 476]	[143 534]	[145 962]	[148 280]
Other Europe	12 025	12 835	13 397	14 034	13 980	13 831	14 888	15 270	14 906	(15 078)
Middle East	19 672	28 442	35 037	38 526	37 116	36 565	38 806	39 720	[46 700]	[53 300]
South Asia	4 745	4 532	4 976	5 638	5 455	5 704	5 998	6 126	6 761	7 376
Far East (excl. China)	[16 730]	[17 130]	[19 260]	[21 410]	[23 010]	[25 570]	[26 530]	[26 560]	[28 490]	[31 250]
China	[30 700]	[30 700]	[32 400]	[33 200]	[32 800]	[37 000]	[49 000]	[42 600]	[37 200]	[39 400]
Oceania	4 802	3 980	3 847	3 834	3 849	3 917	4 031	4 270	4 558	(4 617)
Africa (excl. Egypt)	7 763	9 669	(11 777)	(12 800)	(12 958)	[12 980]	[13 140]	[13 600]	[14 000]	[14 000]
Central America	1 242	1 336	1 480	1 675	2 132	2 313	2 467	2 481	2 849	(3 126)
South America	7 959	7 890	8 840	9 403	10 147	9 913	9 849	10 150	(10 042)	[16 570]
World total	**473 782**	**488 189**	**502 959**	**508 953**	**519 219**	**532 410**	**554 237**	**560 571**	**578 760**	**618 744**
Developed market economies[a]	267 723	268 489	267 475	263 353	270 943	275 625	280 463	287 620	300 607	320 051
Centrally planned economies[a]	[160 798]	[163 567]	[168 338]	[171 487]	[173 890]	[180 683]	[194 798]	[190 625]	[188 091]	[193 038]
OPEC countries[a]	15 707	25 418	33 177	37 061	35 491	36 970	37 555	(40 520)	[46 500]	[52 903]
Non-oil developing countries:[a]										
with (1979) GNP *per capita* < US $380	6 568	6 480	6 851	7 436	7 137	7 790	(8 112)	(8 247)	(8 970)	[9 625]
with (1979) GNP *per capita* US $380–$1 000	7 434	8 404	9 098	9 251	10 093	8 103	8 313	(8 192)	(8 285)	[9 060]
with (1979) GNP *per capita* > US $1 000	14 516	14 770	16 826	19 038	20 232	21 655	23 345	23 706	(24 545)	[32 125]
Total non-oil developing countries	28 518	29 654	32 775	35 725	37 462	37 548	39 770	40 145	41 800	[50 810]

Table 7A.2. World military expenditure, in constant price figures

Figures are in US $ million, at 1980 prices and 1980 exchange-rates. Totals may not add up due to rounding.

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
NATO[b]										
North America:										
Canada	3 843	4 123	4 068	4 343	4 621	4 794	4 545	4 703	4 784	5 117
USA	145 237	143 583	139 241	131 702	137 104	138 001	138 776	143 974	154 036	169 691
Europe:										
Belgium	2 988	3 030	3 300	3 471	3 562	3 798	3 883	3 958	3 993	3 727
Denmark	1 294	1 417	1 538	1 517	1 525	1 584	1 592	1 608	1 625	..
France	20 863	20 773	21 696	22 639	23 894	25 286	25 862	26 425	27 079	27 177
FR Germany	24 281	25 342	25 228	25 046	24 949	25 988	26 368	26 691	27 113	26 990
Greece	1 434	1 781	2 290	2 507	2 657	2 715	2 631	2 276	2 692	2 656
Italy	8 293	8 304	7 727	7 690	8 255	8 608	9 154	9 578	9 779	10 265
Luxembourg	33.4	36.1	38.4	41.1	40.3	43.8	45.1	52.5	54.2	53.4
Netherlands	4 367	4 569	4 791	4 739	5 284	5 108	5 415	5 269	5 324	5 318
Norway	1 297	1 332	1 444	1 478	1 507	1 612	1 651	1 669	1 686	1 731
Portugal	1 314	1 574	1 083	847	780	789	800	868	864	840
Turkey	1 740	1 824	2 870	3 297	3 173	2 905	2 578	2 442	3 015	3 355
UK	23 003	23 491	23 478	23 926	22 930	23 680	24 754	26 749	25 250	27 163
Total NATO (excl. USA)	94 751	97 592	99 550	101 540	103 177	106 909	109 276	112 286	113 256	116 056
Total NATO	239 988	241 175	238 791	233 242	240 281	244 910	248 052	256 260	267 292	285 747
WTO										
Bulgaria	540	612	695	756	820	(857)	(917)	(1 055)	(1 093)	..
Czechoslovakia	2 070	2 119	2 316	2 345	2 292	2 380	(2 366)	(2 434)	[2 473]	..
German DR	2 467	2 558	2 713	2 887	3 015	3 166	(3 325)	(3 604)	(3 907)	(4 130)
Hungary	602	659	709	668	694	788	744	746	(807)	(806)
Poland	2 592	2 654	2 793	2 897	3 089	2 964	(2 984)	(2 863)	(2 673)	..
Romania	1 085	1 197	1 327	1 438	1 482	1 553	1 540	1 333	(1 310)	(1 342)
USSR	[118 800]	[120 700]	[122 600]	[124 200]	[126 100]	[128 000]	[129 600]	[131 500]	[133 700]	[135 500]
Total WTO (excl. USSR)	9 356	9 800	10 554	10 991	11 391	11 707	11 876	12 034	12 262	[12 780]
Total WTO	[128 156]	[130 500]	[133 154]	[135 191]	[137 491]	[139 707]	[141 476]	[143 534]	[145 962]	[148 280]
Other Europe										
Albania[c]	84.3	87.1	90.7	112	115	118	119	131	134	..
Austria	632	712	794	813	840	917	961	950	931	970
Finland	587	604	650	662	612	642	717	771	746	846

Ireland	(177)	(177)	232	242	249	261	287	296	293	..
Spain	2 918	3 169	3 299	3 532	3 542	3 239	3 699	4 007	4 110	4 335
Sweden	3 675	3 704	3 809	3 801	3 819	3 881	4 046	3 872	3 700	3 702
Switzerland	2 005	1 998	1 884	2 135	2 017	2 028	2 122	2 109	2 064	2 122
Yugoslavia	1 948	2 385	2 638	2 737	2 786	2 745	2 937	3 134	(2 928)	(2 671)
Total Other Europe	12 025	12 835	13 397	14 034	13 980	13 831	14 888	15 270	14 906	(15 078)
Middle East										
Bahrain	(42.8)	50.8	27.3	35.7	46.6	114	149	157	192	..
Cyprus	20.0	28.5	31.2	30.4	39.3	31.3	40.5	30.9	(22.5)	..
Egypt	[3 978]	4 393	4 266	3 709	3 883	[1 894]	[2 068]	[1 886]	[1 875]	..
Iran	4 798	10 604	13 530	14 673	11 888	11 043	6 582	[4 995]	..	..
Iraq[d]	1 123	2 210	2 247	2 204	2 303	2 179	(2 783)	[3 175]	[3 850]	..
Israel	(4 103)	(4 166)	(4 439)	(4 435)	(4 430)	(3 942)	(4 156)	(2 812)	(4 220)	(4 257)
Jordan	367	333	329	535	438	444	502	469	496	(609)
Kuwait	490	858	1 017	1 246	1 361	1 169	1 159	1 265	[1 430]	..
Lebanon[c]	71.9	87.3	91.7	95.2	74.2	143	215	266	307	[363]
Oman[c]	122	342	698	785	686	767	779	1 178	1 511	[1 679]
Saudi Arabia	3 594	(4 429)	(6 774)	(9 120)	(9 850)	[12 217]	[16 252]	[19 261]	[22 110]	[25 772]
Syria	822	776	1 389	1 381	1 382	1 450	2 511	2 144	2 018	1 699
United Arab Emirates	13.9	21.6	33.4	84.2	520	814	1 185	1 707	..	..
Yemen Arab Republic[e]	71	87	103	126	141	259	[310]	[245]	..	..
Yemen, People's Democratic Rep. of	56.3	56.7	62.7	67.1	74.6	98.2	116	(130)	..	..
Total Middle East	19 672	28 442	35 037	38 526	37 116	36 565	38 806	39 720	[46 700]	[53 300]
South Asia										
Afghanistan	54.3	51.1	56.2	71.4	72.9	77.7	..	..	..	..
Bangladesh	55.9	65.5	84.8	145	155	140	145	153	160	180
India	3 490	3 270	3 681	4 257	4 042	4 235	4 496	4 475	4 896	5 344
Nepal	11.6	11.8	13.4	17.4	18.1	(18.6)	(19.8)	[19.4]	19.9	23.2
Pakistan	1 118	1 115	1 121	1 124	1 146	1 208	1 224	1 355	1 548	1 679
Sri Lanka	15.6	19.1	20.1	23.5	21.2	26.1	31.4	41.2	..	..
Total South Asia	4 745	4 532	4 976	5 638	5 455	5 704	5 998	6 126	6 761	7 376
Far East										
Brunei	29.3	34.5	62.2	99.3	91.9	109	187	135	183	..
Burma	214	186	164	154	176	204	201	..	..	..
Hong Kong	41.1	35.8	35.3	64.0	97.4	142	156	287	..	..
Indonesia	[1 472]	[1 608]	[2 001]	2 004	1 939	2 089	1 945	1 517	1 739	(1 875)
Japan	7 588	7 131	7 677	8 116	8 433	9 122	9 748	9 685	9 913	10 410
Korea, North[c]	1 433	1 790	2 143	2 366	(2 436)	2 695	2 946	3 161	3 460	3 757

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Korea, South	1 149	1 465	1 694	2 434	2 892	3 605	3 420	3 566	3 697	4 331
Malaysia	664	685	729	668	798	858	896	973	1 509	1 871
Mongolia[c]	(73.2)	(124)	(128)	(140)	(139)	(145)	(165)	(146)	(241)	..
Philippines	464	728	876	998	987	906	822	[682]	798	868
Singapore	388	373	435	529	592	575	583	654	718	796
Taiwan	1 542	1 315	1 475	1 719	[2 047]	[2 332]	2 460	2 679	2 698	3 022
Thailand	638	594	645	791	948	1 202	(1 356)	1 223	1 243	1 338
Total Far East (excl. Kampuchea, Laos and Viet Nam)	15 694	16 068	18 064	20 082	21 578	23 983	24 885	24 910	26 720	29 310
Total Far East	[16 730]	[17 130]	[19 260]	[21 410]	[23 010]	[25 570]	[26 530]	[26 560]	[28 490]	[31 250]
Oceania										
Australia	4 460	3 622	3 482	3 483	3 493	3 541	3 645	3 854	4 115	4 169
Fiji	1.7	1.7	2.3	3.4	3.7	4.1	4.3	5.9	4.4	4.7
New Zealand	341	357	363	348	353	373	382	410	439	..
Total Oceania	4 802	3 980	3 847	3 834	3 849	3 917	4 031	4 270	4 558	(4 617)
Africa										
Algeria	281	538	597	836	729	791	661	704	..	..
Benin[c]	6.5	7.3	8.0	8.3	(12.7)	..	..	..	..	..
Burundi	13.9	15.4	14.7	17.7	24.2	23.8	(18.2)	..	..	..
Cameroon	73.4	74.0	78.4	82.4	79.2	75.5	77.0	82.6	90.0	..
Central African Republic	17.1	16.1	14.7	14.9	13.0	14.6	16.7	13.3	..	..
Chad[e]	25.0	23.3	22.2	31.7	(36.0)	(41.3)	..	..	..	..
Congo	39.7	50.6	53.2	56.8	54.4	47.2	56.9	..	..	..
Equatorial Guinea[c]	[3.7]	[3.8]	[3.8]	..	..	..	..	..	..	..
Ethiopia	119	165	260	207	187	304	364	(378)	(385)	(391)
Gabon	26.3	28.5	31.4	34.8	45.2	(69.8)	64.0	74.8	(49.3)	..
Ghana	362	472	447	398	229	170	(185)	[147]	..	..
Guinea[c]	[39.4]	[39.5]	..	..	..	..	..	..	..	..
Ivory Coast	(85.4)	113	100	95.2	(92.9)	125	119	118	109	..
Kenya	91.2	98.0	98.6	141	237	311	291	(229)	(217)	..
Liberia	7.7	6.5	6.9	7.8	9.9	11.2	14.6	25.9	28.1	[22.7]
Libya[d]	(600)	(1 090)	(1 090)	(1 780)	(1 800)	(2 200)	(2 820)	..	..	..
Madagascar	44.1	49.6	47.6	59.6	73.0	75.2	97.5	..	85.2	..
Malawi	6.1	7.3	14.2	14.9	21.5	28.9	26.4	..	..	..

Mali	26.4	29.6	40.4	48.3	47.1	39.0	44.3	38.6	..	..
Mauritania	11.7	13.5	42.7	(61.4)	(79.8)	93.3	78.1	..	..	..
Mauritius	1.5	1.5	1.8	2.2	2.2	2.3	2.9	5.5	..	..
Morocco	390	460	675	948	1 088	970	971	1 118	1 129	1 228
Mozambique[c]	..	..	12.0	(35.2)	38.0	72.9	74.6	..	112	..
Niger	8.5	9.6	12.8	12.7	13.2	16.0	36.3	..	..	..
Nigeria	2 446	2 689	4 019	3 429	3 276	2 579	2 271	2 280	1 997	1 438
Rwanda	23.8	17.5	15.8	17.6	17.0	18.3	18.9	..	..	..
Senegal	52.5	58.7	54.2	64.6	64.5	71.2	69.2	64.2	67.5	64.1
Sierra Leone	10.0	10.7	10.6	9.7	10.2	10.6	..	..	..	..
Somalia	62.0	70.1	63.1	62.9	68.9	157	134	93.4	99.9	..
South Africa	1 249	1 673	2 055	2 542	2 874	2 768	2 648	2 594	2 783	2 754
Sudan	281	226	188	239	271	232	212	..	..	..
Tanzania	142	186	175	184	228	420	[388]	..	..	..
Togo	13.2	14.9	15.4	22.2	23.7	27.4	(25.5)	(24.4)	..	..
Tunisia	63.6	77.1	105	118	161	181	170	191	236	..
Uganda[e]	398	306	306	271	187	136	98.1	102	..	..
Upper Volta	13.8	14.1	30.5	40.1	37.2	44.6	36.2	35.4	38.5	..
Zaire	330	524	355	(218)	(48.8)	(40.3)	(102)	..	..	..
Zambia	276	340	450	368	353	[318]	[333]	[292]	..	..
Zimbabwe	122	149	215	264	368	423	492	[478]	364	347
Total Africa	7 763	9 669	(11 777)	(12 800)	(12 958)	[12 980]	[13 140]	[13 600]	[14 000]	[14 000]
Central America										
Costa Rica	14.0	14.5	17.4	23.3	32.7	30.2	32.3	30.9	(27.1)	..
Cuba[c]	351	366	(423)	..	909	1 018	1 092	1 053	1 094	1 200
Dominican Republic	76.1	87.5	91.9	100	100	111	127	..	..	..
El Salvador	52.8	57.2	51.4	65.3	77.3	80.2	(79.8)	71.7	101	107
Guatemala	47.1	51.5	71.3	74.7	103	112	116	128	(136)	..
Haiti	19.0	15.8	14.6	15.5	15.8	19.6	..	..	..	..
Honduras	30.2	28.2	33.6	35.5	43.9	56.1	57.3	(88.0)	(99.8)	(181)
Jamaica	25.9	24.2	30.3	36.8	35.0	..	..	..	..	..
Mexico	569	624	670	752	702	715	796	756	978	1 005
Nicaragua	30.9	39.7	45.6	61.0	75.7	91.5	60.6	119	(146)	..
Panama	18.4	19.1	20.5	(20.5)	..	..	..	..	..	..
Trinidad and Tobago	8.0	8.5	9.9	11.1	11.9	..	..	..	..	..
Total Central America	1 242	1 336	1 480	1 675	2 132	2 313	2 467	2 481	2 849	(3 126)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
South America										
Argentina	2 642	2 691	3 419	3 890	3 979	4 025	3 980	3 942	4 106	[9 795]
Bolivia	65.9	76.2	104	114	109	118	121	106	141	..
Brazil	2 672	1 873	1 988	2 212	2 017	1 867	1 665	1 303	1 354	1 531
Chile	802	1 196	923	971	1 285	1 443	1 728	2 038	1 761	(1 762)
Columbia	238	228	253	260	238	220	(241)	301	(269)	[599]
Ecuador	125	144	176	161	268	204	210	222	(215)	(178)
Guyana	20.4	29.5	56.5	78.7	47.1	(34.3)	..	..	..	..
Paraguay	44.9	41.7	52.2	54.1	58.0	60.9	56.3	..	..	..
Peru	533	516	681	772	1 121	851	667	(980)	(857)	(850)
Uruguay	198	238	224	187	200	241	(299)	258	336	..
Venezuela	618	857	965	704	825	850	848	907	912	(920)
Total South America	7 959	7 890	8 840	9 403	10 147	9 913	9 849	10 150	(10 042)	[16 570]

Table 7A.3. World military expenditure, in current price figures

Figures are in local currency, current prices.

	Currency	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
NATO[b]											
North America:											
Canada	*mn dollars*	2 405	2 862	3 127	3 589	4 124	4 662	4 825	5 499	6 289	7 415
USA	*mn dollars*	78 358	85 906	90 948	91 013	100 925	109 247	122 279	143 974	170 033	198 509
Europe:											
Belgium	*mn francs*	50 533	57 739	70 899	81 444	89 480	99 726	106 472	115 754	125 689	127 901
Denmark	*mn kroner*	3 520	4 439	5 281	5 680	6 343	7 250	7 990	9 061	10 230	..
France	*mn francs*	42 284	47 878	55 872	63 899	73 779	85 175	96 439	111 672	129 708	145 155
FR Germany	*mn marks*	31 908	35 644	37 589	38 922	40 184	43 019	45 415	48 518	52 193	54 553
Greece	*mn drachmas*	19 991	31 499	45 936$_6$	56 963	67 738	77 861	89 791	96 975	142 865	171 968
Italy	*bn lire*	2 392	2 852	3 104	3 608	4 533	5 301	6 468	8 203	9 868	12 066
Luxembourg	*mn francs*	601	710	836	983	1 029	1 154	1 242	1 534	1 715	1 876
Netherlands	*mn guilders*	5 360	6 144	7 119	7 662	9 092	9 146	10 106	10 476	11 296	11 932
Norway	*mn kroner*	3 505	3 938	4 771	5 333	5 934	6 854	7 362	8 242	9 468	10 844
Portugal	*mn escudos*	16 736	25 108	19 898	18 845	22 082	27 354	34 343	43 440	51 917	61 859
Turkey	*mn liras*	12 192	15 831	30 200	40 691	49 790	66 239	93 268	185 656	313 067	447 790
UK	*mn pounds*	3 512	4 160	5 165	6 132	6 810	7 616	9 029	11 510	12 154	14 186
WTO											
Bulgaria	*mn leva*	422	483	548	596	653	(689)	(745)	(865)	[905]	..
Czechoslovakia	*mn korunas*	16 303	16 772	18 458	18 821	18 646	19 666	(20 292)	(21 495)	[22 010]	..
German DR	*mn marks*	6 900	7 083	7 512	7 994	8 261	8 674	(9 110)	(9 875)	(10 705)	(11 315)
Hungary	*mn forints*	9 488	10 564	11 811	11 671	12 607	14 983	15 397	16 854	(19 060)	(20 260)
Poland	*mn zlotys*	43 968	48 229	52 274	56 605	63 315	65 653	(70 780)	(74 285)	(84 450)	..
Romania	*mn lei*	7 835	8 744	9 713	10 575	10 963	11 713	11 835	10 394	(10 400)	(10 800)
USSR	*mn roubles*	[44 000]	[44 700]	[45 400]	[46 000]	[46 700]	[47 400]	[48 000]	[48 700]	[49 500]	[50 200]
Other Europe											
Albania	*mn leks*	590	610	635	783	805	825	835	915	940	..
Austria	*mn schillings*	5 324	6 565	7 946	8 728	9 515	10 767	11 693	12 292	12 864	14 140
Finland	*mn markkaa*	956	1 148	1 455	1 695	1 767	1 996	2 396	2 876	3 117	3 871
Ireland	*mn pounds*	(31.5)	(36.8)	58.5	71.8	84.1	95.0	118	144	172	..
Spain	*mn pesetas*	67 467	84 749	103 064	127 028	158 568	173 777	229 401	287 276	337 463	409 283
Sweden	*mn kronor*	7 823	8 666	9 781	10 768	12 054	13 466	15 054	16 377	17 548	19 402
Switzerland	*mn francs*	2 556	2 795	2 813	3 242	3 110	3 151	3 414	3 533	3 682	3 995
Yugoslavia	*mn dinars*	14 108	21 100	28 815	33 234	38 766	43 379	56 330	78 060	(101 893)	(123 000)

	Currency	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Middle East											
Bahrain	*mn dinars*	(6.3)	9.3	5.8	9.3	14.3	40.5	53.9	59.2	80.7	..
Cyprus	*mn pounds*	3.9	6.7	7.4	7.5	10.4	8.9	12.6	10.9	(8.8)	..
Egypt	*mn pounds*	[1 250]	1 530	1 631	1 564	1 845	[1 000]	[1 200]	[1 320]	[1 450]	..
Iran	*bn rials*	125	315	453	547	564	585	385	[353]	..	..
Iraq	*mn dinars*	199	422	470	520	593	587	(822)	(1 032)	(1 417)	..
Israel	*mn shekels*	(985)	(1 395)	(2 073)	(2 722)	(3 660)	(4 905)	(9 217)	(14 407)	(46 883)	(109 345)
Jordan	*mn dinars*	47.3	51.2	56.7	103	96.5	105	135	140	166	(215)
Kuwait	*mn dinars*	(74.7)	148	191	247	292	276	293	342	[415]	..
Lebanon	*mn pounds*	247	300	315	327	255	491	738	915	1 056	[1 246]
Oman	*mn riyals*	42.0	118	241	271	237	265	269	407	522	[580]
Saudi Arabia	*mn riyals*	4 830	(7 226)	(14 875)	(26 335)	(31 685)	[38 684]	[52 388]	[64 076]	[75 738]	[87 715]
Syria	*mn pounds*	1 485	1 682	3 345	3 690	4 160	4 573	8 282	8 415	9 378	9 778
United Arab Emirates	*mn dirhams*	51.6	79.9	124	312	1 928	3 019	4 394	6 330	..	..
Yemen Arab Republic	*mn rials*	127	197	286	411	572	1 180	1 606	1 453	1 933	..
Yemen, People's Democratic Rep. of	*mn dinars*	10.3	12.5	15.4	17.1	20.0	27.1	36.3	(45.0)	..	..
South Asia											
Afghanistan	*mn afghanis*	1 458	1 563	1 834	2 353	2 673	2 938	..	..	..	..
Bangladesh	*mn taka*	312	566	911	1 408	1 665	1 693	1 981	2 366	2 797	3 446
India	*mn rupees*	16 737	20 044	23 823	25 400	26 158	28 091	31 716	35 183	43 500	51 535
Nepal	*mn rupees*	74.9	89.2	116	148	165	(180)	(204)	[233]	269	345
Pakistan	*mn rupees*	4 695	5 932	7 212	7 751	8 697	9 780	10 850	13 412	17 438	20 844
Sri Lanka	*mn rupees*	137	184	207	245	224	309	411	681	..	..
Far East											
Brunei	*mn dollars*	35.0	53.2	97.9	167	175	203	372	288	416	..
Burma	*mn kyats*	711	772	895	1 035	1 168	1 267	1 323	..	..	..
China	*mn yuan*	..	..	..	..	16 400	18 500	24 500	21 300	18 600	19 700
Hong Kong	*mn dollars*	118	118	118	219	354	545	666	1 422	..	..
Indonesia	*bn new rupiahs*	[265]	[406]	[602]	723	777	906	1 029	951	1 224	1 445
Japan	*bn yen*	902	1 054	1 269	1 466	1 646	1 848	2 046	2 196	2 358	2 540
Korea, North	*mn won*	1 247	1 557	1 864	2 058	(2 119)	2 345	2 563	2 750	3 010	3 269
Korea, South	*bn won*	203	321	465	771	1 008	1 438	1 614	2 167	2 770	3 447
Malaysia	*mn ringgits*	904	1 103	1 314	1 219	1 517	1 692	1 834	2 118	3 688	4 850
Mongolia	*mn tugriks*	(213)	(362)	(373)	(407)	(405)	(421)	(480)	(426)	(700)	..
Philippines	*mn pesos*	1 398	2 930	3 812	4 614	4 924	4 863	5 240	[5 125]	6 700	8 300

Singapore	*mn dollars*	553	650	779	927	1 072	1 091	1 151	1 401	1 663	1 919
Taiwan	*bn dollars*	25.8	32.4	38.3	45.7	[58.3]	[70.2]	80.7	96.5	113	132
Thailand	*mn baht*	6 274	7 264	8 307	10 609	13 682	18 697	(23 199)	25 049	28 680	32 578
Oceania											
Australia	*mn dollars*	1 788	1 672	1 849	2 100	2 365	2 587	2 906	3 385	3 962	4 443
Fiji	*mn dollars*	0.7	0.8	1.2	2.0	2.3	2.7	3.1	4.8	4.0	4.6
New Zealand	*mn dollars*	138	160	187	209	243	288	334	421	520	..
Africa											
Algeria	*mn dinars*	542	1 088	1 312	2 001	1 956	2 490	2 318	2 703	3 481	3 893
Benin	*mn francs*	1 377	1 544	1 691	1 759	(2 680)	..	..	..	..	..
Burundi	*mn francs*	474	605	672	860	1 256	1 533	(1 600)	..	..	..
Cameroon	*mn francs*	7 052	8 334	10 023	11 582	12 769	13 700	14 876	17 458	21 066	25 347
Central African Republic	*mn francs*	1 616	1 667	1 774	1 915	1 880	2 289	3 061	2 816	..	..
Chad	*mn francs*	3 553	3 685	4 052	5 977	(7 370)	(9 330)	..	..	..	.
Congo	*mn francs*	4 330	5 810	7 178	8 205	9 000	8 600	11 200	..	..	..
Equatorial Guinea	*mn ekueles*	[265]	[270]	[275]	..	..	..	..	..	..	..
Ethiopia	*mn birr*	102	155	259	265	280	519	722	(783)	(845)	(908)
Gabon	*mn francs*	2 107	2 556	3 612	4 807	7 107	(12 160)	12 036	15 806	(11 000)	..
Ghana	*mn cedis*	47.9	73.7	90.6	126	157	202	(339)	[405]	..	..
Guinea	*mn syli*	[748]	[750]	..	..	..	..	..	..	..	..
Ivory Coast	*mn francs*	(6 400)	9 900	9 834	10 458	(13 000)	19 800	21 900	24 900	25 000	..
Kenya	*mn pounds*	13.1	16.6	19.9	31.8	61.2	93.8	95.0	(85.0)	(90.0)	..
Liberia	*mn dollars*	3.7	3.7	4.5	5.4	7.3	8.8	12.8	25.9	30.4	[26.2]
Libya	*mn dinars*	(110)	(215)	(235)	(405)	(435)	(690)	(835)	..	..	..
Madagascar	*mn francs*	4 536	6 231	6 470	8 504	10 732	11 775	17 420	..	23 500	..
Malawi	*mn kwachas*	2.4	3.3	7.4	8.1	12.2	17.8	18.1	..	..	..
Mali	*mn francs*	4 890	5 600	8 100	10 456	12 751	14 080	15 331	16 295	..	..
Mauritania	*mn ouguiyas*	260	340	1 200	(1 975)	(2 830)	3 541	3 238	..	..	..
Mauritius	*mn rupees*	3.5	4.5	6.5	8.8	9.4	10.8	15.7	42.6	..	..
Morocco	*mn dirhams*	763	1 057	1 673	2 548	3 294	3 219	3 495	4 400	5 000	6 250
Mozambique	*mn escudos*	..	..	600	(1 760)	1 900	3 650	3 733	..	5 600	..
Niger	*mn francs*	807	938	1 361	1 667	2 143	2 862	6 949	..	..	..
Nigeria	*mn nairas*	408	505	1 008	1 070	1 219	1 139	1 115	1 247	1 319	1 111
Rwanda	*mn francs*	756	731	860	1 020	1 131	1 370	1 634	..	..	..
Senegal	*mn francs*	5 188	6 780	8 234	9 913	11 074	12 554	13 471	13 559	15 075	17 005
Sierra Leone	*mn leones*	4.1	5.0	5.9	6.3	7.4	8.3	..	..	..	..
Somalia	*mn shillings*	101	135	145	165	200	502	533	588	908	..
South Africa	*mn rands*	438	655	913	1 257	1 578	1 675	1 813	2 020	2 496	2 834

	Currency	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Sudan	*mn pounds*	38.6	39.2	40.2	52.0	68.9	70.9	84.7	..	..	..
Tanzania	*mn shillings*	391	612	728	818	1 130	2 324	[2 444]	..	..	..
Togo	*mn francs*	1 261	1 604	1 960	3 153	4 118	4 789	(4 800)	(5 155)	..	..
Tunisia	*mn dinars*	16.1	20.3	30.3	36.0	52.2	61.7	62.5	77.3	104	..
Uganda	*mn shillings*	416	535	642	835	1 089	1 078	775	805	..	..
Upper Volta	*mn francs*	1 355	1 509	3 871	4 667	5 627	7 305	6 814	7 470	8 742	..
Zaire	*mn zaires*	41.8	84.6	73.9	(82.0)	(31.0)	(38.0)	(200)	..	..	..
Zambia	*mn kwachas*	90.0	120	175	170	195	[205]	[235]	[230]	..	..
Zimbabwe	*mn dollars*	53.2	69.3	85.6	122	180	227	300	[307]	265	291
Central America											
Costa Rica	*mn colones*	53.3	71.8	101	140	205	201	235	265	(318)	..
Cuba	*mn pesos*	270	282	(326)	..	700	784	841	811	842	924
Dominican Republic	*mn pesos*	36.6	47.6	57.2	67.4	75.8	87.1	109	..	..	..
El Salvador	*mn colones*	51.4	65.1	69.7	94.8	125	147	(170)	179	291	369
Guatemala	*mn quetzales*	21.5	27.4	42.9	49.8	77.1	91.0	105	128	(152)	..
Haiti	*mn gourdes*	39.9	42.3	50.9	55.8	60.9	73.5	..	..	..	..
Honduras	*mn lempiras*	31.9	33.8	42.8	47.4	63.6	86.2	99.1	(176)	(220)	(440)
Jamaica	*mn dollars*	11.7	13.6	20.0	26.6	28.2	..	..	..	..	..
Mexico	*mn pesos*	3 500	4 740	5 870 ·	7 630	9 190	10 980	14 460	17 340	28 700	42 500
Nicaragua	*mn cordobas*	107	154	191	262	363	459	450	1 200	(1 700)	..
Panama	*mn balboas*	10.7	13.0	14.7	(15.3)	..	..	..	..	..	..
Trinidad and Tobago	*mn dollars*	7.3	9.5	13.0	16.0	19.3	..	..	..	..	..
South America											
Argentina	*bn new pesos*	6.5	8.1	29.2	180	509	1 419	3 642	7 242	15 425	[87 500]
Bolivia	*mn pesos*	418	787	1 157	1 325	1 375	1 636	2 012	2 592	4 561	..
Brazil	*mn cruzeiros*	10 831	9 690	13 259	20 960	27 465	35 247	48 015	68 712	146 750	329 200
Chile	*mn pesos*	72.0	651	2 383	7 815	19 850	31 223	49 875	79 488	82 184	(87 752)
Columbia	*mn pesos*	2 479	2 950	4 023	4 975	6 066	6 583	(9 010)	14 237	16 203	[44 945]
Ecuador	*mn sucres*	1 263	1 790	2 522	2 563	4 813	4 097	4 638	5 539	(6 247)	(5 867)
Guyana	*mn dollars*	22.5	38.1	78.9	120	77.5	(65.0)	..	..	..	..
Paraguay	*mn guaranies*	2 135	2 482	3 316	3 588	4 204	4 892	5 793	..	..	..
Peru	*mn soles*	13 803	15 605	25 464	38 527	77 246	92 514	121 000	(283 000)	(434 000)	(679 000)
Uruguay	*mn new pesos*	60.0	128	218	274	464	811	(1 676)	2 362	4 126	..
Venezuela	*mn bolivares*	1 309	1 969	2 440	1 918	2 422	2 673	2 993	3 893	4 550	(5 060)

Table 7A.4. World military expenditure as a percentage of gross domestic product

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
NATO										
North America:										
Canada	1.9	1.9	1.9	1.8	1.9	2.0	1.8	1.8	1.8	1.9
USA	6.0	6.1	5.9	5.4	5.3	5.1	5.1	5.6	5.9	6.6
Europe:										
Belgium	2.8	2.8	3.1	3.1	3.1	3.3	3.3	3.3	3.5	3.3
Denmark	2.0	2.3	2.4	2.3	2.3	2.3	2.3	2.4	2.5	..
France	3.8	3.7	3.8	3.8	3.9	4.0	4.0	4.0	4.2	4.1
FR Germany	3.5	3.6	3.6	3.5	3.3	3.3	3.3	3.3	3.4	3.4
Greece	4.1	5.6	6.8	6.9	7.0	6.7	6.3	5.7	7.0	6.9
Italy	2.7	2.6	2.5	2.3	2.4	2.4	2.4	2.4	2.5	2.6
Luxembourg	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1
Netherlands	3.2	3.2	3.4	3.2	3.3	3.1	3.2	3.1	3.2	3.2
Norway	3.1	3.0	3.2	3.1	3.1	3.2	3.1	2.9	2.9	3.0
Portugal	5.9	7.4	5.3	4.0	3.5	3.5	3.5	3.6	3.6	3.4
Turkey	4.1	3.9	5.8	6.2	5.8	5.2	4.3	4.3	4.9	5.3
UK	4.8	5.0	4.9	4.9	4.7	4.6	4.7	5.1	5.0	5.3
WTO										
Bulgaria[f]	2.7	2.8	3.0	3.0	3.2	(3.2)	(3.2)	(3.2)	..	
Czechoslovakia[f]	3.2	3.0	3.2	3.1	3.1	3.1	(3.1)	(3.1)	..	
German DR[f]	4.1	4.0	4.0	4.1	4.0	4.1	(4.1)	(4.3)	..	
Hungary	2.2	2.4	2.5	2.2	2.2	2.4	2.3	2.3	(2.5)	
Poland[f]	3.0	2.9	2.8	2.6	2.7	2.6	(2.7)	(2.9)	..	
Romania[f]	2.1	2.1	2.2	2.2	2.1	2.1	2.0	1.7	(1.6)	
USSR[f]	[10.8]	[10.4]	[10.3]	[9.9]	[9.5]	[9.2]	[9.0]	[8.8]	[8.7]	
Other Europe										
Austria	1.0	1.1	1.2	1.2	1.2	1.3	1.3	1.2	1.2	
Finland	1.4	1.3	1.4	1.5	1.4	1.4	1.5	1.5	1.5	
Ireland	1.2	1.2	1.6	1.6	1.5	1.5	1.6	1.7	1.7	
Spain	1.6	1.7	1.7	1.8	1.7	1.5	1.7	1.9	2.0	
Sweden	3.6	3.4	3.3	3.2	3.3	3.3	3.3	3.1	3.1	
Switzerland	2.0	2.0	2.0	2.3	2.1	2.1	2.2	2.1	2.0	
Yugoslavia[g]	4.7	5.5	5.7	5.6	5.3	4.8	4.8	5.0	..	
Middle East										
Bahrain	(4.3)	3.0	1.6	1.7	2.2	..	..	..	..	
Cyprus	1.2	2.2	2.9	3.2	2.5	1.7	2.0	1.4	..	

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Egypt	[34.1]	36.5	33.6	24.9	22.5	[10.2]	[9.6]	[7.9]	[7.0]	
Iran	6.9	10.9	13.2	12.4	10.5	11.2	6.6	..	..	
Iraq	12.2	12.5	11.7	10.7	10.4	..	..	..	..	
Israel	(25.6)	(25.6)	(26.7)	(27.4)	(25.4)	(20.7)	(20.7)	(13.8)	(19.1)	
Jordan	21.7	20.7	17.6	23.9	18.4	16.2	17.6	14.0	13.8	
Kuwait	(4.8)	4.5	5.4	6.6	7.3	6.6	4.8	4.7	[6.0]	
Lebanon	3.5	3.7	4.2	..	3.1	5.6	6.6	..	..	
Oman	24.8	20.8	33.3	32.8	26.9	29.6	22.9	22.3	..	
Saudi Arabia	6.9	(6.0)	(9.8)	(14.3)	(14.7)	[16.3]	[16.5]	[14.1]	..	
Syria	15.8	10.5	16.2	14.8	15.3	14.0	21.1	16.1	14.8	
United Arab Emirates	0.5	0.3	0.3	0.6	3.0	5.0	5.5	5.8	..	
Yemen Arab Republic	5.0	6.0	6.6	7.2	7.8	12.8	14.5	..	..	
Yemen, People's Democratic Rep. of	15.1	16.0	..	..	..	..	..	..	..	
South Asia										
Afghanistan	..	..	..	1.7	1.9	1.9	..	..	..	
Bangladesh	0.5	0.6	0.8	1.3	1.4	1.2	1.2	1.3	..	
India	3.0	3.0	3.1	2.9	2.7	2.7	2.6	..	..	
Nepal	0.7	0.6	0.7	0.9	0.9	(0.9)	(0.9)	[0.9]	..	
Pakistan	6.1	6.2	5.9	5.5	5.4	5.3	5.0	5.2	..	
Sri Lanka	0.7	0.8	0.8	0.8	0.6	0.7	0.8	1.0	..	
Far East										
Brunei	3.6	2.1	3.6	4.9	4.2	4.7	6.4	2.9	..	
Burma	5.1	4.2	4.0	3.9	4.0	4.0	3.7	..	..	
Hong Kong	0.4	0.3	0.3	0.4	0.6	0.8	0.8	1.3	..	
Indonesia	[4.3]	[4.2]	[5.0]	4.9	4.3	4.0	3.2	2.1	2.3	
Japan	0.8	0.8	0.9	0.9	0.9	0.9	0.9	0.9	..	
Korea, North	8.4	9.1	9.8	10.1	(9.7)	9.7	9.7	..	..	
Korea, South	3.8	4.3	4.7	5.8	5.9	6.2	5.5	6.1	6.2	
Malaysia	4.9	4.8	5.9	4.3	4.7	4.7	4.1	4.1	6.6	
Philippines	2.2	2.9	3.3	3.4	3.2	2.7	2.4	[1.9]	2.2	
Singapore	0.5	5.2	5.8	6.4	6.7	6.2	5.7	6.0	6.1	
Taiwan	7.4	7.1	7.1	7.5	[7.9]	[7.9]	7.6	7.4	..	
Thailand	2.9	2.7	2.8	3.1	3.5	4.0	(4.2)	3.7	3.6	
Oceania										
Australia	3.5	2.7	2.8	2.7	2.7	2.7	2.7	2.8	2.8	
Fiji	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5	..	
New Zealand	1.6	1.6	1.7	1.6	1.6	1.7	1.7	1.8	..	

Africa									
Algeria	1.7	2.2	2.3	2.9	2.4	..	..	..	..
Benin	1.5	1.5	1.5	1.3	(1.8)	..	..	..	..
Burundi	1.9	2.2	2.1	2.2	2.5	2.7	(2.2)	..	..
Cameroon	1.6	1.6	1.6	1.6	1.5	1.3	..	..	..
Chad	3.9	3.2	2.7	3.8	(4.6)	..	..	..	..
Congo	..	..	4.4	4.6	..	4.3	..	..	..
Ethiopia	1.9	2.8	4.5	4.1	4.0	6.8	8.8	(9.1)	..
Gabon	1.3	0.7	0.8	0.7	1.0	(2.3)	1.9	..	..
Ghana	1.4	1.6	1.7	1.9	1.4	..	..	..	..
Ivory Coast	(1.1)	1.3	1.2	0.9	(0.8)	1.1	..	..	..
Kenya	1.5	1.6	1.7	2.2	3.3	4.6	4.2	(3.2)	(3.0)
Liberia	0.9	0.7	0.7	0.9	1.0	1.1	1.5	2.8	3.6
Libya	(4.9)	(5.5)	(6.2)	(8.3)	(7.5)	(12.1)	(10.6)	..	..
Madagascar	1.5	1.7	1.6	1.6	2.4	2.5	3.0	..	..
Malawi	0.6	0.7	1.3	1.2	1.6	2.0	1.7	..	..
Mauritania	2.1	2.1	6.3	8.7	(11.6)	(14.2)	11.6	..	..
Mauritius	0.2	0.1	0.2	0.2	0.2	0.2	0.2	0.5	..
Morocco	3.1	3.1	4.6	6.2	7.0	5.8	5.6	6.3	..
Nigeria	3.7	2.8	5.4	3.8	4.0	..	..	..	..
Rwanda	3.1	2.5	1.6	1.7	1.6	1.7	1.7	..	..
Senegal	1.9	2.2	2.2	2.3	2.3	2.6	2.6	..	..
Sierra Leone	0.9	0.9	1.0	0.9	0.9	0.9	..	..	..
South Africa	2.2	2.7	3.3	4.0	4.6	4.2	3.8	3.3	3.5
Sudan	3.6	2.8	2.4	2.5	2.6	..	..	..	..
Tanzania	3.0	3.8	3.8	3.5	3.8	6.9	[6.6]	..	..
Togo	1.4	1.8	1.5	2.3	2.4	2.5	(2.2)	..	..
Tunisia	1.4	1.3	1.8	1.9	2.4	2.5	2.1	2.2	2.6
Uganda	3.2	3.3	2.9	3.2	2.2	1.7	..	..	..
Upper Volta	1.2	1.2	2.7	2.9	2.9	3.4	2.6	..	..
Zaire	2.8	4.7	3.9	(2.9)	(0.8)	(0.7)	(1.8)	..	..
Zambia	5.7	6.3	11.1	9.1	10.0	[9.3]	[9.0]	[7.7]	..
Zimbabwe	3.4	3.7	4.3	5.6	8.1	9.7	11.3	..	..
Central America									
Costa Rica	0.5	0.5	0.6	0.7	0.8	0.7	0.7	0.6	(0.6)
Cuba[g]	3.7	3.6	(3.7)	..	7.3	7.6	7.9	7.5	..
Dominican Republic	1.6	1.6	1.6	1.7	1.7	1.8	2.0	..	..
El Salvador	1.5	1.7	1.6	1.7	1.7	(1.9)	2.0	2.1	3.3
Guatemala	0.8	0.9	1.2	1.1	1.4	1.5	1.5	1.6	(1.7)
Haiti	1.2	1.2	1.2	1.2	1.3	1.7	..	..	..
Honduras	1.7	1.6	1.9	1.8	1.9	2.5	2.3	(3.5)	(4.1)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
Jamaica	0.7	0.6	0.8	1.0	0.9	..	..	..	..	
Mexico	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.4	0.6	
Nicaragua	1.4	1.5	1.7	2.0	2.3	3.1	3.4	6.7	..	
Panama	0.7	0.7	0.8	(0.8)	..	..	..	..	..	
Trinidad and Tobago	0.3	0.2	0.2	0.2	0.2	..	..	..	..	
South America										
Argentina	1.8	1.7	2.0	2.4	2.4	2.7	2.6	2.6	2.8	
Bolivia	1.6	1.8	2.4	2.3	2.1	2.1	2.2	1.9	2.3	
Brazil	2.1	1.3	1.3	1.2	1.1	0.9	0.8	0.5	0.6	
Chile	5.9	6.7	5.7	5.3	6.2	6.4	6.5	7.3	6.0	
Columbia	1.0	0.9	1.0	0.9	0.8	0.7	(0.8)	0.9	(0.8)	
Ecuador	2.0	1.9	2.3	1.9	2.9	2.1	2.0	1.9	(1.9)	
Guyana	3.5	4.0	6.6	10.7	6.9	(5.1)	..	..	..	
Paraguay	1.7	1.5	1.7	1.7	1.6	1.5	1.3	..	..	
Peru	3.8	3.5	4.6	5.0	7.3	5.5	3.9	(5.7)	(5.1)	
Uruguay	2.4	2.8	2.6	2.1	2.3	2.7	(3.0)	2.6	3.4	
Venezuela	1.7	1.8	2.1	1.4	1.6	1.6	1.4	1.5	1.6	

Conventions

.. Information not available or not applicable.
( ) SIPRI estimates.
[ ] Imputed values, with a high degree of uncertainty.

Notes

[a] *Developed market economies* include all NATO countries, Other Europe except Albania and Yugoslavia, plus Australia, New Zealand, Japan, Israel and South Africa.
Centrally planned economies include all WTO countries, Albania, North Korea, Mongolia, China and Cuba.
OPEC countries include Iran, Iraq, Kuwait, Saudi Arabia, United Arab Emirates, Indonesia, Algeria, Gabon, Libya, Nigeria, Ecuador and Venezuela. Qatar, although a member of OPEC, is not included. Oman, although it is not a member of OPEC, is included, since its position is essentially similar to that of other Arab OPEC countries.
Non-oil developing countries include the rest of the world, excluding Kampuchea, Laos and Viet Nam.
[b] Spain is not included in NATO but in Other Europe, since it has not been a member of NATO for a full calendar year.
[c] At current prices and 1980 exchange-rates.
[d] At 1979 prices and 1979 exchange-rates.
[e] At 1978 prices and 1978 exchange-rates.
[f] Per cent of gross national product.
[g] Per cent of gross material product.

Appendix 7B

Sources and methods for the world military expenditure data

Square-bracketed numbers, thus [1], *refer to the list of references on page 180.*

This appendix describes the sources and methods used in the preparation of the tables on military expenditure (appendix 7A). Only the main points are noted here. The tables are updated and revised versions of those which appeared in the *SIPRI Yearbook 1982*. It is important to note that these revisions can be quite extensive—not only are significant changes made in figures which were previously estimates, but entire series are altered when new and better sources come to light.

I. Purpose of the data

The main purpose of the SIPRI data is to give some measure of the resources absorbed by the military sector in various countries, regions and in the world as a whole—that is, the 'opportunity cost' of military spending. The purpose is *not* to provide a measure of military strength. For a large number of reasons (*inter alia*, because of differences in coverage, the difficulty in finding appropriate exchange-rates, the fact that price conditions vary widely between countries, because money may be spent on ineffective weapons, and because there is no reason to suppose that defence necessarily costs the same as offence), expenditure figures are inappropriate for this purpose.

II. Definitions

The data for NATO countries are estimates made by NATO to correspond to a common definition. These include military research and development; include military aid in the budget of the donor country and exclude it from the budget of the recipient country; include costs of retirement pensions, costs of paramilitary forces and police when judged to be trained and equipped for military operations; and exclude civil defence, war pensions and payments on war debts.

The NATO definition is used as a guideline for all countries. In practice it is, however, far from possible to adhere to a common definition of military expenditure for all countries and throughout the time period covered in the SIPRI military expenditure series, since this would require

much more detailed information than is available about the content of military budgets as well as about military expenditure items covered under other budget headings. There are many shortcomings, but those of the greatest magnitude concern military aid received and expenditure for paramilitary forces. Although the sums received in military aid are available for many countries, it is not clear to what extent these sums are included in the military budgets of the recipient countries. Further, there are countries which rely on foreign economic support for more than half of their total government budget. Although this budget support is not classified as military aid, it is evident that not all of their military expenditure is domestically financed. This is an area which requires much research in order to adjust military expenditure in accordance with the NATO definition. The same is true of expenditure for paramilitary forces. It is known that such expenditure is included in the internal security budgets for some countries, but so far it has not been possible to estimate the size of these expenditures for all countries and to add them to the military expenditure series. For other countries, the budgets of the defence and the interior ministries are lumped together in the official statistics without any information about the relation between them or the content of the internal security budget.

In the light of these difficulties, priority is given to the choice of a uniform definition over time for each particular country in an effort to show a correct time trend, rather than adjusting the figures for single years according to the common definition.

Thus, at best, the ambition to adhere to a common definition amounts in practice to a consistent choice between alternative statistical series or, in a few cases, to the identification and adjustment of one of the components included in the definition. For many countries, the military expenditure estimates are chosen from the *Government Finance Statistics Yearbook* (GFSY), in which a quite detailed definition is used [1], although it differs in some respects from the NATO definition, mainly with regard to expenditure for civil defence and military retirement pensions. The source from which the military expenditure estimates for the Warsaw Treaty Organization (WTO) countries other than the USSR is taken makes an adjustment for Czechoslovakia, the German Democratic Republic and Poland to include some estimates for military research and development expenditure financed outside of defence budget appropriations, and to exclude an estimated 'civilian' portion of internal security for the German Democratic Republic, whose published budget appropriation figures up to and including 1976 reflect defence and internal security taken together. There are, however, other items for which adjustments have been impossible. "No attempt has been made to assess industrial investments related to armaments production. Nor has any attempt been made to include here

the various military related outlays known to be financed outside the defense budgets proper, such as benefits to soldiers' families and paid leave for reservists. Investment expenditures made directly by ministries of defense, however, are implicitly included" [2a].

For calculating the ratio of military expenditure to national product, gross domestic product (GDP) at purchasers' values has been used. GDP is defined as "the final expenditure on goods and services, in purchasers' values, *less* the c.i.f. (cost, insurance, freight) value of imports of goods and services" [3]. For the WTO countries, military expenditure is expressed as a percentage of estimates of gross national product (GNP) at market prices, which for these countries cannot be more than negligibly different from the ratio to GDP.

Coverage

The tables of military expenditures cover 129 countries.

The countries are presented by region in the following order: NATO (North Atlantic Treaty Organization), WTO (Warsaw Treaty Organization), Other Europe, Middle East, South Asia, Far East, Oceania, Africa, Central America and South America. The individual countries are listed alphabetically within each of these regions.

Data are provided for the years since 1973. Series for the years since 1950 are published in previous volumes of the *SIPRI Yearbook* and are also available on request for specific countries.

III. Sources

The estimates of military expenditure for NATO countries are taken from official NATO data, published annually in, for example, *NATO Review* and *Atlantic News*. The estimates for WTO countries other than the USSR are taken from reference [4] for the years up to and including 1979. For the years after 1979, the official budget percentage changes were used to extend the series. For the Soviet Union, a 'compromise' figure has been taken, which corresponds neither with the official figures nor with the US Central Intelligence Agency estimates; the reasons are explained in the *SIPRI Yearbook 1979* (page 28).

Official figures for China for 1977–82 do not include expenditure on military research and development and have therefore been increased by 10 per cent to allow for this.

For the remaining countries, the prime sources are the GFSY, published by the International Monetary Fund; the United Nations' *Statistical*

Yearbook (UNSY); and the United Nations' *Statistical Yearbook for Asia and the Pacific* (UNSYAP). The UNSY gives data unadjusted in the form they are notified by governments and has not published any public finance statistics since 1978.

For a number of countries, estimates are made on the basis of budgets, White Papers and statistical documents published by the government or the central bank of the country concerned.

Annual reference works are most often not very useful, since they tend to quote each other when giving military expenditure figures. An exception is the *Europa Year Book* (London) which is useful especially for small nations.

The countries for which figures have been impossible to find in these sources present difficulties. The estimates of their military spending have been derived from other sources, mainly journals and newspapers, and are therefore highly approximate. This is true also of the most recent years for most countries, since the above sources do not include figures for these later years.

The figures for 'constant price' military expenditure become more unreliable when inflation is rapid and unpredictable. Supplementary allocations, made during the course of the year to cover losses in purchasing power, often go unreported and recent military expenditure can appear to be falling in real terms. This is a particular problem in Latin America where, for example, the two major military powers in the region, Argentina and Brazil, have had particularly high inflation since the mid-1970s.

The data on GDP, consumer price index and exchange-rates are taken principally from *International Financial Statistics*, published by IMF, and from the *United Nations Monthly Bulletin of Statistics*.

The GNP estimates for the USSR were obtained by converting the GNP dollar-estimate for 1975 given in reference [5a] to roubles and constructing a series by applying the percentage changes in the net material product series. For the other WTO countries, figures for the ratio of military expenditure to GNP at market prices calculated in domestic currencies were cited directly from reference [2b] for the years up to and including 1978; for the years from 1979, they were calculated using the net material product series.

IV. Methods

All figures are presented on a calendar-year basis. Conversion to calendar years was made on the assumption of an even rate of expenditure throughout the fiscal year. Figures for the most recent years are budget estimates.

When the latest figures differed from the previous series chosen, the percentage change from the latest source was applied to the existing series in order to make the trend as correct as possible.

In order to provide time series estimates of total world military expenditure at constant prices, so as to allow for volume comparisons, all national expenditures must be converted into a common currency. The US dollar is the most widely used currency for this purpose, and SIPRI has adopted this practice. It is also necessary to adjust for the effect of price changes. The figures in this *Yearbook* are presented at 1980 price levels and 1980 exchange-rates.

For the WTO countries other than the USSR, the exchange-rates given in reference [2b] were used. Updating was done by using the basic and non-commercial rates. For the Soviet Union, we have used the 'purchasing-power-parity' estimate, derived from national product comparisons of the United States and the Soviet Union, of 1.79 dollars to the rouble [5c], updated by the change in the US consumer price index from 1975 to 1980, which brings it to 2.7 dollars per rouble. The Chinese rate of exchange is arrived at by considering Chinese costs in terms of US prices and *vice versa*. This very roughly approximates to a rate of 2 dollars to the yuan for 1980.

The adjustment for changes in prices was made by applying the consumer price index in each country. In many countries this is the only price index available. As an index of the general movement of prices, it is a reasonable one for showing the trend in the resources absorbed by the military, in constant prices. For the most recent year, the estimate of the consumer price increase is based on the figures for the first 6–10 months only. For the USSR, no adjustment for prices is made, since the figure for military expenditure is so rough and inflation practically zero. For the other WTO countries, adjustments were made according to the official consumer price index.

The calculations of the ratio of military expenditure to GDP/GNP were made in domestic currencies. In international comparisons this procedure tends to underestimate the defence burden in the centrally planned economies due to the pricing policies practised there. This has been explained with reference to the WTO countries other than the Soviet Union as follows:

> Comparisons based on such shares will be meaningful only if the basis of valuation of the defense and nondefense (civilian) components of GNPs of various countries is more or less uniform. However, in the East European centrally planned economies, the price of civilian consumption goods and services, because of the heavy incidence of turnover taxes, most probably are relatively high in relation to prices of military hardware and other procurement items, on which turnover taxes generally are not imposed. Also very probably, the production of defense items is heavily subsidized through financial transfer at the state budget or lower levels. [2c]

References

1. SIPRI, *World Armaments and Disarmament, SIPRI Yearbook 1981* (Taylor & Francis, London, 1981), p. 172.
2. Alton, T. P., Lazarcik, G., Bass, E. M. and Znayenko, W., 'East European defense expenditures, 1965–78', in *East European Economic Assessment, Part 2*, a compendium of papers submitted to the Joint Economic Committee, US Congress (US Government Printing Office, Washington, D.C., 1981).
   (a) —, pp. 419–20.
   (b) —, pp. 413–14.
   (c) —, p. 412.
3. *Statistical Yearbook* (United Nations, New York, 1974), p. XVII.
4. Alton, T. P., Lazarcik, G., Bass, E. M. and Znayenko, W., *Military Expenditures in Eastern Europe, Post World War II to 1979* (L. W. International Financial Research, Inc., New York, 1980).
5. Sivard, R. L., *World Military and Social Expenditures* (WMSE Publications, Leesburg, Va, March 1978).
   (a) —, p. 21.
   (b) —, p. 30.

Appendix 7C

Military expenditure series: a comparison of five Latin American countries[1]

Despite the importance of this area, especially when the contrast between military spending and the chronic shortage of resources for development programmes is drawn, information is fragmentary or zero. To some extent, this is explainable in terms of the secrecy surrounding the subject, for tactical or political reasons. The degree of precision in information available appears inversely proportional to the distance from the area in question; for example, it is difficult if not impossible to extract up-to-date information concerning Argentina in Buenos Aires, yet that same information is more easily available in London, Stockholm or Washington.

Latin American Week, Special Report
19 March 1982

I. Introduction

It is in the very nature of military spending that exact figures are not made public. Even in countries where government accounts are open to minute scrutiny and unlimited public debate, unpopular spending can be made to disappear behind a bland heading in an innocent budget title. Some countries solve the problem of secrecy by not making the details of military spending public at all; others, where the tradition of public accounting and even public accountability is long, keep their ledgers in good order and then keep them out of the public view. Thus in a large number of countries, budgets are drawn up, priorities weighed, and allocations made between competing ministries in a fashion familiar to all budget departments, but the amount given to the military is only made known in a small notice in an Official Gazette or Central Bank report which the public does not read and which journalists understand they should not broadcast.

This pattern is particularly true of some of the countries of Latin America. In these countries, details of budget allocations and expenditure accounts are often not secret but at the same time are never the subject of public debate. Accounts can be examined by a persistent student who knows what to ask for and where to ask, but almost insurmountable problems of comprehension arise since the structure, content and presentation of accounts may change annually. A less adventurous student might consult other official publications with surprising results, as the following examples illustrate.

[1] This appendix was written by Rita Tullberg and Victor Millán.

The existence of such divergent series must be a source of dismay to all who are concerned with gaining a true picture of the amount of resources going to the military in these countries. Several explanations can be offered for the variations in absolute levels and growth rates which the series afford. The primary reason for major differences in the absolute level of series relates to differences in definition, which are discussed briefly below. Further, the notion of 'planned growth' of military expenditure is foreign to countries whose politics revolve around the military. New regimes mean promotions, improved conditions and new equipment for the armed forces whose loyalty must be bought and retained. Last year's generals must be pensioned off or a sufficient number of new ones loyal to the regime created. This system, known as *rotación de mando*, is costly and disturbing for budget planning. In addition, many of these countries have suffered from periods of rapid inflation for which the military receive compensation in the form of extra allocations during the budget year. Thus figures reported to international organizations rapidly become out-of-date for countries where there are rapid changes of economic and political fortune. Nor is it always in the interest of governments to report to international organizations the full extent of military spending, when at the same time they are seeking financial support for social and economic programmes.

Bearing in mind that Latin American countries are rarely served by exaggerating the extent of their military spending, it seems unlikely in general that military expenditure is lower than the highest figure quoted by any of these official sources.

II. General remarks

The tables in the section below give military expenditure series for the 1970s for five Latin American countries. Two series for each country are from the standard works of two international bodies, the United Nations (except for Peru where the series stops in 1968 and Mexico for which there are no recent figures) and the International Monetary Fund. One series is from material available in specialist public libraries in Stockholm, Sweden, in particular the library of the Central Bureau of Statistics. Such material can be expected to be available in similar libraries elsewhere. A fourth series is based on material consulted in the country concerned or in the Library of Congress in Washington, D.C.

The United Nations has not published any public finance statistics in its most recent Statistical Yearbook, so that material, when available, refers at the very latest to 1978. It is noticeable that the United Nations Economic Commission for Latin America, ECLA/CEPAL, gives no figures for military expenditure, although it does publish detailed annual statistics for

Latin American countries, including government expenditure.[2] The material from the International Monetary Fund (IMF) specifically excludes expenditure on pensions and other social security benefits for military personnel. Such payments can form a significant part of personnel costs and are not unimportant in explaining the attraction of military life in these countries. Another problem of definition involves the inclusion or otherwise of police forces which are armed and trained in a fashion which leaves them scarcely distinguishable from the armed forces proper. These and other problems of definition are always a potential source of divergence between series, but the divergence should be regular for a few years at least. Figures given in national statistical yearbooks or the like are of unknown quality, but do indicate what the countries themselves like to make known about their defence spending. Budgeted defence expenditure can sometimes be collected annually from official sources (typically, publication of budget laws), but such figures are in some cases only remotely related to expenditure, especially in countries with racing inflation. Ideally, audited expenditure accounts for all branches of government spending should be examined and combined with a knowledge of personnel strength, military procurement and research and development to produce a more accurate picture of defence spending. This study has involved no more than a very preliminary examination of such government accounts as have become available.

[2] The United Nations Economic and Social Commission for Asia and the Pacific, however, publishes military expenditure figures in its Statistical Yearbook as does, to a limited extent, the United Nations Economic Commission for Africa. Material relating to military expenditure is not published in the annual report of the Inter-American Development Bank, *Economic and Social Progress in Latin America.*

Table 7C.1. Argentina: military expenditure, 1970–80[a]

Figures are in million new pesos (ARP), current prices.

Source	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
1	1 799	2 171	3 474	4 434	6 387	10 308	180 379	415 518	1 187 366	3 479 094	5 623 165
2	..	2 155	3 566	5 869	8 131	29 186	180 101	511 805	1 187 326	..	..
3	..	2 000	3 000	6 000	7 000	22 000	143 000	380 000	1 267 000	3 481 000	6 385 000
4	454	643	1 071	1 489	2 089	11 436	90 371	274 754	652 324	1 615 909	2 465 579
5	1 692	2 345	3 831	6 473	8 131	29 186	180 101	509 298	1 419 407	3 642 529	7 242 031

Key to the Sources:

1. *Boletín Oficial:* Budget laws for the years given. Collected in the US Library of Congress by Nicole Ball.
2. *United Nations Statistical Yearbook 1977 and 1978.*
3. *Government Finance Statistics Yearbook*, Vol. 6, 1982 (IMF): Argentina, Table B.
4. *Anuario Estadístico de la República Argentina 1979–80.* Available in a public library in Stockholm.
5. *Presupuestos de la Administración Nacional* (national budgets). Destino de las Erogaciones—Administración Central—Cuentas Especiales y Organismos Descentralizados—Ejercicios 1971 a 1975 (Ministerio de Economía, Secretaría de Hacienda, Superintendencia del Tesoro, Buenos Aires, August 1978); Secretaría de Estado de Hacienda, *Memoria 1976–78;* budget laws for fiscal years 1979–81. Study made in Buenos Aires by Mario Carranza.

[a] Figures given in Source 1 are for current expenditure. Those in Source 5 include capital expenditure.

Table 7C.2. Brazil: military expenditure, 1970–80[a]

Figures are in million cruzeiros (BRC), current prices.

Source	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
1	3 930	6 500	8 030	10 830	8 200	..	..	..	..	..	..
2	3 200	4 000	5 000	6 700	8 700	11 200	19 000	25 900	36 900	44 400	..
3	..	6 498	8 033	10 831	9 690	13 259	20 960	26 951	35 247	48 015	68 712
4	..	5 500	6 585	7 957	8 379	11 532	18 516	27 465	31 362	41 722	58 365
(a)	..	5 446	6 517	7 871	8 202	11 278	18 137	26 951	30 589	40 622	58 365
(b)	..	54	68	86	177	254	379	514	773	1 100	..

Key to the Sources:

1. *United Nations Statistical Yearbook 1976.*
2. *Government Finance Statistics Yearbook*, Vol. 6, 1982 (IMF): Brazil, Table B.
3. *Anuário Estatistico do Brasil.* Secretaria de Planejamento da Presidencia da República. Fundação Instituto Brasileiro de Geografia e Estatística, 1970–81, capítulo 69 'Receita et Despesa da União. 4. Despesa fixada da União, segundo as funções e os Poderes e Órgãos Auxiliares'. Ministério do Exército, Ministério da Marinha, Ministério da Aeronáutica. Available in a public library in Stockholm.
4. República Federativa do Brasil, Ministério de Planejamento e Coordenação Geral. *Orçamento da União para o Exercício Financeiro* (union budgets), Brasília. Departamento de Imprensa Nacional 1971–2. República Federativa do Brasil. Projeto de Lei Orçamentária Anual. Exercício Financeiro 1973–80. Consolidação da Despesa. Demonstrativo da Despesa por Órgãos e Categorias Económicas—Recursos do Tesouro.
   (*a*) Ministério do Exército, Ministério da Marinha, Ministério da Aeronáutica
   (*b*) Tribunal Militar; Auditorias da Justiça Militar; Conselho de Segurança Nacional; Serviço Nacional de Informações; Estado-Maior das Forças Armadas (General Staff); Escola Superior de Guerra; Hospital das Forças Armadas and Escola Nacional de Informações. Collected in the US Library of Congress by Nicole Ball.

[a] Figures given in Source 3 are for the Army, Navy and Air Force Ministries only. The Brazilian budgets are very detailed and their format remains largely unchanged through the years. Items for defence and security purposes appear in the budgets of several ministries.

Table 7C.3. Chile: military expenditure, 1970–80[a]

Figures are in million pesos (CLP), current prices.

Source	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
1	2	3	6	41	432	1 587	5 075	..	..	..	..
2	..	..	6	42	441	1 631	5 065	11 300	19 932	..	..
3	4	8	16	72	651	2 382	7 815	19 850	31 223	34 625	..

Key to the Sources:

1. *United Nations Statistical Yearbook 1978*. The figures here are rounded to the nearest million.
2. *Government Finance Statistics Yearbook*, Vol. 6, 1982 (IMF): Chile, Table B.
3. From a study made by Carlos Portales and Augusto Varas. Total expenditure less military aid from the United States. Total current and capital expenditure from *Balance Consolidado del Sector Público*, Ministerio de Hacienda—NIPRES. This total comprises expenditure on: Carabineros; Investigaciones; Subsecretaría de Guerra; Subsecretaría de Marina; Subsecretaría de Aviación; FAMAE (Army Munitions Industry); the Naval Dockyards, ASMAR; Previsión (Military pensions and social benefits); the nuclear energy development programme run by the Army; the General Recruiting Department; the Hydrographic Institute of the Navy; the Aerial Photographic Service of the Air Force and the Geographic Institute of the Army. The figures for military aid were taken from Agency for International Development (AID), 1 July 1945–30 September 1976; Center for International Policy (CIP), 1970–78.

[a] The UN figures are of the same order of magnitude as the total of the first five items given under the series from Source 3, with the exception of the years 1971 and 1972 when there is no correspondence between these figures.

Table 7C.4. Mexico: military expenditure, 1970–80[a]

Figures are in million pesos (MXP), current prices.

Source	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
1	..	..	3 260	4 080	5 380	6 740	8 170	10 290	12 210	..	..
2	..	..	2 820	3 500	4 740	5 870	7 630	9 190	10 980	14 460	17 340
3	1 719	1 796	2 196	2 674	3 528	4 679	5 927	..	..	..	..
4	1 931	1 923	2 334	2 809	3 273	..	..	..	..	11 815	..

Key to the Sources:

1. *Government Finance Statistics Yearbook*, Vol. 4, 1980 (IMF): Mexico, Table B.
2. *Government Finance Statistics Yearbook*, Vol. 6, 1982 (IMF): Mexico, Table B.
3. *La Economía Mexicana en Cifras.* Nacional Financiera SA 1978, Table 6.30, Presupuesto de Egresos del Gobierno Federal por Ramos Administrativos 1967–76, Defensa Nacional plus Industria Militar. These are expenditure figures, not including amendments made after 1978. The same figures are available in *Anuario Estadístico 1979.* Available in a public library in Stockholm.
4. Secretaría de Hacienda y Crédito Público, *Presupuestos 1970–74* (budgets 1970–74), Defensa Nacional plus Industria Militar; 1979, Defensa Nacional. Collected in the US Library of Congress by Nicole Ball.

[a] The revision of the IMF series (Source 1) to the second series (Source 2) was made in 1981 without explanation or comment. Department of Defence budgets are very detailed and their format remains largely unchanged through the years. Items for defence and security purposes appear in the budgets of several ministries.

Table 7C.5. Peru: military expenditure, 1970–80

Figures are in million soles (PES), current prices.

Source	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
1	..	..	8 210	9 750	12 700	16 710	28 070	31 380	37 760	59 700	130 700
2	..	..	9 500	12 557	15 605	25 464	38 527	77 246	92 514	121 000	176 000
3	7 466	9 702	9 702	13 803	13 803	22 386	22 386	31 384	33 117	44 606	95 664

Key to the Sources:

1. *Government Finance Statistics Yearbook*, Vol. 6, 1982 (IMF): Peru, Table B.
2. M. Moreyra L., *Proyecciones Financieras*, Banco Central de la República, 1979, 1980. Also published in *Actualidad Económica.* Available in a public library in Stockholm.
3. *Cuentas Generales de la República*, Ministerio de Economía y Finanzas 1970–77. *Leyes de Presupuestos* (budget laws), 1978–80. Study prepared in Peru by José A. Ancinas del Pando.

Table 7C.6. Military expenditures of five Latin American countries, 1970–80, according to different sources[a]

Figures are in US $ million, at constant (1978) prices.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Argentina											
Boletín Oficial	1 125	1 006	1 013	802	937	535	1 724	1 438	1 492	1 685	1 356
UN	..	999	1 040	1 062	1 192	1 515	1 722	1 771	1 492	..	..
IMF	..	927	875	1 085	1 027	1 142	1 367	1 316	1 592	1 686	1 540
Stockholm	284	298	312	269	306	594	864	951	820	782	595
Local	1 058	1 087	1 117	1 171	1 192	1 515	1 721	1 763	1 784	1 764	1 747
Brazil											
UN	1 599	2 200	2 332	2 792	1 656	..	..	..	..	..	..
IMF	1 302	1 354	1 452	1 727	1 757	1 754	2 095	1 988	2 042	1 609	..
Stockholm	..	2 199	2 333	2 792	1 957	2 077	2 312	2 069	1 951	1 740	1 362
Local	..	1 862	1 913	2 051	1 693	1 806	2 042	2 108	1 736	1 512	1 157
Chile											
UN	147	185	206	312	543	420	431	..	..	..	..
IMF	..	..	206	320	554	432	430	500	630	..	..
Local	294	493	550	548	818	631	664	878	986	820	..
Mexico											
IMF (1)	..	..	401	448	478	519	544	530	536	..	..
IMF (2)	..	..	347	384	421	452	508	474	482	537	510
Stockholm	234	232	270	293	313	360	394	..	..	..	..
Local	262	249	287	308	291	252	..	..	..	439	..
Peru											
IMF	..	..	242	262	292	311	391	317	242	229	315
Stockholm	..	..	280	338	359	474	537	780	592	464	424
Local	252	306	286	371	317	417	312	317	212	171	231

[a] The figures have been analysed by converting them into constant dollar series, using the method described in appendix 7B.

Table 7C.7. Percentage change in military expenditures of five Latin American countries, according to different sources

Argentina	1970–80	1971–78	1971–74	1975–78
Boletín Oficial	21	48	−7	179
UN	..	49	19	−2
IMF	..	72	11	39
Stockholm	110	175	3	38
Local	65	64	10	18

Brazil	1971–79	1971–75	1976–79
UN	..	..	..
IMF	19	30	−23
Stockholm	−21	−6	−25
Local	81	−3	−26

Chile	1972–78	1970–76	1972–76
UN	..	193	109
IMF	206	..	109
Local	79	126	21

Mexico	1972–79	1972–78	1972–75
IMF (1)	..	34	29
IMF (2)	55	39	30
Stockholm	..	..	33
Local	53	..	−12

Peru	1972–80	1972–75	1976–80
IMF	30	29	−19
Stockholm	51	69	−21
Local	−19	46	−26

Appendix 7D

The burden of defence: the case of Israel[1]

I. Introduction

The normal measure of the 'burden of defence' is to take military expenditure as a share of national product. For many countries this is an adequate measure: there is no other single figure which is better for purposes of international comparison. However, the problem of measuring the burden of defence becomes more complicated with countries which receive significant amounts of military aid—particularly if some of this aid is in the form of loans which have to be repaid. There are further complications to be considered in countries which have conscription, and which require reservists to devote some of their time to military training. Israel provides an example of both these complications.

Military aid should normally be considered as part of the burden of defence in the supplying country, and it should be subtracted from the burden of defence in the recipient country. In the case of Israel this can be done, since the figures are known; however, this is not by any means always the case. When military aid is in the form of loans, there are two possibilities. One possibility is to make no subtraction from the military expenditure of the recipient country, on the grounds that most imported weapons are bought on long repayment terms anyway, but are nonetheless counted in the military expenditure figure for the year in which they are received. Alternatively, a loan for military purposes can be subtracted from the military expenditure total in the recipient country; in that case the subsequent payment of interest and repayments of capital should be added. This is what is done in the calculations which follow.

There is the problem of economic aid: on occasions this may be fairly explicitly provided to enable the recipient country to undertake more military expenditure than would otherwise be the case. For example, the United States Economic Support Fund is considered to be part of its Security Assistance Programs. It was established "to promote economic or political stability in areas where the US has special security interests and has determined that economic assistance can be useful in helping to secure peace or to avert major economic or political crises" (as stated in the Congressional Presentation for fiscal year 1982, p. 16). However, it would introduce too imponderable an element into the calculations if economic

[1] This appendix was written by Paul Rivlin, Ph.D. student at the School of Oriental and African Studies, London University.

aid were always to be classed simply as an alternative form of military aid.

The other major complication—also illustrated by the Israeli case—is the adjustment of the defence burden to allow for conscription and reserve army manpower. The 'opportunity cost' of a conscript is, of course, the output he or she could produce in the civil economy. This estimate requires a separate examination of the economic situation in each country which has conscription. In a country with chronic under-employment the opportunity cost of a conscript is likely to be low (though it will hardly be zero); in countries with a labour shortage it will be close to the average wage or salary.

II. Israel

There is a certain general problem in the calculations which follow. The rate of inflation in Israel was over 100 per cent in 1980; this led to a rapid depreciation of the shekel (ILS) exchange-rate, and consequently complicates any calculations involving transfers across the exchanges.

In a country which receives foreign aid, the total available resources will exceed the gross national product: two additional concepts are therefore relevant. One is the figure for gross total resources, including loans and grants; the second is the figure for net total resources, where debt payments are subtracted. In 1980, after debt repayments, Israel had resources available equal to 115 per cent of its gross national product (table 7D.1).

Table 7D.1. Israel: gross national product, and gross and net total resources, 1980

Figures are in billions of Israeli shekels.

(1) Gross national product	99 887	
(2) Loans from US government[a]		7 081
(3) Grants from US government[a]		7 450
(4) Other loans and transfers		9 360
(5) Total, (2)+(3)+(4)		23 891
(6) Gross total resources (1)+(5)	123 778	
(7) Debt payment[b]		9 013
(8) Net total resources (6)−(7)	114 765	

[a] Both civil and military. Military aid from the US government included in these loans and grants totalled 10.188 billion shekels.
[b] Including $585 million (3 billion shekels) to the USA.

Sources: Bank of Israel Annual Report, 1980, Jerusalem, May 1981; Central Bureau of Statistics, *Statistical Abstract of Israel 1981* (Jerusalem, 1981).

Another problem is the adjustments for conscription, and for the services of reservists. In table 7D.2 calculations are made for the opportunity cost

of this military use of labour. Conscripts are assumed to have little training, and so their productivity potential is estimated at half the average level for the economy as a whole. Reservists are estimated at one month in 1980, on average.

Table 7D.2. Israel: estimates of extra-budgetary manpower costs, 1980

(1) Conscripts	Number	125 300
(2)	Full-time equivalents	62 650
(3) Reservists	Number	230 400
(4)	Full-time equivalents	19 200
(5) Total, (2)+(4)		81 850
(6) GNP per worker in labour force	Israeli shekels	83 939
(7) Extra-budgetary manpower cost, (5)×(6)	Million Israeli shekels	6 870
(8) (7) as share of GNP	Per cent	6.9

Sources: Military Balance (International Institute for Strategic Studies, London, 1981). For earlier estimates see Rivlin, P., 'The burden of Israel's defence', *Survival*, July/August 1978, IISS. Additional data from *Bank of Israel Annual Report 1980* (Jerusalem, May 1981); *Statistical Abstract of Israel 1981* (Central Bureau of Statistics, Jerusalem, 1981); and Labour Office, *Yearbook of Labour Statistics, 1981*.

The defence budget in 1980 was 25.159 billion shekels; of this, military aid provided 10.188 billion shekels. In 1980, Israel's total debt payments were 9.013 billion shekels. This was for both military and civil debt, but a breakdown is not available. However, 3 billion ($585 million) of it consisted of payments to the US government ($363 million in interest and $222 million in capital repayments). It is likely that a high proportion of these US debt payments and a low proportion of the non-US debt payments were military. It is therefore not unreasonable to take 3 billion shekels as a rough estimate of the debt payment which can be attributed to the military sector. (Debt payments fluctuate considerably from year to year.)

Table 7D.3 presents some of the various calculations which can be made of the defence burden. The simple calculation of defence expenditure as a percentage of national product produces a figure of 25 per cent. If military aid is subtracted, the figure comes down to 15 per cent. If, however, the 'opportunity cost' of military manpower is then added, together with an estimate of military debt repayment, the figure returns to 24 per cent. All these percentages use the gross national product as denominator: if, instead, the concept of gross total resources is used, then a different set of percentages can be derived. Which figure is appropriate depends on the precise nature of the question which is being asked.

There is the additional point—whether any kind of allowance should be made for arms exports, which probably earned some $750 million in foreign currency in 1980. On the one hand, because Israel has a large military industry it has access to the buoyant world market for weapons.

Table 7D.3. Israel: the defence burden, 1980

	Per cent
As share of gross national product:	
(1) Defence expenditure	*25.2*
(2) Defence expenditure *minus* military aid	*15.0*
(3) Defence expenditure *minus* military aid, *plus* extra-budgetary manpower *plus* military debt payments	*24.8*
As share of gross total resources:	
(4) Defence expenditure *plus* extra-budgetary manpower *plus* military debt payment	*28.3*

Source: Tables 7D.1 and 7D.2.

On the other hand, the resources used in producing weapons for export could be transferred (in the long run) to the production of other exportable goods. On balance, exports of weapons should not be considered as a factor significantly reducing the burden of defence.

8. Military prices[1]

Square-bracketed numbers, thus [1], *refer to the list of references on page 211.*

I. Introduction

In a world of virtually universal, and recently very rapid, inflation, current price figures for military expenditure tell nothing about the real trend. Any analysis of world, regional or national trends has to rely on some form of price correction; comments on estimates of year-to-year changes have to be expressed in terms of volume rather than value. Some system of price correction is a necessity for any analysis of world military expenditure.

It would also be a necessity if at any time progress were made toward using limits on military expenditure as a technique of arms control. If countries were to agree to limit their military budgets, the limits would have to be set in constant price terms. In a world with rates of inflation which vary widely from year to year and country to country, limits set in current price terms would lead to wholly unpredictable results for real military spending. The implication is that any agreement on the limitation of military budgets would have to include some general agreement about methods of price correction.[2]

It is clear that many of those who cite volume figures for military expenditure are unaware of some of the problems which are intrinsic in index number calculations for the volume or price trends of major categories of government expenditure. For example, NATO countries agreed to a 3 per cent volume increase target for their military expenditures, apparently without giving consideration to the choice of the price index which should be used for constructing the volume figures—whether it should be a civil price index of some kind, or a military input price index, or an attempt to construct some proxy for a military output index. To take another example, figures are quoted for the trends of the volume of military expenditure in the Soviet Union as if there were one single, unquestioned, agreed figure—whereas (to take just one uncertainty) the volume calculation derived from the Soviet figures estimated in dollars differs markedly from the volume calculation based on estimates denominated in roubles [5].

The purpose of this chapter is to set out some of the main conceptual problems in the construction of price indices for the military sector, and to

[1] This chapter was written by Elisabeth Sköns.

[2] This is discussed extensively in the reports to the Secretary-General of the United Nations prepared by the Group of Experts on the Reduction of Military Budgets [1–3] and the *Ad Hoc* Panel on Military Budgeting [4].

present and discuss some of the specific military prices indices[3] which are available.

The main conclusion is that there is no strong evidence to suggest that inflation in the military sector—when properly measured—is faster than in the civil sector. It is true that in many countries price indices for military *inputs* rise faster than civil price indices for *expenditure* or *output*. This is probably because military input figures make no allowance (as they should) for an increase in the productivity of military personnel. It is also true that the prices of most weapon systems have risen much faster than the prices of civil engineering products. This is because the process of product improvement (or quality change) is so much more rapid in the military sector. When this product improvement factor is removed (as it should be in the construction of a price index) the differences between civil and military price indices for procurement tend to disappear.

II. Concepts[4]

Output and inputs

The main conceptual problem in constructing a price index for the military sector is that there is no satisfactory way of measuring military output.

The problem can be illustrated by contrasting the military sector with, say, the steel sector. The output of the steel industry consists of a wide variety of different steel products—bars, billets, slabs, and so on—which can be counted, and which can be brought into one output index by taking the various physical series and weighting them by their value in some base year. The output of the military sector cannot be measured in that way.

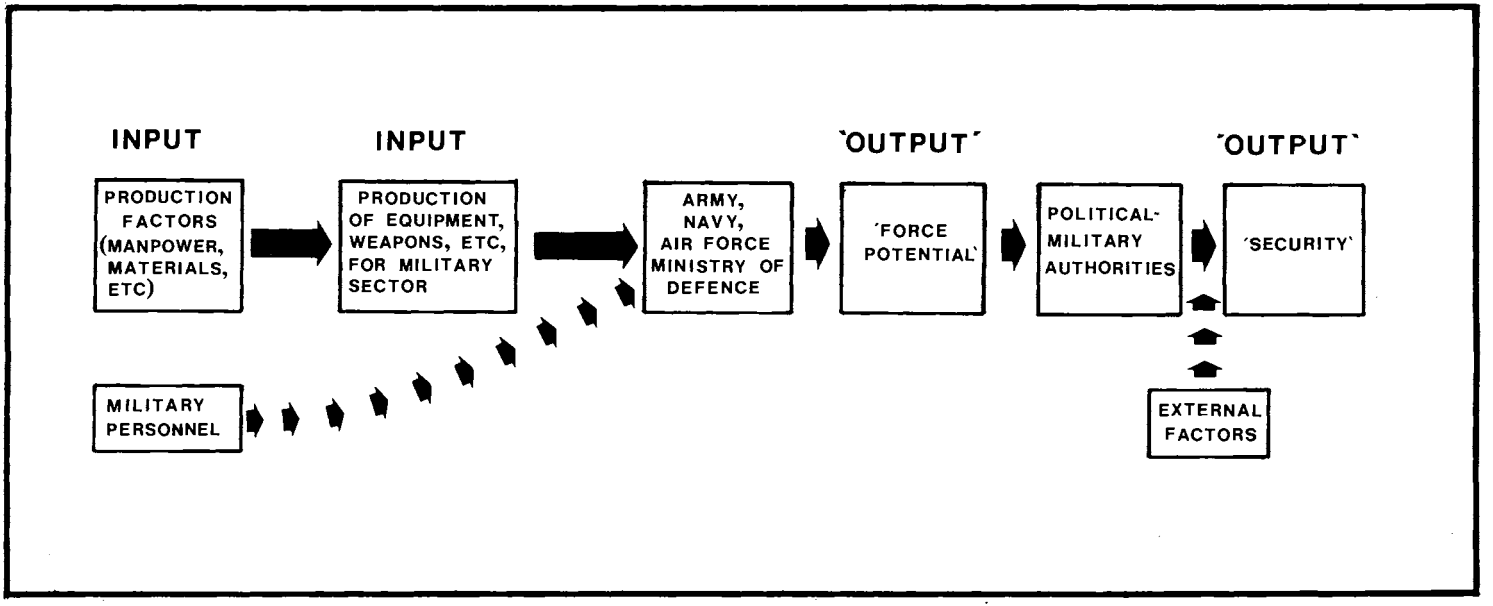
This problem of measuring output is not exclusively a problem of the military sector: it is found in other sectors of government expenditure as well—expenditure on health and education, for example. Of course it is possible to think of some crude measures of educational output—the number of children successful in a particular examination, for example; but there is no proper measure of the success or failure of educational expenditure in, for example, broadening the horizons of those who are taught. Indicators can also be found for the improvement—or the absence of improvement—in the health of a nation: but this depends not simply on health expenditure, but on many other factors such as changes in smoking, drinking and dietary habits.

The difficulties with the measurement of the output of the military sector are similar. Figure 8.1 illustrates the problem. The ultimate objective of

[3] Throughout this chapter the term 'price index' is used in a general sense, covering 'average value' indices as well.

[4] This section draws partly on material from references [1] and [6].

Figure 8.1. The military sector: input and output concepts



Source: Adapted from figure 1 in *Reduction of Military Budgets, Measurement and International Reporting of Military Expenditures*, Report prepared by the Group of Experts on the Reduction of Military Budgets, UN document A/31/222, 20 October 1976.

military expenditure can be said to be national security: but of course this cannot be measured—and in any case it is also a function of the military expenditure of other countries; so even if it could be measured it would not serve as an output measure for any one country.

There have been some suggestions for using, as output indices of the military sector, measures such as explosive power: the greater a country's destructive potential, the greater its military output [6]. The use of such a component as explosive power would, of course, produce astronomical estimates of output increases as a country increased its production of nuclear weapons. A great deal of military expenditure is not concerned directly with the increase in explosive power but, for instance, with devices to prevent a weapon platform being subjected to the explosive power of the other side—the equipment for electronic countermeasures, for example, or the provision of satellite guidance for missile trajectories.

If specific military price indices are wanted, the only practicable series are those for military inputs. This is the solution also used for other categories of government expenditure, such as health and education. It is possible to assemble physical series for the range of inputs, and to find price indices for them. Table 8.1 sets out a possible set of price indices for constructing a volume index of this kind.

Can an input volume index of this kind be considered a reasonable proxy for an output index? The arguments in favour are these. When the military services purchase equipment—and in particular when they choose between different forms of expenditure—they do so with some concept of military output in mind. One such concept is 'force potential', defined as "the capacity to apply physical force in organized form against external opponents" [1]. In their selection and combination of various outputs, therefore, it can be argued that the military know what they are doing, and act to maximize 'force potential' in much the same way as a consumer, in purchasing consumer goods, acts to maximize his consumer satisfaction.

There are a number of problems with this somewhat idealized picture of the behaviour of military decision makers. For particular, fairly narrow, choices between the weapons needed for particular missions, studies of the cost-effectiveness of different weapons are possible. However, it is much more doubtful whether this 'utility-maximizing' process is a good description of the battles which go on in most countries between the different branches of the military services. Of course there is a broad general relationship between inputs and additional 'output' in some sense: if a country doubles its military inputs in real terms, it would be surprising if it did not get some increase in 'force potential'. However, it is much more likely to be a broad general relationship rather than a close one. For example, a considerable volume of resources can be—and has been—wasted in the development of weapon systems which at the end of the day

Table 8.1. Example of indices used for the deflation of military expenditures

Expenditure category	Index
Forces' pay	Volume indicator: index of strength of armed forces
Civilian wages and salaries, including locally engaged staff overseas but excluding payments of pensions	Deflation by base-weighted index of wage and salary rates
Research and development (excluding wages and salaries of government employees)	Deflation by price index for input costs of research and development
Aircraft	Deflation by price index based on input costs for aircraft
Shipbuilding (excluding wages and salaries of government employees)	Deflation by price index for ships
Other major equipment and munitions	Deflation by price indices mainly based on input costs for aircraft
Construction	Deflation by price index for costs of new construction other than dwellings
Petroleum products	Deflation by index for world petroleum prices
Transport	Deflation by appropriate section of the retail price index
Maintenance and repair of buildings	Deflation by appropriate section of the retail price index
Other expenditure	Deflation by price index implied for all categories above, other than wages and salaries

Source: Measuring Price Changes of Military Expenditure, US Department of Commerce, Bureau of Economic Analysis (US Government Printing Office, Washington, D.C., June 1975), p. 134.

were never actually deployed, or which—like the British £1 billion Chevaline programme—were designed to meet contingencies which did not in fact occur.

There is also the particular problem of productivity in the military sector. It is known from the civil sector that input price indices tend to rise faster than output price indices, because there is a productivity trend; technological change embodied in more advanced capital equipment is the main source of the long-term rise in labour productivity, and the rise in productivity serves to slow down the rise in prices. Given the immense technological advances in weaponry, the value of the military sector's capital stock (measured at constant prices) has of course risen very rapidly, and with it labour productivity in terms of output per soldier. Therefore, even if it is assumed that prices of military equipment reflect productivity trends within the industries which manufacture the equipment (which they may not always do) there is still the question of the productivity trend within the military sector itself. Any input price series should be adjusted by some productivity factor for more advanced weapons in use, if it is to be

regarded as a proxy for a military output index. However, no productivity adjustment is usually made—perhaps not surprisingly, because, since there is no output measure of the military sector, the only way it could be made is to assume that the productivity trend in the military sector is the same as in the civil sector. In general, therefore, the use of input prices will tend to give a figure which is somewhat too high.

Opportunity costs

Given the difficulty of measuring military output, there is a strong attraction in turning to an alternative way of measuring the volume of military expenditure—the 'opportunity cost' measure. It is, essentially, an answer to a different question; the question is: 'What is the additional cost, in the volume of civil resources forgone, of this year's increase in military expenditure?' The advantage of this approach is that, whereas there is no good way of measuring the volume of military output, there are adequate ways of measuring volumes of most forms of civil output and civil expenditure. Those who argue for this approach say that it is not possible to calculate the effect on military output of any increase in military expenditure, given the elusive nature of the concept of military output; it is, however, possible to say what the cost of that increase is, measured by the volume of civil expenditure forgone. The calculation simply requires that the increase in military expenditure should be divided by a civil price index.

Which civil price index should be used? It depends on whether it is envisaged that the increase in military resources is at the expense of the provision of consumer goods in particular, or the civil economy in general: either concept is legitimate. In fact, there does not appear to be any general tendency for the GDP price index to diverge significantly from the consumer price index (table 8.2). There are practical arguments for using a consumer price index: it is available for more countries, and in many countries it probably has a firmer statistical base than the GDP deflator.

The question at issue, in opportunity cost calculations of this kind, is not one of the consequences for civil output and expenditure of a total transfer of resources from the military sector; this would raise a number of conceptual problems about the specificity of resources used in the military sector, and so on. It is a marginal question, which asks about the consequences for the volume of civil expenditure if any increase in military spending in a particular year did not occur. Certainly at the present time this calculation is wholly realistic. Many governments (rightly or wrongly) consider that they are faced with a limit—given the level of taxation—on total government expenditure. An increase in military expenditure is therefore at the expense of other government outlays (in particular welfare payments), or of tax cuts. If military expenditure were not increased, then

Table 8.2. Changes in consumer price indices and GDP deflators, 1950–79

	Average annual percentage change			Number of countries
	1950–59	1960–69	1970–79	
World[a]				
CPI	3.5	4.2	10.4	119
GDP deflator	..	4.2	10.5	84
Industrial countries[a]				
CPI	2.8	3.0	8.3	21
GDP deflator	3.3	3.3	8.0	20
Oil exporting countries				
CPI	2.8[b]	1.9	11.7	9
GDP deflator	..	2.8[c]	17.5[d]	7
Non-oil developing countries				
CPI	7.4	11.5	20.5	89
GDP deflator	..	11.8	23.7	57

[a] Centrally planned economies not included.
[b] 1953–59.
[c] 1963–69.
[d] 1970–77.

Source: International Financial Statistics, Supplement on Price Statistics (International Monetary Fund, Washington, D.C., 1981), p. vii.

there would be every likelihood that taxes would be cut or welfare payments raised, with a resultant increase in private consumption. So the calculation of the cost of an increase in military expenditure, in terms of the volume of consumer expenditure forgone, is a legitimate exercise.

III. Current deflation practices in various countries[5]

Countries which construct price indices specifically for the military sector do so with two general purposes in mind. One is a 'national accounts' purpose: in the process of calculating volume increases in the national product, some countries construct a special deflator for military expenditure. The second purpose is a military one: for military planning purposes, price indices are calculated for past and future military budgets, in order to estimate trends in the military purchasing power of those budgets.

Only a limited number of countries have estimated such separate price indices for the military sector. In response to the 1980 UN National

[5] Replies are gratefully acknowledged from the following: the statistical offices in Belgium, Denmark, FR Germany, France, Italy, Sweden and the UK; the economic planning agency of Japan; the defence ministries of Belgium, Canada, Denmark, FR Germany, Italy, the Netherlands, Norway and the UK; NATO; and the statistical offices of the United Nations and the European Communities.

Accounts Questionnaire, only 12 countries reported a separate constant price series for 'general government final consumption expenditure on defence': they are the countries listed in table 8.3. The United States and the Netherlands, although not among the respondents to this edition of the

Table 8.3. Comparison between military expenditure deflators and other price indices, 1970–79

Country	Index number for 1979 (1970 = 100)			Difference in rate of increase (per cent)	
	Military expenditure deflator	Consumer price index	GDP deflator	Military expenditure deflator/CPI	Military expenditure deflator/GDP deflator
Australia	268	244	255	10	5
Belgium	215	191	189	13	14
Denmark[a]	187	156	165	20	13
Finland[b]	144	149	144	−3	0
Italy	367	301	328	22	12
Japan[c]	221	206	185	7	19
Netherlands[d]	146	139	140	5	4
Norway	215	202	195	6	10
Portugal[e]	135	244	199	−45	−32
Sri Lanka	242	182	257	33	−6
Sweden	247	212	225	17	10
Thailand	229	212	221	8	4
UK	366	306	307	20	19
USA[f]	166	174	163	−5	2
Unweighted average for industrial countries				10	10
Unweighted average for non-oil developing countries				−1	−11

[a] Index number for 1975.
[b] 1975–79, base year 1975.
[c] 1971–79, base year 1971.
[d] 1974–79, base year 1974.
[e] Index number for 1976.
[f] 1972–79, base year 1972.

Sources: United Nations National Accounts Questionnaire, 1980 edition, computer printouts received from the UN Statistical Office for all countries except the Netherlands and the USA; Netherlands: Letter from Ministerie van Defensie, 23 December 1982; USA: *The National Income and Product Accounts of the United States, 1929–76 Statistical Tables*, US Department of Commerce, Bureau of Economic Analysis, September 1981, and 'Revised Estimates of the National Income and Product Accounts', *Survey of Current Business*, July 1982.

questionnaire, should be added to the list. Of these countries, Denmark stopped calculating a separate constant price series for defence in 1976, because of the uncertainty of the calculation. France and FR Germany are two of the important industrial countries which do not construct separate constant price series for defence spending.[6]

[6] The *Bundesamt für Wehrtechnik und Beschaffung* of FR Germany has, however, constructed a price index for military procurement items which is based on civil price indices. Although this is not officially published, a series for the years 1970–77 is given in reference [7].

NATO is carrying out work on military expenditure deflators. Preliminary results are scheduled for 1983, but it is not yet known whether these will be declassified. In all cases other than the United States the military price indices received from member countries are at present classified [8].

All the implied price indices, derived from national accounts calculations, are indices of the price of inputs into the military sector, not indices of any concept of output. All (except the USA) use a set of civil price indices, weighted by the pattern of military consumption (though the UK makes some use of specific military price series in the procurement sector).

The pattern of military consumption, which provides the basic weights for these price calculations, is set out for 16 countries in table 8.4. Perhaps the main point is the importance of personnel costs in most of these countries: these costs account for over 45 per cent of the total in 12 of the 16 countries.

Table 8.4. Main resource categories as a share of total military expenditure (per cent)

		Operating costs				
Country	Year	Personnel	Operations and maintenance	Procurement	Construction	R&D
Australia	1978–79	50	26	17	3.6	3.1
Austria	1979	48	20	24	8.3	0.1
Belgium	1978	55	20	19	6.4	0.05
Canada	1978–79	55	29	13	2.5	0.8
France	1980	37	27	19	4.3	13.0
FR Germany	1978	41	28	19	7.0	4.4
Indonesia	1978–79	48	28	15	9	0.1
Italy	1980	49	24	24	1.8	1.3
Japan	1981	49	..	21	..	1.0
Mexico	1980	78	14	(4.5)	(3.5)	0
Netherlands	1978	57	19	20	3.4	0.9
New Zealand	1978–79	59	29	7	3.1	0.8
Norway	1978	46	27	21	5	0.8
Sweden	1978–79	40	19	29	5.6	5.6
UK	1979–80	43	(11)	25	(6.5)	14
USA	1977–78	49	21	20	1.8	8.4

Sources: Reduction of Military Budgets, United Nations document A/35/479 (United Nations, New York, 1981), for all countries except the UK and Japan; for the UK: *Statement on the Defence Estimate 1981, Vol. 2*, Cmnd. 8212–11 (HMSO, London, April 1981); for Japan: *Defense of Japan, 1981* (Defense Agency, Japan, 1981).

Price indices for military personnel

There are two approaches in these 16 countries to the construction of volume and price indices for the personnel sector. One is to make a volume index directly from the numbers employed, or the hours worked: separate

employment series are used for different ranks and grades, and these series are added by weighting them according to their pay. A price index is derived by dividing total personnel costs by this aggregate volume index.

Alternatively, a wage and salary index is constructed for military personnel: series are taken for the pay changes for a number of different grades, and these are added by using as weights the numbers employed in these grades.[7] Pay, of course, has to include the value of benefits in kind.

Both these methods take average pay as the appropriate price index for military personnel and thus imply that there has been no rise in the productivity of those employed in the armed forces and ministries of defence.[8] This, as already discussed, will tend to lead to an overstatement of the price trend.

Price indices for other military expenditure

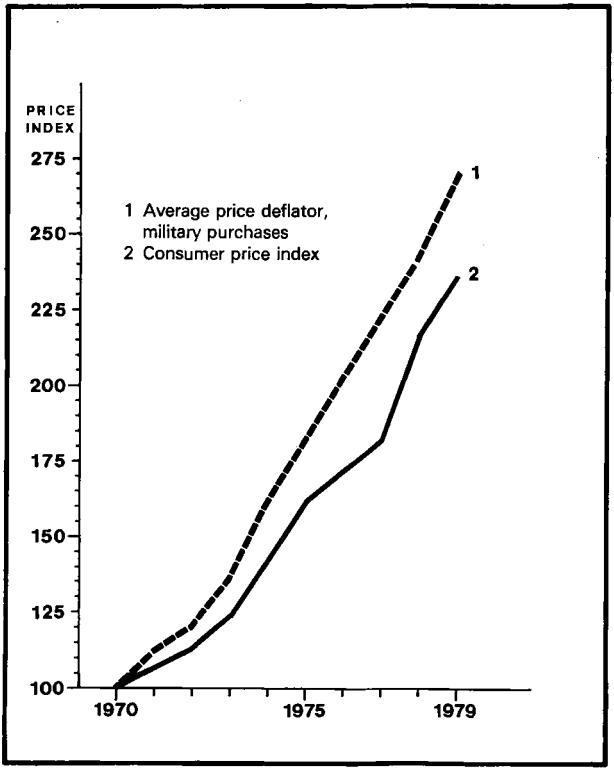
Other military expenditure is divided into sub-categories, and for each sub-category a civil price index is used. The degree of disaggregation varies. Belgium and Italy distinguish some 30 sub-groups; in the UK, the sub-division is into 15 categories. For many of these categories—such as food, clothing or fuel—there are perfectly adequate civil price indices. For construction too, there is no particular reason for thinking that the price movements for military construction differ significantly from those for civil construction on a similar scale. The main problem arises with weapon procurement. Here, many countries use indices for civil machinery and transport equipment. However, the United Kingdom makes some attempt to find price series specifically for certain types of weapon.[9]

Comparisons: military and other price indices

The general tendency in industrial countries is for these military 'input' price indices to rise faster than the consumer price index or the GDP deflator. Figure 8.2 shows a comparison for seven industrial countries taken together. Over the period 1970–79 the aggregate military price index for these countries rose 14 per cent faster than the consumer price index. However, if some allowance were made for a rise in the productivity of military personnel, serving to lower costs per unit of output, the difference between the movement of the two indices would be much diminished. Indeed, if we assume that military personnel in these seven countries had

[7] Italy uses a general wage index, rather than one specific to the military sector [9].
[8] In Belgium, an assumption is made about productivity increases: half of the increased costs which are the result of increased social benefits are considered to be offset by the increase in productivity [10].
[9] Norway used also to do so, but ceased this practice because it was too resource-consuming and the data obtained did not meet the reliability requirements [11].

Figure 8.2. Comparison between price indices for military purchases and for civil consumer goods for seven industrial countries,[a] 1970–79



[a] Australia, Belgium, Italy, Japan, Norway, Sweden, UK.

Source: United Nations National Accounts Questionnaire, 1980 edition, computer printouts received from the UN Statistical Office.

the same productivity trend over this period as the civil labour force—of around 3 per cent a year—the gap between the two indices disappears.

There is, however, considerable variation between countries in the size of the gap between the military price index and the consumer price index (table 8.3). A full analysis of these differences would require, for each country, a lengthy and detailed comparison of the component price series and of the weighting of those series for the two indices. The presence or absence of conscription may well be a factor, since conscripts' pay may have risen more slowly than the consumer price index. Another factor may well be the degree of disaggregation in the construction of the index.

The United States

In the United States, the Bureau of Economic Analysis (BEA) has gone much further than in other countries in constructing a measure of price

changes in the military sector which uses specific series for military purchases [12]. The main purpose is for generating a constant price series for 'general government final consumption on defence' in the national accounts. It therefore uses the national accounts conventions which exclude transfer payments (in particular military pensions) from this total, and which attempt to measure purchases (that is, items delivered in the year), rather than outlays (which include progress payments). Exceptions are made for ship construction and new construction, for both of which work in progress is included.

The BEA developed no fewer than 15 000 basic series for measuring military price movements. A large number of final delivery prices paid are collected for a great many items. The technique for dealing with the problem of quality change is particularly interesting. The BEA attempts to measure the change in prices of items for which the specification does not change. If it does change, then the volume of the quality change is measured by the production cost associated with that change—and this would count as a volume rather than as a price change.

Over the period 1972–81 this military price index showed a different pattern from that of other industrial countries (figure 8.3). It did not rise faster than the consumer price index; indeed it rose a little more slowly (but slightly faster than the GDP deflator). The main reason was, no doubt, the relatively slow rise in the average pay of military personnel, of only 79 per cent. (Over this period, the average wage and salary in the United States private industries rose by 99 per cent.)

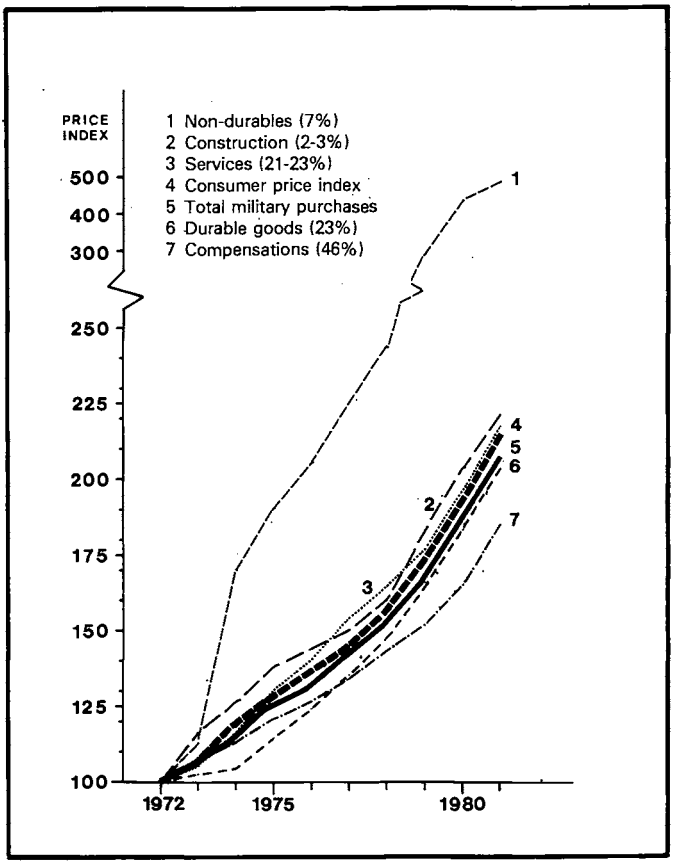
Among the components of the military price index there was a fivefold increase over this period in the index for military non-durable goods, mainly because of the rise in the price of oil. The price index for military durable goods, with an increase of 105 per cent over this period, rose rather more slowly than the US wholesale price index for capital equipment (121 per cent).

Canada

The Canadian Department of National Defence (DND) produces a price series for military expenditure of a rather different kind [13, 14]. With the help of its own economic model, it forecasts inflation rates for items in the military budget seven years ahead: these forecasts are published twice yearly for 450 categories of military expenditure. The general pattern in the past has been for the forecasts of this military price deflator to exceed those of the consumer price index. However, these are always forecasts rather than actual figures; comparisons of these forecast figures with actual figures for the past do not appear to be available.

Thus, for the United States, which is the only country for which a

Figure 8.3. Implicit price deflator for military purchases, USA, 1972–81[a]



[a] In brackets: purchase category as percentage of total military purchases.

Sources: The National Income and Product Account of the United States, 1929–76 Statistical Tables, US Department of Commerce, Bureau of Economic Analysis, September 1981; 'Revised Estimate of the National Income and Product Accounts', *Survey of Current Business*, July 1982.

systematic attempt to estimate specific price changes for total military purchases has been made, there is no evidence that aggregate prices in the military sector have risen faster than civil ones during the 1970s.

IV. Product improvement

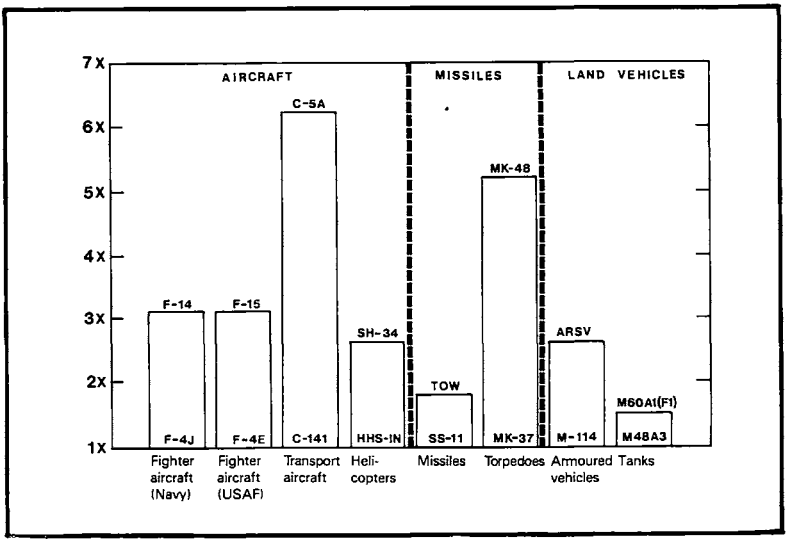
The measurement of product improvement, or quality change, is a considerable problem with all price indices, civil as well as military. Price indices cope well with measuring the price changes in a collection of goods or services which stays the same from year to year. Changes in quality

present problems which are not easy to solve, and many quality changes fail to get properly measured. To take one example from the civil sector—when it becomes possible to choose between two or more channels rather than one on a standard television set, obviously there has been a very significant quality change in the service provided. In theory, the price series for television sets should allow for this quality change; in practice they do not. Price indices are well known to be defective in their allowance for quality changes, or product improvement.

Product improvement is, of course, very much more rapid in the military procurement sector than it is in the civil sector: consequently it is very important that the indices used for military procurement should make full allowance for this. Indeed this is one argument for using civil price indices, derived from the civil machinery and vehicles sectors, for deflating the figures for military procurement. In so far as unit costs for military items rise faster than these civil price indices, it can be presumed that this excess largely represents a more rapid rate of product improvement in the military sector.

Estimates can be obtained for two different aspects of product improvement, most of them derived from US sources. One is the change from one generation of weapons to the next. Perhaps the most frequently quoted study is one by the US General Accounting Office in 1973 [15]. A constant price comparison showed that the cost of each replacement system was between two and six times greater than its predecessor (see figure 8.4). It is

Figure 8.4. Relative costs of successive generations of weapon systems, 1960s–1970s

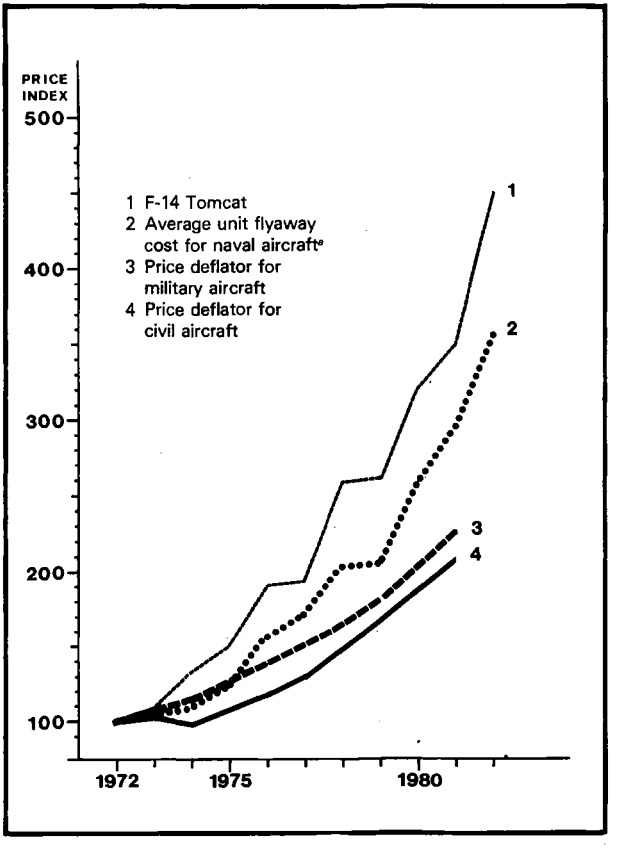


Source: Cost Growth in Major Weapon Systems, Report to the Committee on Armed Services, House of Representatives, by the Comptroller General of the United States (US General Accounting Office, Washington, D.C., March 1973), p. 18.

possible from figures of this kind to deduce annual rates of increase in 'product improvement': a 1976 US estimate suggests a figure of 4.5 per cent per annum for major ships, submarines, aircraft carriers, tanks and strategic missiles and 6 per cent per annum for attack helicopters, frontline fighters and attack aircraft [16].

This process of product improvement occurs, of course, also within the same generation of weapon systems, and not simply from one generation to another. It is possible to trace—again for the United States—the year-to-year movement of procurement costs for particular military items, and to compare these movements with the general price index for military aircraft

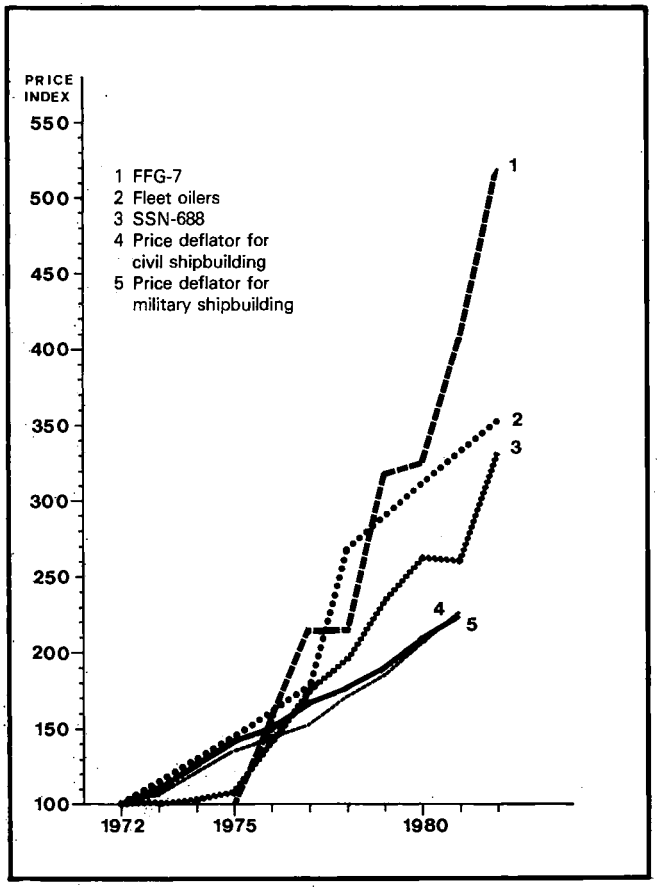
Figure 8.5. Comparison between the US implicit price deflators for military and civil aircraft and the unit flyaway cost for US Navy and Marine Corps aircraft, 1972–81



[a] Using the same sample of aircraft as that used for the implicit price deflator for naval aircraft, which rose more slowly than for total military aircraft through 1975 and somewhat faster during the two following years.

Sources: Implicit price deflator, see table 8.3. Unit flyaway costs calculated from cost summaries reported by the military when presenting their procurement funding requests in successive volumes of *Department of Defense Authorization for Appropriations*, Hearings before the House and Senate Armed Services Committees.

Figure 8.6. Comparison between the US implicit price deflators for military and civil shipbuilding and the unit cost of three ships[a]



[a] Three of the four ships used as sample for the implicit price deflator.

Source: As figure 8.5.

—an index constructed to exclude product improvement effects. Some of these comparisons are set out in figures 8.5 and 8.6.

For example, while the general price index for military aircraft roughly doubled between 1972 and 1981, the unit flyaway cost for a sample of seven naval planes went up two-and-a-half times, and the unit costs of the F-14 more than trebled. It is the same story with military shipbuilding. Again from 1972 to 1981 the general price index for military shipbuilding went up by 120 per cent. The unit procurement cost of the Los Angeles-class (SSN-688) nuclear attack submarine went up by 175 per cent; the unit cost of a fleet oiler rose 225 per cent; and the unit cost of a FFG-7 guided missile frigate went up over 300 per cent.

From the US examples it seems reasonably clear that the basic cost

indices for military aircraft and for military shipbuilding moved very much in line with their civil counterparts. The reasons for the much higher rate of increase in the unit procurement costs of particular military items lay essentially in the rapid process of product improvement observed in the military sector.

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9. Military research and development: some aspects of its resource use in the USA and the USSR[1]

Square-bracketed numbers, thus [1], *refer to the list of references on page 240.*

I. Introduction

Military research and development (R&D) is the effort to extend knowledge and technical expertise wherever there are thought to be military applications, existing or potential, in order to create more effective weapons, more effective means of using them and more effective ways of making these same weapons (when used by the other side) ineffective.

The importance of R&D in the process of competitive weapon developments is clear. A very large part of the huge sums currently spent on armaments now pays for modernizing them rather than increasing their numbers. These qualitative increases depend upon military R&D. Although R&D is not a sufficient condition for the qualitative arms race, it is a necessary one.

From very ancient times, there has always been technological development in weaponry, but since World War II the scale of expenditure and the pace of change have been in a totally different league. An illustration from the USA: in fiscal year 1940, the US Department of Agriculture spent more on R&D than the Department of Defense (DoD). In FY 1961, the DoD spent 45 times as much on R&D as the Department of Agriculture. Even in FY 1970, when the proportion of public R&D money spent on defence in the USA had fallen, 25 times as much was being spent on defence R&D as on agricultural R&D [1, 2]. (Agricultural R&D expenditure itself trebled between 1940 and 1970, after correction for the general price rise.)

The weaker the factual basis for analysis of the scale, pattern, implications and effects of military R&D, the greater the element of speculation there will be in attempts at analysis. The factual basis is poor: among the problems are concealment, understatement, incompatible or inadequate definitions, uncertainty about the inclusion of much space and nuclear military R&D as well as the general problems that arise with any comparisons between countries.

This chapter, therefore, after some general discussion, concentrates on looking at what can be said about some aspects of resource use in the present two overwhelmingly most significant performers of military R&D: the United States and the Soviet Union.

[1] This chapter was written by Mary Acland-Hood.

Military R&D as a use of resources

Although world military R&D accounts for less than one-ninth of total world military expenditure, it accounts for something like a quarter of all world expenditure on R&D of all kinds [3] and probably employs about a quarter of all the world's scientists and engineers engaged in research. The uncertainties about the data, and in particular lack of hard information on Soviet expenditure and employment, make precision impossible.

The distribution of world spending on military R&D is very highly concentrated—much more so than total military expenditure. The USA and the USSR account for roughly half of all military expenditure: they probably account for four-fifths or more of all military R&D expenditure. Ten years ago it was estimated that the USA, the USSR, the UK, France, China and the Federal Republic of Germany were spending over 95 per cent of the total [4a]: there seems little evidence of any very significant change, although there is some tendency for more countries to enter the field.

The resources used in military R&D are large, but it is highly likely that the level of expenditure alone underestimates the economic burden: it will only give the static effects, and there are also dynamic effects. The very large number of research scientists and engineers engaged in it diverts scarce expertise and intellectual effort from the civil sector, reducing civil technological development and so depressing rates of economic growth. Moreover, because of the number of jobs available in militarily oriented fields, the educational system will eventually become biased towards the subjects which are more useful militarily.

The effects of military R&D

On turning from the resource use—the inputs—to the effects—the outputs—the significance of military R&D becomes even more apparent. The end result of successful R&D is the advance of knowledge and technological progress. Successful military R&D stimulates increased military spending in two ways. First, it increases the speed of weapon replacement. Static, or even decreasing, levels of military R&D spending can stimulate increased military spending in this way, so long as the R&D produces some technological change. Second, it stimulates yet more R&D: once there is a new weapon it is assumed that the potential enemy will be working on it and on countermeasures and so work must begin on the next weapon. This need not depend on actual observation of the potential enemy.

Technological change in the military sector is far in excess of that in the civil sector: the research intensity[2] of military products has been estimated

[2] For the military sector, the value of military R&D expenditure as a percentage of the estimated value of production of military equipment; for the civil sector, the value of R&D expenditure as a percentage of the value of manufacturing production in the civil sector.

to be about 20 times that of civil products in the USA, the UK and FR Germany [5].

It is often suggested that there is a positive side to military technological development: the 'spin-off'—adaptations to civil use. These benefits are somewhat dubious. It is very likely that a desired aim could be reached much more efficiently directly rather than as a chance by-product. For the benefits to exist, it must be assumed that resources would not otherwise be devoted to these objects directly; in other words, that they did not have a very high priority. Moreover, there is evidence for spin-off in both directions: civil to military as well as military to civil.

A specific example is the special metallic paint originally developed by the Japanese to shield microwave ovens, which is now becoming a 'stealth' paint to enable aircraft and missiles to fly undetected through enemy radar [6]. More generally, US concern about the export of militarily useful civil as well as military technology to the USSR indicates a belief in civil to military spin-off.

The relationship between input and output

Assessing the output of military R&D is very difficult; indeed the problems may be insoluble. Estimation of the amounts spent on military R&D and the numbers of qualified people engaged in it (which is not straightforward itself) can indicate how much of a burden this use of resources is on economies and how much of the world's total research activity is devoted to military ends. It does not lead directly to measures of the output of military R&D—that is, to measures of the results. For one thing, there are considerable differences between countries in attitudes to technological change and in methods of implementing it, which lead to differences in the kind of results obtained from R&D and probably to the output per unit of input. However, the level and pattern of resources used for military R&D and trends in them are important determinants of the amount and types of armament in the future. Some examination of individual new weapon and support systems may also give output indicators, but the methods of analysis of patents taken out and of trade in technology-intensive goods which provide some sort of indicators of the output of civil R&D would clearly be unsatisfactory in this sector.

Factors encouraging the growth of military R&D

Many interacting factors encourage the growth of military R&D. While it is possible that competing uses for resources could force some slow-down in expenditure in this area, there seems no natural stage at which the idea

that there is 'enough' military R&D seems likely to occur to those engaged in the qualitative arms race.

There are large permanent establishments engaged solely in military R&D; educational systems, reflecting current demand, are geared to producing a high proportion of graduates in disciplines appropriate for military research. These factors provide powerful pressures towards a continued process of product improvement in the military sector. They are a constant source of new ideas for weapon developments, in addition to those initiated by military policy makers.

There are also pressures for the spread of the conduct of military R&D to a wider group of countries. (Some of these pressures are not exclusively or even mainly confined to the military sector.) Countries may carry out their own R&D or they may import technological progress embodied in advanced products. Saving foreign exchange is one motive for movement towards indigenous production. Another is the fear of having independence of action compromised by other countries' refusal to supply particular products. This may well stimulate a move towards indigenous arms production—progressing from arms purchase through manufacture under licence to indigenous design, which requires a military R&D capability. For many Third World countries, this is likely to be a proportionately greater burden on their resources, particularly of skilled people, than it is in the rest of the world.

Military R&D and arms control

Military R&D presents particular problems and some opportunities for arms control which should be explored.

The benefits of reducing or stopping it are clear—the qualitative arms race would slow down and the danger of destabilizing developments would be diminished. Arms control agreements which close off 'exotic options' help here.

Some particular problems are the questions of what to aim at and how to verify compliance. Possible aims might be limits on expenditure, prohibition of certain areas of research (for instance, into obviously offensive means of warfare) and closure of big establishments. Verification in some areas would be very difficult, especially at the research stage, but there may well be greater possibilities at the development and testing stage.

There is a particular (short-term) conversion problem here; specialists whose area of research is of little or no civil use would stand to lose heavily. However, there is thought to be a fairly high proportion—well over half—of skilled military research and development jobs which are less specialized or technician jobs, and for which there are civil alternatives. The structure is roughly pyramidal. The top point of the pyramid—heads

of establishments and top administrators—could probably find other jobs. So too could those who make up the large base of the pyramid—the less specialized skilled workers and technicians. It is the middle section of specialists who would find it most difficult to find alternative suitable employment. One possibility is their diversification to research into means of verification.

The increasing debate within the scientific community about responsibility for the uses of their work is an encouraging move away from fatalistic attitudes of dissociation based on ideas of the inevitability of progress and the basic objectivity of science. While science itself is ethically neutral, its funding and decisions about what to research are not. It would be rather odd if the broad thrust of progress were not accelerated in particular directions by concentration of a high proportion of the available resources in those directions.

II. US expenditure on military research and development

The scale and pattern of military R&D in the United States are particularly interesting for a number of reasons. First, the US use of resources for military R&D is very large and is a very large part of the world total; 10 years ago it was probably nearly half [4a]. Even if its share is somewhat less now, it still represents an enormous effort directed at the development of new weapons. Second, this particular sort of military expenditure is especially important in the USA, where a main aim is to preserve technological leads [7a]. Spending on R&D is essential for this, but cannot guarantee it. Third, a steep increase in funding has begun and is planned to continue for at least five years.

Total US military RDT&E, 1963–83[3]

Table 9.1 and figure 9.1 present US military research, development, test and evaluation (RDT&E) expenditure (or, for 1969 onwards, obligations) over the past 20 years. The USA publishes a great many, in some cases very detailed, figures on military R&D, as on other parts of military spending. However, much of the material is not entirely appropriate to use in putting

[3] Short definitions of some of the terms used in this section (based on those in the *Budget Handbook* [8]) are as follows: the *budget authority* is the form in which the US Congress provides the amounts that agencies can obligate, resulting in immediate or future outlays of federal funds; *obligations* are amounts of orders placed, contracts awarded, services rendered or other commitments made by federal agencies during a given period, which will require outlays during the same or some future period; *outlays* are the values of cheques issued, interest accrued on the public debt or other payments made, net of refunds and reimbursements; the *functional classification* presents budget authority, outlay and tax expenditure data in terms of the principal purposes that federal programmes are intended to serve.

Table 9.1. US military research and development: DoD direct and indirect funding and atomic energy

	$ million, expenditures						$ million, obligations			
	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
DoD direct funding of military RDT&E							7 387	6 984	7 161	7 945
DoD indirect RDT&E[b]	415	407	387	416	439	340	300	367	339	362
Total DoD military RDT&E							7 687	7 351	7 501	8307
Defence-related atomic energy RDT&E activities[c]	482	571	556	524	534	609	669	629	609	594
Total military RDT&E:										
current prices[d]	**7 273**	**8 000**	**7 179**	**7 200**	**8 134**	**8 593**	**8 356**	**7 981**	**8 110**	**8 902**
constant calendar year A[e]	**12 839**	**13 901**	**12 251**	**11 970**	**13 108**	**13 353**	**12 398**	**11 249**	**10 864**	**11 398**
1975 prices B[f]										

[a] Up to and including FY76, fiscal years were the 12 months up to and including 30 June of the stated FY. From and including FY77, fiscal years have been the 12 months up to and including 30 September of the stated FY. The transitional quarter, 1 July–30 September 1976, was reported separately in the budget statistics.

[b] Non-RDT&E appropriations primarily covering pay and allowances of military personnel engaged in R&D. In the NSF sources, these are labelled 'other appropriations' or 'other DoD military'.

[c] Conducted by the Atomic Energy Commission up to and including 1973, by the Energy Research and Development Administration from and including 1974 until October 1977, by the Department of Energy from October 1977 up to and including 1982. It is now intended that the Department of Commerce should take over. From 1969 to 1977 these activities consisted, in decreasing order of magnitude of obligations in 1977, of the R&D and testing of nuclear weapons, naval reactors, inertial confinement fusion, nuclear materials security and safeguards, intelligence and arms control and special materials production. The figures for 1963–68 form part of an annual series up to 1971 (with 1972 and 1973 estimates) which is broadly consistent with the 1969 onwards series from which the 1969–77 figures are taken. The 1978–82 figures are of the same order of magnitude as the Budget Authority figures for atomic energy defence activities given in the annual National Science Foundation publication *Federal R&D Funding by Budget Function, 1978–80, 1979–81* and *1980–81*, which consist, in decreasing order of magnitude of budget authority in 1982, of weapon research, development and testing, naval reactor

together a picture of what has been spent on military R&D over a number of years. Many figures are prepared for budget purposes and are in the form of budget authority, which reflects spending intentions rather than expenditure at a particular time, or in the form of obligations, which are commitments to spend at that time or at a future time. Where expenditure or outlay figures are not available, obligations have been used, since they are one step nearer expenditure than budget authority is. (These budget terms are briefly defined on page 217, footnote 3). Further, many data are classified by the agency performing the R&D rather than by the function the funding is intended to fulfil, and some data which are classified functionally as defence are not subdivided into R&D and other categories.

About nine-tenths of easily identifiable military R&D is funded directly by the DoD. However, the rest is by no means negligible. There is some indirectly funded by the DoD, mainly to pay for military personnel under-

defence activities, FYs[a] 1963–83

									Estimates		% change
1973	1974	1975	1976[a]	1977[a]	1978	1979	1980	1981	1982	1983	1980–83
8 000	8 009	8 572	9 212	10 522	11 085	12 021	13 475	15 910	19 872	23 784	
393	401	429	417	417	434	441	468	585	681	685	
8 394	8 409	9 001	9 629	10 940	11 520	12 463	13 943	16 494	20 553	24 469	+75
608	607	678	801	924	1 063	1 131	1 132	1 347	1 504	1 684	+49
9 002	**9 016**	**9 679**	**10 430**	**11 864**	**12 583**	**13 594**	**15 075**	**17 841**	**22 057**	**26 153**	**+73**
10 985	**10 263**	**10 109**	**10 165**	**10 800**	**10 711**	**10 698**	**10 894**	**11 882**	**13 691**	**15 314**	**+41**
11 236	**10 619**	**10 297**	**9 984**	**10 186**	**10 106**	**10 074**	**10 107**	**10 597**			

development, inertial confinement fusion, defence nuclear waste management, nuclear materials and safeguard development, materials production and verification and control.

[d] Includes, for the Office of Emergency Preparedness:

expenditures (in $ million) of	1963	1964	1965	1966	1967	1968
	0.6	0.3	0.1	0.6	0.7	0.7
and obligations (in $ million) of	1969	1970	1971	1972		
	0.5	1.0	0.6	0.5		

[e] Deflated by the implicit US GDP price deflator quoted in *IMF International Financial Statistics*, adjusted to fiscal years. For 1982 and 1983 the estimate and forecast made by the US Office of Management and Budget quoted in *Science Resources Highlights*, National Science Foundation, August 1982 were used.

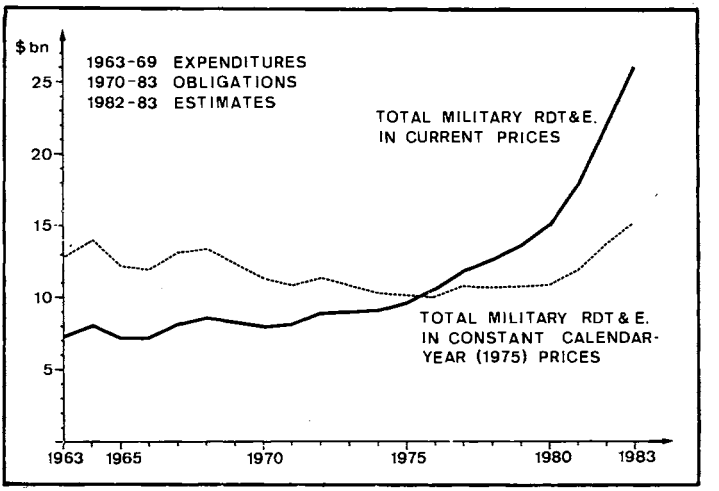
[f] Deflated by the implicit price deflator for national defense purchases of contractual R&D (available only from 1972) quoted in the *US Survey of Current Business*, adjusted to fiscal years.

Sources: 1963–68: *An Analysis of Federal R&D Funding by Function, FYs 1963–73*, National Science Foundation Report 72–313, table C.1.
1969–77: *An Analysis of Federal R&D Funding by Function, FYs 1969–79*, National Science Foundation Report 78–320, Appendix C.
1978–83: *Special Analyses, Budget of the United States Government, FYs 1980, 1981, 1982, 1983* (US Government Printing Office, Washington, D.C.).

taking R&D: this now amounts to rather less than $0.7 billion. Defence-related atomic energy RDT&E too, currently nearly $1.7 billion, is funded outside the DoD, at present by the Department of Energy from which the Department of Commerce is intended to be taking over, and earlier by the agencies detailed in table 9.1, note *c*. Table 9.1 shows these items and includes them in 'total military RDT&E'.

Defence-related atomic energy RDT&E expenditure is a minor part of total US military RDT&E (6–8 per cent in recent years). However, it is bigger than most Western countries' *total* military R&D expenditure: one-third as big again as that of FR Germany and five times that of Sweden. Only the UK and France spend more—about twice as much each—on all their military R&D as the USA does on the atomic energy part of its military R&D. Indeed, the USA spends nearly as much on this minor part of its military RDT&E as Sweden spends on total government R&D of all

Figure 9.1. US military RDT&E: DoD direct and indirect funding and atomic energy defence activities, 1963–83



Source: Table 9.1.

kinds and more than Belgium, Canada, Denmark or Norway spend on total government R&D of all kinds [9].

There are two important omissions from total US military RDT&E. First, some of that part of defence companies' in-house R&D and bid and proposal development which is paid for by the DoD as an overhead on contracts is omitted. It is not correct to include it all since the amounts paid for this item on contracts which are themselves for RDT&E are already included in DoD RDT&E. Unfortunately the published figures show the total DoD share. This came to nearly $0.7 billion in 1972 and some $1.7 billion in 1979.

Second, only DoD funding for space activities is included (under a number of headings), and NASA (National Space and Aeronautics Administration) activities which support the DoD are not. The US General Accounting Office (GAO) has made an allocation of items in the NASA budget request for 1983 [10] in three categories: civil, DoD and joint civil and DoD. The wholly DoD element that the GAO arrived at for 1983 is given in table 9.2, which also shows what the wholly DoD element would be for the previous four years if the share of DoD support in the total for each programme was the same as in 1983. According to the GAO, some $1.1 billion—20.5 per cent of NASA's 1983 budget request—is for DoD support. This excludes any share of the further 7.7 per cent of NASA's budget which the GAO allocated to joint civil and DoD support. NASA disagreed with the GAO allocation, which divided much of the costs that NASA had defined as joint civil and military—giving only 0.1 per cent of

Table 9.2. DoD support element of NASA budget,[a] FYs[b] 1979–83

Figures are in US $ million, except where stated; bracketed figures are SIPRI estimates.

	DoD support element, 1983 (percentage of programmes)	Obligations			Estimated obligations	
		1979	1980	1981	1982	1983
Space transportation systems	*31.4*	(632)	(749)	(857)	(970)	1 088
Aeronautical research and technology	*2.1*	(6)	(6)	(6)	(5)	5
Space research and technology, space science and applications, tracking and data acquisition	*0*	–	–	–	–	–
Total: at current prices	*20.5*	**(638)**	**(755)**	**(863)**	**(975)**	**1 093**
at constant 1975 prices[c]		**(502)**	**(546)**	**(575)**	**(605)**	**640**

[a] GAO allocation of NASA budget request for 1983 and derived estimates based on percentages of DoD support element from this GAO allocation for items in NASA budget applied to the past four years. Joint civil and DoD support is excluded. Research and programme management ($1 179 million in 1983) was not included in the allocation. All NASA's budget is support for R&D.

[b] Fiscal years are the 12 months up to and including 30 September of the stated year.

[c] Deflated by the implicit GDP deflator: see note *e* to table 9.1.

Sources: Analysis of NASA's Fiscal Year 1983 Budget Request for Research and Development to Determine the Amount that Supports DoD's Programs, MASAD-82-33 (US General Accounting Office, Washington, D.C., 1982); *Special Analyses, Budget of the United States Government, FYs 1981, 1982, 1983* (US Government Printing Office, Washington, D.C.).

the budget as military—into either civil or military. The major difference between the two analyses was the treatment of the space shuttle costs. NASA's position was that there was no precise basis to use for allocation between civil and military uses. The differences between the two allocations are shown in table 9.3 below.

It does seem that it would be easier for NASA to show that it was maintaining a proper balance between civil and military activities if it altered its accounting system and its system for estimating shuttle operation costs so that it could allocate costs between civil and military operations. (NASA has stated that these systems do not provide for this allocation [10a].)

Table 9.3. NASA and GAO allocations of NASA budget between DoD, civil and joint civil and DoD support

Figures are percentages of total.

	DoD support	Civil support	Civil and DoD support
NASA allocation	0.1	33.6	66.3
GAO allocation	20.5	71.8	7.7

Source: Analysis of NASA's Fiscal Year 1983 Budget Request for Research and Development to Determine the Amount that Supports DoD's Programs, MASAD-82-33 (US General Accounting Office, Washington, D.C., 1982).

This is likely to become more important as the military use of space expands [11].

Obscurity over the costs of military space programmes or their support is not confined to NASA: in its report made in February 1981 to the US Congress on DoD participation in the space transportation system (STS), the GAO stated that "visibility over total costs of DoD's participation in the STS program is limited. Nowhere are all costs reported in one place" [12]. The total DoD space budget for FY 1982 of $5.5 billion was stated in the summer of 1982 by a spokesman who said it was the first time such a figure was computed [13]. (It was not stated whether this was all R&D, as is the case for the NASA budget.) However, these direct DoD costs, although difficult to extract, are included in its total RDT&E figures.

In spite of the omissions, which probably amount to some 5 to 6 per cent of the total, the total military RDT&E figures given in table 9.1 give a broadly correct view of developments. As well as the current money figures, two constant price series are given. The first, which is the series that will be used here, is deflated by the implicit gross domestic product (GDP) deflator. This is the deflator used by the National Science Foundation (NSF) for R&D statistics and, at their insistence, by the Organization for Economic Cooperation and Development (OECD) for US R&D statistics (see note *e* to table 9.1). The other series is included for comparison. It is deflated by the implicit price deflator for national defence purposes of contractual R&D. Unfortunately this price index is only available from calendar year 1972. It suggests a rather more rapid price rise than the GDP deflator.

Table 9.1 and figure 9.1 show that US military R&D at constant prices was fairly static during the 1960s and even fell slightly during the 1970s (rather more so if the alternative constant price series is used). However, this followed a five-year period in which it more than doubled, probably influenced by the Soviet acquisition of a nuclear capability in 1953 and the Soviet launching of the first artificial satellite in 1957. By the early 1960s, US military R&D expenditure (in current prices) was about five times its wartime peak.

High expenditure on military R&D, even if it is not itself increasing, is likely to lead to growing military expenditure as the R&D results in more and more new, more effective and, usually, more expensive weapons (see chapter 8) and makes the old ones obsolete. The present steep increase in funding will put even greater upward pressure on military expenditure.

Expenditure on military R&D (in constant prices) is expected to exceed the early 1960s peak in 1983, reaching 141 per cent of the figure for 1980, and is expected to grow by about 6 per cent a year until 1987 [7b, 14]. By that time it will have increased to about 125 per cent of the 1983 level and about 175 per cent of the 1980 level. Even in a period of generally deficient

demand, this must put pressure on supplies of the highly trained and able people needed for all kinds of research.

Amounts spent on military R&D measure resources used on it—the input—and can only give indications of the likely output. However, the resource use is interesting in itself, and the indications it gives are useful, especially as output in this field is particularly difficult to measure.

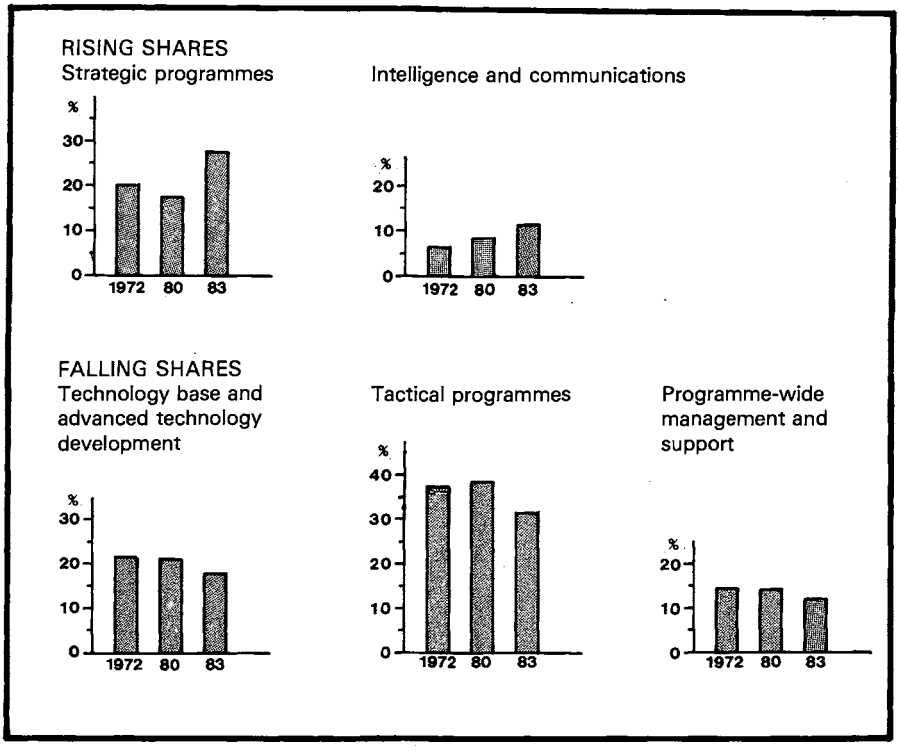
The composition of US military RDT&E expenditure

Expenditure can be broken down in a number of ways: where the funds come from, who spends them, for what purpose and on what sorts of activity.

Funds for US military R&D come, directly or indirectly, from the government. More than two-thirds of the money is spent by industry, about a quarter by the government, some 3 per cent by universities and some 2 per cent by federal contract research centres [15].

Figure 9.2. Shares of functions in DoD direct funding of military RDT&E: FYs 1972, 1980 and 1983

Percentages of total.



Source: Table 9.4.

Table 9.4. Functional analysis of DoD direct funding of military RDT&E, FYs 1982–83

Figures are in US $ million, obligations.

		1972		1973		1974		1975		1976[a]		1977[a]	
		$	%	$	%	$	%	$	%	$	%	$	%
Technology base		1 462	18.4	1 376	17.2	1 353	16.9	1 372	16.0	1 487	16.1	1 682	16.0
Advanced technology development		238	3.0	160	2.0	200	2.5	300	3.5	557	6.0	537	5.1
Strategic programmes		1 581	19.9	1 896	23.7	1 882	23.5	2 143	25.0	2 222	24.1	2 333	22.2
Tactical programmes		3 019	38.0	2 936	36.7	2 811	35.1	2 923	34.1	2 895	31.4	3 848	36.6
Intelligence and communications		493	6.2	528	6.6	665	8.3	643	7.5	887	9.6	830	7.9
Programme-wide management and support		1 152	14.5	1 104	13.8	1 097	13.7	1 192	13.9	1 164	12.6	1 293	12.3
Total DoD direct funding of military RDT&E:													
current prices		**7 945**	**100.0**	**8 000**	**100.0**	**8 009**	**100.0**	**8 572**	**100.0**	**9 212**	**100.0**	**10 522**	**100.0**
constant calendar year	A[b]	**10 173**		**9 762**		**9 117**		**8 952**		**8 979**		**9 579**	
1975 prices	B[c]			**9 985**		**9 443**		**9 119**		**8 817**		**9 034**	

Notes:

Total DoD direct funding of military research and development includes funding for NATO co-operation in R&D and direct funding for space activities but does not include (*a*) NASA activities which support DoD (see table 9.2); (*b*) atomic energy defence RDT&E (see table 9.1); (*c*) DoD indirect RDT&E, which is small amounts from DoD non-RDT&E appropriations primarily covering pay and allowances of military personnel engaged in R&D. In NSF sources these are labelled 'other appropriations' or 'other DoD military' (see table 9.1); or (*d*) independent R&D and bid and proposal (IR&D and B&P) programmes which are part of defence companies' costs for in-house R&D and proposal development. These partial costs are recovered by the companies as overhead costs against DoD contracts and so do not appear separately in the DoD budget. Some will be recovered on RDT&E contracts, so adding IR&D and B&P to other defence RDT&E would mean a small element of double counting.[d] However, it is not an insignificant item: in 1972 DoD's share of total IR&D and B&P was $698 million[e] and in 1979 it was $1 127 million.[d]

Technology base is research and exploratory development of technology which has potential applications for defence; these efforts involve the physical, mathematical, environmental, engineering, biomedical and behavioural sciences. All DoD basic research programmes are included. In 1980 and 1981, research was just under a quarter of the total of this function.[f]

Advanced technology development supports more extensive exploration of promising systems, alternatives and concepts than technology base. In 1980, it included programmes in aeronautics and propulsion, flight simulation, medical sciences, materials and structures, weapon technology, electronics and directed energy devices. In 1982, very high-speed integrated circuits and advanced radiation technology were among the programmes included.

Strategic programmes are to ensure long-term deterrence of nuclear attacks and threats of nuclear attack against the USA and its allies. Space defence programmes, missile attack warning systems, and command and control systems are included, as well as strategic weapon systems.

A breakdown by purpose is shown in table 9.4, which gives a functional analysis of DoD direct funding of military RDT&E. If atomic energy is added, a slightly greater share of funds is spent on science and technology and a slightly smaller share on strategic programmes [16].

Table 9.4 does not show very dramatic changes from 1972 to 1980. However, the large increase (at constant prices) of 43 per cent between 1980 and 1983 was not uniformly applied: the estimated individual increases are shown in the last column of the table and range from 135 per cent for strategic programmes to 15 per cent for tactical programmes.

1978		1979		1980		1981		Estimates 1982		1983		% change 1980–83	
$	%	$	%	$	%	$	%	$	%	$	%	%	Deflated by implicit GDP deflator
1 785	16.1	1 976	16.4	2 235	16.6	2 570	16.2	2 849	14.3	3 288	13.8	+47	+19
500	4.5	542	4.5	618	4.6	578	3.6	736	3.7	928	3.9	+50	+22
2 246	20.3	2 078	17.3	2 250	16.7	3 187	20.0	4 802	24.2	6 520	27.4	+190	+135
4 516	40.7	4 984	41.5	5 296	39.3	5 914	37.2	7 029	35.4	7 524	31.6	+42	+15
551	5.0	748	6.2	1 162	8.6	1 565	9.8	2 167	10.9	2 675	11.2	+130	+87
1 487	13.4	1 693	14.1	1 914	14.2	2 096	13.2	2 289	11.5	2 849	12.0	+49	+21
11 085	**100.0**	**12 021**	**100.0**	**13 475**	**100.0**	**15 910**	**100.0**	**19 872**	**100.0**	**23 784**	**100.0**	**+77**	**+43**
9 436		**9 460**		**9 738**		**10 596**		**12 334**		**13 927**		**+43**	**+43**
8 903		**8 908**		**9 034**		**9 450**							

Tactical programmes support the development of combat systems for the general-purpose forces.

Intelligence and communications: The US Air Force has sponsored most programmes: the space booster was the largest Air Force programme in 1979. In 1982 the NAVSTAR global positioning system (a joint effort of all three services) was the largest programme.

Programme-wide management and support (called 'Defense-wide mission support' in recent NSF publications). Defence support for the space shuttle is a leading programme in this area, which also includes federal contract research centres, missile ranges and test facilities.

[a] Up to and including FY76, fiscal years were the 12 months up to and including 30 June of the stated FY. From and including FY77, fiscal years have been the 12 months up to and including 30 September of the stated FY. The transitional quarter, 1 July–30 September 1976, was reported separately in the budget statistics.

[b] Deflated by the implicit GDP deflator quoted in *IMF International Financial Statistics*, adjusted to fiscal years. For 1982 and 1983, the estimate and forecast made by the US Office of Management and Budget quoted in *Science Resources Highlight*, National Science Foundation, August 1982, were used.

[c] Deflated by the implicit deflator for national defence purchases of contractual R&D (available only from 1972) quoted in the *US Survey of Current Business*, adjusted to fiscal years.

[d] Long, F. A. and Reppy, J., 'Decision making in military R&D: an introductory overview', in *The Genesis of New Weapons*, ed. F. A. Long and J. Reppy (Pergamon Press, Oxford, 1980).

[e] *GAO Partial Report—In Depth Investigation into Independent Research and Development and the Bid and Proposal Programs*, in US Senate *Congressional Record*, 17 September 1974.

[f] *Defense/81:* Special Almanac Issue, 'Facts and figures about the Department of Defense' (American Forces Information Service, Arlington, Va., 1981).

Sources: An Analysis of Federal R&D Funding by Function, FYs 1969–79, National Science Foundation Report 78–320; *Special Analyses, Budget of the United States Government FYs 1980, 1981, 1982, 1983* (US Government Printing Office, Washington, D.C.).

Figure 9.2 shows the shares of the main functions in the totals for 1972, 1980 and 1983: pointing to the coming big growth of strategic programmes and the continuing growth of intelligence and communications, at the expense of tactical programmes, programme-wide management and support, and technology.

The main types of activity into which R&D can be broken down are basic research, applied research and development. Table 9.5 shows the shares of DoD R&D funds devoted to each of these in 1960, 1970 and (estimated) 1982 and, for comparison, the shares of all federal

R&D expenditure, of all non-federal R&D expenditure and of all US R&D.

It is clear that the DoD distribution of R&D funds differs greatly from other R&D expenditure. The proportion spent on development (85 per cent of DoD obligations) is very much higher, and applied research receives much less and basic research very much less.

Over the period, total US funds for basic research have increased their share, due to increases in federal non-DoD expenditure. It is reasonable to expect that a greater share of basic research—"research without any particular application or use in view" [17a]—will be funded by governments than by private industry since the connection with future profit is somewhat distant and tenuous. However, in the long run it is a necessary base for applied research which is in its turn necessary for development. If the proportion of federal R&D funds going to DoD increases very sharply, as is intended, basic research is very likely to suffer in spite of the Administration's intention to favour it. (Moreover, even for basic research,

Table 9.5. Shares of basic research, applied research and development in total R&D in the USA: all R&D, federally and non-federally funded R&D and DoD obligations for R&D

	Total R&D	Basic research	Applied research	Development
	($ billion)	(Percentage of total R&D)		
Total R&D expenditure (all sources of funds):				
1960	13.5	9	22	69
1970	26.1	14	22	65
estimate 1982	77.3	12	21	67
Total non-federal R&D expenditure:				
1960	4.8	10	28	62
1970	11.2	9	24	67
estimate 1982	41.2	8	23	70
Total federal R&D expenditure:				
1960	8.7	8	19	72
1970	14.9	17	21	63
estimate 1982	36.1	17	20	63
DoD obligations for R&D:				
1960	5.7	3	12	85
1970	8.4	4	13	83
estimate 1982	21.5	3	11	85

Sources: National Patterns of Science and Technology Resources 1982, National Science Foundation Report 82–319; *Federal Funds for Research, Development and other Scientific Activities, FYs 1971, 1972 and 1973*, detailed statistical tables, Vol. 21, National Science Foundation Report 72–317; *Federal Funds for Research and Development, FYs 1979, 1980 and 1981* and *FYs 1980, 1981 and 1982* Vols. 29 and 30, National Science Foundation Reports 80–318 and 81–325.

the planned growth is greatest for defence [18].) From 1960 to 1982 the share of federal funds devoted to basic research rose from 9 to 17 per cent; at the same time, the share of non-federal funds (most of which are from industry) fell from 10 to 8 per cent. It does not seem likely that this share will rise quickly in the present economic climate.

US military RDT&E related to wider aggregates

Military RDT&E expenditure is a part of all RDT&E expenditure and also a part of total military expenditure. Table 9.6 shows its percentage share or estimated share in these in 1963, 1965, 1970, 1975 and from 1980 onwards, and also its relationship to GDP.

In the early 1960s, when US military RDT&E had grown rapidly to an unprecedented level, it was over 60 per cent of all federal RDT&E expenditure, 15 per cent of all military expenditure and over 1 per cent of GDP (incidentally, 1 per cent of GDP is the ceiling on *total* military expenditure that the Japanese, up to now, have kept to). All of these percentages fell during the 1960s—to 52 per cent of all federal RDT&E expenditure, 10 per cent of military expenditure and 0.8 per cent of GDP. The share of military RDT&E in federal RDT&E expenditure fell further during the 1970s,

Table 9.6. Total military RDT&E percentage shares of GDP, total military expenditure and total federal RDT&E expenditure in the USA, FYs 1963–82

Figures are percentages.

Fiscal year[a]	Military RDT&E share of total federal RDT&E expenditure	Military RDT&E share of total military expenditure	Military RDT&E as a percentage of GDP
1963	64	15 (1964)	1.3
1965	52	14	1.1
1970	52	10	0.8
1975	51	11	0.7
1980	48	11	0.6
1981	50	11	0.6
1982[b]	54	12	(0.7)
1983[b]	62	..	(0.8)

[a] Up to and including FY76, fiscal years were the 12 months up to and including 30 June of the stated FY. From and including FY77, fiscal years have been the 12 months up to and including 30 September of the stated FY. The transitional quarter, 1 July–30 September 1976, was reported separately in budget statistics.

[b] Estimates.

Sources: Table 9.1; *An Analysis of Federal R&D Funding by Function, FYs 1963–73* and *FYs 1969–79*, National Science Foundation Reports 72–313 and 78–320; *Federal Funds for Research and Development*, FYs 1979, 1980 and 1981, detailed statistical tables, Vol. 29, National Science Foundation Report 80–318; *National Patterns of Science and Technology Resources 1982*, National Science Foundation Report 82–319; 'Projected federal outlays of $42 bn by 1983: America holds its own', *Economist*, 6 November 1982; 'Statistical trends in the US', *Financial Times*, 1 November 1982.

reaching 47 per cent in 1979, but is now rising and is estimated to be 62 per cent in 1983, almost back to the 1963 level. Military RDT&E as a percentage of GDP also fell in the 1970s, being 0.6 per cent from 1976 to 1981, and is now estimated to be rising slightly, to 0.8 per cent in 1983, well below the 1963 level but likely to continue to rise. The share of military RDT&E in total military expenditure was between 11 and 12 per cent during the 1970s and was estimated to be 12 per cent in 1982 and probably rising.

Conclusions

US resources used for military RDT&E, already very large indeed, are being greatly increased, and it is planned that this increase will continue for at least the next five years. Any effective military RDT&E, even if it is not increasing, is likely to lead to greater future military expenditure than there would otherwise be, as the results of effective military RDT&E are new, more effective weapons and the obsolescence of old ones. Moreover, it is likely to stimulate competition, as can be seen from US statements about responding to Soviet efforts. Increasing military RDT&E will greatly increase these effects. The payoff in increased security seems uncertain.

Military RDT&E is a smaller, though rising, proportion of GDP than it was 20 years ago. The sums of money spent, enormous though they are, cannot be said to be a crippling burden on the economy, particularly as there are underutilized resources. However, very large numbers of the most able and skilled brains in the country are engaged in military RDT&E, and this, particularly as the large increases under way generate a greatly increased demand for researchers, is a burden: this is an area not only where there is rather less need to reduce unemployment than elsewhere, but where there is or soon will be scarcity.

III. Military R&D in the USSR: some pointers to the scale of and trends in resource use

The Soviet Union devotes considerable resources to military R&D: this much is clear from developments observed in its weapons. Information on the size of these resources is even less precise than that on the size of the rest of its military expenditure. (The CIA considers its estimated dollar costs of Soviet RDT&E "significantly less reliable" than the estimated costs of all other categories of Soviet military activity [19a]. Some recent estimates are discussed and tabulated below.)

Methods of estimation

There are a number of possible approaches to estimating the scale of Soviet military R&D. None can be expected to provide more than an indication;

therefore estimates based on more than one approach seem preferable. Most approaches include some assumptions based on comparisons or analogies with the USA: such assumptions should not be treated as estimates in subsequent calculations. Apart from calculations based upon the assumption of full employment of observed facilities—an option only open to intelligence services—which seem rather unconvincing, even as a check, these approaches are as follows.

1. To make an assessment of its likely size in relation to total military expenditure (itself an uncertain figure).
2. To infer it from examination of weapon developments, especially compared to US developments, allowing for the effects of technological lags.
3. To examine aggregate budget and other data.
4. To estimate the military share of R&D outlays sector by sector.
5. To attempt to identify the military element of total R&D employment and to assess the significance of changes in it.

The first approach is a broad brush one which yields a general order of magnitude that is highly dependent on the rather problematic assessment of Soviet military expenditure. It can also be a check on the plausibility of results arrived at by other methods.

In 1972 a SIPRI study [4] of world expenditure on military R&D tentatively estimated the annual average level of Soviet military R&D expenditure during the 1960s at between 1.6 and 2.2 billion roubles, based on an 11–13 per cent share of an estimated range of figures for military expenditure, supported by evidence of weapon developments.

The second approach involves making assumptions about efficiency: it works back to inputs from assessment of output. However, the efficiency of Soviet R&D and the relative efficiencies of civilian and military R&D are, as Nimitz has said, "a central issue in evaluating the military burden in the USSR" [20a]. Moreover, the only general agreement is that the efficiency of Soviet military R&D exceeds that of Soviet civilian R&D.

The third approach—examination of aggregate budget data—depends upon identifying the budget allocations most likely to include military R&D and estimating its share, together with an examination of unspecified residuals. Nimitz, who has made one of the most thorough studies of Soviet military R&D outlays [20], concluded that "the source most likely to support most defense/space, along with some civilian research, is the portion of the budget allocation to 'science' that comes directly from the all-union budget" [20b]. (The word *nauka*, usually translated 'science', is nearer in meaning to 'knowledge' or 'learning'.) This portion of the budget allocation totalled 4.4 billion roubles in 1968 [20b]. Nimitz's view is supported by Korol [21a]. However, there is some evidence (quoted by Holzman [22]) that the science allocation excludes some military R&D.

Korol also considered it significant that when an itemized breakdown of some of the science budget was given for 1950 to 1957 (in a Soviet source *The USSR State Budget Expenditures for Socio-Cultural Programmes*) the unitemized residual was almost entirely in the all-union budget—"that is, the budget that covers among others the military and other secret programs" [21b]. Comparison of the itemized part of the budget with other evidence supported the view that the unitemized part covered some special kind of research effort, and it seemed reasonable that this secret part should be military. The share of this unitemized part of the total science budget rose from 43 per cent in 1950 to 61 per cent in 1957 [21b]. However, in the absence of later itemized figures it is not really possible to extrapolate this percentage.

Lee [23], believing that substantial military R&D expenditures were outside the reported 'science' outlays, started with total R&D employment (from Bronson [24a]), which he accepted as comprehensive, and built up from it estimates of total R&D outlays for each year from 1955 to 1975 (coming to about half as much again as reported 'science' outlays). His estimated wage bill is only one-third of total outlays, which seems low. From the total obtained in this way he subtracted 75 per cent of reported science expenditures, on the assumption that they were civil (following Trapezhnikov [23a]). Lee based his belief that 'science' expenditures were not comprehensive on institutional factors and on the omission of some development from 'science' expenditures. His estimates are 1.0–1.7 billion roubles in 1955 rising to 11.3–18.6 billion roubles in 1975, roughly half his estimates of total R&D outlays [23a].

Nimitz [20] used this third method—of examination of aggregate budget data—only to test the plausibility of her other, independent, method and considered its sole use unwise, because there was only ambiguous and partial evidence for the defence/space share of the all-union budget and because a method "that relies only on aggregate rouble data is incapable of benefitting by available bits and pieces of outlay data for particular sectors" [20c].

Her independent method, which is discussed more fully below, was to use the fourth approach—estimation of the military share of outlays sector by sector—together with employment data. As she says, this reduces the risks of overlooking civilian activity and of the use of analogies with the USA, and is open to piecemeal improvement in the light of new information [20a]. She estimated that about half of Soviet R&D outlays were military—1.6 to 2.0 billion roubles in 1960 and 3.0 to 4.3 billion roubles in 1968 [20d].

The outlay and employment data on 'science'

The fourth and fifth approaches are based on outlay and employment data about 'science'. The data are not classified in a way equivalent to the

Frascati [17] definition of R&D, and it is necessary to make adjustments to the published data to arrive at series which approximate to R&D. (In the mid-1960s, when it was hoped that an international definition might be arrived at, a number of Soviet textbooks were published on *nauchno-issledovatel'skaya i opytno-konstruktorskaya rabota* (NIOKR): the Russian term for R&D [25a].)

There is not a lot of information on *expenditure*. Only a few relevant basic series are published, and the definitions are neither clear nor consistent [26a]. In particular, it is not certain how capital investment is treated or whether any non-budget financed research is included [26a]. Nor is it clear how much of military R&D is included: the final stages of prototype development and testing, which are probably a significant part of military R&D, have been thought to be excluded [21c, 26b] (perhaps because the tendency is to classify data by performer rather than by purpose [27a]), but some doubt has been cast on this [28a]. Moreover, some routine work that would not qualify as research in the West is included—Campbell quotes the example of the Institute for Geology and Production of Mineral Fuels, which managed to produce not a single discovery or invention that could qualify for an author's certificate in 1973 in spite of employing 1 143 people [26c]. However, the outlay data that exist are a useful source of information, particularly in conjunction with the employment data, as Nimitz has used it.

The information on *employment* in 'science' is rather better than that on outlays [20e, 29a], although the statistics here, too, need careful adjustment to make them approximate to Western definitions. (The effect of not making these adjustments is generally to overstate Soviet capabilities [24b, 26d].) The problems may be growing; the USSR has stopped publishing a number of series which used to be available from time to time [28b], but, on the other hand, there are some useful recently published data on industrial R&D (by G. G. Plekhov, described and analysed by Cooper [30]).

Moreover, if information can be derived about the levels of and trends in employment in military R&D, it is interesting in itself, not just as part (an indispensable part) of the total input to military R&D. Employment in military R&D, especially the employment of qualified researchers, is a major use of scarce expertise and intellectual resources in the USSR. Also, in making comparisons between countries, it may be useful to avoid the problems of money cost comparisons, although, of course, there are other problems of comparability.

A number of investigations of the size and trend of total employment in all Soviet R&D, and of the scientists and engineers within it, have been made [21d, 24–26, 28, 29, 31]. Only the two most recent are discussed here: Nolting and Feshbach [31] and Campbell [26, 28].

The main Soviet statistical series which form the starting-point for estimates are (*a*) employment in science and science services, which can be used as a starting-point for estimating total R&D employment, and (*b*) scientific workers and (*c*) specialists, both of which can be used as starting-points for estimating scientists and engineers in R&D. All three series include social scientists and humanities specialists, who are not included in Western definitions of scientists and engineers.

The first series is not confined to specialists; it covers everyone on the payroll of the institutions included, some of whom may have jobs very remote from research. Among the institutions included are hydrometeorological and geological organizations (which are normally excluded from definitions of R&D). Not included are higher education (VUZy) institutions (although some of their time is spent on R&D) or R&D specialist and support people in industrial enterprise scientific and technical subdivisions and in central administrative scientific and technical departments. Nolting and Feshbach adjusted the data for 1970 to include estimates of the R&D element of the excluded institutions and to exclude the non-R&D institutions and social sciences and humanities, arriving at a figure of about 2 827 000 full-time equivalent people, starting from the reported figure of 2 999 000 for employment in science and science services [31a]. However, this figure is not comparable to US data on people working in R&D because support people are defined and used differently. Bronson [24c] estimated that in 1970 the ratio of scientists and engineers to support people in R&D was 1:5 in the USSR and 1:1.3 in the USA. This was not because the USSR had a higher ratio of technicians to scientists and engineers than the USA: the reverse was true. Bronson considered that this reflected a low level of efficiency of R&D support in the USSR.

The other two 'science' series do not include untrained workers. Neither corresponds exactly to the concept of scientists and engineers engaged in R&D. They both include the social sciences and humanities. *Scientific workers* are those directly engaged in research work, including some without a diploma (which is roughly a first degree equivalent) plus everyone else who has an advanced degree (candidates or doctors). Scientists in the armed forces are included. *Specialists* are all graduates of higher educational institutions employed in the economy, except members of the armed forces.

Nolting and Feshbach [31a] and Campbell [26e, 28c] estimated the numbers of scientists and engineers in R&D starting with the scientific workers series. Their estimates were designed to exclude those in the social sciences and humanities and the (probably small [31b]) number of trained people not engaged in R&D. VUZy employment was adjusted downwards to an estimated full-time R&D equivalent, and the estimated full-time R&D equivalent of graduate student employment was added. Campbell

also added 40 or 60 per cent of the excess of specialists in the science sector over the adjusted scientific workers [26f, 28d]. This was to allow for specialists working in *opytno-konstruktorskaya rabota* (OKR), an activity which Campbell thought was excluded from Soviet data on scientific workers but which would "often qualify as development in the US" [26g]. Nolting and Feshbach did not make this adjustment: they presumably considered that the scientific worker category already included all the genuine development element of OKR [31c]. This is not a trivial difference —the adjustment forms about one-quarter to one-third of Campbell's total figure.

However, both series show numbers of scientists and engineers lower for the USSR than for the USA at the beginning of the 1960s and higher during the 1970s: the cross-over point is in the mid-1960s, according to Campbell, and just before 1970, according to Nolting and Feshbach (table 9.7).

Table 9.7. Estimates of numbers of scientists and engineers employed in R&D in the USSR and the USA, 1950–80

Figures are in thousands.

	USSR: scientific workers			
		Adjusted to approximate to US concepts by:		
Year	As published[a]	Nolting & Feshbach (1979)	Campbell[b] (1978 & 1980)	USA: scientists and engineers, NSF estimate
1950	163	112[c]	..	159
1960	354	244[c]	296–328	381
1965	665	423	522–561	495
1970	928	591	733–807	547
1975	1 223	779	1 061–1 188	535
1978	1 314	828	1 179–1 327	595
1980	1 371[d]		1 254–1 412	(610)[e]

[a] The series was broadened in 1962 by the inclusion of 39 000 people officially described as "persons without advanced degrees". These people are thought to be defence-related, perhaps in missile testing or space launches, and are known to include some with advanced degrees (see Nimitz, N., *The Structure of Soviet Outlays on R and D in 1960 and 1968*, Rand Report R-1207-DDRE, pp. 24–25).

[b] Lower figures obtained by including 40 per cent of the excess of specialists in the science sector over the adjusted scientific workers; higher figures by including 60 per cent.

[c] Adjusted upwards to allow for the 1962 change in series.

[d] Estimate by Campbell 1980 (p. 7).

[e] 1979.

Sources: Campbell, R. W., *Reference Source on Soviet R&D Statistics 1950–1978* (University of Indiana for National Science Foundation, Washington, D.C., 1978), pp. 28, 38; Campbell, R. W., *Soviet R&D Statistics*, 1977–1980 (University of Indiana for National Science Foundation, Washington, D.C., 1980), p. 10; Nolting, L. E. and Feshbach, M., 'R&D employment in the USSR—definitions, statistics and comparisons', in *Soviet Economy in a Time of Change*, Vol. 1, US Congress, Joint Economic Committee (US Government Printing Office, Washington, D.C., 10 October 1979), p. 746.

The military element of professional employment in R&D

Numbers of scientists and engineers in total R&D show only two things about similar employment in military R&D: the size of and change in the pool of specialist labour available to it.

Military R&D is carried out in three different sectors and also, in high-priority areas, in special-purpose organizations cutting across departmental boundaries [32a].

The first sector is the Academies of Science and VUZy. These carry out mainly (and most) basic research [20f, 27b, 32a]. The second is the research institutes and academies of the Ministry of Defence, which carry out military-operational orientated theoretical and applied research [32a]. These are not thought to play a major role [20f, 32b]. The third sector is the (independent) defence-industrial ministries' research institutions, carrying out applied research and development [27b, 32a], thought to amount to about 90 per cent of all military applied research [27c]. Within this sector Machine Building and Metal Working (MBMW) is the most important part, in total and in the military share of it [20g].

There are some incomplete data for professional R&D employment by sector which can be supplemented by information on the distribution of professionals by field of training [20h] which is probably reasonably closely related to sector of employment, since Soviet training is fairly specific [20i]. (This is not thought to be true for engineers, however. Bronson [24d] reported that according to the 1959 census about half the employed engineers worked outside engineering, and that President Brezhnev was counted as an engineer in government and administrative institutions because he held a metallurgical engineering degree.)

Nimitz [20] used this information, supplemented for industrial R&D by US industrial sectoral ratios of R&D professionals to production sector workers, to make a sectoral distribution of R&D employment in "specialised R&D organizations" (these cover the bulk of Soviet R&D [20j]). From this and the available R&D outlay per head data she estimated outlays sector by sector and derived a 'medium' to 'high' range of defence outlays in each sector: the medium by applying the percentage share of defence in total outlays in the analogous US sector and the high by applying a higher percentage share of outlays chosen as one it was improbable would be exceeded [20k].

The military share of employment is not calculated and cannot be derived in a simple way from the data given without some overly sweeping assumptions—principally, that the share of military in total employment in each sector was the same as the estimated share of military in total outlays in each sector.

Nimitz also made speculative estimates of R&D outlays and employment in a number of defence-related subsectors of MBMW, based on data from

Plekhov [20m], but owing to doubts about his reliability did not value them very highly. However, Cooper [30] has described and analysed a new contribution from Plekhov in conjunction with the old one. Cooper presented data on the number and branch distribution of scientific workers serving industry during 1967–77. He also made a sectoral analysis of the total number of scientific workers in the USSR at the end of 1970, based entirely on Soviet sources and not on analogy with the USA. Cooper agreed with Nolting and Feshbach's assessment of the comparability of Soviet scientific workers with US scientists and engineers [30a]. He compared the numbers of scientists in manufacturing industry in the USSR and the USA, first adjusting the Soviet figures only by reducing them by 5 per cent to approximate to the exclusion of social sciences and humanities and, second, adjusting them further by a reduction of 25 per cent to allow for possible inferiority and lower quality (which is generally assumed to exist). He concluded that if the first set of figures were used, it appeared that the Soviet total had overtaken the US in the early 1970s, but that if the Soviet totals were reduced to allow for possible inferiority and lower quality this conclusion was altered. This, combined with comparisons of science intensity, suggested that it was "by no means evident that in the late 1970s the USSR was as well endowed as the USA in terms of the force of its industrial scientists" [30b].

Cooper's data showed a near doubling of scientific workers serving industry between 1965 and 1977, but with a declining rate of growth and no substantial change in the branch distribution. MBMW increased its share slightly, but within it the shares of radioelectronics and instrument making grew at the expense of aircraft and missiles and general machine building and metal working: reflecting the determined effort to strengthen the R&D base of the electronics and instrument-making computer industries during the 1970s [30c]. The growth rate of scientific worker employment in MBMW slowed in the 1970s: Cooper speculated that this might be an indication that "the improved international relations which prevailed during the first half of the 1970s allowed some moderation of the rate of growth of military R&D to the benefit of civilian branches" [30d]. However, the rate of growth in MBMW was very similar to that of all industry, so any benefit would have arisen from the civilian sector falling no further behind.

Cooper suggested on the basis of his data that a Soviet motive for secretiveness about R&D statistics could be unwillingness to let it be known that (when quality and productivity differences are allowed for) they may only have caught up with the US force of scientists in industry by the end of the 1970s [30e].

Recent CIA cost estimates of Soviet military R&D

The CIA regularly estimates Soviet military R&D as part of its assessment of total Soviet defence activities in dollar terms published annually [19, 33–35]. It also publishes, less frequently, a similar assessment in rouble terms [36]. The dollar cost assessment is made by converting the aggregate rouble estimate [36a]: so, given the large margins of error introduced by the conversion, it must be less accurate than the rouble estimate. The unsatisfactory nature of dollar cost estimates of Soviet expenditure is well known and has been expressed again forcibly by Campbell, who has actually calculated them for total Soviet R&D from time to time for the National Science Foundation [28e].

The dollar cost figures for Soviet military RDT&E indicated by charts published by the CIA up to 1980 [33a, 34a, 35a] and by a graph (reproduced here as figure 9.3) in Secretary of Defense Weinberger's Annual Report to Congress, FY 1983 [37] show Soviet expenditure catching up with that of the USA in 1971 and 1972 and continuing to climb, while the US figures remained fairly static throughout the 1970s.

The rouble assessment gives rather less data on the rouble estimate from which these dollar estimates are derived. It gives estimates of total military expenditure and of the R&D share of it only for 1967 and 1977 (in 1970 prices) [36b]. For 1967, total military expenditure was estimated to be 35–40 billion roubles, of which R&D was less than one-fifth, and so rather less than 7–8 billion roubles. For 1977 R&D was said to be nearly one-quarter of 53–58 billion roubles: 13–14 billion roubles. (The dollar cost assessments state or imply an R&D share of 15 per cent throughout [19a, 33b, 34b, 35b].)

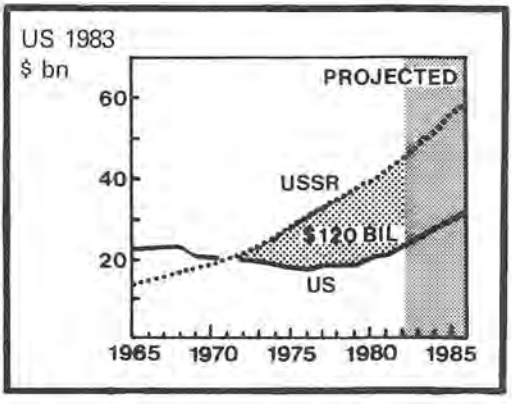
More information about methodology is given in the rouble assessment [36c] than in the dollar cost assessments. It states that the estimates are based on published Soviet statistics on science, statements by Soviet authorities on the financing of research, and evidence on particular RDT&E projects. Also mentioned as indicators are "the rising trend in Soviet expenditures for science as a whole, the high level of activity at Soviet design bureaus and test facilities, the large number of strategic and tactical weapon systems currently under development, and our estimate of Soviet force requirements and objectives" [36d]. (It is also stated that "RDT&E expenditures . . . provide some indication of plans for future force modernization" [36e]—this seems to indicate some circularity of argument.)

Both the rouble and the dollar cost assessments say that the estimates are derived in the aggregate using a less certain methodology than those for other parts of military spending [19a, 33c, 34c, 35c, 36f]. Presumably this information is supplemented by some disaggregated information. Other

supporting information mentioned in the dollar cost assessments changes over time, perhaps reflecting a change in the weight given to different methods. The estimate made in January 1978 referred to the "number and increasing complexity of the weapon systems deployed and under development" [33c]; in January 1981 the estimate was "reinforced by evidence on increases in manpower and facilities devoted to Soviet military RDT&E programmes" [19b]. This last does not appear on the face of it to be likely to be clear, unambiguous evidence.

The dollar cost assessments all say that the RDT&E assessment is the least reliable element of their military expenditure estimates: they also express "high confidence" [33d, 34b, 35b] or "confidence" [19b] that the

Figure 9.3. The US Secretary of Defense's comparison of US military RDT&E expenditure with estimated Soviet military RDT&E expenditure, calendar years 1965–85[a]



[a] Includes non-DoD-funded defence programmes.

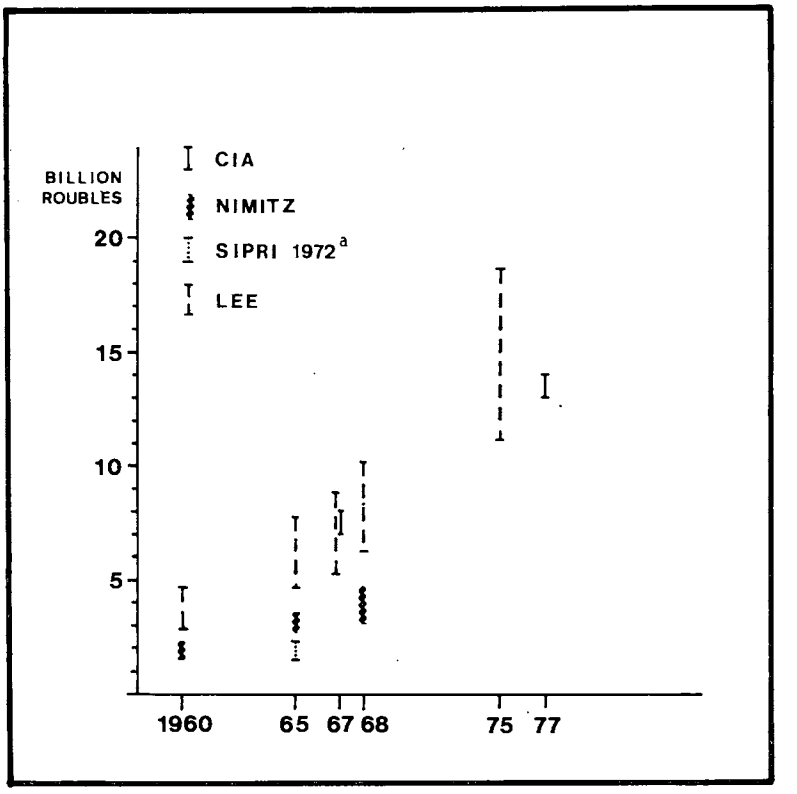
Source: Weinberger, C. W., *FY 1983 Report of the Secretary of Defense to the Congress* (US Government Printing Office, Washington, D.C., 8 February 1982).

Soviet military RDT&E effort is large and growing. This is not altogether unreasonable, especially for the "large", but it seems appropriate to wonder how early the methods available would accurately pick up a falling trend. The earlier discussion of information, methods and other assessments does seem to support the CIA's lack of faith in the reliability of its estimates.

Conclusions

Table 9.8 and figure 9.4 bring together the few reasonably up-to-date estimates of rouble expenditure on Soviet military R&D that exist. The first three estimates include space: the estimate derived from CIA information (which is designed to be comparable in coverage to US data) is intended to exclude civil space.

Figure 9.4. Soviet military R&D expenditure: estimates for selected years, 1960–77



[a] Annual average during 1960s.

Sources: SIPRI, *Resources Devoted to Military Research and Development* (Almqvist & Wiksell, Stockholm, 1972); Nimitz, N., *The Structure of Soviet Outlays on R and D in 1960 and 1968*, Rand Report R-1207-DDRE (Rand, Santa Monica, June 1974); Lee, W. T., *The Estimation of Soviet Defense Expenditures, 1955–75, An Unconventional Approach* (Praeger, New York, 1977); *Estimated Soviet Defense Spending: Trends and Prospects*, National Foreign Assessment Center (CIA, Washington, D.C., June 1978).

These rouble estimates have very wide margins of error and differ very considerably—by a factor of up to 3. They reflect the large areas of disagreement about interpretation of Soviet data as well as differences in methods. Converting rouble estimates into dollars introduces further large errors. In these circumstances, categorical statements which purport to give definite indications of the size of the Soviet R&D effort compared with that of the USA are unwarranted. However, these statements are made, and are repeated as fact by people with no knowledge of the margins of error in the figures. For example, the chart (reproduced as figure 9.3) given in Secretary of Defense Weinberger's *Annual Report to Congress FY 1983* [37] (even though the text on the page before says that the comparisons of expenditures are approximate) appears extraordinarily precise. The chart says that from

Table 9.8. Soviet military and space R&D expenditure: rouble estimates made in the past 10 years

Figures are in billion roubles unless specified otherwise.

Author	Date of publication	1955	1960	1965	1967	1968	1970	1975	1977
SIPRI	1972		Annual average of 1.6–2.2 in 1960s						
Nimitz (as a percentage of total R&D outlays)	1974		1.6–2.0 (48–62%)	2.6–3.4 (45–57%)		3.0–4.3[a] (39–55%)			
Lee	1977	1.0–1.7	2.9–4.6	4.7–7.7	5.3–8.8	6.2–10.1	7.5–12.4	11.3–18.6	
CIA military only, at constant 1970 prices	1978				7–8[b]				13–14[b]

[a] It is not certain that Ministry of Defence-operated specialist institutions are included in reported outlays. If they are not, the 1968 figures should be increased to 3.2–4.6 (based on the numbers of military scientists; see Nimitz, p. 22).

[b] Estimate calculated from the statements that military R&D expenditure was less than one-fifth of military expenditure in 1967 and nearly one-quarter in 1977 and the total military expenditure figures of 35–40 billion roubles for 1967 and 53–58 billion roubles for 1977 given in *Estimated Soviet Defense Spending: Trends and Prospects* (CIA, 1978).

Sources: SIPRI, *Resources Devoted to Military Research and Development* (Almqvist & Wiksell, Stockholm, 1972); Nimitz, N., *The Structure of Soviet Outlays on R and D in 1960 and 1968*, Rand Report R-1207-DDRE (Rand, Santa Monica, June 1974); Lee, W. T., *The Estimation of Soviet Defense Expenditures, 1955–75, An Unconventional Approach* (Praeger, New York, 1977); *Estimated Soviet Defense Spending: Trends and Prospects*, National Foreign Assessment Center (CIA, Washington, D.C., June 1978).

1972 to 1982 the USSR spent $120 billion more than the USA (at FY 1983 prices). This precision is not supported by the evidence. Further, these comparisons, even if accurate, do not compare the results of R&D: expenditure on it is an input, not an output measure. There is some evidence—from employment—that Soviet R&D is less efficient than US: that the output per unit of employment is less.

Since R&D expenditures are only an input and, even if known exactly in detail, would not give a clear and unambiguous picture of future weapon systems, it does seem unlikely that the USSR would lose very much by less secrecy. The present lack of information invites speculation and does little to contradict outside estimates which are more likely to be too high than too low. Belief in a very high and rapidly rising use of resources on Soviet military R&D invites increased NATO efforts.

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10. Anti-tank missiles[1]

Square-bracketed numbers, thus [1], *refer to the list of references on page 265.*

I. Introduction

The purpose of this chapter is to survey the field of anti-tank weapons—to describe (as far as is possible from open sources) the present world inventory, and to discuss possible future developments.

Although the first tanks, used during World War I, were primitive, they were successful in combat because there were no effective anti-tank weapons. Tanks were considerably improved during World War II, and several types of anti-tank weapon were used. The most widely used and most efficient of these was the tank gun, which was dominant until the mid-1950s, when the anti-tank missile was introduced. The technology of these missiles, and of other anti-tank weapons, is now advancing rapidly.

Section II describes the different types of ground- and air-launched anti-tank weapon, with particular emphasis on the missile. 'Anti-tank missile' refers to those missiles whose primary target is the tank, even if they can also be used against other targets. Those with other primary targets—such as bridges, ships and bunkers, but with a good anti-tank capability as well—are not categorized here as anti-tank missiles. Section III discusses some possible future trends, and section IV sets out some conclusions.

II. Anti-tank weapons today

Ground-launched weapons

Recoilless guns[2] and *rocket launchers* fulfil the requirement for a one-man portable, shoulder-launched anti-tank (AT) weapon. The means of propulsion distinguishes these two types: the propellant charge of the rocket is contained in the projectile itself and the gases are ejected through a nozzle. However, these distinctions have become blurred: the recoilless gun projectile may have rocket-assisted propulsion (RAP), and the rocket can be fitted with a small recoilless type of charge used as a booster before the engine is ignited.

[1] This chapter was written by Gunilla Herolf.

[2] The recoilless gun is characterized by gases escaping backwards in order to equilibriate the momentum of the projectile, thus avoiding gun recoil.

Recoilless guns and rockets differ from missiles in a number of respects. Their penetration power is at present about 200–400 mm of homogenous steel if the target is struck head-on (referred to as 0° incidence), which is lower than that of most missiles. Their velocity must be high when they are aimed at moving targets, since these projectiles, in contrast to the missiles, have no guidance after launch: they can attain velocities of 700 metres per second (m/s). Their range is usually around 200–400 m, or greater for RAP-assisted projectiles.

There are a few large recoilless guns, mounted on vehicles or wheeled gun carriages, with ranges as long as 1 000–1 500 m. In the West their role has now been largely taken over by missiles, but they are still produced in the Soviet Union [1].

While almost all missiles are guided according to the command via wires or radio command methods, requiring the operator to steer the missile until impact, the operator of unguided weapons can return to cover once the weapon has been fired (fire-and-forget capability). Together with their high velocity, this gives rocket launchers and recoilless guns a distinct advantage over missiles for short ranges, where accuracy can be attained without guidance after launch. They are also cheaper. Furthermore, at very short distances, missiles cannot be used at all since they must be acquired in sight by the operator before they can be steered. However, added protection of tanks gives the present arsenal of recoilless guns and rocket launchers a limited capability to penetrate tank frontal armour.

The *tank gun* is another important anti-tank weapon. High muzzle velocity gives a flat trajectory and thus high accuracy. Laser range-finders and electronic computers diminish still more the disadvantage of lack of after-launch guidance. Its range, usually around 2 000 m, is much less than that of long-range missiles; on the other hand, the tank gun is effective at very short distances. Its penetration effect, when equipped with the latest type of kinetic energy (KE) warhead, is also greater than that of present missiles against new types of tank armour [2]. (The tank gun can also be fitted to lighter armoured vehicles—notably the tank destroyer, which has been developed as a cheaper alternative to the tank for a defensive role.)

Other types of vehicle are equipped with guns and howitzers, constituting *self-propelled artillery*. These differ from tank guns in their larger calibre with a wider arc of fire on the vertical plane, and are mostly used for indirect fire at longer ranges. The range can extend to over 20 000 m or, with RAP-assisted ammunition, to 30 000 m. The mobility and rate of fire for these weapons have been much improved, but, firing unguided projectiles, they can only be used as area weapons. Cluster ammunition has been developed whereby anti-tank mines and bomblets can be dispersed over advancing enemy formations [3].

The *mine* is an important component of anti-tank warfare, since the advance of the enemy can be slowed down. A mine is usually detonated by the weight of a tank passing over it or by magnetic impulse [4]. Mines can be pre-set to react only to certain pressures or to a certain number of pressures, ensuring that not only the first tank is affected. They can be laid rapidly from weapons based on the ground and from vehicles, as well as from airborne dispensers [5].

Air-launched weapons

Apart from missiles and mines, a variety of other AT weapons, such as *low-calibre guns*, *rockets*, *cluster submunitions* and *fuel–air explosives*, can be fired from fixed-wing aircraft and helicopters. Rockets and low-calibre guns are efficient when fired from aircraft since they attack the less well armoured top of the tank and since the increased velocity improves the penetration capability.

Cluster submunition dispensers carry a large number of small bomblets. They can be used against such targets as an advancing armoured formation, giving a high probability of several hits. Missiles cannot as yet be launched in this manner.

The fuel–air explosive (FAE) is another AT area weapon. The FAE principle is to create a mist or aerosol cloud of fuel and then detonate it. The primary effect is a very high-pressure shock wave followed by a fireball. Present FAEs are reported to have three to five times the destructive power of conventional warheads of equivalent weight [5].

Warheads and tank protection

Warheads for anti-tank weapons fall into two distinctive categories: those using chemical energy and those using kinetic energy. Chemical energy warheads have predominated: they are the only type used for rocket launchers and recoilless guns (apart from some of the few wheeled ones) as well as for missiles. Some tank guns can fire both types of ammunition.

The conventional high-explosive shell is not efficient in an anti-tank role since the gases created by the explosion tend to expand in all directions, preferably in a direction where they meet no resistance. Other types have therefore been developed, such as the HESH (high-explosive squash head). The HESH does not penetrate armour but crumbles on impact to form a large contact area before the explosive is detonated. The explosion sets up shock waves in the armour which can shatter the inside of the tank.

The most dominant chemical energy warhead is the high-explosive anti-tank (HEAT) warhead, also called hollow charge or shaped charge. These names refer to the design of the warhead in which the explosive does not

fill up the whole space but forms an inverted cone with an empty cavity towards the target. The explosive and the cavity are separated by a copper or copper alloy lining. The explosion is triggered when the front of the charge comes into contact with the armour. The lining then breaks and the explosive energy is focused into a thin jet of hot gas and vaporized metal. This jet penetrates the armour, spreading molten metal inside it [6].

A countermeasure to the chemical energy warhead is composite armour, sometimes called Chobham armour, after the place where it was first developed in the UK. The precise composition is still a secret but it is generally believed to involve laminates of armour separated by substances such as ceramics, aluminium, plastics or carbon fibre. This is thought at least to double the resistance to a HEAT projectile, compared to an equivalent weight of steel. The effect is reached by deflecting and dispersing the jet; the most vulnerable parts of the tank are covered by this armour [2]. The US M-1 Abrams and the West German Leopard 2 tanks are equipped with this new armour, as is the British Challenger which is expected to become operational in 1985. The latest Soviet tank, the T-80, is also equipped with composite armour; it is not known, however, whether the T-80 armour is similar to the Western composite armour or if it is the special Soviet-designed laminate armour type used in the glacis plate of the T-64 and T-72 [7].

Another countermeasure is called active armour. A thin cover of explosives is fitted between two plates of the tank on the most vulnerable areas. When a shaped charge warhead hits the tank these explosives will ignite in such a way as to reduce the effect of the jet.

Parts of the tanks can also be fitted with simple armoured skirts to set off the explosion prematurely and thereby avoid the most severe effects of the explosion.

These measures to limit the effects of high-explosive (HE) weapons have caused renewed interest in kinetic energy warheads, since their penetration effect is not diminished by the new armour to the same extent. A kinetic energy charge is a kind of solid shot which can at present only be fired from a gun; it penetrates armour due to its high velocity. The armour-piercing discarding sabot (APDS) consists of a tungsten alloy core surrounded by a full-calibre light alloy sabot which is discarded when leaving the muzzle. This concept results in higher muzzle velocity. The high density and the small cross-section furthermore bring about a slower reduction of velocity with the range; increased penetration capability is thus attained. The high velocity also results in a flat trajectory and a short time of flight, thereby increasing accuracy of fire.

Even more efficiency has been attained with the armour-piercing fin stabilized discarding sabot (APFSDS) round. This round consists of a cylindrical bar of a very dense material like tungsten alloy or depleted

uranium and is surrounded by a sabot. The cross-section is even more reduced, resulting in even higher velocity [6].

Another warhead whose use against armoured targets has been much discussed is the so-called neutron bomb. The implications of the use of such a weapon are so great that it cannot be treated simply as one of a number of anti-armour weapons. It is therefore not dealt with here (see *SIPRI Yearbook 1982*, chapter 3).

Missiles

The salient features of the anti-tank missiles currently in production or under development are given in table 10.1. Those which have been retired or whose development has been discontinued are not included. The information given is that which relates directly to the missile; other equipment is not only essential (e.g., launchers and sights) but is to a large extent decisive for the performance of the missile.

Airframe

The size of AT missiles does not vary much—usually from less than 1 m to about 1.5 m in length. The diameter of the airframe varies from 0.10 m to 0.20 m. The weight of the missile is important since it influences the extent to which it is man-portable. But for this the weight of the whole system is most important: system weight can vary considerably for missiles of the same weight. (Whereas the weights of the Dragon and the Milan are 6.1 and 6.7 kg, respectively, the weights of the whole systems are 14 kg for the Dragon and 28 kg for the Milan.)

Propulsion and speed

All AT missiles at present use rocket engines, of the solid-propellant type and with either one or two stages. Dual-thrust propulsion is common—the thrust of a one-stage system can be modified to that of a two-stage one. The booster can also be of the recoilless charge type (see above). It is used to propel the rocket until it reaches a safe distance from the operator, after which the main engine is ignited. (The Dragon is unique since it is boosted by a recoilless charge after which it is steered by 60 small sustainers fired in successive pairs via wire signals.) The engine determines the speed; the slow-burning type gives a fairly even cruise speed, and the fast-burning engine a continuously decelerating speed. (Both the HOT and the TOW have two-stage solid-propellant engines with a booster burn of less than a second. The HOT sustainer, with a burn time of 16 seconds, has an average cruise speed of 240 m/s, and the TOW, with a sustainer burn-time of 1 second, has a maximum speed of 310 m/s, slowing down to around 100 m/s at maximum range. For a range of 3 000 m, the HOT is the faster

Table 10.1. Anti-tank missiles in operation or under development

Producing country	Designation	Stage of development[a]	Platform[b]	Range (m) Minimum	Range (m) Maximum	Speed[c] (m/s or Mach)	Weight[d] (kg)	Type of warhead[e]
Argentina	Mathogo	(O)	GV	350	2 100	90	11.3	SC
France	SS.11B1	O	GV	500	3 000	150	29.9	SC[h]
	Harpon	O	V	350	3 000	150	30.4	SC[h]
	AS.11B1	O	H	500	3 000	150	29.9	SC[h]
	ENTAC	O	GV	400	2 000	85	12.2	SC
	AS.12	O	H	800	8 000	260[j]	76	SC[h]
FR Germany	Cobra 2000	O	GV	400	2 000	85	10.3	SC[h]
	Mamba	O	GV	300	2 000	140	11.2	SC[h]
France/ FR Germany (Euromissile consortium)	HOT	O	GVH	75: G 400: H	4 000	240	23	SC
	Milan	O	GV	..	2 000	200	6.7	SC
Italy	Mosquito	O	GVH	360	2 300	90	14.1	SC
	Sparviero	D	GVH	75	3 000	290	16.5	SC
	MAF	D	G	..	..	..	..	SC
Japan	Type 64/KAM-3D	O	GVH	350	1 800	85	15.7	SC
	Type 79/KAM-9	O	GV	..	3 000–4 000	High subsonic	(24)	SC
	Chu-MAT	D	..	..	Medium range	..	..	..
Sweden	RBS 53/Bantam	O	GV	300	2 000	85	7.6	SC
	RBS 56/Bill	D	GV	150	2 000	200	16 (incl. tube)	SC
Switzerland/ USA	ADATS (Air Defence Anti-Tank System)	D	V	500	6 500	> M.3	(51)	SC
UK	Vigilant	O	GV	200	1 400	160	14.7	SC
	Swingfire	O	GV[m]	150	4 000	185	27	SC
USA	MGM 51A/Shillelagh	O	V	1 140	5 200	1 175	26.8	SC
	FGM-77A/Dragon	O	G	..	1 000	..	6.1	SC
	AGM-114A/Hellfire	D	H	..	7 000–8 000	Supersonic	(43)	SC
	BGM-71A/TOW (basic)	O	GVH	65	3 000	310	18.8	SC
	ER TOW	O	GVH	65	3 750	310	18.8	SC
	Impr. TOW	O	GVH	65	3 750	310	19.1	SC
	TOW-2	D	GVH	65	3 750	> 310	21.5	SC
	TOW-3	D	GVH	65	3 750	> 310	..	SC
	Fiberoptic TOW	D	..	..	≥ 12 000	50	..	..
	SPARK	D	H	..		M.3–10	..	KEP
	HVM	D	A	..	6 000	≤ M.7	(20)	KEP
	Wasp	D	A	..	20 000	(M.1)	45	SC
	Tank Breaker	D	G	< 50	(2 000)	..	< 16	SC

Weight of warhead (kg)	Warhead penetration[f] (mm)	Guidance[g]	Year of design	Year entered service	Number produced	Comments
..	..	MCLOS	..	..	..	Entered production in 1979
..	600	MCLOS	..	1962	*i*	Not man-portable
..	600	SACLOS	1959	1967	*i*	
..	600	MCLOS	..	1962	*i*	Optional: SACLOS
4.1	650	MCLOS	..	1957	140 000	
28.4	..	MCLOS	1955	early 1960s		
2.7	500	MCLOS	..	(1968)	> 170 000[k]	Also a Brazilian version
2.7	500	MCLOS	1966	1972	> 20 000	
6	800	SACLOS	1964	1977		~50 000 have been ordered; ground-launched from dug-out positions; not man-portable
3	> 700	SACLOS	1963	1974	> 100 000	
4	660	MCLOS	1954	1964		
4	..	IR beam riding	1973	..	–	
..	..	SALG	Before 1980	..	–	Weight, range and warhead reported similar to TOW; production estimated to start end-1982
3	..	MCLOS	1956	1964	> 8 000	
1.9	500	SACLOS	1964	1980	> 800	Though long-range, primary role is man-portable and tripod-launched
..	..	(SALG)	1978	(1987)		
1.9	500	MCLOS	1956	1963	16 000	
..	..	SACLOS	(1978)	(1986)		
> 12	> 900	SALG	1979	(1985)		Primarily an anti-aircraft missile
5	580	MCLOS	1956	1963	..	
7	> 530	MCLOS	1958	1969	> 30 000	
6.8	..	IR command	1959	1967	36 000	Gun-launched
2.5	600	SACLOS	1964	1974	..	
9.1	..	SALG	1970	(1984)	–	
3.6	(500)	SACLOS	1963	1970	> 300 000	
3.6	(500)	SACLOS	..	(1976)		Only change is longer wire
3.9	..	SACLOS	..	1981		Improved warhead only
almost 6	..	SACLOS	..	1983	–	Improved warhead, propulsion and guidance
almost 6	..	(mm-wave)	..	(before 1990)	–	
..	..	FOL	..	..	–	
..	..	SALG	1978	..	–	
2.2–2.7	..	Laser command	1981	(before 1990)	–	
..	..	mm-wave	1977	(1988)	–	
..	..	IIR	..	(mid-1980s)	..	

Producing country	Designation	Stage of development[a]	Platform[b]	Range (m) Minimum	Range (m) Maximum	Speed[c] (m/s or Mach)	Weight[d] (kg)	Type of warhead[e]
USSR	AT-1 Snapper	O	GV	500	2 300	90	22.3	SC
	AT-2 Swatter A	O	VH	..	2 200	150	25	SC
	AT-2 Swatter B	O	VH	..	3 500	150	29	SC
	AT-3 Sagger	O	GVH	500	≤3 000	120	11.3	SC
	AT-4 Spigot	O	G	..	(2 000)	150–250	10.2	SC
	AT-5 Spandrel	O	V	..	(3 000)	150–250	> 15	SC
	AT-6 Spiral	O	H	..	7 000–10 000	..	..	SC

.. Information not available.
( ) Data uncertain or an estimate.
[a] D = in development (includes all stages and types of development); O = operational.
[b] A = (fixed-wing) aircraft; G = ground; H = helicopter; V = vehicle.
[c] Indicates maximum speed for fast-burning engines and average speed for slow-burning ones.
[d] Tube not included.
[e] KEP = kinetic energy penetration; SC = shaped charge.
[f] At 0° inclination (head-on).
[g] FOL = optical command via fibre optic link; IIR = imaging infra-red; IR = infra-red; MCLOS = manual command to line-of-sight; mm-wave = millimetre-wave guidance; SACLOS = semi-automatic command to line-of-sight; SALG = semi-active laser guidance. For MCLOS and SACLOS, wire command guidance is used unless otherwise indicated.

missile, with a 12.5-second flight-time, compared to 15 seconds for the TOW [8].)

Speed is an important factor for several reasons: accuracy against a moving target naturally increases with speed, since it gives the target less time to escape and thus increases the fire opportunity time. The flight-time also affects the vulnerability of the operator, who has to guide the missile until impact.

Penetration

The penetration capability of a warhead is indicated by the thickness of the homogeneous steel armour of the tank which it can penetrate. This is often indicated for a head-on impact (angle of incidence of 0°). While warheads might be used at wider angles, the effect is naturally reduced. (A two-section probe has been fitted to the Improved TOW which extends forward of the warhead soon after launch. The probe will trigger the warhead at a distance from the armour, thus giving more time for the armour-piercing jet to develop.)

Guidance

Almost without exception, all missiles now in service or retired employ *radio command guidance* or more commonly *wire command guidance.* Command signals are then usually sent in the form of varying voltages through extremely fine wires. In most modern systems, two wires, uncoiled from a spool, complete the circuit.

Weight of warhead (kg)	Warhead penetration[j] (mm)	Guidance[g]	Year of design	Year entered service	Number produced	Comments
5.25	350–380	MCLOS	..	(1960)	..	Being replaced by AT-3
..	(500)	MCLOS[n]/ IR	..	..	..	Being replaced by AT-6 from helicopters
..	(500)	SACLOS[n]/ IR	..	First seen 1973	..	
2.7	>400	MCLOS	..	First seen 1965	..	SACLOS versions may also exist: there is also a Chinese version
(2.5)	(500)	SACLOS	..	mid-1970s	..	
(2.5)	(500)	SACLOS	..	mid-1970s	..	
..	600–700	(SACLOS)[n,o]	..	(1978)	..	

[h] Can also be fitted with other warheads.
[i] Production of SS.11, SS.11B1, AS.11, AS.11B1 and Harpon has amounted to 180 000 units.
[j] Speed at impact.
[k] Also includes Basic Cobra production.
[m] Apart from armoured vehicles a number of other installations have been developed:
Beeswing: Land Rover or similar vehicle.
Golfswing: two-wheeled trolley.
LATS (light air-transportable system): Saboteur vehicle, which can be air-dropped by parachute or transported by helicopter.
It can also be fired from positions on the ground and has limited man-portability.
[n] Radio command.
[o] Some sources claim laser guidance is used.

The first version of radio and wire command guidance was the manual command to line-of-sight (MCLOS) system. Missiles with this guidance mode are called first-generation AT weapons. The operator launches the missile and then keeps the target in his sight while steering the missile on the trajectory to the target with a 'joystick'. The missile is equipped with tracking flares, so the operator can see it.

Command guidance via wires is virtually immune to countermeasures. Another advantage of MCLOS guidance is that the operator is not easily discovered since he can stay up to about 100 m away from the launcher. However, there are a number of drawbacks as well. The flight velocity of a MCLOS missile must be kept relatively low to give the operator sufficient time to correct deviations in the trajectory. Demands on the operator's skill are high and continuous training is necessary. The low velocity means a long flight-time, which reduces the fire opportunity time and exposes the operator for a longer time, thus increasing the risk of error. The first part of the flight is especially critical since the operator has to acquire the missile in his sight at the same time as the sight is aimed at the target. The missile cannot be guided until after acquisition (the 'minimum engagement range'). Furthermore, most of the earliest MCLOS missiles have aerodynamic control surfaces, necessitating a certain velocity before there is effective control, which also increases the minimum engagement range.

Another version of command guidance is the semi-automatic command to line-of-sight (SACLOS) guidance, developed to avoid some of the drawbacks of MCLOS guidance. Missiles guided in this way are called second-

generation AT weapons. The operator's task is simplified: after firing the missile he need only keep his sight directed towards the target. A tracker in the launcher senses radiation from the source in the missile and thereby detects any deviation from the line of sight. Computer-generated commands to the missile bring it back on to the line of sight. (This guidance is also called the angular tracking method, since it is the angular deviation of the actual trajectory from the preferred one that is measured.)

Since adjustments to the missile's trajectory are automatic, the speed can be increased, usually to about twice the speed of the MCLOS missile. This also makes it possible to use smaller wings which can be folded or wrapped around the body, thus enabling the missile to be inserted into a tube for launch and transport. The time for acquisition of the missile is very short in this system, and the higher velocity reduces the amount of time during which the missile with aerodynamic surface controls cannot be controlled. Thus the effective minimum engagement range is very much reduced. The increased reliance on automatic systems should increase the accuracy of fire and also reduce the amount of training needed. However, the SACLOS system has one major drawback: it is impossible to separate the launcher and the operator, since the operator's line of sight must be exactly aligned with the launch path of the missile. This means that the aiming device used by the operator, and the infra-red detector attached to the launcher, must be very close. Thus the operator can more easily be traced and become a target for counterfire [9]. Some missiles use variants of these two types of command guidance. The Swingfire is something of a hybrid between an MCLOS- and a SACLOS-guided missile since the manual steering of the missile is combined with automatic acquisition. The AT-2 Swatter, which uses radio commands on three different frequencies to make electronic countermeasures more difficult, probably also employs infra-red terminal guidance. The A version of the Swatter uses MCLOS and the B version SACLOS [10].

The US Shillelagh missile, which became operational in 1967 and is now in limited use, employs another type of guidance, the *infra-red command guidance system*, which works along the same principle as the SACLOS, although the commands are sent by an infra-red transmitter [10].

To increase the capability of the guidance system, thermal sights (or night sights) have been developed and fitted to some installations and missiles. The TOW AN/TAS-4 night sight is thus compatible with many TOW installations. For the Swingfire and Dragon, night sights have also been developed; the Milan will soon be similarly equipped. For the Milan night sight an acquisition range of 3 000 m and a fire range of 1 500 m have been claimed [10]. These ranges can, however, only be obtained under the most favourable conditions.

Platforms and roles

Ground-launched missiles

Most AT missiles are launched from the ground. Many are deployed on vehicles, ranging from tanks and other armoured vehicles to Land Rovers and trolleys. Others (or the same ones) are launched from positions on the ground. Tank guns can also be used for firing missiles: the Shillelagh missile was installed on the M60A2 battle tank as well as on the M551 General Sheridan assault/armoured reconnaissance vehicle for launch from a 152-mm gun. The gun acts as a booster, after which a solid-propellant sustainer rocket burns for slightly more than a second. The missile then continues to the target, guided by its infra-red command guidance system [10].

Long-range missiles—that is, those with a range of 3 000 to 4 000 m—are usually installed on armoured vehicles, among them tank destroyers. The vehicles employed can often be reloaded from inside. However, many of them can also be launched from positions on the ground, and some are described as man-portable. (The term 'man-portable' is, of course, not a very precise one. It makes a difference whether the weapon is to be carried a few hundred yards, or on a long day's march.) These missiles are able to attack the tanks outside the range of tank guns.

Other types of missile are intended to be used when the enemy is closer; the main requirement for their platform is thus mobility. These missiles usually have a range of around 2 000 m and are installed on a wide range of vehicles. Installation is usually simple: the vehicle can consist of a base on which a tripod (also used for ground launch) is placed. It can also be a ramp which permits firing from inside the vehicle but necessitates reloading from the outside. On the whole these missiles are fairly light and man-portable.

Several of these medium-range missiles are primarily designed to be launched from positions on the ground. An entire missile system—consisting of missile, launcher sight and control box—is carried and operated by a crew of two to three persons and is launched from a simple mount on the ground. This can be a tripod on which a missile is fitted in its launcher container tube. It can also be a box which is simply placed on the ground, also serving as the container. Some missiles can even be placed directly on the ground. MCLOS missiles are launched from boxes and directly from the ground, while only the SACLOS-guided missiles can be fitted into tubes. Several missiles can often be connected to one control box and be steered by one man. With MCLOS guidance this person can be some distance from the missile. The selected examples which follow illustrate these various characteristics: more details are given in the 'comments' column of table 10.1.

TOW is an example of a long-range missile which is used in a number of roles, including the air-launched one. The Improved TOW Vehicle (ITV), an adapted armoured personnel carrier, and other vehicles have been modified to carry TOW under armour with either one or two launchers. Each ITV carries 10 missiles (two active and eight reloads) [11]. Apart from being installed on a number of lighter vehicles the TOW is also operational in a man-portable version fired from a tripod. This was in fact the original role of the missile. However, it is a fairly heavy system (the launcher alone weighs 78 kg) and requires a crew of four persons.

The Soviet AT-3 Sagger is a very versatile missile; it is deployed on several types of armoured car, personnel carriers and helicopters, and can be fired from the ground. It weighs only 11.3 kg and is one-man portable. (It is carried in a glass-fibre case, known as the 'suitcase', with the warhead separated from the rest of the missile; the case lid contains a rail from which the missile is launched after assembly.) The Sagger is said to have a maximum range of 3 000 m, which was challenged during the Yom Kippur War—2 000 m was judged the maximum and 1 600 m the preferred range [12].

The group of man-portable medium-range missiles is large compared to the group of long-range missiles, and more countries have developed them. FR Germany has participated in the development of several, either alone (for the Cobra and Mamba) or in the Euromissile consortium (for the Milan). (The Cobra and Mamba can be launched directly from the ground, taking off with a start that lifts the missile clear of rough terrain.)

One of the most important medium-range missiles today is the Milan, developed by the Euromissile consortium as a complement to the long-range HOT. It is fired from a tripod on the ground and from vehicles, with a tripod fitted on a pivot or with a specially developed turret for use with armoured vehicles.

Other vehicle-launched man-portable missiles (the Entac, Type 64, AT-1, AT-2A, Vigilant, Mosquito and Bantam) have been deployed for years. They will probably all be replaced within a few years. Another missile, the Dragon, has only a 1 000-m range but is the lightest of the AT weapon systems currently in use, which is one reason why it has been sold in large numbers to other countries.

Helicopter-launched missiles

The helicopter is regarded as outstanding in AT warfare—as a platform, for its mobility and speed, and for its role in, for example, reconnaissance and designation of targets for other helicopters and laser-guided weapons. Helicopters can be hidden from the enemy behind a hill or forest and then make a sudden appearance to deliver their weapons before taking cover—all in a short period of time. Several long-range (and some short-range)

missiles are deployed on helicopters, but the advantage of the long acquisition range of the helicopter is best exploited with a long-range missile. Helicopter-launched missiles are derivatives of ground-launched ones, except for the Soviet AT-6 Spiral and the US Hellfire, which is not yet operational.

Helicopter-launched missiles depend to a large extent on the helicopter equipment, such as mast-mounted sights, laser range-finders and thermal sights, which improve the performance of such missiles as HOT and TOW even more.

Fixed-wing aircraft-launched missiles

The first AT missile ever developed, the German X-7, was intended for launch from aeroplanes. The missile never entered service. When the helicopter was introduced, this platform was preferred for air-launched AT missiles.

Two specialized close air-support aircraft carry AT weapons: the US A-10 Thunderbolt II carries the GAU-8 AT gun and the Maverick AGM-65B missile (the Maverick is used when longer range and more explosive power are required). The Soviet Su-25 aircraft has a Gatling-type AT cannon, but carries no AT missiles (it is expected to become fully operational in 1983–84) [13].

III. The future

Missile developments

Two factors have prompted new developments in missiles: increased protection for tanks, and imperfections in the anti-tank missiles currently in service. Warheads are being improved for penetrating composite armour. New guidance modes are being developed to decrease dependence on daylight, fair weather and visual contact with the enemy. Multi-launch capability and guided submunitions will be introduced to increase the effectiveness of the weapon. New types of warhead and some of the new guidance modes will give 'top-attack capability'. US developments in long-range anti-tank missiles will allow the attack of second-echelon armoured forces.

The area with perhaps the greatest number of projects in process is that of guided submunitions for both missiles and other carriers. Not all such projects are taken up in this chapter. There is less detailed information about projects in WTO countries than in NATO countries, which means that more emphasis has been given to the latter, in particular to US projects.

Warheads

The limited capability of present missiles to penetrate composite armour has led to improvements in shaped charge warheads. (The Milan and the HOT are being updated [14], as is the TOW, for which an improved warhead was fitted as late as 1981.) A new approach to improving the shaped charge warhead is illustrated by the Swedish RBS 56 Bill, now under development: the jet of the warhead is inclined downwards at an angle of 30° instead of being projected forward, which results in a shorter penetration route through the sloping armour when the front of the tank is hit. The inclination of the jet is also used to achieve top-attack capability: the Bill is guided by the SACLOS principle, but flies 1 m above the line of sight, which means that when the operator is aiming at the turret, the missile overflies the target. A proximity fuse then detonates the warhead, whose 30° inclined jet of molten metal will penetrate the armour of the tank through the roof [15] which is usually less well protected.

The shaped charge, however, is not as effective against composite armour as is the high-velocity kinetic energy penetrator. The air-launched solid-propellant advanced ramjet, kinetic energy (SPARK) and the high-velocity missile (HVM) can fly at speeds of between Mach 3 and 10 [16], and up to Mach 7 [17], respectively. Both programmes are in early stages of development.

A new type of warhead, the self-forging fragment (SFF), is at present under development for submunitions but can also be fitted to missiles. The SFF consists of a dish made of heavy metal (copper, tantalum or depleted uranium) and a shaped explosive charge. The sensor of the submunition triggers the detonation in the warhead, which forges the metal plate into a streamlined projectile. It will travel at extremely high velocity and perforate the target by its kinetic energy [18].

The disadvantages of radio and wire command have prompted development of other guidance systems. The Italian Sparviero missile, under development since 1973, will employ *IR beam riding guidance* whereby the IR (infra-red) aerials of the missile steer to equalize the reception from each of them; this occurs when the missile is centred in the beam [19]. However, this programme is expected to be cancelled in a few years due to technical problems and funding priorities [20].

Semi-active laser guidance is under development for several missiles. Laser-guided missiles are equipped with a seeker which picks up a laser beam reflected off the target. The beam originates from a laser designator which can be fitted to the platform of the missile such as a helicopter or a vehicle on the ground, or it can be hand-held by a soldier. The Italian man-portable MAF (*missile anticarro fanteria*) will use this guidance as well as the Swiss–US ADATS. The Japanese Chu MAT missile, under development, may also have this guidance mode.

Laser guidance will also be used for the US helicopter-launched Hellfire missile (the US equivalent of the Soviet AT-6), expected to enter service in 1984. Tests have shown that the Hellfire can be employed for indirect fire using lock-on after launch (LOAL) and have demonstrated the 'ripple fire' technique: missiles are launched in rapid succession, directed at different targets and guided by laser designators with different codes. Using only one designator in the 'rapid fire' technique, multiple targets can still be attacked with slightly more time between each launch.

The SPARK and HVM will also have laser guidance. The HVM will use a carbon dioxide laser beam fire control system: the laser acquires the targets and assigns missiles to each. By means of synchronous clocks in missiles and aircraft and time coding, each missile receives only the signals that apply to it and its target. Up to 10 targets can be attacked simultaneously. The signals are received by the missile's aft-looking optical system and thus have to be able to penetrate its exhaust gases [21].

Some advantages over radio and wire command guidance are achieved with laser guidance: the possibility of indirect fire and the option for the launching platform to leave while the target is illuminated by a designator elsewhere. By disposing of the wires, a higher speed can also be reached. However, laser-guided missiles have only a limited capability in adverse weather and they cannot be considered as fire-and-forget weapons since the target has to be illuminated by the laser designator operator until impact.

The imaging infra-red (IIR) guidance mode is under development for anti-tank and other missiles against ground and sea targets. Apart from increased capability in adverse weather, this guidance mode gives a fire-and-forget capability. A thermal picture is created by sensing the differences in heat radiated by the objects in view. The operator watches this picture, locates the target, locks on the missile and fires it. After launch the missile proceeds to the target independently of the operator. The Tank Breaker missile is in development for IIR guidance. Since this will be a shoulder-launched, one-man portable weapon, the picture will be miniaturized by using a focal plane array seeker. By using this staring (instead of scanning) infra-red seeker it will be possible, apart from reducing the picture to a diameter of less than 2.5 cm, to dispense with a separate search and acquisition device. This mode of guidance will also give a top-attack capability to ground-launched missiles which laser- and (usually) the radio and wire command-guided missiles do not have [22].

A type of guidance which fulfils the requirements for adverse weather and fire-and-forget capability is *millimetre-wave guidance*. The millimetre-wave guided missile is also supposed to be able to find the targets despite heavy ground clutter and to distinguish tanks and other military targets from non-target vehicles. During the first stage this guidance works in an

active mode, searching for targets and locking on to one. When nearer to the target, where 'glints' from multiple reflecting surfaces could cause guidance problems, the seeker switches to a passive mode. It is then guided by natural millimetre-wave energy from the sky that is reflected from the target. The missile will then dive to penetrate the top armour of the tank. This guidance system is presently being developed for the Wasp missile which is the only missile to be installed with multi-launch capacity. The Wasp is contained in pods, 12 missiles in each on an aircraft carrying two or four pods. They are launched either singly or in salvoes in the direction of a massed armour formation with no need for visual contact by the aircraft crew. After launch the missile will climb or descend to a terrain-following search altitude. It will also be pre-programmed in order to aim at a specifically sequenced target so that all Wasps do not home on the first tank in a formation. This guidance mode, in combination with multi-launch capability, would give high accuracy in combination with a large number of hits for an attack made outside visual range [23].

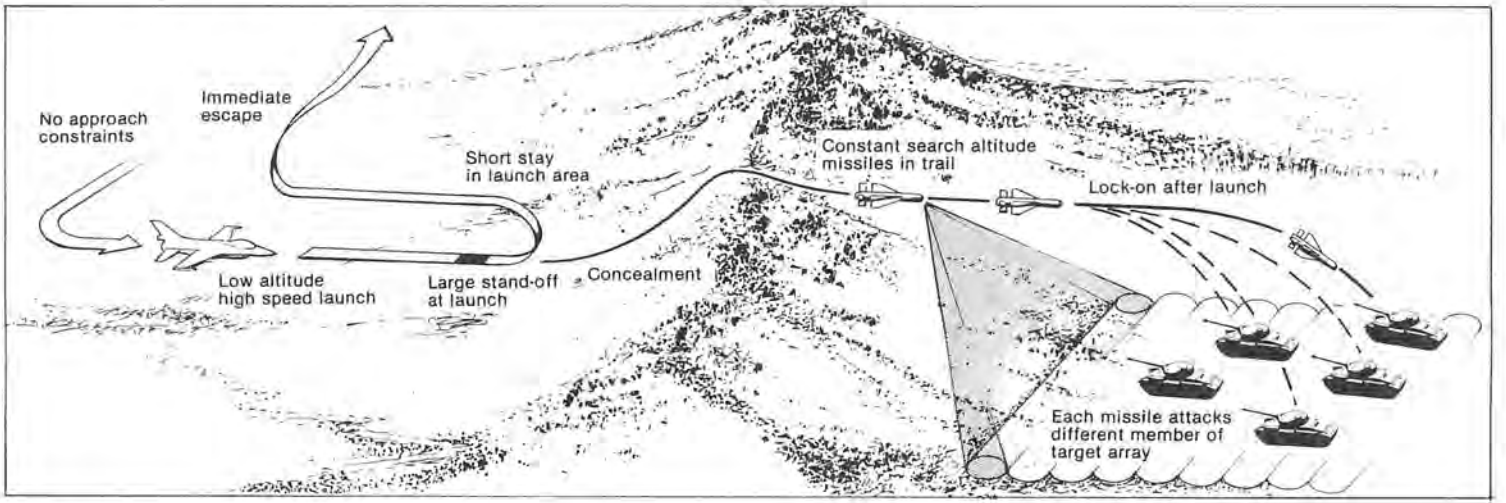
Some sources suggest that the TOW-3 is also intended for this guidance mode [11]. Both the Wasp and TOW-3 missiles are expected to become operational before 1990. There have also been reports on Soviet deployment of millimetre-wave guided missiles, but there is no substantive evidence. It can be assumed, however, that this type of guidance is also being developed in the Soviet Union.

Optical command using fibre optics is another type of guidance which is being studied for TOW. Pictures would be transmitted from the missile while in flight via the fibre optic strand to the operator, who would then be able to select a target and send guidance commands back to the missile over the same link. This would give a mode of transmission considered to be immune to countermeasures and an extended range to the missile [24].

By adding guided submunitions to missiles, a multi-launch capability would be added to the accuracy which already characterizes this weapon. The combination would allow a large number of targets to be destroyed in one attack. The guided submunition furthermore gives a top-attack capability to ground-launched weapons. The guidance modes which are preferred for submunitions are millimetre-wave and two-colour IR seekers. The IR seeker is said to be able to distinguish the heat emission of a tank from that of another vehicle.

Submunitions for missiles are presently being developed in the Assault Breaker programme. The Assault Breaker is an extremely wide-ranging endeavour including among other weapons a ground- (150-km) and an air-launched missile. Two types of submunition, the terminally guided submunition (TGSM) and the Skeet, have been tried out for the ground-launched one, but no decision has been made as to which type of submunition will be chosen.

Figure 10.1. The Wasp missile in operation



Source: Courtesy *Flight International*, 8 January 1983.

The TGSM is ejected from the missile, after which a parachute is deployed to retard the descent of the unpropelled device. TGSMs can be dispensed in one of four patterns, which are circular or elliptical depending on the formation of the target. The two-colour IR seeker is then activated to search for targets. This seeker will be tuned to the typical emission spectrum of armoured vehicles. Millimetre-wave guidance is also being considered for the TGSM. The warhead will be of the shaped charge type.

When launched from a missile, four Skeets will be housed in a Skeet delivery vehicle assembly (SDVA). After release at an altitude of 3 000 m, the SDVAs will be dispersed in an appropriate pattern to cover an extended armoured column, and they will fall to 200 m where a parachute will be deployed. At 30 m above ground the Skeets are ejected horizontally in pairs. The two-colour infra-red sensor of each Skeet is activated and will home on the characteristic heat signature of a tank. The SFF warhead will be used. The Skeet can also be carried by a Tactical Munitions Dispenser (TMD) carried by an aircraft [25].

Other anti-tank weapons

Developments in tanks challenge the capabilities of not only missiles but other AT weapons as well; longer range and better accuracy, penetration and adverse weather capabilities are required. Future trends seem to indicate that AT weapons will become more similar when these requirements are met, including the addition of propulsion and guidance units.

The United States has begun to deal with the entire concept of anti-tank warfare rather than with individual weapon systems in the Assault Breaker programme, which was started in 1978 to be able to acquire and neutralize second-echelon armed forces in all weather conditions. Both the US Army and Air Force are involved in this programme. Ground- and air-launched missile developments have already been mentioned. A new radar (the Pave Mover, recently renamed Joint Stars) will acquire and track targets, direct aircraft towards them and give mid-course information to missiles. The radar will be carried by an aircraft flying 50 km from the front which can scan an area several hundred kilometres into territory on the other side of the front. The programme is also likely to include the MLRS-3 (multiple launch rocket system) ground-launched weapon system which will fire rockets containing submunitions to attack the top armour of tanks. A number of European countries are participating in the development of the weapon, estimated to become operational in the late 1980s. The submunition has not been selected, but it is assumed that it will use either IR or millimetre-wave sensors [26].

Conventional artillery has limited AT capability. Launching unguided projectiles from long ranges is increasingly considered unsatisfactory.

Cluster ammunition has been developed and fire control systems are being improved. Yet there are demands for more accurate projectiles. In the United States, the Copperhead projectile, guided by semi-active laser, was thus developed to be fired from 155-mm howitzers, but production was sharply curtailed by Congress after poor reliability tests [27]. Although Copperhead production plans may change again, other US programmes are developing precision guidance for artillery projectiles. Furthermore, one project is trying to achieve a range of 40 000 m by adding a rocket engine to a projectile carrying submunitions; another expects to achieve 70 000 m by means of a ramjet engine. Both IR and millimetre-wave sensors are being considered [3].

Another weapon which, like the artillery, has been confined to area attack is the *mortar*. The basic definition of a mortar is a high-trajectory ballistic fire weapon in which the recoil force is passed directly to the ground through a baseplate. The range is up to 9 000 m (and more for rocket-assisted projectiles). Mortar projectiles can only destroy the outer equipment of heavily armoured targets, but projectiles are now under development to increase the effect on such targets, e.g., the Swedish Strix. The Strix, fired from a 120-mm mortar, has a shaped charge warhead and will use an IR seeker for terminal guidance. It follows a normal ballistic trajectory and can be sustained by a rocket motor. The trajectory enables the Strix to attack the top of tanks [9].

Recoilless guns and *rocket launchers* are used for very short ranges with less dependence on guidance. The emphasis for these weapons is on low weight and good penetration capability. It is difficult to combine these characteristics, as seen in the development of the US Viper system; it was discovered that the weapon could not penetrate the front of a modern tank. (For example, a Soviet T-72 tank has a front glacis plate of 200 mm, which corresponds to 550 mm with a 70° hit incidence.) The newly developed French Apilas, however, is claimed to penetrate 700 mm (compared to 400 mm for the Viper and 1 000 mm for the West German Jupiter which will become operational after 1986) [28].

Tank guns are, within a certain range, efficient against tanks. This range can be extended by the RAKE (rocket-assisted kinetic energy) now under development in the USA. The RAKE has a two-stage rocket engine to reach a velocity of 4 500 m/s; it can be fired from a tank and other platforms [29].

The WAAM (wide area anti-armour munitions) US Air Force programme is a complement to the Assault Breaker-type munitions. It involves three elements: (*a*) the Wasp missile, (*b*) the ERAM (extended range anti-armour munition) mine carried in underwing tactical munition dispensers, and (*c*) the ACM (anti-armour cluster munition) submunition.

Unguided *cluster ammunition* fired from aircraft can achieve multiple

hits owing only to their large numbers. A new dispenser design for operation in early 1984 is being developed in FR Germany: the MW-1 (*Mehrzweckwaffe*) will have a large central dispenser with 224 launching tubes which fires several types of submunition including anti-tank bomblets and mines [30].

Developments in guided submunitions and the large number of submunitions which these dispensers can carry will lead to greater accuracy in a single attack and greater effect on such targets as armour concentrations.

Rockets fired from aircraft are, by definition, unguided. If guidance is introduced (making them 'missiles'), efficiency would increase but they would become more complex, more costly and less well suited for mass production. It seems that present programmes to develop hyper-velocity missiles will also include rockets: the high speed will shorten the flight-time and thus simplify aiming the weapon [31].

IV. Conclusion

Recoilless guns and rocket launchers can be expected—at least in the short run—to continue to predominate among short-range anti-tank weapons. Improvements in missiles will take some time to become operational, but in the long term they will acquire fire-and-forget capability and will be much lighter than at present. The missile is already less dependent on the skill of the operator, and will not lose in accuracy with added range to the same extent as unguided weapons.

Tank gun projectiles and missiles are only competitive to a limited extent since the tank has other important roles apart from carrying anti-tank weapons. The tank gun kinetic warhead will be superior to the missile warhead until it also has a kinetic warhead, and the disadvantage in range of tank guns can be offset by rocket-assisted projectiles. However, most platforms for missiles are more mobile than tanks and demands for mobility are expected to increase in the future.

Missiles and artillery have separate roles in anti-tank warfare, but with the introduction of guided submunitions these roles will merge. Artillery will be able to perform anti-tank missions with pin-point accuracy, and the long range of artillery will make it an important complement to missiles.

Among the air-launched weapons, missiles will become more important through the development of laser guidance for indirect fire capability and fire-and-forget guidance to decrease the vulnerability of the platform, and through the introduction of missile multi-launch capability. On the other

hand, guided cluster munitions will also be highly effective, particularly if they are deployed in dispensers fitted to aircraft.

Rising costs will also be important in the future. Guided weapons are more expensive than unguided weapons. Apart from other factors, the extent to which guidance equipment is reusable influences the costs (for example, much of the command guidance equipment is fitted to the launcher, while the expensive equipment for fire-and-forget weapons is located within the weapon itself and is thus destroyed). The cost of the weapon platform will also be related to the number of weapons which can be fitted to each platform since the cost of a platform is usually many times that of a missile.

The best-equipped tanks are at present nearly invulnerable to frontal attack by weapons other than those with kinetic energy warheads, but this is changing. Anti-tank weapons will be able to cause increasing damage to tanks, the majority of which will for a long time to come not be equipped with composite armour. They will thus be vulnerable to present chemical energy warheads. It is difficult to increase the protection of tanks without making them excessively bulky and heavy, but extensive research is being carried out in this field.

The tank has been treated here as the only target in anti-tank warfare. A number of other vehicles for infantry, artillery and logistics support are necessary for the operation of tanks and thus also constitute targets. In the same way anti-tank weapons work in co-operation with other weapons. It is therefore important to consider also these operational factors when assessing technical capabilities. This is also vital when comparing costs of anti-tank weapons and tanks.

In general, both technical and cost considerations seem to point to a stronger position for anti-tank weapons in relation to tanks. To the extent that it is possible to distinguish between defensive and offensive weapons, anti-tank weapons are largely regarded as defensive. Their increased efficiency would therefore be a positive development, since it would contribute to make offensive actions with massed armour less likely and neutron weapons might be seen as unnecessary weapons.

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11. The trade in major conventional weapons[1]

Square-bracketed numbers, thus [1], *refer to the list of references on page 288.*

I. Introduction

The proliferation of major conventional weapons throughout the world continues: the factors propelling the world-wide rearmament process seem to be far more compelling than any factor of restraint. Indeed, no significant initiative towards any kind of restraint has been taken in recent years. The total volume of transfers of major conventional weapons for the period 1978–82 was about 70 per cent greater than in the preceding five-year period. There is not only an increase in the number of weapons being traded by a growing number of suppliers and recipients; the weapons traded are also becoming more technologically sophisticated—and hence more expensive—than before.

The United States and the Soviet Union remain the principal suppliers of conventional weaponry: they compete for political and economic influence in the world, particularly in the Third World. The Reagan Administration is using arms sales as a major instrument of foreign policy; the USA also has at its disposal a wide range of other instruments—such as civil trade, direct investments and economic aid—to extend its influence in Third World countries. The Soviet Union continues to use arms sales as the main tool for expanding its influence in the Third World.

The political, economic and military factors that give impetus to the trade in arms are not easily definable as separate determinants of any given arms sale—there is, obviously, close interaction and interdependence between the various determinants of supply and demand. However, the vast majority of the weapons traded come from the industrialized countries: these countries account for about 97 per cent of total exports of major weapons. Therefore, the attitude towards arms sales within governments, parliaments, arms industries and other influential groups in the industrialized arms-exporting countries is a subject of major importance. In this Yearbook there are three chapters on the arms trade; all three use a supplier-oriented approach. They concentrate on the arms export policies—and shifts in these policies—in a number of industrialized countries. This chapter discusses (*a*) the United States which, together with the Soviet Union, is one of the world's largest arms suppliers; (*b*) FR Germany—a 'middle-level' supplier with long-standing legal restraints on

[1] This chapter was written by Thomas Ohlson and Evamaria Loose-Weintraub.

arms sales; and (*c*) Austria—an arms supplier in the somewhat neglected group of smaller and non-aligned industrial countries. Arms exports from FR Germany and Austria are described in greater detail, and from an historical perspective, since they have not been analysed so fully in previous Yearbooks. Chapter 12 deals with Soviet arms exports and chapter 13 with the economic determinants of French arms sales.

II. The flow of arms: general trends

There is a certain amount of confusion in the international debate as to who is the largest arms supplier in the world, the United States or the Soviet Union. The SIPRI figures presented in this chapter show that there is no simple or unambiguous answer. It varies according to the year or years chosen, and it also makes a difference whether the total flow is studied, or only parts of it. (All tables and figures in this chapter are based on the SIPRI values of major weapons *actually delivered* in the given year or years; for a description of the valuation method used, see appendix 11D.) Some of the points to be made are listed below.

1. The figures for the five-year period 1978–82 show that the United States and the Soviet Union account for about a third each of *total* arms exports, that is, 36 per cent for the USA and 34 per cent for the USSR (table 11.1). The Soviet Union, however, is the largest supplier to the *Third World* during the same period, accounting for 37 per cent of deliveries, while the US share is 32 per cent. On the other hand, the United States is the largest supplier to the *industrialized countries*—45 per cent—while the Soviet share in this comparison is 30 per cent.

2. A large share of both countries' total arms exports is directed to the Third World: 69 per cent for the Soviet Union and 56 per cent for the United States. The USA, however, has about three times as many recipients for its exports as the Soviet Union, and it has granted a far greater number of production licences. Since the Soviet Union, in spite of this, is the largest supplier to the Third World during the period as a whole, the conclusion is that the countries that receive weapons from the Soviet Union are getting these weapons in very large numbers.

3. The *annual* values and shares for the past five years (table 11.1, figure 11.1, and appendix 11A) indicate that the United States was the largest arms exporter in 1978 and 1982—this is so both for total exports and for exports to the Third World. The Soviet Union was in the lead during 1979–81. These figures suggest two things: first, that there was a marked decline in US exports, particularly to the Third World, during 1979–81. This resulted partly from President Carter's attempt to curb the

Table 11.1. The largest major-weapon exporting countries: the values and respective shares for 1978–82

Figures are SIPRI trend indicator values, as expressed in US $ million, at constant (1975) prices; shares in percentages.

Country	1978	1979	1980	1981	1982	1978–82
USA	8 136	4 011	4 966	4 958	4 962	27 033
	47.8	*26.6*	*34.7*	*33.8*	*37.7*	*36.4*
USSR	4 274	6 460	5 750	4 990	4 005	25 479
	25.1	*42.9*	*40.2*	*34.0*	*30.4*	*34.3*
France	1 734	1 677	1 175	1 298	1 312	7 196
	10.2	*11.1*	*8.2*	*8.9*	*10.0*	*9.7*
UK	651	553	454	558	683	2 899
	3.8	*3.7*	*3.2*	*3.8*	*5.2*	*3.9*
Italy	417	531	413	560	669	2 590
	2.4	*3.5*	*2.9*	*3.8*	*5.1*	*3.5*
FR Germany	559	488	317	389	195	1 948
	3.3	*3.2*	*2.2*	*2.7*	*1.4*	*2.6*
Others	1 258	1 350	1 243	1 903	1 346	7 078
	7.4	*9.0*	*8.6*	*13.0*	*10.2*	*9.6*
Total	**17 029**	**15 070**	**14 318**	**14 656**	**13 172**	**74 232**
	100.0	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*

Figure 11.1. The US and Soviet shares of world exports of major weapons: total exports and exports to the Third World, 1978–82

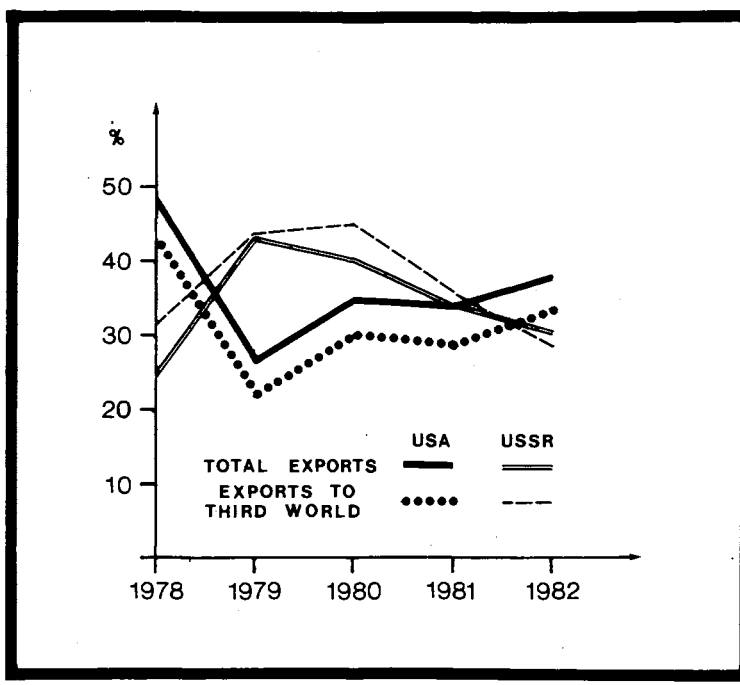


Table 11.2. Rank order of the 20 largest Third World major-weapon importing countries, 1978–82

Percentages are based on SIPRI trend indicator values, as expressed in US $ million, at constant (1975) prices.

Importing country	Percentage of total Third World imports	Importing country	Percentage of total Third World imports
1. Syria	*9.4*	11. Morocco	*2.4*
2. Libya	*9.2*	12. Algeria	*2.4*
3. Saudi Arabia	*8.2*	13. Jordan	*2.3*
4. India	*6.5*	14. South Yemen	*2.2*
5. Egypt	*5.8*	15. Argentina	*2.1*
6. Iraq	*5.2*	16. Peru	*1.8*
7. Israel	*4.9*	17. Indonesia	*1.5*
8. South Korea	*4.1*	18. Taiwan	*1.4*
9. Iran	*3.5*	19. Cuba	*1.3*
10. Viet Nam	*2.5*	20. Thailand	*1.2*
		Others	*22.1*
		Total	*100.0*
		Total value	**47 710**

international arms trade through a policy of unilateral restraint. The Reagan Administration's new policy of encouraging arms sales explains why the USA reappears as the leading supplier in 1982. Secondly, during 1979–81 there was a substantial increase in Soviet arms deliveries to the Third World.

4. The long-term trends in the arms trade with the Third World are shown in figures 11.2 and 11.3. Except for the period 1973–77, the USSR has—in terms of consecutive five-year totals—been the largest arms exporter to the Third World during the past 20 years (see also appendix 11A).

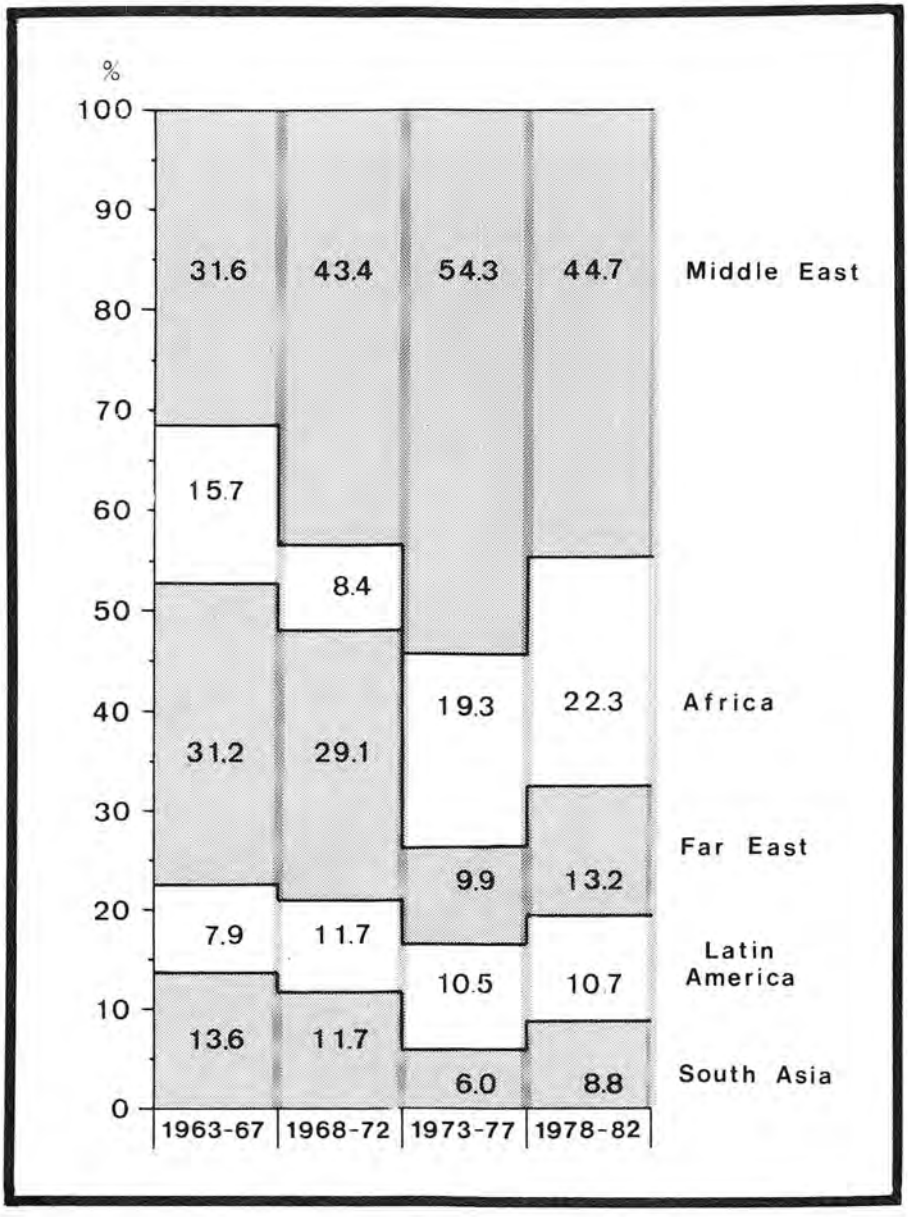
Apart from comparing US and Soviet export figures, the following other facts emerge.

1. About two-thirds of the total arms flow during 1978–82 consist of imports by the Third World. The rate of growth, however, seems to be slowing down. From 1963–67 to 1968–72, the volume doubled; it doubled again in the next five-year period, 1973–77. However, from then to the most recent five-year period, 1978–82, the increase was down to 50 per cent.

2. The same impression—that arms exports are not growing as once they did—is given by looking at the year-to-year figures from 1978 to 1982. Year-to-year movements are erratic, and the figures for the most recent years are likely to be revised upwards, as more transactions are identified. However, even after revision, the likelihood is that the period 1978–82 will show a flattening out.

3. The main reason for this flattening out is probably the world recession, and the budget constraints it has brought with it; there is also the possibility of a certain market saturation.

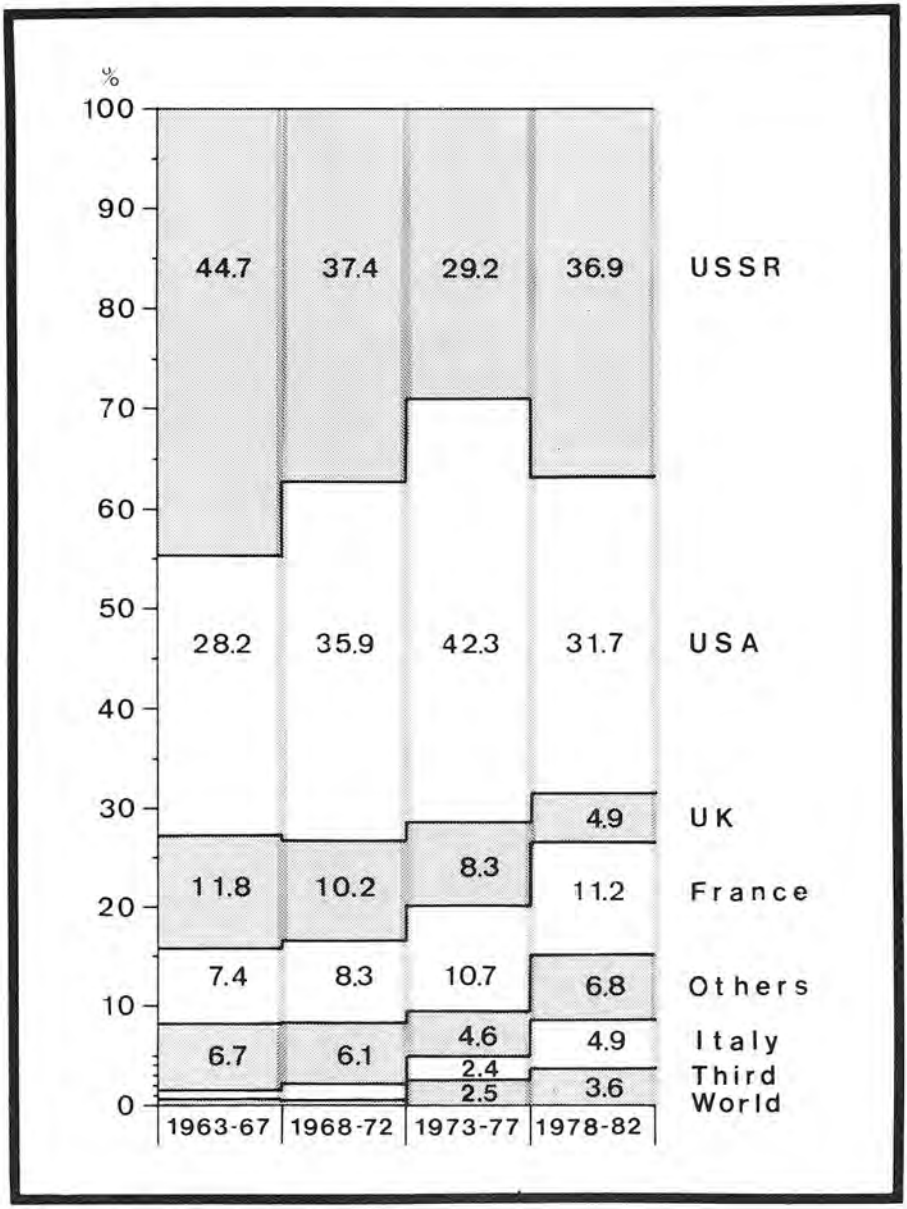
Figure 11.2. Percentage shares of imports of major weapons by the Third World: by region, 1963–82



4. France, in a category of its own, is the third largest exporter; and the Third World as a group is becoming an increasingly important supplier.

5. The Middle East and North Africa are the main importing regions, and 11 of the 14 highest-ranking arms-importing countries in the Third World are located in these two regions.

Figure 11.3. Percentage shares of exports of major weapons to the Third World regions listed in figure 11.2: by supplier, 1963–82



III. Some supplier policies

The United States

During fiscal year 1982, the United States signed arms sales agreements with foreign countries valued at $21.4 billion, with contracts covering a further $10 billion pending acceptance from the recipient countries. This surpassed by a wide margin the previous arms sales record of about $16 billion, reached during the Ford Administration in 1975. For comparison, the average annual value of concluded contracts since the mid-1970s has been approximately $10 billion. However, in spite of this record increase, arms exports were not a principal political issue in the United States during 1982—at least not to the same extent as in 1981. The defence debate in the United States instead centred around the MX missile, and the economic consequences of the US rearmament programme.

The explanation for this dramatic increase in arms sales during the past year, an increase which will appear in the SIPRI statistics once deliveries begin, is to be found in the arms export policy of the current US Administration. This policy, proclaimed in July 1981, represents a marked shift away from the Carter Administration's emphasis on restraint in conventional arms transfers and toward a policy of active government promotion and encouragement of arms sales abroad. 1982 was the first full year of implementation of this new arms transfer policy: a policy whose basic spirit is that any foreign military sale which provides a positive net contribution to US security interests—economically, militarily or otherwise—will be approved. There are no ceilings in terms of quantitative or qualitative control mechanisms, and there is nothing comparable to the Carter formula with respect to human rights.

During 1982, this policy manifested itself in a number of rather spectacular weapon contracts, such as the AWACS package to Saudi Arabia, and the sale of F-16 Fighting Falcon top-of-the-line fighters to Pakistan and Venezuela.[2] Other examples include the sale of 4 E-2C Hawkeye AEW aircraft to Egypt; 108 M-60 tanks and 381 AGM-65B Maverick air-to-ground missiles to Morocco; Harpoon and Seasparrow shipborne missile systems to Chile; and the offer to sell the new export fighter, the Northrop F-20 Tigershark, to Bahrain and Jordan. Another development, involving far less money but still one of major political significance, is the rapidly increasing US support of the regimes in El Salvador, Guatemala and Honduras. During 1982 there were deliveries of counter-insurgency jet aircraft, helicopters, munitions and spare parts to these countries, and aid in the form of military advisers, training and joint manoeuvres has risen dramatically from a level of almost zero during the Carter period. This

[2] For an analysis of these deals, see *SIPRI Yearbook 1982*, pp. 177–82.

support illustrates that very little attention is paid to the human rights record of the recipient countries by the Reagan Administration and that, instead, any internal conflict in a Third World country appears to be interpreted primarily in an East–West perspective.

Arms sales to Taiwan were perhaps the most controversial arms transfer issue in the United States during 1982. President Reagan, a strong supporter of Taiwan for many years and under pressure from a formidable Taiwan lobby in Congress and his own pro-Taiwan campaign rhetoric, found himself caught between loyalty towards a traditional anti-Communist friend on the one hand, and the wish to forge an anti-Soviet 'alliance' with China on the other. China made a major issue of the continuing sales to Taiwan and there were severe strains on US–Chinese relations. As a result of this pressure, the Reagan Administration announced early in 1982 that it would not sell the F-16 or the F-5G (F-20) to Taiwan. A compromise with China was announced in a joint communiqué in mid-August, after at least 10 months of negotiations which included visits to Peking by Vice-President Bush in May and Senator Baker in June. The Bush visit may have been prompted in part by the Defense Department announcement in April of its intention to sell $60 million worth of aircraft spare parts to Taiwan, this being the first such sale of spare parts since mid-1979.

Throughout the negotiations the Chinese leaders criticized the US Taiwan Relations Act in general and continued US arms sales under the terms of the Act in particular. The controversial Act was passed in 1979, shortly after the Carter Administration normalized relations with Peking. Among other things, it obligates the USA to provide Taiwan with defence articles and defence services to allow it to defend itself adequately. In the negotiations in 1981–82, the Chinese position was consistently one of the Act being a violation of their national sovereignty. China requested (*a*) a statement that all arms sales to Taiwan would end by an agreed date, and (*b*) that they should have a veto over which weapons the USA supplies Taiwan during the interim.

In the joint communiqué the USA promised progressively to reduce its arms sales to Taiwan. However, the Administration refused to establish a rate of reduction or to specify a final cut-off date. The level of sales in 1980, $830 million, was set as the upper limit from which the reduction would begin. In an elaboration of this point it was stated that the United States does not seek to carry out a long-term policy of arms sales to Taiwan. In addition to quantity restrictions, the Administration agreed that it would not increase the quality of weapons sold to Taiwan in recent years. The communiqué included some significant concessions from China as well, most notably a pledge that peaceful reunification with Taiwan was its fundamental policy.

The communiqué did not require congressional approval. However, the US Administration provided some reassurance to conservatives of continued support for Taiwan by announcing a few days later that the co-production contract for the Northrop F-5E Tiger-2 fighter aircraft would be renewed. Some 250 F-5E/Fs will have been assembled under the current contract when it expires in July 1983. Under the new contract Taiwan will receive components for 30 F-5Es and 30 F-5Fs plus 150 General Electric J85-21 turbojet engines, 60 AN/AIR-46 radar warning receivers, and 60 AN/ALE chaff/flare dispensers for a total package price of $662 million [1]. Public Taiwanese reaction to the communiqué was predictably negative, and included threats to seek arms aid from other sources. However, most observers doubt whether other potential suppliers would risk Chinese anger by making major sales arrangements with Taiwan. Nevertheless, Taiwan has, in a move to reduce its dependence on the supply of US aircraft engines, reportedly allocated $210 million to engine development, of which $150 million has already been spent. In addition, Taiwan is reported to be exchanging information on conventional weapons with South Africa and Israel. It has already bought the Shafrir air-to-air missile from Israel and is, like South Africa, producing a derivative of the Israeli Gabriel ship-to-ship missile, designated Hsiung Feng.

The Federal Republic of Germany

The arms export policy of the Federal Republic of Germany has been conditioned by the political situation in post-war Europe, as has its entire foreign policy. After Germany's defeat in 1945, West German arms industries were dismantled by the victorious powers and all military production was prohibited.

The Protocols to the 1948 Brussels Treaty of collaboration and collective self-defence was signed in Paris in 1954, thereby establishing the Agency for the Control of Armaments of the Western European Union (WEU).

The WEU "took note" of the declaration of the West German Chancellor in which he undertook not to allow the manufacture on West German territory of atomic, chemical or biological weapons; long-range missiles or similar types of weapon; warships of more than 3 000 tons displacement; submarines of more than 350 tons displacement; warships which are driven by means other than steam, diesel or petrol engines or by gas turbines or jet engines; and strategic bomber aircraft [2].

The formal restraints on West German arms production, including those in the constitution, were reinforced by a series of policy decisions concerning West German rearmament.

The War Material Control Act (*Kriegswaffenkontrollgesetz*), passed by the *Bundestag* on 20 April 1961, regulates production, ownership, handling

and sale of weapons [3]. In order to prevent third country sales, an end-use certificate is demanded from the recipient country. To receive West German military equipment, orderly domestic conditions (*geordnete innerstaatliche Verhältnisse*) must prevail in the recipient country and it must not be an area of tension (*Spannungsgebiet*). The export of strategic goods not classified as weapons is regulated under the Foreign Trade and Payment Act (*Aussenwirtschaftsgesetz*), which covers items that might otherwise evade the regulations of the War Material Control Act.

Although the War Material Control Act was revised in 1971, the definition of "areas of tension" is not clear. For example, the FRG apparently considered that orderly domestic conditions prevailed in South American countries during the mid-1970s when they filled large ship orders from these countries.

The West German political situation has led to pressures which both encourage and inhibit arms exports. On the one hand, the FRG's role *vis-à-vis* the USA and within NATO has brought about considerable commitments to provide military aid to other NATO countries, notably Greece, Portugal and Turkey. On the other hand, exports are inhibited by a fear of appearing militaristic, which is reinforced by strong public opinion.

Since the summer of 1980, the subject of arms exports has been discussed publicly for two reasons: the construction by the Kiel shipyard Howaldtswerke Deutsche Werft (HDW) of two Type 209 submarines for Chile, and the interest shown by Saudi Arabia in West German weapons, in particular Krauss–Maffei's Leopard-2 main battle tank (MBT), Gepard anti-aircraft vehicle (AAV), and the Thyssen–Henschel Marder mechanized infantry combat vehicle (MICV) for which a letter of intent has existed since 1978 [4].

In the West German Parliament, while both the Christian Democratic Union (CDU) and the Christian Socialist Union (CSU) have adopted a position somewhere between reserve and approval, the Social Democratic Party (SPD) rejected the suggestion that arms should be exported to countries outside the NATO alliance. The SPD also fear that expanding West German armaments production and exports may determine West German foreign policy; and they are also concerned that arms exports should not be regulated by employment considerations.

The existing arms export guidelines of June 1971 were modified and new guidelines were introduced on 28 April 1982, with the overall intention of continuing a restrictive arms export policy. The main change was the deletion of the concept of "area of tension". Arms exports are permitted if the government can provide convincing arguments that they are necessary for FR Germany's vital international and security interests [5].

One could argue that such 'elastic' phraseology has been included to allow for exceptions. A case-by-case examination of potential sales, rather

than a blanket veto on exports to areas of tension, is mainly intended to improve the co-ordination of arms policies with West German strategic and economic interests. Nevertheless, it is also expected to remove the virtual ban on competition for military equipment orders outside NATO by arms industries in FR Germany. When presenting the new policy, however, Chancellor Helmut Schmidt reconfirmed that the armoured vehicle sale to Saudi Arabia would not be made. Although the official attitude of the West German government is that arms exports should form only a small share of total defence production, for certain individual companies the share is considerably higher. West German arms exports have increased during 13 years of SPD government, and it is probable that these exports may reach even greater heights under the new export guidelines.

Arms production and exports

Between 1945 and 1956, no military equipment of any sort was produced in FR Germany; the formation of the *Bundeswehr* in 1956 allowed for the re-establishment of an armaments industry. It is difficult to obtain reliable figures for the West German defence industry. Some 100 major firms are directly involved in defence, with about 200 000 jobs—which is less than 1 per cent of the total labour force. The entire defence production of West German industry is about 2.5 per cent of the value of total output, with the aerospace industry being most dependent on defence production (the defence share is 60 per cent) [6].

Aircraft

The aircraft industry was largely built up on the basis of licensed production and international collaboration. This limited both the need and the ability to export, since recipient countries wishing to acquire an aircraft will generally purchase the original rather than the West German version.

Since 1980, when Vereinigte Flugtechnische Werke (VFW) Fokker was taken over by Messerschmitt–Bölkow–Blohm (MBB), MBB and Dornier have become the two main aircraft producers in FR Germany. One of the few indigenously designed aircraft is the Do-27 transport aircraft and its derivatives. These have been highly successful and have been exported in substantial numbers. In 1982 India decided to produce some 150 Do-228-200 light-transport aircraft under licence, and several African countries have ordered and received Do-27/28s. In 1982, Thailand received a licence from FR Germany for the assembly of 47 Fantrainer aircraft, developed in the FRG and under production there since 1979. Another development in the late 1960s was the MBB Bo-105 helicopter. This helicopter is licence-produced in Indonesia and the Philippines and has been ordered by a substantial number of Third World countries, for example, Bahrain, Brunei, Mexico, Sudan and the United Arab Emirates.

The French–West German Alpha Jet project started in 1969. An agreement was signed between Dornier and Dassault–Bréguet to develop a new basic/advanced training aircraft. Dassault–Bréguet was appointed as the executive authority and general contractor, and Dornier as co-contractor. As in all co-production programmes it has been argued that this was a way to circumvent West German arms export regulations. Exports of Alpha Jet aircraft went to Morocco, the Ivory Coast, Nigeria and Togo in 1980–81; Nigeria placed a new order for 12 Alpha Jets in 1982 and Cameroon ordered 6 in 1981. In 1981 Egypt signed an agreement with France for the assembly and licensed production of 45 Alpha Jets, the first of which left the Egyptian factory in July 1982 [7]. Iraq is also negotiating an agreement for 150 Alpha Jets, some of which will be assembled locally.

Armoured vehicles

The most important West German tank project has been the Leopard main battle tank (MBT), produced by Krauss–Maffei. The Leopard-1 has become the standard NATO MBT [8]. The total cost of the planned West German Army procurement of 1 800 Leopard-2 MBTs is now 8 150 million DM, that is, a system price of 4.52 million DM [9] as compared to about 3.06 million DM for each tank in 1977 [10]. The Netherlands signed an offset contract with FR Germany in 1979 for the production of 445 Leopard-2 MBTs. Greece ordered 110 Leopard-1s in 1981, but to date no Third World country has been supplied with the Leopard.

A new European field howitzer, the FH-70 155-mm towed howitzer (TH), was developed during the 1970s as a joint venture between Rheinmetall of FR Germany, OTO-Melara of Italy and Vickers of the United Kingdom. The FH-70 is now in operation with NATO (the first deliveries were made in 1979). It was, in part, public opinion that prevented FR Germany from carrying out the armoured vehicle deal with Saudi Arabia in 1981. As part of the three-country consortium, however, the UK stepped in as supplier, enabling Saudi Arabia to order 72 FH-70s in 1982. The Gepard anti-aircraft vehicle (AAV), part of the NATO standardization programme and jointly developed by FR Germany (Krauss–Maffei) and Switzerland (Contraves), has also been offered to Saudi Arabia. Thyssen–Henschel is producing Marder MICVs and Condor armoured personnel carriers (APCs) which were ordered by Malaysia in 1981, the only export customer so far.

Only one licence-production agreement has been signed—in 1976 with Argentina, which is producing 220 TAM medium tanks (MT) as well as 300 VCTP infantry combat vehicles (ICV). In 1982 China and Pakistan expressed interest in acquiring the TAM tank from Argentina.

Missiles

One direction in European missile development has been the creation of the French–West German guided-weapon consortium, Euromissile, consisting of MBB and Aérospatiale. The two companies have developed and produced the Milan and HOT anti-tank missile (ATM) and the Roland surface-to-air missile (SAM) system. Within the consortium final assembly is performed by Aérospatiale only, while MBB is responsible for the launcher and warhead of the missile. Aérospatiale is directly responsible for the marketing and industrial management of the three weapon systems.

The Milan ATM development started in 1963 and entered series production in 1972. This missile was ordered by a substantial number of countries, and it is currently on order by Belgium, Cameroon, Italy and Qatar. Licence agreements were signed with India in 1982 as well as with the UK in 1976. The bulk of the British requirement will be handled by the BAe Dynamics Group under licence; more importantly, the UK will become an additional outlet for fulfilling contracted export sales. The HOT ATM, which has twice the firepower of the Milan, entered series production in 1976 and is reportedly deployed in nine countries outside the NATO alliance. At present, orders have been received from Cameroon, Qatar and Spain. The Roland SAM is another example of West German technology helping to produce a weapon system which can then be marketed by the co-producer. Even though the United States cancelled its co-production programme in September 1981, Euromissile currently has export orders from several countries, including Argentina, Iraq and Venezuela. Italy has a licence agreement with France for the production of the Roland-2 SAM, and Brazil produced the Roland-1 under licence until 1979 [11].

Warships

The size, content and direction of West German ship production have changed considerably over the past 30 years. The shipbuilding programme became significant in 1957, when six frigates were laid down for Greece. Construction of the first 12 West German submarines began in 1961, and the tonnage limit put on West German submarine construction by the Western European Union was extended from 350 tons in 1954 to 1 800 tons in 1973. Before that, FR Germany circumvented the WEU restrictions by shipping two 1 200-ton submarines in subsections to Argentina and having the final assembly carried out in Buenos Aires. Technologically advanced patrol and fast attack craft, corvettes and frigates have, together with submarines, been the major export items for West German shipbuilders: warships on order from FR Germany by early 1983 are listed in table 11.3.

FR Germany has today two main submarine contractors: Thyssen–Nordseewerke in Emden, and Howaldtswerke Deutsche Werft (HDW), with two shipyards in Hamburg and three in Kiel [12]. Blohm & Voss in Hamburg and HDW in Kiel are the largest builders of light destroyers, frigates and corvettes. Lürssen-Werft, Bremen-Vegesack, is the largest producer of fast attack and patrol craft (FAC/PC) and also the only West German shipyard totally dependent on military contracts. During the past 30 years more than 135 FAC/PCs of different types have been commissioned to 21 navies all over the world. Lürssen co-operates with other West German shipyards and has granted licences to Malaysia, Singapore, Spain and Turkey for production of these light vessels.

Bremer Vulcan, another West German shipyard, employs about 4 400 people. No export orders have yet been received for the Type 122 frigate, developed and produced for the navy. Portugal has considered the purchase of these frigates, but has instead opted for the Dutch Kortenaer-class. Abeking & Rasmussen has developed minesweepers and SAR-33 FACs. Turkey has been building 13 of an older version—the SAR-33 PC—under licence since 1977.

Although the federal government states that arms contracts are not a suitable means of control, West German shipbuilders are in the unique position of having more work for overseas navies than for their own: coupled with a lack of domestic demand, this is mainly attributed to a combination of design, cost and delivery factors, with the assurance of subsequent provision of spares and assistance. Also, the average size of warships for export is decreasing because most Third World countries are unable to find funds for the bigger and more expensive vessels. Many Third World navies are also faced with a more limited, local threat and can therefore base their force structures on corvettes and FACs.

Austria

There are important similarities between the Austrian and, for example, the Swedish approaches to the arms trade. In line with their policies of neutrality, both countries pursue restrictive arms export policies and attempt to maintain a relatively self-sufficient armaments base.

When the occupation forces (US, Soviet, French and British) withdrew from Austria in 1955 and Austria proclaimed permanent neutrality, the Austrian State Treaty provided that the country would never join a military alliance or allow foreign bases on its territory. The Treaty also prohibits Austria from possessing nuclear or other offensive weapons.

Restrictions on arms exports, based on the principle that no arms should be supplied to countries in conflict, are an integral part of Austria's policy of neutrality. However, like Sweden, Austria has a policy of 'armed

Table 11.3. Register of warships on order from FR Germany, as of 1 March 1983

Country	Order date	Number ordered	Designation	Comments
Submarines				
Argentina	1977	2	Type 1400	
	1977	4	Type 1700	Two licence-produced in Argentina
Brazil	1982	2	Type 209	One licence-produced in Brazil
Chile	1980	2	Type 209	
India	1981	4	Type 1500	Two licence-produced in India; option on 4 more
Norway	1982	6	Type 210	Offset agreement; option on 2 more
Peru	1976	6	Type 209	Last delivered in 1982
Turkey	1974	(8)	Type 209	Licence-produced in Turkey; in addition to 4 delivered directly from FR Germany
Venezuela	1977	2	Type 209	
Destroyers, frigates and corvettes				
Argentina	1979	6	Meko-140	Licence-produced at AFNE with technical assistance from Blohm & Voss
	1979	4	Meko-360	
Brazil	(1981)	4	..	Licence-produced corvette
Colombia	1980	4	FS-1500-class	
Malaysia	1981	2	FS-1500-class	
Turkey	1982	4	Meko-200	Two licence-produced in Gölcük, Turkey
FAC/PCs				
Argentina	(1979)	2	Type 148	
Indonesia	1982	8	PC-57 Type	One built in FR Germany; remaining 7 at Lürssen facilities at Penang, Malaysia
Kuwait	1980	2	PC-57 Type	
	1980	6	TNC-45	
Turkey	1976	13	SAR-33 Type	Prototype delivered from FR Germany for trials in 1977; rest being built in Turkey
	1979	1	Type 57	In addition to 4 in service; also designated Dogan-class

Source: SIPRI arms trade registers.

neutrality' which, it is argued, requires a domestic defence industry for preparedness and for securing supplies in times of crisis. One important difference between Sweden and Austria is that the Austrian defence industry is more heavily dependent on exports, due to the relatively small size of the Austrian armed forces.

Arms export regulations

Austrian arms production is spread over a large number of companies and co-producers which also manufacture closely related civilian goods. The Austrian economy as a whole is heavily dependent on exports, and the distinction between military and civilian products is sometimes very difficult to maintain.

As a result of this dependence on exports, the restriction on arms trade is less effective than would appear from a casual examination. Austrian restrictions do not apply to the export of production licences abroad, nor to the machinery necessary for construction of military equipment; end-use agreements issued by the government are not demanded, which means that re-export may occur.

The principle followed by the Austrian government in granting export licences is not to allow arms exports to areas of armed conflict, to areas where such conflict might break out or to areas where other dangerous tensions exist. There is no official definition of the criteria to be used in deciding when a country should be considered "an area of armed conflict" nor is there any standing list of countries under embargo. This is decided by the authorities on a case-by-case basis, when requests for export licences are received.

The Austrian arms export regulations were re-examined in June 1982. This was initiated partly because of Austrian arms sales to Latin American and other governments violating human rights. As of 1 January 1983, Austria also bans arms sales to countries seriously abusing human rights. This new, so-called *Menschenrechtklausur* was included in the regulations after embarrassing reports first from Chile and Bolivia about the use of Austrian weapons in those countries and more recently about such weapons being used in the Falklands/Malvinas war and in the Middle East.

Since the mid-1970s, Austria's well established arms industry has been undergoing somewhat of a revival as a result of export orders. In 1981, arms production was estimated at about 10 billion AS (Austrian shillings) in value (including military trucks, electronics and optical instruments), of which about 85 per cent is said to be for export [13].

Arms producers

One of Austria's largest iron works, and its largest arms exporter, is the Vienna-based Steyr–Daimler–Puch AG. The company's family tree reveals

three roots: the oldest, Steyr, was established in 1866 as a small arms factory; the Austrian representative for Daimler products since 1899 stems from the Österreichische Daimler Motorengesellschaft Bierenz, Fischer and Cie; and Puch was founded as a bicycle factory. The Steyr–Daimler–Puch merger took place in 1934.

In 1979, 23 per cent of the total turnover of the company was attributed to the manufacture of armaments and military vehicles, with a total export reaching 54 per cent of defence production [14]. In 1980, Steyr–Daimler–Puch had about 19 000 employees in Austria and the group employed approximately 22 000 people throughout the world.

Development of the first generation of the 4K 4FA armoured personnel carrier (APC) started in 1955, by Österreichische Saurerwerke AG. The Saurer company was taken over by Steyr–Daimler–Puch in 1965, becoming its Vienna works. The first prototype of the SK-105 Cuirassier tank destroyer/light tank (TD/LT), also designated Panzerjäger K, was completed in 1967, with the second prototype following in 1969. Since 1970, about 190 production vehicles have been built for the Austrian Army. In 1975, Tunisia bought the Cuirassier, making it the first Steyr armoured vehicle to be exported. It has since been procured by several other countries, the most recent being Argentina. Since then, several other vehicles and variants have been developed. The Steyr-4K 7FA APC, first built in 1977, is essentially an improved version of the earlier Saurer-4K 4FA APC fitted with the engine and transmission of the Cuirassier. Prototypes of the Steyr-4K 7FA have since been delivered to the Austrian Army for trials and it has been ordered by Nigeria and Tunisia. Production of the Pinzgauer unarmoured cross-country vehicle began in 1970 at the Graz plant. Annual production is now running at 2 500 units. The Pinzgauer has proved to be an export success with particularly strong sales in African countries and the Middle East.

Today, defence against tanks is increasingly carried out by anti-tank missiles, rather than by other tanks. Because Austria is prevented by its State Treaty from producing missiles, it went into tank production, initially only for the Austrian Army but since the mid-1970s almost exclusively for Third World countries.

One Steyr–Daimler–Puch policy is to develop only those weapons which are used by the Austrian Army: the Army can then demonstrate military products to a potential buyer at any time. The success of the company on the international market depends to a great extent on specialization. And the Steyr-4K 7FA APC as well as the Cuirassier TD/LT are the right 'specialities' for Third World countries.

Another major weapon producer in Austria is the Voest Alpine group of Austria. Voest Alpine is state-owned and has 42 000 employees, making it one of the largest concerns in Austria; it specializes primarily in heavy

industrial steel products. Of the 1981 turnover of 70 billion AS, 3 per cent (or about 210 million AS) were devoted to military production. Although Voest Alpine had not produced artillery since World War II, it has relevant technological expertise and produces patrol boats at Linz-Korneuburg AG shipyards as well as hulls and turrets for Steyr's Cuirassier.

In November 1979, the Belgian Space Research Corporation International (SRCI) granted exclusive licence rights for the production, and non-exclusive rights for the sale, of the GHN-45 (gun-howitzer-Noricum) 155-mm towed howitzer (TH) to Voest Alpine in Liezen. Production and marketing of the GHN-45 was to be organized by Voest Alpine's Noricum centre. Development of the GHN-45 (designated G-5 in South Africa and GC-45 in Belgium) has a peculiar history. According to (contradictory) information, the development of the G-5 was initially entrusted to the South African Armaments Corporation (ARMSCOR) in 1975, which made preliminary studies; later it was entrusted to the Space Research Corporation of Quebec (SRCQ), a Canadian company on the US–Canadian border, for development. In 1977, two barrels were sent to the then-British colony of Antigua for test firing, and four howitzers and nearly 6 000 shells were delivered to ARMSCOR in South Africa in 1978. In 1976, SRCI was set up in Brussels to hold the marketing and financial rights for the GC-45 and the Extended Range Full Bore (ERFB) ammunition. SRCQ owned 45 per cent and the Belgian munitions group Poudreries Réunies de Belgique SA (PRB) owned 55 per cent of SRCI.

During 1978, SRCI had been negotiating seriously with the Royal Thai Navy for a contract to supply two batteries of GC-45s and several thousand rounds of ammunition. The deal was finally agreed upon on a government-to-government basis, with the state-owned Canadian Commercial Corporation (CCC) signing on behalf of SRCQ. CCC signed because it emerged that SRCQ had dealings with South Africa, and the intervention of SRCQ in the development of the G-5 (especially the delivery of barrels and shells) led to a legal investigation in the USA because of the arms embargo on South Africa. In November 1980, SRCQ was declared bankrupt, the organization was closed down, and its two top executives were convicted [15].

CCC was then responsible for the Thai contract and subcontracted, through the Belgian SRCI, the assembly of all but the first two Thai towed howitzers (which had been delivered from Canada) to Voest Alpine, using parts previously bought at SRCQ. Voest Alpine gained experience in assembling the GC-45 for the Royal Thai Marine Corps, and in 1981 all guns (except for the two directly delivered from Canada) were in service with the Thai Marines on the Kampuchean border [16a].

The GHN-45 towed 155-mm gun howitzer entered series production at Voest Alpine in late 1981; the fully ballistic ERFB projectiles are series-produced by the PRB Group in Belgium. Basic high-strength steel alloy forging is carried out at Kapfenberg, while autofrottage, final machining and assembly is done at Liezen. Production capacity now exceeds 20 weapons per month [16b].

Voest Alpine also expressed interest in producing the ammunition and is setting up a production line at the newly acquired subsidiary Hirtenberger Patronenfabrik, which has manufactured small arms, mortars and 155-mm M-109 ammunition for the Austrian Army [16b].

Arms exports

Steyr–Daimler–Puch exports arms mainly to Latin America and the Middle East. In 1977, when the Carter Administration banned all arms exports to Argentina because of its human rights violations, Steyr started negotiating with the Argentine Army for the sale of Cuirassiers, which resulted in the delivery of 57 vehicles to Argentina. A follow-on order of 27 Cuirassiers was made in June 1981, valued at $180 million. The Cuirassiers were originally ordered by Chile, but the Austrian government cancelled the order because of public pressure. The vehicles will form a new regiment to be based in the southern part of Argentina. Delivery of the second batch of 27 Cuirassiers was halted at the outbreak of the Falklands/Malvinas war. Suspension of this delivery led to bitter public debate over Austria's profitable arms industry. The dispute has annoyed the governing Socialist Party and the trade unions, and has brought Steyr–Daimler–Puch under criticism for dealing with military dictatorships. Michael Malzacher, the director-general of Steyr, responded publicly by stating that his company, with a total labour force of 22 000, cannot survive without arms exports.

Bolivia received 34 Cuirassiers from Steyr during 1978–79. Payment of 700 million AS, guaranteed by the Austrian 60 per cent state-owned Kontrollbank, has not yet been completed by the Bolivian military government. However, Steyr has up to now received about 500 million AS from the Kontrollbank [17]. Despite financial problems, a new contract for 30–60 Cuirassiers is under negotiation and the necessary export licence has been granted. Only massive public protest, together with the unstable political situation in Bolivia, has—so far—prevented the transfer of the light tanks.

The most well-known arms deal planned by Steyr–Daimler–Puch was Chile's planned purchase of 100 Cuirassiers, valued at $150 million, including APCs and small arms. The deal was eventually cancelled in 1980, although unsuccessful attempts were made to re-export at least 60 of the vehicles via a French arms manufacturer.

Ecuador has been negotiating since 1979 to get trial orders for the Cuirassier as well as for small arms, especially the AUG rifles, also a Steyr product. In December 1980, the weapons were demonstrated at Guayaquil. After the outbreak of war between Ecuador and Peru in January 1981, Austrian authorities withdrew the export licence, only to grant it again later in the same year for 100 Cuirassiers [18a].

Steyr–Daimler–Puch also has its customers in the Middle East and North Africa. Morocco received well over 100 Cuirassiers and an unspecified number of 4K 7FA APCs, although the export regulations of 18 October 1977 state that arms exports to countries at war are prohibited. In 1978 Morocco was in its third year of war with the Polisario Liberation Movement in Western Sahara. Of the vehicles delivered, four were captured by members of Polisario and shortly afterwards displayed to the world press [17]. After this incident, all military aid to Morocco was stopped in December 1979; however, in May 1980 military personnel from Morocco visited Steyr in Vienna and 32 soldiers attended a training and maintenance course for the Cuirassier [18b].

Nigeria received 23 4K 7FA APCs from Steyr–Daimler–Puch in 1981 and a follow-on order was placed for 70 more. Of this latter order, 50 APCs (including ambulance, command post and mortar-carrier variants) have been delivered, and the remaining 20 vehicles will be delivered during 1983. The one Cuirassier which was brought to Lagos in October 1981 is still being evaluated by the Nigerian Army [19].

Tunisia is one of Steyr–Daimler–Puch's oldest customers, and the Austrian Cuirassier was the backbone of the small North African country's armed forces. By 1979, Tunisia had received 45 Cuirassier light tanks at a cost of 811 million AS [20]. By 1980 Tunisia had also received 52 000 AUG rifles, and there are rumours that Steyr plans to set up an assembly plant in Tunisia for the AUG rifle.

Licence rights for the GHN-45 TH were handed over to Voest Alpine only at the end of 1979. The first customer to receive the assembled GHN-45 was the Royal Thai Navy in 1981. Despite the very high unit price of $0.7 million, in 1981 Jordan ordered 200 GHN-45s; about 20 of these are ready for shipment [16c].

Jordan is trying to liberate itself from its arms dependence on the two big powers, and a new trend is emerging in Jordan's purchase of weapons from small neutral arms suppliers. Jordan may also want to re-export the weapons to other Middle East countries, which is not prohibited by Austrian arms export regulations.

Export of armament industries

In the 1970s, Austria, especially Steyr–Daimler–Puch, developed a new trend in its export policy: the export of know-how and whole industries.

The incentive is primarily economic. Austria has a high arms production capacity with rather high operational costs and a relatively small domestic market. By exporting whole assembly or production plants, arms export regulations could be circumvented. Re-export regulations could also be facilitated.

The first example of the new strategy was Steyr–Hellas: the first plant was built in Thessaloniki, Greece, in 1972. In 1979 the Greek government purchased the major part of the Austrian-owned firm and today Steyr holds about 32 per cent of the shares in the company [21]. Over the years, annual output has averaged 50 000 agricultural tractors, 2 000 trucks, 1 500 military vehicles and 1 500 marine engines and generating sets. Two types of truck produced under licence are the 4 × 4 Steyr 680MH and the 6 × 6 Steyr 680MH3.

In 1982 the company began series production of a tracked APC, the Leonidas, which is to replace the Greek Army's ageing M-113s. This vehicle uses the same chassis, engine and transmission as the Steyr-4K 7FA APC, and its armoured hull is assembled in Greece. The turret, the design of which has not yet been fully defined, will be fitted either with a 7.62-mm machine-gun or with a 20-mm cannon.

Steyr–Hellas proposes to use this chassis again at a later stage for an anti-aircraft vehicle armed with the Artemis 30 twin mount manufactured by the Hellenic Arms Industry at Aighion near Patras. The Austrian Thessaloniki plant is, as far as equipment is concerned, one of the most modern plants in Greece. According to some reports a licence has been submitted to Steyr–Hellas via Brazil for the production of the Cuirassier [18c]. Military vehicles could then be exported from the Greek plant directly into areas of tension without the need for Austrian export approval.

As part of an effort to modernize its armed forces, the Nigerian government and Steyr–Daimler–Puch founded Steyr–Nigeria Ltd in 1976 in Lagos. Steyr, Austria, holds 40 per cent of the company shares and by 1979 Steyr–Nigeria produced heavy-duty military trucks. Apart from direct arms purchases from Austria, the Nigerian government also offered the Austrian Steyr company a $600 million contract for another plant project—the assembly of light tanks and Steyr-4K 7FA APCs. Such a plant is nearing completion now at Bauchi with planned annual production of 200 Cuirassiers and 500 Steyr-4K 7FAs due to start during 1983. The plants employ about 450 Nigerians and 50 Austrians. As Steyr's director-general Michael Malzacher puts it: "We cannot export products requiring only a labour force of low standards, we have to export high technology products. Components which cannot be produced economically here in Austria consequently are produced in other countries where the assembly is also done. This has a stimulating effect on our market for high technology components, and it enables us to expand here in Austria" [22].

Interest in acquiring armament industries has been shown by new customers. Argentina and Thailand have already been in contact with Steyr–Daimler–Puch for the possible purchase of assembly or production facilities. Other interested countries are Egypt and Saudi Arabia in the Middle East, as well as several countries in South-East Asia for the production of small arms.

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Appendix 11A

Aggregate tables of the value of the trade in major weapons with the Third World, 1963–82

Table 11A.1. Values of imports of major weapons by the Third World: by region, 1963–82[a]

Figures are SIPRI trend indicator values, as expressed in US $ million, at constant (1975) prices.
A = yearly figures, *B*[b] = five-year moving averages.

Region code	Region[c]		1963	1964	1965	1966	1967	1968	1969	1970
8	Middle East	A	393	388	441	440	1 063	1 258	1 212	1 462
		B	398	447	545	718	883	1 087	1 351	1 353
12	North Africa	A	34	40	81	122	135	83	87	121
		B	42	63	82	92	102	110	110	116
10	Far East (excl. Viet Nam)[d]	A	310	392	340	497	199	266	586	271
		B	320	379	348	339	378	364	348	341
9	South Asia	A	221	79	213	391	271	297	312	300
		B	198	219	235	250	297	314	336	363
15	South America	A	72	51	110	138	128	208	158	148
		B	109	96	100	127	148	156	173	209
13	Sub-Saharan Africa (excl. S. Africa)	A	47	68	95	93	81	55	71	121
		B	63	70	77	78	79	84	92	94
14	Central America	A	96	34	18	21	16	8	10	6
		B	131	93	37	19	15	12	17	21
	South Africa	A	155	51	186	92	78	45	46	77
		B	82	100	112	90	89	68	63	52
11	Oceania	A	–	–	–	–	–	–	–	–
		B	–	–	–	–	–	–	–	–
	Total (excl. Viet Nam)[d]	A	**1 328**	**1 104**	**1 485**	**1 794**	**1 971**	**2 220**	**2 482**	**2 506**
		B	**1 344**	**1 468**	**1 536**	**1 715**	**1 990**	**2 195**	**2 490**	**2 551**
	Viet Nam	A	56	91	74	237	494	473	298	433
		B	74	107	190	274	315	387	427	568
	Total[e]	A	**1 384**	**1 195**	**1 559**	**2 031**	**2 465**	**2 693**	**2 780**	**2 939**
		B	**1 418**	**1 574**	**1 726**	**1 989**	**2 305**	**2 582**	**2 917**	**3 118**

[a] The values include licensed production of major weapons in Third World countries (see appendix 11D). For the values for the period 1950–56, see *SIPRI Yearbook 1976*, pp. 250–51; and for 1957–62, *SIPRI Yearbook 1978*, pp. 254–55.

[b] Five-year moving averages are calculated from the year arms imports began, as a more stable measure of the trend in arms imports than the often erratic year-to-year figures.

[c] The regions are listed in rank order according to their five-year average values in the column for 1980. The region code numbers in the first column correspond to those used in the arms trade registers (appendices 11B and 11C).

[d] Viet Nam is included in the figures for the Far East after 1975, the year the Viet Nam War ended.

[e] Items may not add up to totals due to rounding.

– Nil.

Source: SIPRI computer-stored data base.

1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
1 758	1 076	2 211	2 836	3 527	3 613	5 190	4 018	3 551	4 926	4 287	4 548
1 544	1 869	2 282	2 653	3 475	3 837	3 980	4 260	4 394	4 266	–	–
123	167	145	228	761	929	948	1 337	1 815	1 441	1 095	1 078
129	157	285	444	602	841	1 158	1 294	1 327	1 353	–	–
419	162	302	249	640	1 035	653	2 367	2 042	905	576	387
348	281	354	478	579	989	1 347	1 400	1 309	1 255	–	–
499	409	289	373	177	414	663	1 077	601	688	951	881
362	374	349	332	383	541	586	689	796	840	–	–
222	310	352	446	630	710	826	713	846	746	916	771
238	296	392	490	593	665	745	768	809	798	–	–
134	89	152	386	232	432	1 148	1 269	299	806	678	433
113	176	199	258	470	693	676	791	840	697	–	–
47	35	56	87	137	58	60	110	80	240	391	305
31	46	72	75	80	90	89	110	176	225	–	–
69	25	37	274	179	118	211	253	120	88	20	35
51	96	117	127	164	207	176	158	138	103	–	–
–	–	–	–	–	3	–	3	3	1	3	10
–	–	–	–	–	–	–	2	2	4	–	–
3 272	**2 273**	**3 545**	**4 878**	**6 284**	**7 312**	**9 699**	**11 147**	**9 357**	**9 841**	**8 917**	**8 448**
2 816	**3 295**	**4 050**	**4 858**	**6 344**	**7 864**	**8 760**	**9 471**	**9 792**	**9 542**	–	–
435	1 200	82	185	20	–	–	–	–	–	–	–
490	467	384	–	–	–	–	–	–	–	–	–
3 707	**3 473**	**3 627**	**5 064**	**6 304**	**7 312**	**9 699**	**11 147**	**9 357**	**9 841**	**8 917**	**8 448**
3 305	**3 762**	**4 435**	**5 156**	**6 401**	**7 905**	**8 764**	**9 471**	**9 792**	**9 542**	–	–

Table 11A.2. Values of exports of major weapons to regions listed in table 11A.1: by supplier, 1963–82[a]

Figures are SIPRI trend indicator values, as expressed in US $ million, at constant (1975) prices.
A = yearly figures, B = five-year moving averages.

Country[b]		1963	1964	1965	1966	1967	1968	1969	1970
USSR[c]	A	429	375	544	970	1 545	1 116	834	1 136
	B	578	669	773	910	1 002	1 120	1 229	1 615
USA[c]	A	514	372	540	514	481	754	1 244	1 258
	B	437	462	484	533	707	850	983	1 120
France[c]	A	194	137	96	140	68	288	172	203
	B	120	138	127	146	153	174	201	258
Italy	A	20	20	7	1	20	67	53	43
	B	10	10	14	23	30	37	49	51
UK	A	177	179	265	193	203	294	348	185
	B	197	188	203	227	261	245	285	318
FR Germany	A	13	26	13	83	4	11	17	1
	B	12	27	28	27	26	23	12	18
China[c]	A	–	51	9	47	17	5	10	22
	B	12	21	25	26	18	20	32	60
Netherlands	A	*	11	22	1	–	5	25	10
	B	8	7	7	8	11	8	15	20
Canada[c]	A	13	11	18	12	11	48	19	37
	B	13	11	13	20	22	25	34	40
Sweden	A	–	–	–	2	–	–	*	–
	B	–	–	–	–	–	–	1	1
Czechoslovakia	A	16	9	4	8	11	39	22	31
	B	8	9	10	14	17	22	23	24
Switzerland	A	2	–	1	1	1	1	–	2
	B	1	1	1	1	1	1	1	1
Japan[c]	A	1	1	6	11	30	49	2	*
	B	9	9	10	19	20	18	16	10
Third World	A	4	3	4	25	15	9	20	8
	B	5	9	10	11	15	15	13	14
Other industrialized, West	A	1	*	30	23	58	7	11	3
	B	7	11	22	24	26	20	25	16
Other industrialized, East	A	*	–	*	–	2	–	2	–
	B	2	2	–	–	1	1	2	1
Total[d]	A	**1 384**	**1 195**	**1 559**	**2 031**	**2 465**	**2 693**	**2 780**	**2 939**
	B	**1 418**	**1 574**	**1 727**	**1 989**	**2 305**	**2 581**	**2 917**	**3 118**

[a] The values include licences sold to Third World countries for production of major weapons (see appendix 11D). For the values for the period 1950–56, see *SIPRI Yearbook 1976*, pp. 252–53; and for 1957–62, *SIPRI Yearbook 1978*, pp. 256–57.
[b] The countries are listed in rank order according to their five-year average values in the column for 1980.
[c] Including exports to Viet Nam.
[d] Items may not add up to totals due to rounding.
* < $0.5 million.
– Nil.

Source: SIPRI computer-stored data base.

1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
1 515	1 225	1 537	1 930	2 160	1 554	2 156	3 526	4 104	4 425	3 172	2 390
1 249	1 469	1 673	1 681	1 867	2 265	2 700	3 153	3 477	3 523	–	–
1 179	1 166	1 061	1 404	2 343	3 892	4 826	4 727	2 057	2 983	2 547	2 836
1 182	1 214	1 431	1 973	2 705	3 438	3 569	3 697	3 428	3 030	–	–
276	351	538	449	593	553	1 282	1 070	1 211	916	1 047	1 087
308	363	441	497	683	789	942	1 006	1 105	1 066	–	–
41	52	56	139	72	159	348	341	473	367	535	649
49	66	72	96	155	212	279	338	413	473	–	–
393	369	316	579	647	587	536	553	490	318	432	546
322	368	461	500	533	580	563	497	466	468	–	–
25	37	3	116	138	131	60	41	230	153	290	119
17	36	64	85	90	97	120	123	155	167	–	–
106	158	27	104	63	57	66	154	26	75	147	51
65	83	92	82	63	89	73	76	94	91	–	–
34	27	39	33	42	29	72	64	169	108	57	14
27	29	35	34	43	48	75	88	94	82	–	–
55	39	6	1	6	34	29	116	28	17	42	71
31	28	21	17	15	37	43	45	46	55	–	-
–	5	1	6	21	21	5	16	69	101	36	21
2	7	6	11	11	14	26	42	45	49	–	–
14	14	1	15	6	6	–	18	45	45	23	7
16	15	10	8	6	9	15	23	26	28	–	–
2	2	2	*	1	8	5	6	24	17	32	32
2	2	1	3	3	4	9	12	17	22	–	–
*	–	–	3	–	3	–	14	21	–	–	–
–	1	1	1	1	4	8	8	7	7	–	–
15	18	20	276	185	202	134	382	329	269	385	333
16	67	103	140	163	236	246	263	300	340	–	–
46	11	19	11	13	46	162	113	49	21	94	292
18	18	20	20	50	69	77	78	88	114	–	–
5	–	–	–	2	30	18	6	32	26	78	–
1	1	1	6	10	11	18	22	32	28	–	–
3 707	**3 473**	**3 627**	**5 064**	**6 304**	**7 312**	**9 699**	**11 147**	**9 357**	**9 841**	**8 917**	**8 448**
3 305	**3 762**	**4 435**	**5 156**	**6 401**	**7 905**	**8 764**	**9 471**	**9 792**	**9 542**	–	–

Appendix 11B

Register of the arms trade with industrialized and Third World countries, 1982

This appendix lists major weapons on order or under delivery during 1982. (Note: Statistics in chapter 11 are for actual deliveries only.) The sources and methods for the data collection, and the conventions, abbreviations and acronyms used, are explained in appendix 11D. The entries are made alphabetically, by recipient, supplier and weapon designation.

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
I. Industrialized countries								
11 Australia	France	18	AS-350 Ecureuil	Hel	1982			For delivery 1983-84; 12 for AF, 6 for Navy
		1	Durance Class	Support ship	1977			For delivery 1983; total cost: $68 mn
		(550)	R-550 Magic	AAM	1981			Replacing obsolete Sidewinders on Mirage fighters
	New Zealand	16	CT-4 Airtrainer	Trainer	1980	1981	(4)	
						1982	(12)	
	UK	2	SH-3D Sea King	Hel	1982			For delivery late 1983
	USA	(30)	AGM-84A Harpoon	AShM	1982			Arming 10 P-3C Orions on order
		4	F-111	Fighter/bomber	1980	1982	4	An additional 4 may be ordered as attrition aircraft
		75	F/A-18 Hornet	Fighter/strike	1981			
		4	FFG-7 Class	Frigate	1976	1980	1	
						1981	1	
						(1983)	(1)	
		1	FFG-7 Class	Frigate	1980			For delivery 1984
		2	KC-135	Tanker/transport	1982			For inflight refuelling of RAAF F-111s and F/A-18 Hornets
		36	M-198 155mm	TH	1980			For delivery 1983
		10	P-3C Orion	ASW/mar patrol	1982			Update-2 version; in addition to 20 P-3B/Cs in service; will probably replace the 10 P-3Bs; for delivery 1984-88
		90	RGM-84A Harpoon	ShShM	1976	1980	(24)	Arming FFG-7 Class frigates
						1981	(24)	
						(1983)	(24)	
		(160)	RIM-66A/SM-1	ShAM/ShShM	1976	1980	(40)	Arming 4 FFG-7 Class frigates

						1981	(40)	
						1983	(40)	
7 Austria	France	24	Mirage-50	Fighter/MRCA	(1982)			Decided in principle
	USA	24	M-109-A2 155mm	SPH	1982			US Letter of Offer Mar 1982
4 Belgium	France	(986)	Milan	ATM	1979	1980	(150)	
						1981	(150)	
						1982	(150)	
	USA	(1224)	AIM-7E Sparrow	AAM	1977	1979	(60)	Arming 104 F-16 fighters
						1980	(120)	
						1981	(216)	
						1982	(216)	
		200	AIM-9L	AAM	1982			Will probably be purchased from European consortium which assembles the NATO Sidewinder
		..	MIM-23B Hawk	Landmob SAM	(1979)			To replace 2 battalions of MIM-23A
5 Bulgaria	USSR	(12)	Mi-24 Hind-D	Hel	(1981)	(1981)	(6)	
						(1982)	(6)	
		..	T-72	MBT	(1978)	(1980)	(50)	
						(1981)	(50)	
						(1982)	(50)	
4 Canada	Brazil	..	EMB-312 Tucano	Trainer	(1982)			Unspecified number reportedly ordered in connection with Brazilian order for DHC-5Ds
	UK	..	Blowpipe	Port SAM	1981			
	USA	86	AIM-7F Sparrow	AAM	1980			
		182	AIM-9L	AAM	1980			Ordered Sep 1980; arming F-18s
		..	B-747-200F	Transport	1980			For VIP use
		138	F/A-18 Hornet	Fighter/strike	1980	1982	2	Order incl 113 single-seat fighters and 25 two-seat operational trainers; delivery schedule: 1982-88; Canadian designation: CF-18; total cost: $2 900 mn
3 China	Argentina	..	TAM	MT	(1981)			Negotiating; possible order may include VCTP-type ICV
	France	50	AS-365N	Hel	1980	1982	(1)	Ordered Jul 1980; second batch to be assembled locally; for offshore oil operations; may carry Hot ATMs
	UK	..	Sea Dart Mk-1	ShAM/ShShM	1982			Arming 8 Luda Class destroyers

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
	USA	3	Citation-2	Transport	(1981)	1982	3	Designation unconfirmed
7 Cyprus	Brazil	20	EE-9 Cascavel	AC	1982			
5 Czechoslovakia	Poland	22	An-2 Colt	Lightplane	1980			
	USSR	. .	AT-4 Spigot	ATM	1979	(1980)	(480)	
						(1981)	(480)	
						(1982)	(480)	
		. .	AT-6 Spiral	ATM	(1979)	(1980)	(24)	Seen on Mi-24 Hind-D helicopters; 2 missiles/helicopter
						(1981)	(24)	
						(1982)	(24)	
		. .	M-1974 122mm	SPH	1979	(1980)	(50)	
						(1981)	(50)	
						(1982)	(50)	
		. .	Mi-24 Hind-D	Hel	(1979)	(1980)	(12)	In service
						1981	(12)	
						1982	(12)	
		. .	MiG-23	Fighter	(1977)	1978	(30)	Incl interceptor, ground attack and trainer versions
						1979	(30)	
						1980	(30)	
						1981	(30)	
						1982	(30)	
		. .	SA-9 Gaskin	Landmob SAM	1979	(1980)	(200)	
						(1981)	(200)	
						(1982)	(200)	
4 Denmark	Belgium	46	F-16A	Fighter/strike	1977	1980	13	
						1981	13	
						1982	13	
						1983	7	
		12	F-16B	Fighter/trainer	1977	1980	3	
						1981	3	
						1982	3	
						1983	3	
	USA	200	AIM-9L	AAM	(1982)			Arming F-16s
		840	BGM-71A TOW	ATM	1980			DoD notified Congress; total cost incl 62 launchers

		3	Gulfstream-3	Transport	1979	1981	1	For maritime patrol, transport and SAR
						1982	2	duties
		(72)	MIM-23B Hawk	Landmob SAM	1981			2 btys with 12 launchers each
		24	RGM-84A Harpoon	ShShM	1980	1980	(8)	Order incl support equipment; for
						1981	(8)	3 Niels Juel Class frigates
						1982	(8)	
7 Finland	Netherlands	1	F-27 Mk-600	Transport	1982			2 additional F-27s purchased from Finnish airline Karair
	Sweden	(60)	Bv 206	APC	1980			Total cost: $3.75 mn
		10	J-35 Draken	Fighter/strike	1983			
	UK	50	Hawk	Adv trainer/strike	1977	1980	2	4 to be delivered complete from the UK,
						1981	(5)	the rest scheduled for local assembly
						1982	(12)	during 1981-85
	USA	3	Learjet-35A	Mar patrol/transport	1980	1982	3	
		2	Model 500D	Hel	1982			Replacing 2 Model 300Cs
		4	PA-31 Chieftain	Light transport	1982	1982	4	
	USSR	(7)	An-32 Cline	Transport	1979			Unconfirmed
		. .	SA-7 Grail	Port SAM	1978	(1980)	(25)	
						(1981)	(25)	
						(1982)	(50)	
4 France	Brazil	41	EMB-121 Xingu	Transport	1981	1981	8	25 for AF, 16 for Navy
						1982	19	
						1983	14	
	Canada	2	DHC-6	Transport	1982	1982	(1)	
						(1983)	(1)	
	UK	14	Lynx	Hel	1980			On order
	USA	4	E-2C Hawkeye	AEW	(1982)			Negotiating
		4	RIM-24 Tartar	ShAM	1980			Ordered Feb 1980; 4 systems
5 German DR	USSR	. .	AT-4 Spigot	ATM	1978	(1979)	(240)	
						(1980)	(240)	
						1981	(240)	
						(1982)	(240)	
		. .	M-1973 152mm	SPG	(1978)	1979	(20)	First shown in military parade Oct 1979
						(1980)	(50)	
						(1981)	(50)	
						(1982)	(50)	
		. .	M-1974 122mm	SPH	(1979)	(1980)	(10)	In service
						(1981)	(10)	
						1982	(10)	

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		. .	MiG-23	Fighter	(1978)	1979	(12)	
						1980	(12)	
						1981	(12)	
						1982	(12)	
		. .	Su-20 Fitter-C	Fighter/ground attack	(1978)	1979	(10)	
						1980	(10)	
						1981	(10)	
						1982	(10)	
		. .	T-72	MBT	(1978)	1979	(50)	
						1980	(100)	
						1981	(100)	
						1982	(100)	
4 Germany, FR	Francc	40	MM-38 Exocet	ShShM	(1981)	(1982)	(10)	Arming 10 S-143A Class FACs under construction in FR Germany
	Israel	4	Westwind 1123	Transport	1980	1982	(2)	Ordered May 1980
						(1983)	(2)	
	UK	12	Lynx	Hel	1979	1981	(2)	For 6 Type 122 frigates; some sources report 22 Lynx on order
						1982	(6)	
	USA	500	AGM-65B	ASM	1981			Arming F-4Fs; will probably also be ordered for Tornado MRCA
		. .	FIM-92A Stinger	Port SAM	(1981)			In principle chosen as replacement for Redeye; looking for funding
		142	RGM-84A Harpoon	ShShM	1978	(1982)	(48)	
		126	Seasparrow	ShAM/ShShM	1982			US Letter of Offer
4 Greece	Austria	(80)	Cuirassier	LT/TD	(1980)			
	Germany, FR	1	Fletcher Class	Destroyer	1980	1982	1	NATO aid; transferred Feb 1982
		4	Leopard ARV	ARV	1981			
		106	Leopard-1-A4	MBT	1981			For delivery from . . Greece may order an add . . . 113 Leopards
	Italy	. .	Aspide	AAM/SAM/ShAM	1980	1981	(24)	Arming Kortenaer Class frigates named
						1982	(24)	'Elli' and 'Limnos'; Seasparrow launch unit and fire control system
		6	CH-47C Chinook	Hel	1980	1981	(2)	
						1982	4	
		20	G-222	Transport	(1981)			Unconfirmed
	Netherlands	10	F-104G	Fighter	(1982)	(1983)	(10)	
		(15)	F-27 Maritime	Mar patrol	(1980)			Negotiating 10-15 aircraft plus offset agreement

		1	Kortenaer Class	Frigate	1981	1982	1	Ship named 'Limnos'; in addition to 1 delivered 1981
	USA	200	AGM-65B	ASM	1980			DoD notified Congress; bringing AF air-to-ground capability near to NATO minimum standards
		280	AIM-7M Sparrow	AAM/SAM	1982			Incl in sale of Skyguard SAM system developed jointly by Raytheon (missile and launcher) and Contraves (fire control system)
		300	AIM-9L	AAM	1980			DoD notified Congress Jul 1980; arming A-7 Corsairs
		1487	BGM-71A TOW	ATM	(1981)			Total cost incl 50 launchers: $19 mn
		48	M-109-A2 155mm	SPH	1981			US Letter of Offer; total cost: $37 mn
		110	M-113-A2	APC	1982			US Letter of Offer Dec 1982
		58	M-198 155mm	TH	1982			
		600	Chaparral	Landmob SAM	1979	(1981)	(300)	Ordered Nov 1979; incl 37 launch vehicles
						(1982)	(300)	
		8	Model 209 AH-1S	Hel	1980			Ordered Sep 1980; armed with TOW
		(32)	RGM-84A Harpoon	ShShM	1980	(1981)	(16)	Arming Kortenaer Class frigates
						(1982)	(16)	
5 Hungary	USSR	(60)	MiG-23	Fighter	(1978)	1980	(15)	
						(1981)	(15)	
						1982	(30)	
		. .	T-72	MBT	1980	1981	(30)	Ordered Apr 1980
						(1982)	(50)	
7 Ireland	France	5	SA-365	Hel	1983			
4 Italy	France	(3252)	Milan	ATM	1981	1982	(1000)	Italy plans to procure 37 750 missiles; the remainder will be produced under licence by OTO-Melara over a 10-year period; order incl 1 850 launchers of which 250 will be purchased directly from Euromissile
	Germany, FR	. .	AS-34 Kormoran	AShM	1980			Arming IAF Tornados
	USA	2211	BGM-71A TOW	ATM	1981	(1982)	(200)	First sale of improved version; order incl 632 practice missiles
		1	C-9B Skytrain-2	Transport	1980	1982	1	
		2	RIM-24 Tartar	ShAM	(1980)			DoD notified Congress; 2 systems arming Audace Class destroyers

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		35	RIM-67A/SM-1	ShAM/ShShM	1981			Replacing Terrier on 1 helicopter cruiser, 2 Andrea Doria Class cruisers and augmenting Tartar on Audace- and Impavido Class destroyers
10 Japan	USA	. .	AGM-84A Harpoon	AShM	(1980)			Decided to buy for P-3C Orion instead of Mitsubishi ASM; funding in FY 1980 budget; Navy also wants shipborne version
		164	AIM-9L	AAM	1981			Arming F-4 and F-15 fighters; licence production to follow
		2	C-130H Hercules	Transport	1982			US Letter of Offer Jul 1982
		10	CH-47D Chinook	Hel	(1982)			For delivery 1983-86
		4	E-2C Hawkeye	AEW	1979	1982	2	
						1983	2	
		4	E-2C Hawkeye	AEW	1981			For delivery in 1984; in addition to 4 delivered 1982-83
		100	FIM-92A Stinger	Port SAM	1982			
		16	King Air C-90	Trainer	(1979)	1980	2	Incl in $13 000 mn modernization programme for 1980-84.
						1981	(4)	
						1982	3	
		87	M-113-A2	APC	1980			Ordered Jan 1980
		3	P-3C Orion	ASW/mar patrol	1977	1981	(1)	To be delivered prior to licence production of 42; first aircraft delivered Jun 1981
						(1982)	(2)	
		(32)	RGM-84A Harpoon	ShShM	(1981)	1982	(24)	2 quadruple launchers on 2 new destroyers now under construction in Japan; further orders likely
		(8)	RIM-24 Tartar	ShAM	(1981)			Arming new destroyer now under construction
4 Netherlands	Germany, FR	445	Leopard-2	MBT	1979			Contract signed Jun 1979; chosen instead of US M-1 Abrams; offsets to Dutch industry at 59% of purchase value, may reach 100%; to replace 369 Centurions and 130 AMX-13s
	UK	12	Lynx	Hel	1980			In addition to 24 in service
	USA	(38)	AGM-84A Harpoon	AShM	(1978)			
		840	AIM-9L	AAM	1977	(1979)	(40)	Arming 102 F-16 fighters

						(1980)	(160)	
						(1981)	(240)	
						(1982)	(240)	
		(2086)	BGM-71A TOW	ATM	1981			
		646	FIM-92A Stinger	Port SAM	1982			
		37	M-110-A2 203mm	SPH	1980	(1981)	(10)	Ordered Jul 1980
						(1982)	(27)	
		144	M-198 155mm	TH	1980			On order
		13	P-3C Orion	ASW/mar patrol	1978	1981	1	USA to deliver 3/year 1983-85
						1982	3	
		288	RGM-84A Harpoon	ShShM	1975	1978	24	For 12 Kortenaer Class frigates
						1979	(24)	
						1980	(48)	
						(1981)	(48)	
						(1982)	(48)	
		. .	RIM-24 Tartar	ShAM	1981			Arming last 2 Kortenaer Class frigates
		. .	Seasparrow	ShAM/ShShM	(1974)	(1978)	(32)	Arming Kortenaer Class frigates
						(1979)	(32)	
						(1980)	(64)	
						(1981)	(64)	
						(1982)	(64)	
11 New Zealand	UK	2	Leander Class	Frigate	1981	1982	1	
		26	Scorpion FV-101	LT	1980	(1982)	(13)	On order
		3	Wasp	Hel	(1982)			
4 Norway	Belgium	(144)	MIM-23B Hawk	Landmob SAM	(1982)			Norway decided to buy through Belgium from European consortium; 8 btys
	Germany, FR	6	Type 210	Submarine	1982			Option on 2 more
	Netherlands	60	F-16A	Fighter/strike	1977	1980	(6)	Delivered from Fokker licence production plant in the Netherlands
						1981	(16)	
						1982	(15)	
		12	F-16B	Fighter/trainer	1977	1980	(2)	Delivered from Fokker licence production plant in the Netherlands
						1981	(3)	
						1982	(3)	
	Sweden	. .	Bv 206	APC	(1981)	1982	(51)	Order may ultimately comprise 3 000 APCs
		. .	RBS-70	Port SAM	1981	(1982)	(100)	Additional order for unspecified number
		. .	RBS-70	Port SAM	1982			Third order
	USA	432	AIM-9L	AAM	1977			NATO co-production programme; production started Dec 1980 at Raufoss; also production of rocket engine for NATO Sidewinder; formal contract signed Mar 1981

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		20	M-113-A2	APC	1981	1982	(20)	Delivered via Sweden Nov 1982; deal incl modernization of 40 M-48 MBTs
		5	M-88-A1	ARV	1981			
4 Portugal	Brazil	. .	EE-11 Urutu	APC	(1983)			Negotiating
		. .	EE-9 Cascavel	AC	(1983)			Negotiating
		5	EMB-111	Mar patrol	(1983)			Negotiating
	France	18	MM-38 Exocet	ShShM	(1981)			Arming 3 Kortenaer Class frigates
	Italy	12	A-109 Hirundo	Hel	1980			4 to be armed with TOW
	Netherlands	1	Kortenaer Class	Frigate	1981			On order; to be delivered prior to licence production of 2
	USA	20	A-7P Corsair-2	Fighter	1980	1981	9	
						1982	11	
		30	A-7P Corsair-2	Fighter	(1982)			Negotiating; in addition to 20 in service
		1	C-130H Hercules	Transport	(1980)			Reportedly ordered; 5 in service
		(20)	F-5E Tiger-2	Fighter	(1983)			Uncertain due to order for more A-7Ps
5 Romania	France	4	AS-365N	Hel	(1980)			
7 Spain	France	12	AS-332	Hel	1982	1982	(6)	For SAR duties
		6	Mirage F-1B	Trainer	1976	1978	2	
						1979	2	
						(1981)	(1)	
						(1982)	(1)	
		22	Mirage F-1C	Fighter/interceptor	(1978)	(1981)	(11)	Also designated F-1E
						(1982)	(11)	
	Germany, FR	60	Bo-105CB	Hel	1979	1980	(20)	28 anti-tank version with 6 Hot ATMs each
						1981	(20)	
						1982	(20)	
		8	Bo-105CB	Hel	1981	(1982)	8	In addition to 60 ordered 1979
		(168)	Hot	ATM	1979	1980	(60)	Arming 28 Bo-105CB helicopters
						1981	(60)	
						1982	(48)	
	Italy	. .	Aspide	AAM/SAM/ShAM	1979			For installation in second batch of new F-30 Class frigates; number ordered unknown
	USA	. .	AIM-7F Sparrow	AAM	(1982)			Arming F/A-18A Hornet fighters
		12	AV-8B Harrier	Fighter	1982			

		(113)	BGM-71A TOW	ATM	1978			
		3	CH-47C Chinook	Hel	1980	1982	3	For Army; in addition to 9 in service; also designated Model 414
		24	DHC-4 Caribou	Transport	(1980)	1981	8	
						1982	(16)	
		84	F/A-18 Hornet	Fighter/strike	1982			Ordered Jul 1982 for delivery from 1985
		204	M-113-A2	APC	(1978)	(1981)	(100)	Order incl M-577 and M-125 vehicles
						(1982)	(104)	
		36	M-125-A1	APC	1979	(1981)	(18)	
						(1982)	(18)	
		8	M-577-A1	CPC	1979	(1981)	(4)	
						(1982)	(4)	
		1760	Chaparral	Landmob SAM	1981			
		(128)	RGM-84A Harpoon	ShShM	1978	1978	16	Arming 4 F-30 Class frigates
						1979	32	
						1980	16	
						1981	48	
						(1982)	(16)	
		15	RGM-84A Harpoon	ShShM	1982			
		40	RIM-67C/SM-2	ShAM/ShShM	1982			Arming 3 new FFG-7 Class destroyers now under construction
		. .	Seasparrow	ShAM/ShShM	1976	1979	(24)	For 4 F-30 Class frigates; 1 octuple Selenia Albatross launcher/ship with 16 reload missiles
						1980	(24)	
						1981	(24)	
						(1982)	(24)	
		18	SH-60B Seahawk	Hel	1981			USA agreed in principle; first export order
7	Sweden	Norway	16	Hugin Class	FAC	1975	1978	3	Deliveries to be completed in 1982; armed with Penguin ShShMs
							1979	5	
							1980	2	
							1981	5	
							1982	1	
			96	Penguin-1	ShShM	1975	1978	18	Arming 16 Hugin Class FACs
							1979	30	
							1980	12	
							1981	30	
							1982	6	
		UK	12	Lynx	Hel	(1983)			For AF; follow-on order for 25 more for Army expected; offset contracts for 25% of order value offered by Westland
			(312)	Sky Flash	AAM	1978	1980	(64)	Ordered Dec 1978; arming new JA-37 Viggen
							1981	(128)	
							(1982)	(120)	

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		. .	Sky Flash	AAM	1981			Additional quantity for JA-37 Viggen; total cost: approx. $26.5 mn
	USA	(624)	AIM-9L	AAM	1978			US DoD agreed to sell May 1982; arming JA-37 Viggen; Sweden already has earlier AIM-9J version
		2000	BGM-71A TOW	ATM	1980	1981	(500)	DoD notified Congress Oct 1980; total cost incl 100 practice missiles and associated equipment
						1982	(500)	
		. .	MIM-23B Hawk	Landmob SAM	(1978)			
		10	Model 300C	Hel	1982			Swedish designation: HKP-5B
		2	Sabreliner	Transport	(1980)	1981	1	For ECM training
						1982	1	
7 Switzerland	Austria	. .	Steyr-4K 7FA	APC	1981			Will buy undisclosed number; probably to be partly built by Mowag
	France	2	Mirage-3D	Trainer	1980			To replace 2 trainers lost in recent years; also designated Mirage-3BS/80
	USA	(500)	AGM-65A	ASM	(1981)			Negotiating; arming F-5E fighters
4 Turkey	Belgium	18	F-104G	Fighter	1981	1981	3	
						1982	15	
	Egypt	35	F-4E Phantom	Fighter	(1982)			Offer to sell due to maintenance problems in Egypt
	Germany, FR	1	Dogan Class·	FAC	1979			In addition to 4 in service; armed with Harpoon ShShMs; also designated Type 57
		(4)	Leopard ARV	ARV	1980	1981	(2)	NATO aid; for delivery 1981-83
						1982	(2)	
		77	Leopard-1-A3	MBT	1980	1982	(20)	
		4	Meko-200	Frigate	1982			2 to be built in FR Germany and 2 in Turkey; will probably be armed with 2x4 Harpoon ShShMs and Aspide ShAMs using 1x8 Seasparrow launcher
		(2500)	Milan	ATM	1981	1981	480	
						(1982)	(480)	
	Netherlands	25	F-104G	Fighter	1980	1981	(10)	
						1982	(15)	
	USA	750	AIM-9P	AAM	1982			AIM-9P-3 version
		. .	BGM-71A TOW	ATM	(1979)			Unspecified number on order

		15	F-4E Phantom	Fighter	1981			Letter of Offer announced Apr 1981
		1	Gearing Class	Destroyer	(1980)	1982	1	
		25	Model 205 UH-1H	Hel	1981			Total cost incl spares and support equipment: $36 mn
		12	RGM-84A Harpoon	ShShM	1980			Arming fifth Dogan Class FAC
4 UK	Brazil	3	EMB-312 Tucano	Trainer	1982			
	France	120	MM-38 Exocet	ShShM	1975	1975	12	For 6 Amazon Class frigates and 4 Broadsword Class destroyers
						1976	12	
						1977	36	
						1978	12	
						1979	12	
						1980	12	
						(1981)	(12)	
						(1982)	(12)	
		5	SA-342L Gazelle	Hel	1982			Replacing losses in Falklands/Malvinas
	USA	2000	AGM-88 Harm	ARM	1982			Anti-radar missile for use on Tornado fighters
		100	AIM-9L	AAM	1982	1982	100	Supplied during Falkland/Malvinas conflict
		60	AV-8B Harrier	Fighter	1981			Selected after competition with Harrier Mk-5; final agreement between BAe and McDonnell-Douglas covers 336 Harriers for US Marines and 60 for RAF; first delivery 1984
		30	BGM-71A TOW	ATM	(1981)	1981	(24)	Arming 5 squadrons of British Lynx helicopters in FR Germany
						1982	(6)	
		33	CH-47D Chinook	Hel	1978	1980	(10)	
						1981	(15)	
						1982	(8)	
		8	CH-47D Chinook	Hel	1982			For delivery 1984; first 3 to replace losses in Falkland/Malvinas conflict
		12	F-4 Phantom	Fighter	1982			Ex-US Navy; probably version J
		. .	FIM-92A Stinger	Port SAM	1982	1982	(100)	Received to supplement Blowpipe in Falkland/Malvinas conflict
		(18)	M-109-A2 155mm	SPH	1980	1982	(18)	Some sources report 51 on order
		. .	MIM-23B Hawk	Landmob SAM	1982	1982	(36)	To protect Port Stanley airfield; number delivered estimated
		(64)	Trident-2	SLBM	(1981)			
1 USA	Canada	969	Piranha	APC	1982			USA selected GM of Canada to produce the Swiss-designed Piranha for US Army and Marines; first delivery October 1983

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
	France	91	AS-366 Dolphin	Hel	1981			For Coast Guard; version of SA-365 Dauphin-2; delivery started Apr 1983
	UK	12	Hawk	Adv trainer/strike	(1982)			Negotiating; separate from VTX-programme involving co-production of 320 Hawks
		3	Lyness Class	Support ship	1980	(1981) 1982	1 1	Negotiating purchase of third ship for delivery 1983; total cost of first 2 ships: $37 mn; negotiations for third ship, 'Stromness', halted due to Falkland/Malvinas conflict
		(128)	Rapier	Landmob SAM	1981			Offset for Trident SLBM; for defence of US air bases in the UK; delivery to start in 1983; 32 launch units with 4 missiles/launcher
		(64)	Rapier	Landmob SAM	1982			Additional order
2 USSR	Czechoslovakia	. .	L-39 Albatross	Trainer	1972	1978 1979 1980 1981 1982	(20) (20) (20) (20) (20)	Replacing L-29 Delfin
6 Yugoslavia	Canada	4	CL-215	Amphibian	1980	1981 1982	2 2	Ordered Jun 1980; not known whether bought for civil or military use
	Norway	. .	Penguin-2	ShShM	(1981)			Negotiating
	Switzerland	9	PC-6 Porter	Transport	1981	1982	9	
	USA	(40)	AGM-65B	ASM	1982			
	USSR	1	Koni Class	Frigate	(1982)			USSR offered to deliver second ship
		. .	M-1974 122mm	SPH	1981	(1982)	(20)	

II. Third World countries

9 Afghanistan	USSR	(15)	Su-17 Fitter-C	Fighter/ground attack	1982	(1982)	(15)	1 squadron to replace Su-7s
12 Algeria	Brazil	. .	EE-9 Cascavel	AC	1982			Negotiating sale valued at $400 mn
	France	44	M-3	APC	1982			For delivery from 1983

	UK	2		Support ship	1982			Similar to ships ordered by Oman
	USA	6	C-130H Hercules	Transport	(1980)	1980	1	Due to relaxation of US ban on arms exports to Algeria
						1982	5	
		5	C-130H Hercules	Transport	(1982)			In addition to 6 delivered 1982; 2 of 5 are reportedly C-130H-30 version
	USSR	. .	AT-4 Spigot	ATM	(1980)	(1981)	(100)	
						(1982)	(100)	
		. .	AT-5 Spandrel	ATM	(1980)	(1981)	(100)	Arming BRDM-2 APCs
						(1982)	(100)	
		. .	AT-6 Spiral	ATM	(1980)	(1981)	(24)	Arming Hind-D helicopters
						(1982)	(24)	
		2	Foxtrot Class	Submarine	(1982)			Negotiating
		2	Koni Class	Frigate	(1977)	1980	1	
						1982	1	
		. .	Mi-24 Hind-D	Hel	(1980)	(1981)	(3)	Algeria has approximately 30 Hind helicopters in service
						(1982)	(3)	
		1	Romeo Class	Submarine	(1982)	1982	1	
		(500)	T-72	MBT	(1979)	1979	(31)	First shown in military parade Nov 1979
						1980	(50)	
						(1981)	(50)	
						(1982)	(50)	
13 Angola	Switzerland	12	PC-7	Trainer	1982	1982	3	
	USA	2	L-100-20	Transport	(1980)			
	USSR	. .	AT-4 Spigot	ATM	(1980)	(1982)	(30)	Unconfirmed
		. .	T-62	MBT	(1980)	(1981)	(10)	Unconfirmed; reportedly delivered; incl small number of T-72s
						(1982)	(10)	
15 Argentina	Austria	27	Cuirassier	LT/TD	1982			Negotiations reportedly resumed after Falkland/Malvinas conflict; status of deal uncertain
	Brazil	. .	EE-9 Cascavel	AC	1982	1982	(10)	Delivered May 1982 for evaluation
		3	EMB-111N	Mar patrol	1982	1982	3	Delivered during Falkland/Malvinas conflict
		(12)	EMB-326 Xavante	Trainer/COIN	(1982)			
	France	(40)	AM-39 Exocet	AShM	1979	1982	(20)	Arming 14 Super Etendard fighters
		15	AS-332	Hcl	(1983)			Negotiating
		36	ERC-90 Lynx	AC	1979			Ordered Oct 1979; for border defence against Chile
		60	ERC-90S Sagaie	AC	1981			
		1000	Hot	ATM	1980	1980	(200)	Current status uncertain
						(1981)	(200)	
		. .	MM-40 Exocet	ShShM/SShM	(1981)			Ordered but embargoed
		24	Otomat-2	ShShM	(1979)			Arming 6 Meko-140 frigates

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		. .	R-550 Magic	AAM	(1980)	(1981)	(50)	Delivered prior to Falkland/Malvinas conflict; unconfirmed
						(1982)	(50)	
		(80)	Roland-1	Landmob SAM	1981	1982	(24)	2 launch units and undisclosed number of missiles delivered early 1982
		12	SA-315B Lama	Hel	1978			For Army Air Wing
		14	Super Etendard	Fighter/ASW	1979	1982	14	First 5 delivered early 1982; last 9 delivered Nov-Dec 1982; armed with AM-39 Exocet AShMs
		. .	Super Etendard	Fighter/ASW	1982			Unconfirmed; in addition to 14 in service
		. .	Super-530	AAM	(1980)	(1981)	(15)	Unconfirmed
						(1982)	(15)	
	Germany, FR	4	Meko-360	Destroyer	1979			First ship, 'Almirante Brown', for delivery 1983
		2	Type 148	FAC	(1979)			On order from Lürssen
		2	Type 1700	Submarine	1977			To be delivered prior to licence production of 2
	Israel	(22)	Nesher	Fighter	1982	1982	(22)	
	Italy	48	Aspide	AAM/SAM/ShAM	(1979)			Arming 4 Meko-360 destroyers
	Peru	10	Mirage-5	Fighter	1982	1982	10	Delivered during Falkland/Malvinas conflict
	Spain	5	Halcon Class	PC	1979	(1982)	(2)	Displacement: 900t; helicopter platform
	USA	1	Metro-2	Transport	(1979)			Pending congressional approval; for ambulance use; delivery held up by US arms export embargo
8 Bahrain	USA	60	AIM-9P	AAM	1982			
		2000	BGM-71A TOW	ATM	(1982)			Negotiating
		2	F-5F Tiger-2	Trainer	1982			Total cost incl 4 F-5Gs and 60 AIM-9P AAMs: $180 mn; US Letter of Offer reportedly rejected by Bahrain
		4	F-20 Tigershark	Fighter	1982			
		2	Model 212	Hel	(1981)	1982	2	
9 Bangladesh	UK	1	Leopard Class	Frigate	(1981)	1982	1	In addition to 1 delivered 1978
14 Belize	UK	2	BN-2A Defender	Transport	1982	1982	2	For maritime patrol
13 Benin	France	3	C-47	Transport	1982	1982	3	Delivered May 1982

	Netherlands	1	F-28 Mk-4000	Transport	(1981)	1982	1	Delivered Nov 1982; uncertain whether for AF or for civilian use
	USSR	. .	MiG-17F	Fighter	(1982)			Negotiating; Benin to set up first air combat unit
15 Bolivia	Belgium	52	F-104A	Fighter	1982			
		12	Scorpion FV-101	LT	1982	1982	(12)	
	Brazil	6	SA-315B Gaviao	Hel	1981	1981	2	Ordered Feb 1981; delivery started
						1982	4	Dec 1981
		12	T-25 Universal	Trainer	(1979)			Production line to be re-opened if contract is signed; requested for COIN use
	Switzerland	16	PC-7	Trainer	(1982)			Negotiating; contract not yet finalized
	USA	7	Model 207	Lightplane	(1980)	1982	7	Designation unconfirmed
		1	Model 210T	Lightplane	(1981)	1982	1	
13 Botswana	USA	(25)	V-150 Commando	APC	(1980)	(1981)	(10)	
						(1982)	(15)	
15 Brazil	Canada	(12)	DHC-5D Buffalo	Transport	1982			Reportedly ordered
	Germany, FR	1	Type 209	Submarine	1982			Order incl 1 submarine to be built under licence
	Israel	8	Model 205 UH-1D	Hel	(1982)	1982	8	From Israeli surplus stocks
	Italy	12	Wadi Class	Corvette	1980			Co-production/licence agreement signed Jun 1980; unconfirmed
10 Brunei	Italy	2	SF-260W Warrior	Trainer/COIN	(1981)	1982	2	Delivered Mar 1982
	UK	. .	Rapier	Landmob SAM	(1980)			1 bty ordered; incl Blindfire radar; total cost: $82 mn
	USA	3	Model 212	Hel	(1981)	1982	3	In addition to 7 in service
10 Burma	Canada	2	DHC-5D Buffalo	Transport	1982	1982	2	
	USA	1	Citation-2	Transport	1982	1982	1	Delivered Aug 1982
13 Burundi	France	6	AML-60	AC	1982			
		12	AML/D-90 Lynx	Recce AC	1982			Partly financed by France; deal incl AML-60 and M3 vehicles
		9	M-3	APC	1982			
13 Cameroon	Canada	2	DHC-5D Buffalo	Transport	1982	1982	2	For VIP transport
	France	6	Alpha Jet	Adv trainer/strike	1981	1982	(3)	
						1983	(3)	
		(12)	AS-12	ASM/AShM	1980	(1982)	(12)	Arming 1 Gazelle helicopter
		. .	Hot	ATM	1980	1982	(12)	

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		. .	Milan	ATM	(1981)	1982	12	6 launchers and 12 missiles delivered 1982; more to follow under new military co-operation programme
		8	MM-40 Exocet	ShShM/SShM	1981	(1983)	(8)	Arming 1 P-48 Class FAC
		1	P-48 Class	FAC	1981	(1983)	(1)	For delivery Mar 1983
		4	SA-342K Gazelle	Hel	1980	1982	4	Ordered Dec 1980
		4	Super Magister	Trainer	(1982)	1982	4	
	Germany, FR	3	Do-128-6	Transport	1981	1981	1	For maritime patrol; first delivered Nov 1981
						(1982)	(2)	
	USA	1	C-130H-30	Transport	1982	1982	1	
		2	V-150 Commando	APC	1982			
13 Cape Verde	USSR	2	An-26 Curl	Transport	1982	1982	2	
15 Chile	Brazil	2	EMB-120	Transport	(1982)			Reportedly ordered for delivery 1985
	France	. .	Alpha Jet	Adv trainer/strike	(1980)			Negotiating; Fouga-90 also requested
		50	AMX-30B	MBT	(1980)	1981	(21)	21 delivered by Liberian ship from Bordeaux Mar 1981; delivery of last 29 blocked by Mitterand government; Chile reportedly will return 21 delivered
		. .	AS-332	Hel	(1982)	(1982)	(4)	Small number delivered
		. .	R-440 Crotale	Landmob SAM	1981			Ordered Apr 1981; delivery withheld by Belgium at Brussels Airport; 6 firing units; part of $40 mn contract
		. .	SA-330L Puma	Hel	1982			Unspecified number ordered
	Germany, FR	2	Type 209	Submarine	1980			Construction began in FR Germany Oct 1980 but export licence not yet granted
	South Africa	6	Cactus	Landmob SAM	1980			May be identical with Crotale order
	Spain	(62)	C-101 Aviojet	Trainer/strike	1980	1982	(2)	After delivery of 12, about 50 will be assembled in Chile
		2	F-30 Class	Frigate	1981			Ordered May 1981
	UK	3	Canberra PR-57	Bomber/recce	(1981)	1982	3	
		2	County Class	Destroyer	1981	1982	1	Deal incl tanker 'Tidepool'
						1983	1	
		12	Hunter FGA-9	Fighter/ground attack	1982	1982	12	
		4	MM-38 Exocet	ShShM	1981	1982	4	Arming County Class destroyer
		8	Seacat	ShAM/ShShM	1981	1982	8	Arming County Class destroyer

	USA	16	RGM-84A Harpoon	ShShM	1981			Arming 2 F-30 Class frigates
		16	Seasparrow	ShAM/ShShM	1981			Arming 2 F-30 Class frigates
15 Colombia	Brazil	(100)	EE-11 Urutu	APC	1981	1982	(15)	
		100	EE-9 Cascavel	AC	1981	1982	(20)	
	France	32	MM-40 Exocet	ShShM/SShM	(1980)			Arming 4 FS-1500 Class frigates on order from FR Germany
	Germany, FR	4	FS-1500 Class	Frigate	1980	1983	2	
	Israel	12	Kfir-C2	Fighter/bomber	1981	1982	(12)	Armed with AAMs and ASMs; first delivery Mar 1982
	Spain	. .	C-212-200	Transport	(1981)			Negotiating
	USA	240	AIM-7F Sparrow	AAM	1982			US Letter of Offer Dec 1982; Skyguard air defence system
		1	B-707-320B	Transport	1982			Ordered Dec 1982
		4	C-130H Hercules	Transport	1982			
		12	Model 205 UH-1H	Hel	1981	(1982)	12	
		. .	Seasparrow	ShAM/ShShM	(1980)			On order; arming 4 FS-1500 Class frigates
		12	T-37C	Trainer/COIN	1982			Ordered Dec 1982
13 Comoros	France	4	VLRA	Recce AC	(1982)	1982	4	
13 Congo	Spain	3	Piranha Class	PC	1981	1982	1	Ordered May 1981
						(1983)	(2)	
14 Cuba	USSR	. .	BMP-1	MICV	(1980)	1981	(50)	Acc to US sources; unconfirmed
						1982	(50)	
		. .	Mi-24 Hind-D	Hel	(1981)	1982	(4)	Unspecified number delivered Mar 1982
		(3)	MiG-21FL	Fighter	(1982)	1982	(3)	Delivered Dec 1982
		. .	MiG-23	Fighter	(1980)	(1980)	(15)	Cuba has approximately 40 MiG-23s incl B/E interceptor and F ground attack versions
						1981	(15)	
						1982	(10)	
		(6)	Osa-2 Class	FAC	(1979)	1981	2	
						1982	(4)	
		(140)	SA-3 Goa	Landmob SAM	(1982)	1982	(140)	Delivered Dec 1982
		(24)	SSN-2 Styx	ShShM	(1979)	1981	8	Arming 6 Osa-2 Class FACs
						1982	(16)	delivered 1981-82
14 Dominican Republic	USA	3	A-37B Dragonfly	Fighter/COIN	1981	1982	3	
		2	Model 205 UH-1H	Hel	1981	1982	2	
		12	T-34B Mentor	Trainer	1981			To replace T-41
15 Ecuador	Brazil	14	EMB-326 Xavante	Trainer/COIN	1982			Ordered Dec 1982

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
	Canada	4	DHC-5D Buffalo	Transport	1981	1981	2	Ordered in addition to 1 delivered 1980
						(1982)	(2)	
		6	DHC-6	Transport	(1981)	1982	(2)	
	France	10	AS-332	Hel	1982	1982	(3)	Ordered Sep 1982
		. .	MM-40 Exocet	ShShM/SShM	1979	(1982)	(24)	Arming 6 Esmeraldas Class corvettes
						(1983)	(24)	
		(4)	SA-342L Gazelle	Hel	(1981)	1982	(4)	Previously unannounced order
	Israel	12	Kfir-C2	Fighter/bomber	1981			USA approved sale; option for 12 more
	Italy	. .	Aspide	AAM/SAM/ShAM	1979	(1982)	(24)	Arming Esmeraldas Class corvettes
						(1983)	(24)	
		6	Esmeraldas Class	Corvette	1979	(1982)	(3)	Similar to Wadi Class for Libya; first
						(1983)	(3)	3 commissioned 1982
	USA	. .	A-37B Dragonfly	Fighter/COIN	1982			Unspecified number ordered Dec 1982
8 Egypt	Austria	100	Cuirassier	LT/TD	1981			Also designated SK-105 Jagdpanzer K; may open new arms export market for Austria
	Canada	10	DHC-5D Buffalo	Transport	1981	1982	(6)	Ordered Nov 1981
	China	(60)	F-7	Fighter	1982			60-80 F-7s for local assembly
		2	Romeo Class	Submarine	(1980)	1982	2	
		. .	SA-2 Guideline	Landmob SAM	1980			Ordered Jan 1980
	France	2	Agosta Class	Submarine	1978			
		45	Alpha Jet	Adv trainer/strike	1981	1982	(5)	Direct import of 8; local assembly of
						(1983)	(15)	37; 10 per cent local components; in service from Nov 1982
		. .	Mirage-2000	Fighter/strike	1982	1983	(5)	Ordered Jan 1982; option on 20 more
		16	Mirage-5SD	Fighter	1981			
		. .	Otomat-2	ShShM	1982			Arming F-30 Class and Cormoran Class on order from Spain
		(96)	R-440 Crotale	Landmob SAM	1982	1982	(48)	4 systems ordered Jan 1982
						(1983)	(48)	
		36	SA-342L Gazelle	Hel	1981			Local assembly planned
	Italy	(15)	CH-47C Chinook	Hel	1980	1982	(15)	
		24	Otomat-1	ShShM	1978	1981	8	Arming 6 Ramadan Class FACs under
						1982	16	construction in UK
		4	S-61R	Hel	1981			For delivery 1983
	Spain	2	Agosta Class	Submarine	1982			Option on 2 more
		600	BMR-600	ICV	1982			Option on 300 more
		6	Cormoran Class	FAC	1982			

	2	F-30 Class	Frigate	1982	(1982)	(2)	Option on 2 more; rapid delivery due to diversion to Egypt of last 2 ships for Spanish Navy; order incl 6 Cormoran Class FACs; total cost: $1 400 mn
UK	6	Ramadan Class	FAC	1978	1981	2	
					1982	4	
	. .	Scorpion FV-101	LT	1982			UK reportedly agreed to provide factory for licence production
	14	SRN-6	Hovercraft	(1980)			No official confirmation
USA	600	AGM-65A	ASM	1980	1980	(75)	Arming F-16s
					(1981)	(100)	
					1982	(200)	
	300	AIM-9L	AAM	1982	(1982)	(100)	Arming F-16 fighters
	2400	BGM-71A TOW	ATM	1981	1982	2400	Improved version
	6	C-130H Hercules	Transport	1981	1982	3	3 delivered 1982; rest of order postponed or cancelled
	4	E-2C Hawkeye	AEW	1982			
	40	F-16A	Fighter/strike	1980	1982	(18)	Incl some F-16B trainers; delivery to be completed Jan 1984
					(1983)	(19)	
	34	F-16A	Fighter/strike	1982			In addition to 40 now being delivered; order incl 6 F-16B trainers; principle agreement for a total of 150
	6	F-16B	Fighter/trainer	1982			Total cost incl 34 F-16As: $975 mn
	35	F-4 Phantom	Fighter	(1981)			Version E; gift; in addition to 35 delivered 1980; unconfirmed
	79	M-106-A1	APC	1979	1982	(79)	
	. .	M-109-A2 155mm	SPH	(1982)			Unspecified number for delivery from 1984-85
	400	M-113-A2	APC	1979	1980	(120)	
					1981	(120)	
					1982	(160)	
	570	M-113-A2	APC	1980	1982	(252)	Second batch brings total to 1 100 incl all versions
					(1983)	(318)	
	41	M-125-A1	APC	1979	1982	41	
	34	M-577-A1	CPC	1979	1982	20	
					(1983)	(14)	
	439	M-60-A3	MBT	1980	1981	128	
					1982	183	
					(1983)	(120)	
					(1984)	(8)	
	220	M-60-A3	MBT	1982			In addition to 439 already on order; for delivery from 1984; deal incl 23 M-88-A1 ARVs

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		86	M-88-A1	ARV	1980	1981	16	
						1982	13	
						(1983)	(57)	
		23	M-88-A1	ARV	1982			
		52	M-901 TOW	APC	1980	(1983)	(52)	Improved version of M-113-A1; armed with TOW ATMs
		36	MIM-23B Hawk	Landmob SAM	1979	1981	18	
						1982	(18)	
		216	MIM-23B Hawk	Landmob SAM	1981	1982	(108)	Egypt requests 12 btys; deal incl additional F-16s, M-60 MBTs and 4 Hawkeye AEW aircraft; total order worth $5 bn
		12	Spectre Class	FAC	(1979)			Incl in $1.5 bn credit package
		(18)	UH-12E	Hel	1982	1982	(18)	
14 El Salvador	Argentina	. .	IA-58A Pucara	Trainer/COIN	1982			Deal reportedly incl FAL 7.62mm rifles; unconfirmed
	USA	6	A-37B Dragonfly	Fighter/COIN	1982	1982	6	Delivered Jun 1982; gift incl 4 Model 321 Spotter
		4	C-123 Provider	Transport	1982	1982	4	
		12	Model 205 UH-1H	Hel	1982	1982	12	
		. .	Model 209 AH-1G	Hel	1981			Unspecified number incl in aid package
		4	Model 321	Lightplane	1982	1982	4	Also designated O-2 or Model 337
13 Ethiopia	USSR	. .	An-12 Cub-A	Transport	(1982)	1982	(5)	Unspecified number delivered
		1	Poluchat Class	PC	1981	1982	1	Delivered Feb 1982
13 Gabon	France	7	Alpha Jet	Adv trainer/strike	(1980)			Unconfirmed
		75	VP-200	APC	1982			
	Italy	4	Sarzana Class	PC	1975	1977	1	First ship, 'Ngolo', delivered 1977
	Spain	2		LST	1981			Ordered Aug 1981; displacement: 650t
	USA	1	L-100-30	Transport	1982	1982	1	In addition to 3 in service
		4	T-34C-1	Trainer	1982	1982	4	Incl pilot and crew training
13 Ghana	Italy	8	SF-260TP	Trainer	1982			
14 Guatemala	USA	6	Model 412	Hel	(1980)	1981	(4)	Total cost incl 3 Model 212s: $10.5 mn;
						1982	(2)	Congress not informed of delivery

13 Guinea Bissau	Czechoslovakia	10	L-39 Albatross	Trainer	(1981)	(1982) (1983)	(5) (5)	
15 Guyana	Brazil	. .	EE-11 Urutu	APC	1982			Undisclosed number ordered for border defence against Venezuela
		2	EMB-111	Mar patrol	1982			Small number ordered Oct 1982
14 Haiti	Italy	(6)	SF-260TP	Trainer	1982			
14 Honduras	USA	6	A-37B Dragonfly	Fighter/COIN	1982	(1982)	(6)	
9 India	Canada	(8)	DHC-6	Transport	(1981)			For Coast Guard; CASA-212 also being evaluated
	France	. .	AM-39 Exocet	AShM	(1982)			Arming Mirage-2000 fighters; unconfirmed
		. .	Milan	ATM	(1981)	1982	(100)	To be licence-produced from 1985
		40	Mirage-2000	Fighter/strike	1982			Contract provides for possible local assembly of an additional 50 and local production of 60 Mirage-2000s
		. .	MM-38 Exocet	ShShM	1982			Unspecified number ordered to replace Styx ShShMs
		(240)	Super-530	AAM	1982			Arming 40 Mirage-2000 fighters
	Germany, FR	2	Type 1500	Submarine	(1981)			Licence production of 2-6 to follow
	UK	(4)	BN-2A Islander	Transport	(1981)			
		40	Jaguar	Fighter	(1979)	(1981) (1982)	(15) (25)	India will reportedly retain 8 out of 17 remaining from batch of 18 on loan
		8	Jaguar	Fighter	1980			18 delivered on loan from RAF in 1980 prior to delivery of 40 ordered 1979; 8 returned May 1982; 1 transferred to Oman; 1 crashed; rest offered to Indian AF
		6	Sea Harrier	Fighter/ASW	1979	(1983)	(6)	For use with aircraft carrier 'Vikrant'; option for 8 more cancelled
		2	Sea Harrier T-4	Fighter/trainer	1979	(1983)	(2)	Ordered Nov 1979; total cost incl 6 Sea Harriers
		12	Sea King HAS-5	Hel	(1983)			Negotiating; for ASW
	USA	3724	BGM-71A TOW	ATM	1980			Order incl 62 launchers
		230	M-198 155mm	TH	1980			Total cost incl TOW missiles and ammunition; part of $340 mn deal
	USSR	. .	AA-5 Ash	AAM	1980	(1980) (1981) (1982)	(90) (140) (140)	Arming MiG-23s; part of Soviet arms package to India
		(95)	An-32 Cline	Transport	1980			Ordered Nov 1980
		. .	AT-3 Sagger	ATM	1980			

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		. .	FROG-7	Landmob SSM	1980			Probably version 7
		(30)	Il-76 Candid	Transport	1982			Replacing An-12
		3	Kashin Class	Destroyer	1976	1980	(1)	Modified Kashin Class; possibly with
						1982	1	KA-26 helicopter
		85	MiG-23	Fighter	(1979)	1980	(15)	Order reportedly incl 70 MiG-23BN
						1981	(35)	fighters and 15 MiG-23U trainers
						1982	(35)	
		18	MiG-25	Fighter/interceptor	(1981)	1981	(2)	Counterbalancing sale of F-16 to
						1982	(10)	Pakistan; delivery started
		8	Nanuchka Class	Corvette	1975	1977	1	Total of 8 reportedly to be delivered
						1978	1	
						1979	1	
						1980	1	
		. .	Petya Class	Frigate	1980			Missile light frigate; part of Soviet arms package to India
		. .	SA-9 Gaskin	Landmob SAM	(1982)			Mounted on modified BTR-40 chassis; unconfirmed
		. .	T-72	MBT	1982			Unspecified number ordered in addition to 78 in service; status of possible licence production programme uncertain
10 Indonesia	Australia	1	Attack Class	PC	(1981)	1982	1	Ex-HMAS 'Barricade'
		6	N-22L Nomad	Mar patrol	1980	1981	2	Indonesia has 6 N-22Bs and 12 N-22Ls
						1982	4	
	France	3	C-160F Transall	Transport	1979	1982	3	Aerospatiale received order Sep 1979; for delivery early 1982
	Germany, FR	8	PC-57 Type	PC/FAC	1982			First to be built in FR Germany; remaining 7 at Lürssen facilities in Penang, Malaysia; may be equipped with ShShMs
	Korea, South	4		LST	(1978)	1981	3	3 ships delivered Oct 1981
						1982	1	
		8	PSMM-5 Type	FAC	1976	1979	2	
						1980	2	
	UK	5	Hawk	Adv trainer/strike	(1982)			In addition to 12 delivered 1980-81
		4	Wasp	Hel	(1981)	1982	4	For ASW duties
	USA	16	A-4E Skyhawk	Fighter/bomber	1981	1982	16	
		3	B-737-200C	Transport	1981	1982	1	2 for AEW; 1 for VIP transport; for delivery 1982-83

		4	C-130H-30	Transport	1981	(1982)	(4)	Incl 2 mar patrol version designated C-130H-MP
		4	Jetfoil	Hydrofoil FAC	1982			To be equipped with Exocet ShShMs
		133	M-101-A1 105mm	TH	(1981)			US Letter of Offer
		6	Model 212 UH-1N	Hel	(1981)			Negotiating
8 Iran	France	(66)	MM-38 Exocet	ShShM	(1981)			Order unconfirmed
	Italy	100	Seakiller/Marte	AShM	(1978)	(1978)	(50)	Ongoing dispute concerning delay of deliveries; acc to Sistel spokesman, some 50 missiles remain to be delivered
	Syria	(120)	T-55	MBT	(1982)	1982	(120)	
		(100)	T-62	MBT	(1982)	1982	(100)	Syria and Libya supplied at least 350 MBTs late 1981–early 1982
	UK	1		Support ship	1974	1982	1	Embargo lifted; guns to be removed before delivery
8 Iraq	Brazil	. .	EE-11 Urutu	APC	(1979)	1979	(50)	Number delivered unconfirmed
						1980	(50)	
						(1981)	(50)	
						(1982)	(50)	
		(300)	EE-11 Urutu	APC	1982			Total value incl EE-3 Jararaca: $250 mn; in addition to earlier deliveries of the EE-series
		. .	EE-17 Sucuri	TD	1979	1979	(50)	Number delivered unconfirmed
						1980	(100)	
						(1981)	(100)	
						(1982)	(50)	
		(300)	EE-3 Jararaca	SC	1982			
		. .	EE-9 Cascavel	AC	(1979)	1979	(150)	Number delivered unconfirmed
						1980	(200)	
						1981	(200)	
						(1982)	(200)	
	Egypt	. .	T-55	MBT	1981	1982	(100)	
	France	(150)	Alpha Jet	Adv trainer/strike	(1981)			Negotiating; partly built in France and partly locally assembled; agreement not yet signed
		14	AMX-30 Roland	AAV	1981	(1982)	(4)	Ordered Feb 1981
		85	AMX-30-155 GCT	SPG	1982			
		24	Mirage F-1C	Fighter/interc	1980	(1982)	(12)	Second order; reduced from 36 due to wish to buy Mirage-2000 instead
		29	Mirage F-1C	Fighter/interc	1982			In addition to 60 now being delivered; ordered Feb 1982
		. .	R-440 Crotale	Landmob SAM	(1979)	1981	(50)	
						1982	(50)	

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		. .	R-530	AAM	1979			Delivery may have started
		150	Roland-2	Landmob SAM	1981	(1982)	(50)	Ordered Feb 1981
		40	SA-330L Puma	Hel	1979	1981	(20)	Ordered Jul 1979
						1982	(20)	
		(20)	SA-342K Gazelle	Hel	(1978)	1981	(10)	In addition to 40 previously delivered
						1982	(10)	
		. .	SS-11	ATM	1979			On order
		. .	Super Frelon	Hel	(1981)			Unspecified number on order
	Indonesia	. .	Bo-105CB	Hel	1980			Undisclosed number ordered; to be armed with French ATWs
	Italy	. .	Aspide	AAM/SAM/ShAM	1979			Arming 4 Lupo Class frigates; designation unconfirmed
		2	Esmeraldas Class	Corvette	1981			
		4	Lupo Class	Frigate	1981			
		. .	Seakiller-2	ShShM	1979			Arming 4 Lupo Class frigates; designation unconfirmed
		1	Stromboli Class	Supply ship	1981			Support ship; ordered with 4 Lupo Class frigates and 4 Wadi Class corvettes
		4	Wadi Class	Corvette	1981			
	Jordan	. .	Khalid	MBT	1982	1982	(20)	Small number transferred as military aid
	Spain	. .	BMR-600	ICV	1981			On order
		. .	C-101 Aviojet	Trainer/strike	(1981)			On order
		20	C-212-200	Transport	1981			Incl in $900 mn 5-year programme
	Switzerland	(44)	PC-7	Trainer	(1981)	(1981)	(22)	
						(1982)	(22)	
	UK	58	Saboteur	APC	1982	1982	8	
	USA	6	L-100-30	Transport	1982			US ban lifted Apr 1982; unconfirmed
	USSR	. .		LST	1979			Ordered Jan 1979
		. .	MiG-25	Fighter/interc	1979	(1979)	(5)	Deliveries reportedly re-started 1982
						(1980)	(5)	
						(1982)	(10)	
		. .	MiG-27	Fighter/strike	(1979)	(1979)	(7)	Small number of MiG-23/27s and MiG-25s reportedly delivered 1982
						(1980)	(8)	
						(1982)	(10)	
		. .	SA-6 Gainful	Landmob SAM	1979	(1980)	(90)	Believed to have received a limited number
						(1981)	(50)	
						(1982)	(50)	
		. .	SA-8 Gecko	Landmob SAM	(1982)	1982	(72)	

		3		Submarine	1979			Ordered Jan 1979
		. .	T-62	MBT	(1982)	1982	(100)	Supply of T-62/72s resumed in 1982
		(150)	T-72	MBT	1980	(1982)	(50)	
8 Israel	USA	600	AGM-65A	ASM	1979	1980	(250)	Incl in peace treaty arms package
						1981	(250)	
						1982	(100)	
		. .	BGM-71A TOW	ATM	1981			Arming 18 Model 209 Cobras
		40	F-15A Eagle	Fighter/interc	1978	1978	3	Incl in US sales package to Middle East;
						1979	5	approved Feb 1978; total cost incl 75
						1980	5	F-16A fighters
						1981	17	
						1982	10	
		11	F-15A Eagle	Fighter/interc	1982			Compensatory offer due to sale of extra equipment for Saudi Arabian F-15s; order incl 22 fuel tanks, 6 spare engines and support equipment
		75	F-16A	Fighter/strike	1982			In addition to 75 already delivered
		1	Flagstaff-2	Hydrofoil FAC	1977	1982	1	Prior to possible licence production
		200	M-109-A1 155mm	SPH	1979	(1980)	(50)	
						(1981)	(50)	
						(1982)	(50)	
		56	M-548	APC	1979	1981	(20)	
						1982	(36)	
		98	M-577-A1	CPC	1979	(1981)	(50)	
						1982	(48)	
		300	M-60-A3	MBT	1979	1980	(50)	
						1981	(50)	
						1982	(65)	
		25	M-88-A1	ARV	1979	(1981)	(11)	
						(1982)	(14)	
		200	MIM-23B Hawk	Landmob SAM	1982			
		250	Chaparral	Landmob SAM	1979			Congress requested to approve purchase; for training and stocks
		18	Model 209 AH-1S	Hel	1981			Armed with TOW ATMs
		100	RGM-84A Harpoon	ShShM	(1979)	(1980)	(25)	At least 100 ordered to complement Gabriel ShShM; AShM version for F-4
						(1981)	(25)	probably also ordered
						(1982)	(25)	
8 Jordan	Austria	(200)	GHN-45 155mm	TH/TG	1981	1982	(18)	
	France	2	Falcon-50	Transport	(1980)			On order
		17	Mirage F-1C	Fighter/interc	1979	1982	17	Financed by Saudi Arabia

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
	UK	5	Bulldog-125	Trainer	1981	1983	5	In addition to 5 ordered 1980
		278	Khalid	MBT	1978	1981	(150)	In the UK designated FV-4030/2;
						1982	(128)	originally ordered by Iran and designated Shir-1
		50	Tornado IDS	Fighter/MRCA	(1981)			May order
	USA	(192)	BGM-71A TOW	ATM	1981			Arming 24 Model 209 Cobras
		1	C-130H Hercules	Transport	(1982)	1982	1	
		. .	FGM-77A Dragon	ATM	1980			On order; delivery delayed due to tension in Syria
		(36)	F-20 Tigershark	Fighter	(1982)			Deal incl Stinger SAMs; to be put before Congress after Nov 1982 election
		. .	FIM-92A Stinger	Port SAM	1982			
		78	M-109-A2 155mm	SPH	1980			In addition to 156 in service
		29	M-110-A2 203mm	SPH	1980	(1982)	(29)	Ordered Jan 1980
		81	M-113-A2	APC	1980	1981	(20)	Ordered Jan 1980
		200	M-60-A3	MBT	1980			Requested Jul 1979; US government approved sale; to replace M-47 and Centurion; 118 conversion kits for older models also being offered by USA
		30	M-88-A1	ARV	1981			Pending congressional approval
		24	Model 209 AH-1S	Hel	1981			Deal discussed since mid-1970s and now concluded; total cost incl TOW missiles: $114 mn
		16	S-76 Spirit	Hel	1980	1980	3	
						1981	10	
						1982	3	
	USSR	240	SA-6 Gainful	Landmob SAM	1981			Financed partly by Iraq
		. .	SA-7 Grail	Port SAM	1981			
		. .	SA-8 Gecko	Landmob SAM	1981	(1982)	(20)	Deliveries of SA-6/7/8 as yet unconfirmed; reportedly paid by Iraq since Jordanian battalion is fighting for Iraq against Iran
		(20)	ZSU-23-4 Shilka	AAV	1981	(1982)	(20)	Unconfirmed number delivered Oct 1982
13 Kenya	Israel	(36)	Gabriel-2	ShShM	(1982)	(1982)	(24)	Arming 3 Simba Class FACs
						(1983)	(12)	
	UK	. .	Rapier	Landmob SAM	1979			Ordered Mar 1979
	USA	2	F-5F Tiger-2	Trainer	1980	1982	2	In addition to 2 in service

10 Korea, North	China	(20)	F-6	Fighter	(1982)	1982	(20)	Delivered Sep 1982; Fantan-A version; similar to MiG-21; some sources report 40 aircraft delivered
10 Korea, South	UK	18	Hawk	Adv trainer/strike	(1982)			Negotiating
	USA	(12)	A-10A	Fighter/close support	(1981)			Acc to Krasnaja Svezda; US DoD agreed to sell 1 squadron; unconfirmed; maybe for US forces in South Korea
		200	AGM-65A	ASM	1977			On order
		1800	BGM-71A TOW	ATM	1979	(1980)	(360)	DoD notified Congress about planned sale Apr 1980; order incl 10 launchers
						(1981)	(720)	
						(1982)	(720)	
		30	F-16A	Fighter/strike	(1982)			Reagan Administration lifted ban on F-16 sales to South Korea; total cost incl 6 F-16Bs: $931 mn
		6	F-16B	Fighter/trainer	1981			
		6	F-4D Phantom	Fighter/interc	1982			Compensation for attrition losses
		. .	FIM-92A Stinger	Port SAM	(1981)			
		42	LVTP-7A1	Amph ASSV	1982			
		37	M-109-A2 155mm	SPH	1978			Ordered Aug 1978
		1089	M-551 Sheridan	LT	(1981)			Part of new US policy to build up South Korean armed forces; unit price: $10 000
		21	M-88-A1	ARV	1981			For delivery 1984
		170	MIM-23B Hawk	Landmob SAM	1982			Total cost incl 723 rocket motors: $68 mn
		112	RGM-84A Harpoon	ShShM	1975			Arming 8 PSMM-5 FACs
8 Kuwait	France	8	Combattante-2	FAC	(1982)			Reportedly on order; to be armed with Exocet ShShMs
		12	Mirage F-1C	Fighter/interc	(1982)			
		(32)	MM-40 Exocet	ShShM/SShM	1980	1982	4	Arming 6 TNC-45 and 2 Type 57 FACs
		. .	MM-40 Exocet	ShShM/SShM	1982			Arming 8 Combattante-2 FACs on on order from France
	Germany, FR	2	PC-57 Type	PC/FAC	1980			
		6	TNC-45	FAC	1980			At least 3 ready for delivery but temporarily withheld
	UK	(100)	Chieftain-5	MBT	(1981)			Negotiating
	USA	4840	BGM-71A TOW	ATM	1982			US Letter of Offer Feb 1982; order incl M-901 and M-113 armoured vehicles; total cost: $97 mn
		4	L-100-30	Transport	1981	(1983)	(4)	Ordered Dec 1981; for delivery 1983
		16	M-113-A2	APC	1982			US Letter of Offer Feb 1982
		2	M-125-A1	APC	1980			

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		14	M-577-A1	CPC	1980			
		56	M-901 TOW	APC	1982			US Letter of Offer Feb 1982
8 Lebanon	Austria	. .	Cuirassier	LT/TD	(1981)			Lebanese Army planning rearmament programme with Austrian assistance; designation unconfirmed
		. .	Steyr-4K 7FA	APC	(1981)			Designation unconfirmed
	France	70	AMX-13-105	LT	1978	1981	13	13 delivered Sep 1981
						1982	(9)	
		. .	VAB	APC	(1978)	1981	5	Now being delivered
						(1982)	(10)	
	UK	. .	Swingfire	ATM	1980			Ordered May 1980
	USA	18	M-101-A1 105mm	TH	(1979)	1982	18	Designation unconfirmed; delivered Mar 1982
		26	M-113-A2	APC	1979	1982	26	
		27	M-125-A1	APC	1979			Status of deal uncertain
		12	M-198 155mm	TH	1982	(1982)	(6)	
						(1983)	(6)	
		34	M-48-A5	MBT	1982			
		13	M-578	ARV	1979	1982	13	
		. .	M-60-A3	MBT	1982			
13 Liberia	India	. .	HJT-16 Kiran-2	Trainer/COIN	(1982)			Reportedly ordered Jan 1982
		(6)	SA-316B Chetak	Hel	1982			Negotiating
12 Libya	Brazil	700	EE-11 Urutu	APC	1981			Unconfirmed
		(100)	EMB-312 Tucano	Trainer	(1982)			Unconfirmed
	Canada	10	DHC-6	Transport	1979			
	France	10	Combattante-2G	FAC	1975	1982	7	Delivery withheld due to Libyan intervention in Chad; first delivered Mar 1982
						(1983)	(3)	
		. .	R-530	AAM	(1975)	(1979)	(76)	On order
		40	SA-342K Gazelle	Hel	(1978)	(1981)	(20)	
						(1982)	(20)	
	Italy	20	G-222L	Transport	(1979)	1981	(5)	
						1982	(10)	
		200	Lion	MBT	1978	1980	75	
						(1981)	(75)	
						(1982)	(50)	

		168	Otomat-1	ShShM	1977	1979	(12)	Arming 10 Combattante-2G Class FACs and
						1980	(36)	4 Wadi Class corvettes
						1982	(84)	
						1983	(36)	
		210	Palmaria 155/41	SPH	1981	1982	12	
		(60)	SF-260W Warrior	Trainer/COIN	1981	(1982)	(40)	Bringing total on order to some 300
		. .	Type 6616	AC	1979			On order
	Turkey	1	SAR-33	PC	1980			
	USA	8	C-130H Hercules	Transport	1973			Delivery embargoed by USA
	USSR	. .	AA-2 Atoll	AAM	(1975)	(1976)	(50)	
						(1977)	(50)	
						(1978)	(50)	
						(1979)	(50)	
						(1980)	(50)	
						(1981)	(50)	
						(1982)	(50)	
		. .	AA-6 Acrid	AAM	(1978)	(1979)	(30)	Arming MiG-25s
						(1980)	(30)	
						(1981)	(30)	
						(1982)	(30)	
		(3)	Foxtrot Class	Submarine	1978	1981	1	On order in addition to 3 in service
						1982	1	
		. .	MiG-23	Fighter	(1978)	(1979)	(15)	
						(1980)	(15)	
						(1981)	(20)	
						(1982)	(20)	
		. .	MiG-25	Fighter/interceptor	(1977)	(1979)	(15)	
						(1980)	(15)	
						(1981)	(15)	
						(1982)	(15)	
		4	Nanuchka Class	Corvette	1980	1981	1	
						(1982)	(3)	
13	Madagascar	Brazil	. .	EMB-111N	Mar patrol	(1981)			Negotiating
		France	(30)	AML-60	AC	1982			Requested but not approved
			30	AML-90	AC	1982			Ordered Jan 1982
10	Malaysia	Belgium	186	Sibmas	APC	1982	1982	(20)	Incl 162 APCs and 24 ARVs; for delivery 1982-84
		France	8	MM-38 Exocet	ShShM	1981			Arming 2 FS-1500 Class frigates
		Germany, FR	(108)	Condor	APC	1981	1982	(50)	Order incl 103 Marder MICVs
			2	FS-1500 Class	Frigate	1981			Ordered Jun 1981
			103	Marder	MICV	1981	1981	(50)	
							(1982)	(53)	

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
	Indonesia	12	Bo-105CB	Hel	(1981)	1982	(12)	
	Italy	4	Lerici Class	Minehunter	1980			
		12	MB-339K	Fighter/trainer	1982	(1983)	(12)	Option on 14 more
	Singapore	7	Alouette-3	Hel	(1981)	1982	7	Sold by AF
	Spain	4	C-212A Aviocar	Transport	(1980)			Acc to some sources, ordered from licence production in Indonesia
	Switzerland	44	PC-7	Trainer	1981	1982	6	
						(1983)	(38)	
	UK	29	FH-70 155mm	TH	1982			
		26	Scorpion FV-101	LT	1982			Ordered Jan 1982; total cost incl 25 25 Stormer APCs: $40 mn
		25	Stormer	APC	1982			Ordered Jan 1982
	USA	88	A-4E Skyhawk	Fighter/bomber	1982			Malaysian designation: A-4L; total cost: $380 mn
		14	F-5E Tiger-2	Fighter	1982			US Letter of Offer Jul 1982; order incl 2 F-5Fs; total cost: $260 mn; purchase postponed due to funding problems
		2	F-5F Tiger-2	Trainer	1982			
13 Mauritania	France	1	Patra Class	PC/FAC	1980	1982	1	Arms: 40mm Bofors gun
	Spain	2	Barcelo Class	PC	1976	1979	1	Ordered Jul 1976
						1982	1	
14 Mexico	France	40	ERC-90 Lynx	AC	1981	1982	40	Ordered Jan 1981
	Germany, FR	6	Bo-105C	Hel	(1980)	(1982)	(2)	On 6 Halcon Class PCs
	Spain	2	F-30 Class	Frigate	(1981)			Negotiating
		6	Halcon Class	PC	1980	(1982)	(2)	
	Sweden	12	Spica Class	FAC	(1981)			Negotiating
	Switzerland	55	PC-7	Trainer	1978	1979	(2)	
						1980	(10)	
						1981	(18)	
						1982	(15)	
						1983	(10)	
	USA	(48)	Asroc	ShSuM	(1980)	1982	(48)	
		11	F-5E Tiger-2	Fighter	1980	1982	(5)	Total cost incl 2 F-5Fs: $115 mn
						(1983)	(6)	
		2	F-5F Tiger-2	Trainer	1980	1982	2	
		2	Gearing Class	Destroyer	(1980)	1982	2	

12 Morocco	Brazil	. .	EE-11 Urutu	APC	(1981)			Negotiating
		. .	EE-9 Cascavel	AC	(1981)			Negotiating
	France	. .	AML-90	AC	(1978)	1981	(20)	
						(1982)	(30)	
		108	AMX-10RC	Recce AC	(1978)	1980	2	
						1982	(10)	
		3	AMX-13 ARV	ARV	1981	1982	3	Saudi Arabian funding
		12	AMX-13 DCA	AAV	1981	1981	8	Saudi Arabian funding
						1982	4	
		16	AMX-155 Mk-F3	SPH	1981	(1982)	(16)	Saudi Arabian funding
		16	MM-38 Exocet	ShShM	(1978)	1981	(8)	Arming 4 Cormoran Class FACs
						1982	(8)	
		6	P-32 Type	PC	1976			On order in addition to 6 in service
		2	PR-72 Type	FAC	1976			On order in addition to 2 in service
		(400)	VAB	APC	(1979)	1979	(50)	Several versions
						1980	(100)	
						1981	(150)	
						1982	(100)	
	Germany, FR	(10)	Do-28D-2	Transport	(1979)	1981	(5)	
						1982	(5)	
	Italy	6	CH-47C Chinook	Hel	1981	1982	6	In addition to 6 in service
	Spain	4	Cormoran Class	FAC	1977	1981	2	Ordered Jun 1982; armed with Exocet ShShM
						1982	2	
		1	F-30 Class	Frigate	1977			Spanish designation: Descubierta Class
	USA	381	AGM-65B	ASM	1982			USA approved sale for use with 20 F-5Es; pending congressional approval
		. .	BGM-71A TOW	ATM	1980	1981	(96)	Arming 24 Model 500MD helicopters
						1982	(96)	delivered 1980-81
		7	C-130H Hercules	Transport	1981	1981	5	Ordered Jun 1981; first 5 delivered
						(1982)	(2)	Aug 1981
		40	M-163 Vulcan	AAV	(1979)			Status of deal uncertain
		108	M-60-A3	MBT	(1982)			
		3	Super King Air	Transport	(1981)	1982	3	Delivered May 1982
13 Mozambique	USSR	2	An-26 Curl	Transport	(1981)	1981	1	
						1982	1	
		(20)	MiG-21MF	Fighter	(1981)			USSR proposed new MiG-21 squadron
		1	Tu-134	Transport	(1982)			
14 Nicaragua	France	3	Alouette-3	Hel	1981	1982	3	Ordered Dec 1981; deal incl 2 patrol boats and a training programme
		2		PC	1981			

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
	USSR	2	Mi-8 Hip	Hel	(1980)	1982	(2)	Unconfirmed report of deliveries of helicopters and MBTs
		. .	MiG-21MF	Fighter	(1980)			1 squadron to be delivered; unconfirmed
		15	T-54	MBT	(1981)	1982	(15)	
		(10)	T-55	MBT	(1981)	1982	(10)	About 25 T-54/55s delivered
13 Niger	France	. .	AML-90	AC	1981			Unspecified number ordered Mar 1981
13 Nigeria	Austria	70	Steyr-4K 7FA	APC	(1981)	1982	50	
						1983	20	
	Brazil	(100)	EE-9 Cascavel	AC	1981			Designation unconfirmed; well over 100 ordered
	France	12	Alpha Jet	Adv trainer/strike	1979	1981	(6)	
						1982	(6)	
		12	Alpha Jet	Adv trainer/strike	1982			In addition to 12 in service
		70	AML-60	AC	1981	1982	70	
		28	AMX-30 Roland	AAV	1982	1982	28	
		3	Combattante-3B	FAC	1977	1981	1	
						1982	2	
		36	MM-38 Exocet	ShShM	1977	1981	12	Arming Combattante-3 Class FACs
						1982	24	
		595	Roland-2	Landmob SAM	1982			Total value incl 28 launch vehicles: $170 mn; contract signed Mar 1982
	Germany, FR	3	Do-128-2	Mar patrol	(1981)	1982	3	
	Italy	(16)	Aspide	AAM/SAM/ShAM	1982			Second order; arming Meko-360 destroyer
		6	G-222	Transport	1982			Ordered Jul 1982
		(25)	Palmaria 155/41	SPH	1982			
	Netherlands	2	F-27 Maritime	Mar patrol	1982			
	Sweden	(42)	FH-77 155mm	TH	(1982)			
	Switzerland	57	Piranha	APC	1981			
	UK	. .	Blowpipe	Port SAM	1981			Unspecified number ordered
		5	Bulldog-120	Trainer	1980			In addition to 20 in service; delivery delayed due to financial problems
		8	Lynx	Hel	1981			Ordered Nov 1981
		40	MBT-3	MBT	1981			Deliveries to start 1983
		75	Saboteur	APC	1982			
	USA	3	C-130H-30	Transport	1980	(1983)	(3)	Delivery of 2 rerouted to Algeria; revised order for 3 to be delivered to Nigeria early 1983

8 Oman	France	54	MM-40 Exocet	ShShM/SShM	1981	(1982)	(18)	Arming 3 Province Class FACs; 2 triple launchers on each vessel
		4	SA-330L Puma	Hel	1980			
	UK	. .	Blowpipe	Port SAM	1982			Ordered Dec 1982
		1		Support ship	1982			In addition to 1 delivered 1979
		35	Chieftain-5	MBT	(1981)	1981	(12)	Acc to unofficial reports; following interim lease of 12 Chieftain-5s from the UK delivered Nov 1981
		12	Jaguar	Fighter	1980	(1983)	(12)	Ordered Jul 1980; in addition to 12 in service
		1	Jaguar	Fighter	1982	1982	1	One out of 18 on loan to India sold to Oman
		1	Province Class	FAC	1980	1982	1	Ordered Mar 1980
		2	Province Class	FAC	1981			Ordered in addition to 1 already on order from Vosper Thornycroft; to be armed with MM-40 Exocet ShShMs
		(45)	Scorpion FV-101	LT	(1981)			Negotiating
	USA	. .	AIM-9P	AAM	(1980)			Arming 12 Jaguar on order from the UK
		2	C-130H Hercules	Transport	1981	1982	1	
						(1983)	(1)	
9 Pakistan	Argentina	. .	TAM	MT	(1982)			Negotiating
	China.	2	Hoku Class	FAC	1980	1980	2	
		. .	T-59	MBT	(1975)	(1978)	(50)	China has delivered about 50/year
						(1979)	(50)	
						(1980)	(50)	
						(1981)	(50)	
						(1982)	(50)	
	France	24	FT-337 Milirole	Trainer	1980			
		18	Mirage-3E	Fighter/bomber	1980			Offered in addition to 34 Mirage-3s and some 70 Mirage-5s in service
		32	Mirage-5	Fighter	1979	1980	(10)	
						1981	(10)	
						1982	(10)	
						1983	(2)	
		. .	R-530	AAM	1980	(1981)	(40)	Arming Mirage fighters
						(1982)	(40)	
						(1983)	(40)	
		(192)	R-550 Magic	AAM	1978	1980	(60)	Arming 32 Mirage-5s ordered 1979
						1981	(60)	
						1982	(60)	
						(1983)	(12)	
	Italy	100	SM-1019E	Lightplane	(1980)			Approved but not signed

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
	UK	1	County Class	Destroyer	1982	1982	1	Ex-Royal Navy 'HMS London'
	USA	1005	BGM-71A TOW	ATM	1981			Arming Cobra helicopters and M-901 AVs
		40	F-16A	Fighter/strike	1981	(1983)	(6)	First 6 to be delivered within a year of signing contract; partly paid for by Saudi Arabia; not incl in $3 200 mn aid package; Pakistan did not accept first batch due to lack of certain electronics
		64	M-109-A2 155mm	SPH	1981			
		34	M-109-A2 155mm	SPH	1982			In addition to 64 ordered 1981
		40	M-110-A2 203mm	SPH	1981			
		. .	M-113-A1	APC	(1978)			On order; 550 in service
		75	M-198 155mm	TH	1981			
		100	M-48-A5	MBT	1981			
		35	M-88-A1	ARV	1981			
		24	M-901 TOW	APC	1981			
		10	Model 209 AH-1S	Hel	1981			Deal incl TOW missiles, MBTs, ARVs, anti-tank vehicles and howitzers
		10	Model 209 AH-1S	Hel	1982			Second batch ordered Oct 1982; for delivery 1984
14 Panama	Spain	3	C-212-200	Transport	1981	1981	1	
						1982	2	
	USA	12	V-300 Commando	APC	1982	(1983)	(12)	First order for this vehicle
11 Papua New Guinea	Singapore	4		Landing craft	(1980)			
15 Paraguay	Brazil	10	EMB-110	Transport	1977			
		10	EMB-326 Xavante	Trainer/COIN	1979	1980	(3)	
						1981	(6)	
						1982	1	
		12	T-37A	Trainer	(1982)	(1982)	(12)	Unconfirmed
15 Peru	Canada	8	DHC-6	Transport	1982	(1983)	(8)	
	France	24	Mirage-2000	Fighter/strike	1982			24-26 aircraft ordered Dec 1982
		3	Mirage-5	Fighter	1981			Previously unannounced order
	Germany, FR	4	Type 209	Submarine	1976	1980	1	In addition to 2 delivered 1974-75; also designated Type 1200
						1981	2	
						1982	1	
	Italy	96	Aspide	AAM/SAM/ShAM	1975	1979	48	Arming Lupo Class frigates

		6	G-222	Transport	(1982)			Unconfirmed
		14	MB-339A	Trainer/strike	1981	1981	(4)	Deliveries to begin late 1981
						(1982)	(10)	
		96	Otomat-1	ShShM	1974	1979	48	Arming Lupo Class frigates
	Netherlands	7	Friesland Class	Destroyer	1980	1980	3	
						1981	3	
						1982	1	
	USSR	. .	Mi-24 Hind-D	Hel	1982			Small number ordered
		100	SA-7 Grail	Port SAM	(1978)			On order
		(150)	T-55	MBT	(1981)			
10 Philippines	Netherlands	3	F-27 Maritime	Mar patrol	1980	1981	2	Ordered Apr 1980
						1982	1	
	USA	55	LVTP-7A1	Amph ASSV	1982			US Letter of Offer Feb 1982; for Marine Corps; total cost incl spares and support equipment: $64 mn
		15	Model 205 UH-1H	Hel	1982			For troop transport; total cost incl spares and support equipment: $36 mn
		8	Model 500MD	Hel	1979	(1981)	(4)	Ordered Aug 1979
						(1982)	(4)	
		18	OV-10A Bronco	Trainer/COIN	1980			President Carter agreed to sell; production line to be re-opened
		10	V-150 Commando	APC	1982			
8 Qatar	France	3	Combattante-3	FAC	1980	1982	1	Ordered Sep 1980; cost incl Exocet missiles
		. .	Hot	ATM	1982			Total cost incl Milan ATMs: $20 mn
		. .	Milan	ATM	1982			
		14	Mirage F-1C	Fighter/interceptor	1980	1982	(7)	First 3 delivered Mar 1981
						(1983)	(7)	
		(50)	MM-40 Exocet	ShShM/SShM	1980			3 coastal defence systems ordered
		(24)	MM-40 Exocet	ShShM/SShM	1980	1982	8	Arming 3 Combattante-3 Class FACs on order from France
		. .	SA-330 Puma	Hel	1980			Unspecified number ordered
		(136)	VAB	APC	(1979)	(1980)	(46)	
						(1981)	(46)	
						(1982)	(44)	
	UK	8	Commando Mk-3	Hel	1981	(1983)	(8)	For ASW duties
		. .	Rapier	Landmob SAM	(1981)			1 bty ordered; option on more
	USA	. .	MIM-23B Hawk	Landmob SAM	1977			Unconfirmed order
8 Saudi Arabia	France	4	AMX-30 Shahine	AAV	1974	(1980)	(2)	
						(1981)	(2)	

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		53	AMX-30-30mm SA	AAV	1975	1979	(13)	
						1980	(13)	
						1981	(13)	
						1982	(14)	
		359	AMX-30B	MBT	1975	1976	(55)	Incl 57 AMX-30D and 12 BL versions
						1977	(55)	
						1978	(55)	
						1979	(55)	
						1980	(55)	
						1981	(55)	
						(1982)	(29)	
		(200)	AS-15TT	AShM	1980			Arming SA-365N Dauphin helicopters on 4 guided missile frigates
		(24)	AS-365N	Hel	1980			20 to be armed with AS-15TT; for use on 4 frigates on order from France
		(48)	Crotale Naval	ShAM	1980			First export order of naval version; arming F-2000 Class frigates
		4	F-2000 Class	Frigate	1980			
		. .	Mirage-4000	Fighter	(1983)			Developed with Saudi Arabian financial help; may order
		. .	MM-40 Exocet	ShShM/SShM	(1978)			Order unconfirmed
		(96)	Otomat-2	ShShM	1980			Arming 4 F-2000 Class frigates
		(96)	Shahine	Landmob SAM	1974	(1980)	(48)	Original contract covered 1 bty incl 1
						(1981)	(48)	radar unit and 4 launch units; deliveries completed; unconfirmed whether additional deliveries under way
		2	Durance Class	Support ship	1980			Fuel supply ship; displacement: 10 000t
	Italy	200	VCC-1	APC	1982			
	Spain	40	C-212A Aviocar	Transport	1979			From Indonesian production line
	UK	72	FH-70 155mm	TH	1982			Total Saudi requirement reportedly 200-300 FH-70s; unit cost: $750 000
		(40)	Hawk	Adv trainer/strike	1981			Unconfirmed
		8	SRN-6	Hovercraft	(1980)	1981	(2)	Mk 8 of the SRN-6 series; in addition
						1982	2	to 8 in service
	USA	916	AGM-65A	ASM	1979	(1981)	(458)	Proposed sale Dec 1979 to arm F-5 fighters; part of large package deal to Saudi Arabia
						(1982)	(458)	
		(240)	AIM-7F Sparrow	AAM	1978	(1982)	(50)	Arming F-15 fighters
		1177	AIM-9L	AAM	1981	1982	(200)	Arming F-15 fighters; not incl in initial contract

		(660)	AIM-9P	AAM	1979			Unconfirmed whether now replaced by AIM-9L
		9	As Saddiq Class	FAC	1977	1980	(3)	Ordered Feb 1977
						1981	(4)	
						1982	(2)	
		1000	BGM-71A TOW	ATM	1980	1981	(500)	Incl 50 M-110-A1 guided missile launchers; DoD proposed sale
						1982	(500)	
		2010	BGM-71A TOW	ATM	1982			Improved version; US Letter of Offer Apr 1982
		3	C-130H Hercules	Transport	(1981)	1982	3	
		5	E-3A Sentry	AEW	1981			Congress notified; the 4 USAF AWACS to be kept in Saudi Arabia until deliveries begin in 1985
		45	F-15A Eagle	Fighter/interceptor	1978	(1982)	(15)	Incl in US sales package to Middle East; approved Feb 1978; order incl 15 TF-15A trainers
		2	F-15C Eagle	Fighter	1980			DoD offered to sell; to be retained in USA until needed as replacement
		4	F-5E Tiger-2	Fighter	1982			Cost incl 10 RF-5Es and 1 F-5F: $350 mn
		1	F-5F Tiger-2	Trainer	1982			
		6	KC-135	Tanker/transport	(1981)			
		50	M-110-A1 203mm	SPH	(1980)	1981	(25)	Offered as launchers for TOW; cost incl 1 000 TOW missiles
						1982	(25)	
		18	M-198 155mm	TH	1981	(1982)	(18)	
		. .	MIM-43A Redeye	Port SAM	1977			On order
		10	RF-5E Tigereye	Recce	(1982)			
		(108)	RGM-84A Harpoon	ShShM	1977	1980	(36)	Arming 9 As Saddiq Class FACs
						1981	(48)	
						1982	(24)	
		15	TF-15A Eagle	Trainer	1978	1981	6	Incl in US sales package to Middle East; approved Feb 1978
						(1982)	(9)	
		579	V-150 Commando	APC	(1980)	1981	(100)	For modernization of National Guard
						1982	(100)	
13	Senegal	Canada	1	DHC-6 Srs-300	Transport	1981	1982	1	
		France	1	PR-72 Type	FAC	1979	1982	1	
			2	Rallye-180T	Lightplane	(1981)	(1982)	2	
			2	Rallye-235CA	Lightplane	(1981)	(1982)	2	
		Spain	2		PC	(1981)	1982	2	For Coast Guard; delivered Feb 1982
11	Seychelles	India	2	SA-316B Chetak	Hel	1982	1982	2	
		Italy	1		PC	(1981)	1982	1	Launched early 1982
		USSR	1	Zhuk Class	PC	(1981)	1982	1	In addition to 1 delivered 1981

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
10 Singapore	France	150	AMX-13	LT	1978	(1980)	(30)	
						(1981)	(30)	
						(1982)	(30)	
		6	AS-350 Ecureuil	Hel	1982			For Navy
		24	T-33A	Trainer	1979	1980	12	Ex-French AF
						1982	12	
	Italy	20	S-211	Trainer	1982			
		6	SF-260W Warrior	Trainer/COIN	1982			In addition to 6 delivered 1980
	UK	. .	Rapier	Landmob SAM	1981			In addition to 10 btys previously acquired
	USA	16	A-4P Skyhawk-2	Fighter/bomber	(1981)			Probably as attrition aircraft and for spares
		200	AGM-65A	ASM	1981			Total cost incl launchers: $26 mn
		. .	MIM-23B Hawk	Landmob SAM	1979			3 systems ordered Jul 1979
13 Somalia	Egypt	20	T-55	MBT	(1982)	1982	20	
	Italy	4	AB-212	Hel	1980	1982	(4)	First 2 delivered Feb 1982
		4	G-222	Transport	1979	1980	2	
						(1982)	2	
		6	SM-1019E	Lightplane	1980	(1982)	6	
	USA	431	BGM-71A TOW	ATM	(1981)	1982	431	Arming M-113-A1 APCs
		24	M-113-A1	APC	(1981)	1982	24	Armed with TOW ATMs
		(12)	M-163 Vulcan	AAV	1981			Order incl 3 TPS/43 defence radars; in exchange for US base rights in Berbera and Mogadishu
		. .	MIM-23B Hawk	Landmob SAM	1982	1982	(12)	Began arriving Aug 1982 as part of US emergency aid; designation unconfirmed
13 Sudan	France	15	M-3	APC	1981			
		10	SA-330L Puma	Hel	1978			Unconfirmed
	UK	10	BAC-167	Trainer/COIN	(1981)			Negotiating
	USA	2	C-130H Hercules	Transport	1979			Ordered Feb 1979; 6 C-130Es in AF use
		10	F-5E Tiger-2	Fighter	1979			
		2	F-5F Tiger-2	Trainer	1979	1982	2	Delivered to AF Oct 1982
		80	M-113-A2	APC	1980	1981	36	
						(1982)	(44)	
		50	M-60-A1	MBT	1979	1981	20	Ordered Feb 1979
						(1982)	(30)	

		2	V-150 Commando	APC	1982			
15 Suriname	Switzerland	4	BN-2A Islander	Transport	(1981)	1982	4	Delivered Mar 1982
	USA	6	Model 337	Trainer	(1981)			First military aircraft to Suriname since independence in 1975
8 Syria	Italy	18	AB-212ASW	Hel	(1982)			
		6	CH-47C Chinook	Hel	(1982)			
		12	SH-3D Sea King	Hel	(1982)			
	Libya	(20)	MiG-21F	Fighter	1982	1982	(20)	
		(15)	MiG-23	Fighter	1982	1982	(15)	
	USA	4	L-100-20	Transport	1980			
	USSR	. .	AA-2 Atoll	AAM	(1979)	(1979)	(48)	Arming MiG fighters now being delivered
						(1980)	(96)	
						(1981)	(96)	
						(1982)	(96)	
		. .	AT-4 Spigot	ATM	(1980)	(1981)	(50)	Captured by Israeli forces in Lebanon
						(1982)	(50)	
		(800)	BMP-1	MICV	1981	1982	(400)	Order reportedly incl 4 Nanuchka Class corvettes, 2 Tu-126 AEW aircraft, 700 122/152mm howitzers, 5 squadrons of MiG-23/25s and 4 squadrons of Su-22s; total value: $2 000 mn; Saudi Arabian funding
		2	Il-76 Candid	Transport	(1981)	1982	2	
		(200)	M-1973 152mm	SPG	1981	1982	(100)	Designation unconfirmed
		(500)	M-1974 122mm	SPH	1981	1982	(100)	Designation unconfirmed
		(30)	MiG-23	Fighter	1981	1982	(15)	2 squadrons
		. .	MIG-25RE	Recce	1981	1982	(20)	Unspecified number of new recce version reportedly delivered Apr-May 1982; some sources report 3 squadrons on order
		4	Nanuchka Class	Corvette	1981			
		(12)	SA-5 Gammon	SAM	1983	(1983)	(12)	
		. .	SA-7 Grail	Port SAM	1978	(1979)	(25)	
						(1980)	(25)	
						(1981)	(25)	
						(1982)	(25)	
		. .	SA-8 Gecko	Landmob SAM	1982	(1982)	(48)	Designation unconfirmed; part of upgrading of SAM network around major Syrian cities; deal incl MiG-27 fighter aircraft
		. .	SA-9 Gaskin	Landmob SAM	1978	(1980)	(48)	
						(1981)	(48)	
						(1982)	(48)	
		(60)	Su-22 Fitter-J	Fighter/ground attack	1981	1982	(30)	4 squadrons

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		(200)	T-62	MBT	1982	1982	(200)	Several hundred delivered after Lebanon War
		(500)	T-72	MBT	1980	1980	(200)	
						1981	(200)	
						(1982)	(100)	
		2	Tu-126	AEW	1981			
10 Taiwan	Netherlands	2	Zwaardvis Class	Submarine	1981			Contract signed Sep 1981
	USA	500	AGM-65A	ASM	1979	(1980)	(200)	
						(1981)	(200)	
						(1982)	(100)	
		1013	BGM-71A TOW	ATM	1980			DoD notified Congress; incl 49 launchers
		25	M-109-A2 155mm	SPH	1980			For delivery Mar 1983
		50	M-110-A2 203mm	SPH	1980	(1981)	(25)	
		267	M-113-A2	APC	1982			Order incl 164 APCs, 72 M-125-A2 mortar carriers and 31 M-577 CPCs
		280	MIM-23B Hawk	Landmob SAM	1980			Sale approved by Congress Oct 1980
		90	MIM-23B Hawk	Landmob SAM	(1980)			DoD notified Congress; in addition to 4 battalions already purchased; to enter war reserve
		284	Sea Chaparral	ShAM	1980			Pending congressional approval
13 Tanzania	Italy	2	CH-47C Chinook	Hel	1980	1982	2	On order; for delivery 1982
10 Thailand	Australia	20	N-22B Nomad	Mar patrol	1981	1982	2	Order signed Mar 1982; for delivery 1982-84
	Germany, FR	47	RFB Fantrainer	Trainer	1982			Joint venture incl local manufacture of some parts and assembly in Thailand; planned delivery schedule: 1984-7, 1985-22, 1986-18
	Indonesia	(25)	Bo-105CB	Hel	(1979)			
	Israel	3	IAI-201 Arava	Transport	1980	1980	1	For survey and ECM missions
						1981	1	
						1982	1	
	Italy	3		FAC	(1980)	1982	2	
						1983	1	
	Malaysia	2	F-5B	Fighter/trainer	1982	1982	2	
	Netherlands	3	F-27 Maritime	Mar patrol	1982			For delivery 1984; in addition to 11 in service
	Spain	1	F-30 Class	Frigate	1980			Unconfirmed

	UK	. .	Blowpipe	Port SAM	1981			On request after US refusal to sell Redeye SAMs
		. .	Blowpipe	Port SAM	1982			Additional batch ordered
	USA	2	C-130H-30	Transport	1981			Ordered Nov 1981
		148	M-113-A2	APC	1982			Total cost incl 40 trucks: $33 mn
		18	M-198 155mm	TH	1982			Congress notified; some sources report ordered number as 28; total cost: $17 mn
		20	MIM-43A Redeye	Port SAM	(1981)	1982	20	
		12	Model 205 UH-1H	Hel	1982			Total value incl spares and support equipment: $30 mn
		2	Model 412	Hel	1981	1982	2	
		8	OV-10C Bronco	Trainer/COIN	1980	(1982)	(2)	
		(94)	V-150 Commando	APC	1978	(1980)	(20)	Some sources report 164 on order
						(1981)	(20)	
						(1982)	(54)	
13 Togo	USA	1	L-100-20	Transport	(1979)			
11 Tonga	Australia	1		Landing craft	1982			
12 Tunisia	France	3	Combattante-3	FAC	1981			Armed with Exocet ShShMs
		(36)	MM-40 Exocet	ShShM/SShM	1981			Arming 3 Combattante-3 Class FACs
	USA	454	BGM-71A TOW	ATM	1978	(1981)	(150)	
						(1982)	(304)	
		1	C-130H Hercules	Transport	1982			US Letter of Offer Jul 1982; replacing old transport aircraft
		6	F-5E Tiger-2	Fighter	1982			
		6	F-5F Tiger-2	Trainer	1982			4 of 6 reportedly ordered late 1981
		19	M-109-A2 155mm	SPH	1981			Pending congressional approval
		26	M-163 Vulcan	AAV	1978	(1981)	(10)	
						(1982)	(16)	
		54	M-60-A3	MBT	1982			Congress notified
		(328)	Chaparral	Landmob SAM	1980	(1981)	(100)	
						(1982)	(228)	
13 Uganda	USA	3	Model 206B	Hel	(1982)	1982	3	
		3	Model 214B	Hel	(1981)	1982	3	
8 United Arab Emirates	Brazil	. .	EE-9 Cascavel	AC	1980			Ordered Oct 1980
	Canada	1	DHC-5D Buffalo	Transport	(1981)	1982	1	
	France	6	Alpha Jet	Adv trainer/strike	1982			Unconfirmed
		. .	AS-332	Hel	1982			Unspecified number; for Abu Dhabi

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
	Italy	. .	AB-212	Hel	(1981)			Unspecified number; for Abu Dhabi
		25	OF-40	MBT	1981	1981	(10)	Now being delivered
						(1982)	(15)	
		6	SF-260TP	Trainer	1982	(1983)	(6)	For Dubai
	Spain	4	C-212-200	Transport	1981	1982	4	For delivery end 1982
	Switzerland	14	PC-7	Trainer	(1981)	1982	14	For Abu Dhabi
	UK	30	Hawk	Adv trainer/strike	1982			First Middle East sale of the Hawk; 18 for Abu Dhabi, up to 12 for Dubai
		. .	Rapier	Landmob SAM	(1981)			
	USA	1085	BGM-71A TOW	ATM	1981			Total cost incl 54 launchers and 101 practice missiles: $28 mn
		2	C-130H-30	Transport	(1982)	(1983)	2	
		343	MIM-23B Hawk	Landmob SAM	1981			DoD intends to sell; total cost incl 7 launch units, support equipment and training: $800 mn
15 Uruguay	Argentina	8	IA-58A Pucara	Trainer/COIN	1980	1982	8	Order signed Nov 1980; unofficial reports that aircr arrived prior to Falkland/Malvinas conflict
	Austria	. .	Cuirassier	LT/TD	1980			Undisclosed number on order
	Belgium	15	Scorpion FV-101	LT	1980	(1982)	(15)	Sold from Belgian co-production of Alvis light tank
	France	3	Combattante-2	FAC	(1980)			Armed with Exocet ShShMs
		(12)	MM-38 Exocet	ShShM	(1980)			Arming 3 Combattante-2 Class FACs
	Korea, South	32	M-101-A1 105mm	TH	1981	(1982)	(32)	
	Spain	5	C-212-200	Transport	1980	1981	3	First delivered Jul 1981
						1982	2	
	USA	5	S-2G Tracker	Fighter/ASW	1982			
15 Venezuela	Brazil	4	AS-350M Esquilo	Hel	(1981)	1982	4	
	Canada	19	CF-5A	Fighter	1982	(1983)	(19)	15 fighters and 4 two-seat trainers
		1	DHC-7	Transport	(1981)	1982	1	Delivered Jul 1982
	France	(60)	Roland-2	Landmob SAM	1982			Approximately 10 launch units ordered; unconfirmed
	Germany, FR	2	Type 209	Submarine	1977			On order in addition to 2 in service
	Italy	(144)	Aspide	AAM/SAM/ShAM	1975	1980	(24)	Arming 6 Lupo Class frigates
						1981	(72)	
						1982	(48)	
		(8)	G-222	Transport	(1981)	(1982)	(2)	Finalizing contract

		6	Lupo Class	Frigate	1975	1980	1	Armed with Otomat and Aspide ShShM/ShAMs
						1981	3	
						1982	2	
		(48)	Otomat-1	ShShM	1975	1980	(8)	Arming 6 Lupo Class frigates
						1981	(24)	
						1982	(16)	
	Poland	5	An-2 Colt	Lightplane	1980			
	USA	2	C-130H-30	Transport	1981			
		18	F-16A	Fighter/strike	1981			Total cost incl 6 F-16B trainers: $500 mn; deliveries to start early 1984
		6	F-16B	Fighter/trainer	1981			
		2	Model 214ST	Hel	1981	1982	2	
8 Yemen, South	USSR	. .	MiG-23	Fighter	1980			Ordered Jun 1980; unconfirmed
		. .	T-62	MBT	1980	1980	(20)	Ordered Jun 1980
						1981	(20)	
						(1982)	(50)	
13 Zaire	France	(4)	AS-350 Ecureuil	Hel	(1981)	(1982)	(4)	Unconfirmed
	Italy	9	SF-260M	Trainer	(1982)	(1982)	9	Also designated SF-260MZ; replacing 9 in service
	Netherlands	4	F-27 Mk-500	Transport	1981			Ordered Feb 1981; unconfirmed
13 Zambia	USSR	3	Yak-40 Codling	Transport	(1982)	1982	3	
13 Zimbabwe	Italy	10	S-211	Trainer	1982			
	Spain	6	C-212-200	Transport	1982			For delivery 1983-84
	UK	8	Hawk	Adv trainer/strike	1980	1982	8	1 destroyed and 3 damaged in terrorist attack

Appendix 11C

Register of licensed production of major weapons in industrialized and Third World countries, 1982

This appendix includes licensed production of major weapons for which either the licence was bought, production was started, or production was completed during 1982. The sources and methods for the data collection, and the conventions, abbreviations and acronyms used, are explained in appendix 11D. The entries are made alphabetically, by licensee, licenser and weapon designation.

Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of production	No. produced	Comments
I. Industrialized countries								
11 Australia	UK	19	Fremantle Class	FAC	1977	1980	1	First ship delivered from UK; also designated PCF-420 Class
						1981	3	
						1982	3	
4 Belgium	USA	514	AIFV	MICV	1979	1982	(140)	Total number ordered: 1 189 incl 525 M-113s; unit cost: $100 000
		96	F-16A	Fighter/strike	1977	1979	14	
						1980	9	
						1981	16	
						1982	19	
		44	F-16A	Fighter/strike	(1983)			In addition to 116 on order
		20	F-16B	Fighter/trainer	1977	1979	4	
						1980	3	
						1981	3	
						1982	3	
		525	M-113-A2	APC	1979			
4 Canada	USA	. .	Seasparrow	ShAM/ShShM	1970	1979	(50)	
						1980	(50)	
						1981	(50)	
						1982	(50)	
5 Czechoslovakia	USSR	(1900)	T-72	MBT	1978	(1981)	(300)	
						(1982)	(300)	
4 France	USA	. .	FR-172K Hawk XP	Trainer	(1975)	1977	(25)	
						1978	(25)	
						1979	(25)	
						1980	(10)	

						1981	(10)	
						1982	(10)	
		..	FT-337 Milirole	Trainer	1969	1975	12	Designation: FTB-337 Milirole; exported to Africa
						1976	12	
						1977	12	
						1978	12	
						1979	10	
						1980	3	
						1981	(5)	
						1982	(5)	
4	Germany, FR	USA	6700	AIM-9L	AAM	1977	1981	(200)	For delivery 1981-87; NATO co-production programme
							1982	(1000)	
4	Greece	Austria	100	Steyr-4K 7FA	APC	1981	1982	(10)	Production started by Steyr-Hellas in Saloniki 1982; Greek designation: Leonidas; Greece may also produce recce and AAV versions
4	Italy	France	34498	Milan	ATM	1981			
			..	Roland-2	Landmob SAM	(1981)			OTO-Melara negotiating with Euromissile for licence production
		Germany, FR	..	Cobra-2000	ATM	1974	1974	(500)	
							1975	(1000)	
							1976	(1000)	
							1977	(1000)	
							1978	(1000)	
							1979	(1000)	
							1980	(1000)	
							1981	(1000)	
							1982	(1000)	
		USA	..	AB-205A-1	Hel	1969	1977	(120)	
							1978	(120)	
							1979	(120)	
							1980	(120)	
							1981	(60)	
							1982	(60)	
			..	AB-206B-3	Hel	1972	1978	(50)	
							1979	(50)	
							1980	(50)	
							1981	(50)	
							1982	(50)	
			..	AB-206B-LR	Hel	1978	1979	(50)	
							1980	(50)	
							1981	(50)	
							1982	(50)	

Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of production	No. produced	Comments
		. .	AB-212	Hel	1970	1979	(10)	In production since 1971
						1980	(10)	
						1981	(10)	
						1982	(10)	
		. .	AB-212ASW	Hel	1975	1978	(30)	Current production rate: 4-5/month
						1979	(30)	
						1980	(27)	
						1981	(48)	
						1982	(48)	
		(126)	CH-47C Chinook	Hel	1968	1977	(12)	Licence production began 1970
						1978	(12)	
						1979	(12)	
						1980	(12)	
						1981	(12)	
						1982	(12)	
		200	M-109 155mm	SPH	1968	1977	(18)	
						1978	(18)	
						1979	(18)	
						1980	(18)	
						1981	(18)	
						1982	(18)	
		. .	M-113-A1	APC	1963	1977	(150)	
						1978	(150)	
						1979	(150)	
						1980	(150)	
						1981	(150)	
						1982	(150)	
		500	Model 500MD	Hel	1976	1977	(12)	
						1978	(12)	
						1979	(20)	
						1980	(20)	
						1981	(20)	
						1982	(20)	
		. .	SH-3D Sea King	Hel	1965	1977	(12)	In production since 1969
						1978	(12)	
						1979	(12)	
						1980	(2)	
						1981	(2)	
						1982	(2)	

10 Japan	USA	. .	AIM-7E Sparrow	AAM	1972	1977	(90)	Total number produced for F-4E fighters: 700; to continue in production for use with F-15 Eagle fighters
						1978	(90)	
						1979	(90)	
						1980	(90)	
						1981	(90)	
						1982	(100)	
		1350	AIM-7F Sparrow	AAM	(1979)	1980	(50)	Arming F-15s
						1981	(100)	
						1982	(100)	
		500	AIM-9L	AAM	(1982)			
		100	F-15J Eagle	Fighter/interc	1977	1981	10	Order incl 88 fighter and 12 two-seat trainer versions; some 12 delivered directly from USA
						1982	13	
		(60)	KV-107/2A	Hel	1961	1977	4	
						1978	4	
						1979	4	
						1980	(18)	
						1981	(30)	
						1982	1	
		. .	MIM-23B Hawk	Landmob SAM	1978	1978	(100)	
						1979	(100)	
						1980	(100)	
						1981	(100)	
						1982	(100)	
		. .	Model 205 UH-1H	Hel	1972	1973	(5)	
						1974	(9)	
						1975	(9)	
						1976	(9)	
						1977	(9)	
						1978	(9)	
						1979	(9)	
						1980	(9)	
						1981	(5)	
						1982	(6)	
		54	Model 209 AH-1S	Hel	1982			First batch of 12 to be delivered by Fuji 1983-85
		. .	Model 214ST	Hel	1980			Joint production programme for military and civilian markets; agreement signed by Bell Textron and Mitsui in Oct 1980
		58	OH-6D	Hel	1977	1978	(12)	Identical to Hughes Model-500D
						1979	(12)	
						1980	(12)	
						1981	(8)	
						1982	(8)	

Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of production	No. produced	Comments
		42	P-3C Orion	ASW/mar patrol	1978	1982	(5)	
		. .	S-61B	Hel	1965	1977	(20)	
						1978	(30)	
						1979	(33)	
						1980	(10)	
						1981	(10)	
						1982	4	
		26	Seasparrow	ShAM	1980			Number ordered refers to systems
		51	SH-3B	Hel	1979	1981	(6)	
						1982	(8)	
4 Netherlands	USA	840	AIFV	MICV	1981			In addition to 880 in service; 173 will be M-901 TOW version; Dutch designation: YPR-765
		80	F-16A	Fighter/strike	1975	1979	(3)	
						1980	(15)	
						1981	(20)	
						1982	(20)	
		22	F-16A	Fighter/strike	1980			Order incl 18 F-16As and 4 F-16Bs
		18	F-16A	Fighter/strike	1981			
		12	F-16A	Fighter/strike	1982			
		22	F-16B	Fighter/trainer	1975	1979	(2)	
						1980	(4)	
						1981	(5)	
						1982	(5)	
		86	M-109-A2 155mm	SPH	(1980)	1981	(12)	First 6 delivered Jul 1981; Dutch Army already has 118 old M-109s
						1982	(50)	
5 Poland	USSR	. .	An-2 Colt	Lightplane	1960	1977	(200)	
						1978	(200)	
						1979	(200)	
						1980	(200)	
						1981	(200)	
						1982	(100)	
		. .	An-28	Transport	1978	(1982)	(50)	In large-scale production by 1982; planned production rate: 200/year
		. .	Mi-2 Hoplite	Hel	(1956)	1979	(200)	In production since 1957; 3000 built by end-1979
						1980	(200)	
						1981	(200)	

		(1900)	T-72	MBT	(1978)	1982 (1980) (1981) (1982)	(200) (50) (300) (300)	In production
4 Portugal	Netherlands	2	Kortenaer Class	Frigate	1981			On order; 1 to be delivered directly; 2 to be licence-produced
5 Romania	France	. .	SA-316B	Hel	1971	1977 1978 1979 1980 1981 1982	25 25 25 25 25 (25)	More than 200 produced by 1981
		99	SA-330 Puma	Hel	1977	1978 1979 1980 1981 1982	(20) (20) (20) (20) (19)	Production may continue with new model
	UK	25	BAC-111	Transport	1979	1980 1981 1982	(3) (3) (3)	Total cost: $410 mn plus $205 mn for licence production of Rolls-Royce Spey engine; 20 aircraft for Romanian AF
7 Spain	France USA	4 3	Agosta Class FFG-7 Class	Submarine Frigate	1975 1977	1982	1	Spanish designation: S-70 Class
7 Switzerland	UK	60	Rapier	Landmob SAM	1980			60 towed Rapier systems with Blindfire radar ordered
	USA	. .	FGM-77A Dragon	ATM	(1981)			Agreement reached Aug 1981; further details not specified
		38	F-5E Tiger-2	Fighter	1980			Order incl 32 F-5E fighters and 6 F-5F trainers; local assembly; in addition to 72 in service
4 Turkey	Germany, FR	. .	Cobra-2000	ATM	1970	(1981) (1982)	(100) (100)	Has 85 systems in use; current status of production programme uncertain
		13	SAR-33 Type	PC	1976	1978 1979 1980 1981 1982	(2) (2) (2) (2) (2)	Prototype delivered from FR Germany 1977 for trials; rest of building in Turkey
		(8)	Type 209	Submarine	1974	1982	1	Built under licence in addition to 4 delivered from FR Germany

Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of production	No. produced	Comments
4 UK	France	(50000)	Milan	ATM	1976	1979 1980 1981 1982	(1500) (3500) (5000) (5000)	
	USA	1709	AIM-9L	AAM	1977	1982	(100)	NATO co-production programme
		(8000)	BGM-71A TOW	ATM	(1981)			US government offer to UK Army
		. .	UGM-84A Harpoon	SuShM	(1980)			Arming Churchill Class submarines from 1982; will be built under licence from McDonnell-Douglas
1 USA	France	595	Roland-2	Landmob SAM	1974			Total procurement: 595 missiles and 27 launch units; to be procured by National Guard
	UK	(307)	Hawk	Adv trainer/strike	1981			BAe and McDonnell-Douglas will co-produce new trainer for US Navy
6 Yugoslavia	France	132	SA-342 Gazelle	Hel	1971	1978 1979 1980 1981 1982	(15) (15) (15) (15) (15)	New contract for version L signed Dec 1982

II. Third World countries

12 Algeria	USSR	4		FAC	1979			
15 Argentina	France	. .	VAB	APC	(1981)	1981	2	To be armed with Hot ATMs on order from Euromissile; receiving 2 prototypes for evaluation
	Germany, FR	6	Meko-140	Frigate	1979			Order incl 4 Meko-360 destroyers to be built in FR Germany
		220	TAM	MT	(1976)	1981 1982	(70) (100)	
		2	Type 1400	Submarine	1977			
		2	Type 1700	Submarine	1977			2 ordered directly from FR Germany; 2 to be licence-produced in Argentina

		300	VCTP	ICV	1976	1981	(25)	Similar to Marder MICV
						1982	(100)	
	USA	. .	Arrow-3	Trainer	1977	1981	(10)	Local development of licence-produced Piper aircraft; for use as military trainer
						1982	(10)	
		120	Model 500M	Hel	1972	1977	(15)	Assembly of knocked-down components
						1978	(15)	
						1979	(15)	
						1980	(15)	
						1981	(15)	
						1982	(15)	
15 Brazil	France	200	AS-350M Esquilo	Hel	1978	1979	(6)	10-year programme
						1980	(20)	
						1981	(20)	
						1982	(20)	
		30	SA-315B Gaviao	Hel	1978	1979	(3)	France owns 45% of new company; assembly of 30 over 10 years, most for civilian market
						1980	(3)	
						1981	(3)	
						1982	(3)	
		(6)	SA-330L Puma	Hel	1980	1982	(1)	
	Germany, FR	. .	Cobra-2000	ATM	1973	1975	(10)	In production for Army
						1976	(100)	
						1977	(200)	
						1978	(200)	
						1979	(200)	
						1980	(200)	
						1981	(200)	
						1982	(200)	
		4		Corvette	(1981)			To be built under licence in Brazil; possibly instead of 12 Maestrale Class from Italy
		1	Type 209	Submarine	1982			In addition to 1 purchased directly
	Italy	(79)	AM-X	Fighter/ground attack	1981			Joint production of new Italian fighter/ground attack aircraft; production to begin 1983
		3	Sauro Class	Submarine	1980			May be followed by 3 more
	USA	. .	EMB-Piper	Lightplane	1974	1975	(200)	EMBRAER/Neiva produces 12 types of Piper-designed light aircraft
						1976	(200)	
						1977	(200)	
						1978	(200)	
						1979	(200)	
						1980	(200)	
						1981	(200)	
						1982	(200)	

Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of production	No. produced	Comments
15 Chile	France	2	Batral Type	LST	1979	1981	1	Announced Jan 1980 in Chile
						1982	1	
	Switzerland	. .	Piranha	APC	1980	1981	(20)	Chile produces 4- and 6-wheeled versions
						1982	(50)	
	USA	134	PA-28 Cherokee	Trainer	1980	1981	(10)	Built by Indaer; Chile also produces
						1982	(30)	Piper-designed T-35 Pillan trainer and is assembling C-101 Aviojet trainers
		100	T-35 Pillan	Trainer	1980	(1982)	(5)	Deliveries to start 1983; production
						(1983)	(20)	rate: 20/year
15 Colombia	USA	. .	Cessna	Lightplane	1969	1973	65	By Feb 1980 Colombia had assembled a
						1974	93	total of 668 Cessna aircraft of
						1975	(90)	various types
						1976	(90)	
						1977	(90)	
						1978	(90)	
						1979	(90)	
						1980	(92)	
						1981	(90)	
						1982	(80)	
8 Egypt	UK	(5000)	Swingfire	ATM	1977	1979	(250)	
						1980	(500)	
						1981	(500)	
						1982	(500)	
9 India	France	140	SA-315B Lama	Hel	1971	1973	(6)	First 40 assembly only, then licence
						1974	(10)	production of 100 from local raw
						1975	(10)	material
						1976	(10)	
						1977	(10)	
						1978	(10)	
						1979	(10)	
						1980	(10)	
						1981	(10)	
						1982	(15)	
		. .	SA-316B Chetak	Hel	(1962)	1978	(15)	HAL has built 221 since 1965
						1979	(15)	
						1980	(15)	
						1981	(30)	
						1982	(20)	

	. .	SS-11	ATM	1970	1971	100	
					1972	500	
					1973	(1000)	
					1974	(1000)	
					1975	(1000)	
					1976	(1000)	
					1977	(1000)	
					1978	(1000)	
					1979	(1000)	
					1980	(1000)	
					1981	(1000)	
					1982	(1000)	
Germany, FR	(150)	Do-228-200	Transport	(1983)			
	2	Type 1500	Submarine	1981			Option on 4 more
UK	. .	Gnat T-2 Ajeet	Trainer	1978			Local development from licence-built Gnat; prototype flight-testing 1980-81
	89	Gnat-2 Ajeet	Fighter	1973	1976	(4)	Local development of licence-built Gnat; total requirement of some 100
					1977	(5)	
					1978	(10)	
					1979	(10)	
					1980	(20)	
					1981	(20)	
					1982	(20)	
	20	HS-748M	Transport	1972	1975	2	Programme to be completed by 1983
					1976	2	
					1977	2	
					1978	2	
					1979	2	
					1980	(3)	
					1981	(2)	
					1982	(2)	
	21	Jaguar	Fighter	1979	(1981)	(1)	Local assembly of components; licence production of a further 60 unlikely due to Mirage-2000 deal with France
					1982	3	
USSR	. .	AA-2 Atoll	AAM	1972	1973	30	Arming MiG-21s
					1974	60	
					1975	120	
					1976	120	
					1977	120	
					1978	90	
					1979	60	
					1980	(60)	
					1981	(90)	
					1982	(90)	

Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of production	No. produced	Comments
		(50)	MiG-21bis	Fighter	1976	1980	(10)	In addition to 100 previously assembled from kits
						1981	(15)	
						1982	(15)	
		. .	MiG-27	Fighter/ground attack	(1982)			Licence production rights offered
10 Indonesia	France	(8)	SA-330L Puma	Hel	1980	1982	3	
	Spain	92	C-212A Aviocar	Transport	1975	1976	(3)	New plant set up in 1976
						1977	(7)	
						1978	(7)	
						1979	(8)	
						1980	(8)	
						1981	(8)	
						1982	(10)	
8 Israel	USA	45	Dabur Class	PC	1973	1977	8	Licence production since 1977
						1978	8	
						1979	8	
						1980	(2)	
						1981	(2)	
						1982	(2)	
		1	Flagstaff-2 Cl	Hydrofoil FAC	1977			Option on 10 more
10 Korea, North	USSR	. .	MiG-21MF	Fighter	1974			First delivery was reportedly planned for 1978 but no information available
10 Korea, South	Italy	170	Type 6614	APC	1976	1977	20	Not yet in production in Italy
						1978	(20)	
						1979	(50)	
						1980	(50)	
						1981	30	
	USA	(68)	F-5E Tiger-2	Fighter	1980	1982	(3)	Incl a number of F-5F trainers
		. .	Model 500D	Hel	(1979)	1979	(50)	Some 100 delivered early 1980
						1980	(75)	
						1981	(75)	
						1982	(50)	

		. .	Model 500MD	Hel	1976	1978	10	
						1979	10	
						1980	(15)	
						1981	(15)	
						1982	(15)	
12	Libya	Italy	(160)	SF-260W Warrior	Trainer/COIN	1977		In addition to 80 purchased directly; new assembly plant constructed with Italian assistance; programme may be abandoned
14	Mexico	UK	15	Azteca Class	PC	1975	1979	(4)	
							1980	(4)	
							1981	(4)	
							1982	(3)	
9	Pakistan	Sweden	(117)	Supporter	Trainer/strike	1974	1977	(10)	
							1978	(15)	
							1979	(20)	
							1980	(20)	
							1981	(20)	
							1982	(20)	
		USA	. .	T-41D Mescalero	Trainer	1976			Planned production rate: 50/year
15	Peru	Italy	60	MB-339A	Trainer/strike	1981			Will include an unspecified number of MB-339K Veltro-2 modernized version
			2	Lupo Class	Frigate	1974			In addition to first 2 delivered from Italy
10	Philippines	Germany, FR	. .	Bo-105C	Hel	1974	1976	(9)	
							1977	(9)	
							1978	(9)	
							1979	(9)	
							1980	(9)	
							1981	(9)	
							1982	(9)	
13	South Africa	France	. .	Cactus	Landmob SAM	1974	1978	(100)	
							1979	(100)	
							1980	(100)	
							1981	(100)	
							1982	(100)	

Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of production	No. produced	Comments
	Israel	6	Reshef Class	FAC	1977	1978	1	To be built in Durban; in addition
						1979	1	to 3 previously acquired
						1980	2	
						1982	1	
	Italy	. .	Impala-2	Trainer/COIN	1974	1974	4	Also designated MB-326K
						1976	(12)	
						1977	(12)	
						1978	(12)	
						1979	(12)	
						1980	(12)	
						1981	(12)	
						1982	(12)	
10 Taiwan	Israel	(4)	Gabriel-2	ShShM	1977			Arming 2 Tzu Chiang Class FACs under construction in Taiwan
	USA	(212)	F-5E Tiger-2	Fighter	1973	1974	(2)	
						1975	(8)	
						1976	(16)	
						1977	(24)	
						1978	(48)	
						1979	(48)	
						1980	(24)	
						1981	(16)	
						1982	(14)	
						1983	(12)	
		30	F-5E Tiger-2	Fighter	1982			Total cost incl 30 F-5Fs: $620 mn
		(36)	F-5F Tiger-2	Trainer	1973	1974	(1)	
						1975	(3)	
						1976	(4)	
						1977	(4)	
						1978	(4)	
						1979	(4)	
						1980	(4)	
						1981	(4)	
						1982	(4)	
						(1983)	(4)	
		30	F-5F Tiger-2	Trainer	1982			

Appendix 11D

Sources and methods for the world arms production and trade data

This appendix describes the sources and methods used in the preparation of the SIPRI registers of world arms production and world arms trade. The registers, which are computerized, also constitute the base material for tables and figures presented in the world arms production and world arms trade chapters.

I. Purpose of the data

Together with the data for world military expenditure, the arms production and arms trade data form the nucleus of a comprehensive, quantitative and qualitative survey of world armaments. The arms registers show the origin, flow, costs and main characteristics of the major weapons now being acquired in all countries.

The arms production files include all the major weapons in production or under development in all countries of the world during a given calendar year. Arms production registers are published from time to time in the SIPRI Yearbooks.

The arms trade registers cover all major weapons on order or delivered to all countries during a given calendar year. Four registers are included in the Yearbooks: arms imports and licensed production for industrialized and Third World countries, respectively.

All countries are listed in the registers in alphabetical order; the world region to which each country belongs is indicated in the first column (for the key to the region code, see the conventions and abbreviations in section VI). The absence of a country from the registers means that no activity of the type indicated has been found for that country.

II. Definitions and criteria

The arms production and arms trade data cover the four categories of 'major weapons'—that is, aircraft, armoured vehicles, missiles and warships. Strictly speaking, all of these except missiles are potential 'weapon platforms', while missiles are part of 'weapon systems'. However, our use of the term 'weapon' or 'major weapon' by and large conforms with

general practice. The great majority of the aircraft, armoured vehicles and warships entered in the files are armed; as such, they constitute either the central component of a weapon system, which is generally identified by reference to that platform, or a major unitary fighting system.

In the arms production files, the criterion for selection of major weapon items is that of military application. However, some categories have been excluded from these files, such as aerobatic aeroplanes, harbour tugs and icebreakers.

In the arms trade registers, the criterion for selection of major weapon items is the identity of the buyer—that is, items either destined for or purchased by the armed forces of the buyer country.

The selection of entries for *aircraft* and *warships* presents no particular problems. If an item is purchased by or on behalf of the armed forces of the recipient country, it is included irrespective of type. The category *armoured vehicles* includes all types of tanks, tank destroyers, armoured cars, armoured personnel carriers, infantry combat vehicles as well as self-propelled and towed guns and howitzers. Military trucks, however, are not included. The category *missiles* is meant to include only guided missiles, although the distinction between missiles and rockets is sometimes unclear in the reference works used as sources. In principle, unguided rockets are not included.

All types of arms transfer are included—that is, direct sales, military aid, gifts, loans and grants. Weapons for police forces are as a rule not included. The entry of any arms transfer is made in accordance with the four-category division of major weapons. This means that when, for example, a missile-armed ship or aircraft is purchased, the missiles are entered separately in the arms trade register.

Dates and numbers

Both the order dates and the delivery dates for arms transactions are continuously being revised in the light of new information. The *order date* should ideally be the date on which the sales contract was signed. However, this information is often not available. Order dates given within parentheses, thus (*1980*), indicate either an estimated date or a preliminary date of order—for example, the known date of the decision to acquire a weapon. In order to enable the reader to follow the development of any given arms transaction, all the *delivery dates* are followed by a column of figures indicating the number of items delivered that year.

The exact number of weapons ordered as well as the number of weapons delivered per year may not always be known and may need to be estimated.

Such estimates are also given within parentheses. There are various aids for making these estimates: in the case of aircraft, the size of squadrons is usually known and this provides a relatively reliable basis for estimating the number of a new type of aircraft to be introduced. It is also possible to learn from the information on production of the weapon type in the supplier country how many of a certain type of aircraft can reasonably be expected to be exported in one year.

The number of missiles involved in one transaction poses the greatest problem in the arms trade data collection. The information is often limited to the bare fact that a certain missile system has been bought to arm a certain type of aircraft, warship or armoured vehicle. In such cases it is, however, possible to ascertain how many aircraft will be armed with the missile and how many launchers each aircraft has. But for estimating the exact number of missiles, a rule of thumb is used. It is assumed that there are at least three missiles per launcher: thus, if a new air-to-air missile is purchased for 30 fighter aircraft with two launchers per plane, the number of missiles will be $30 \times 2 \times 3$, or 180. The estimate of three missiles per launcher is also used for warships. Numbers of surface-to-air missiles are calculated primarily on the basis of the launcher—if it is a fixed platform, information is usually available on the size and equipment of a battery or an army battalion equipped with missiles. Numbers of small anti-tank missiles involved in arms transactions are calculated using an estimate of 20 missiles per launch unit.

III. The data collection

Reliability

The data in the arms production and trade files are collected each year from technical, commercial and military publications and journals as well as from a number of daily newspapers, reference books and other literature (see also section V). The common criterion for all these sources is that they are published and available to the general public. Thus, for each weapon project listed in the arms production registers and for each arms transfer listed in the trade registers, there is a wide variety of sources of information. The data and the sources are stored in the computer and can be displayed on request.

Before the data are published, judgement on the reliability of the various sources must first be made. As a rule, reports from one single source are not considered reliable enough; ideally, a minimum of five independent sources is required for a reliable report on one item of data.

The greatest difficulty is not, however, ascertaining the reliability of the data which are published and available, but rather the 'missing data'. Experience with this data collection has shown that, in time, all arms transactions are reported in the published literature, but it often takes a number of years before enough such reports appear, so that, for instance, the information on arms transfers for 1981 will not be sufficiently complete until 1982.

The data

The computerized data include the following.

(*a*) For the *arms production file:* weapon designation, weapon category, designing and producing country, weapon description, the time span for a weapon development project, technical data on weight, speed and range, manufacturing company, the number of weapons planned for production, production rate, the SIPRI value estimate (either for new, second-hand or refurbished weapons), the source for this estimate (see also section IV), and the year of licence if relevant.

(*b*) For the *arms trade file:* buyer, seller, weapon designation, weapon category, date of order, date of final delivery, status of the weapon (new, second-hand or refurbished), buyer and seller organization (for example, government, army, air force, navy, commercial), number ordered, terms of the deal (cash, credit, gift, military aid, loan, offset, arms for oil, illegal, licensed production), total and unit real sales price if available, and delivery years and numbers.

For each entry the source is noted. When the data base is fully computerized, for all countries from 1945 to the current year, a more detailed and useful analysis can be made.

IV. The value of the arms trade

The SIPRI system for evaluating the arms trade was designed as a *trend-measuring device*, to enable the measurement of changes in the total flow of major weapons and its geographic pattern. Expressed in monetary terms, this heterogeneous flow reflects both the quantity and the quality of the weapons transferred. Aggregated values and percentages are based only on *actual deliveries* during the year or years covered in the tables and figures in which they are presented.

SIPRI independently evaluated the arms trade by constructing a list of comparable prices in 1968 dollars, based on such actual prices as were known at that time and on such criteria as weight, speed and role of the

weapon. These criteria differ for each category of weapon. (The choice of base year is due to the fact that the SIPRI arms data collection was begun in 1968, at a time when very little published information was available on the prices of weapons.)

The monetary values chosen do not, therefore, necessarily correspond to the actual prices paid, which vary considerably depending on different pricing methods, the length of production runs, and the terms involved in individual transactions—the actual sales price for a given weapon system differs according to the buyer and the coverage of the deal. For instance a deal may or may not cover spare parts, training, support equipment, compensation and offset arrangements for the local industries in the buying country, and so on.

Furthermore, to use only actual sales prices—assuming that the information were available for all deals, which it is not—military aid and grants would be excluded, and the total flow of arms would therefore not be measured.

The 'pricing' of new weapons developed after 1968 is based on information from various producers on the so-called ex-factory unit cost or 'fly-away' unit cost for Western weapons. For weapons for which all price information is lacking, a comparison is made with a known weapon of the same type as regards performance criteria, and the weapon is valued accordingly. The final check of the reliability of this performance comparison is made by a military panel on which all the armed services are represented.

This means that the SIPRI valuation system is not automatically comparable to official economic statistics such as gross domestic product, public expenditure and export/import figures. However, this valuation system has served the purpose for which it was designed, particularly in the absence of other reliable national or international statistics on the flow of arms. The individual 'prices' are less essential to this valuation system than two other main considerations, namely, that the method of pricing is applied consistently and that the more sophisticated weapons are always given a higher value than the less sophisticated ones. The original price list, based on constant 1968 US dollars, was first inflated to reflect 1973 price levels and then to reflect 1975 price levels. The method used to obtain the factor needed was to construct a weighted index, using only three countries—the USA (60), the UK (20) and France (20)—as the major Western arms-exporting countries, and the wholesale consumer price index for the same countries. The factor arrived at for the 1973 values was 1.3 and for 1975, 1.7.

Each weapon obtains three separate values—new, second-hand and refurbished. Missiles, however, are only valued as new. Licensed production is included in the aggregated trade statistics and is valued in the same way

as the arms trade. For example, an F-15 fighter aircraft built under US licence in Japan has the same value as a US-built F-15 purchased by Japan. When a country first produces a weapon under licence (for example, US helicopters produced in Italy), this transaction is first calculated as an Italian import from the USA. When Italy then exports these helicopters, for example to Libya, this is calculated again, as a Libyan import. In such cases the same weapon is thus calculated twice, which has been found to be a better reflection of the actual transfer of military technology than other methods.

V. The SIPRI sources

The sources of the data presented in the registers are of five general types: official national documents; journals and periodicals; newspapers; books, monographs and annual reference works; and documents issued by international and intergovernmental organizations. The common criterion for all these sources is that they are open sources, available to the general public. The official national documents include budgets; parliamentary or congressional proceedings; reports and hearings; statistics, White Papers, annual reports and other documents issued by governments and agencies; and statements by governments officials and spokesmen.

The total number of sources regularly perused for data is at present about 200. The following sources represent a selection of the first-priority sources for the arms production and trade data.

Journals and periodicals

Afrique Défense (Paris)
Air et Cosmos (Paris)
Air Force Magazine (Washington)
Antimilitarismus Information (Frankfurt/M)
Asia Monitor (Hong Kong)
Aviation Week & Space Technology (New York)
Beiträge zur Konfliktforschung (Cologne)
Campaign against Arms Trade (London)
Current News (Washington)
Defensa (Madrid)
Defense & Economy World Report and Survey (Washington)
Defense & Foreign Affairs Daily (Washington)
Defense & Foreign Affairs Digest (Washington)
Defense Daily (Washington)
Defense Electronics (Palo Alto)
Défense & Armement (Lille)
Europa Archiv (Bonn)
Far Eastern Economic Review (Hong Kong)
Flight International (Sutton, UK)
Interavia (Geneva)
Interavia Airletter (Geneva)
International Defense Review (Geneva)
Internationella Studier (Stockholm)
Jane's Defence Review (London)
Keesing's Contemporary Archives (Bristol)
Latin America Weekly Report (London)
Marine-Rundschau (Stuttgart)

Maritime Defence International (London)
Middle East Review (New York)
Milavnews (Stapleford)
Military Technology (Cologne)
NACLA Report on the Americas (New York)
NATO's Fifteen Nations (Brussels)
Naval Forces (Aldershot, UK)
Navy International (Dorking, UK)
New Scientist (London)
News Review (Institute for Defense Studies & Analyses, New Delhi)
Osteuropa (Munich)
Science (Washington)
Soldat und Technik (Frankfurt/M)
Soviet Aerospace (Washington)
Soviet Military Review (Moscow)
Der Spiegel (Hamburg)
Tecnologia militar (Bonn)
Voennij Vestnik (Moscow)
Wehrtechnik (Bonn-Duisdorf)
World Missile Forecast (Ridgefield)
Österreichische Militärische Zeitung (Vienna)

Newspapers

Dagens Nyheter (Stockholm)
Daily Telegraph (London)
Financial Times (London)
Frankfurter Allgemeine Zeitung (Frankfurt/M)
Hsin Hua News (London)
International Herald Tribune (Paris)
Izvestia (Moscow)
Jerusalem Post (Jerusalem)
Le Monde (Paris)
Le Monde Diplomatique (Paris)
Neue Zürcher Zeitung (Zurich)
New York Times (New York)
Pravda (Moscow)
Svenska Dagbladet (Stockholm)
The Guardian (London)
The Times (London)
Washington Post (Washington)

Annual reference publications

'Aerospace Forecast and Inventory', annually in *Aviation Week & Space Technology* (McGraw-Hill, New York)
Defense and Foreign Affairs Handbook (Copley & Associates, Washington)
Interavia Data: Air Forces of the World (Interavia S.A., Geneva)
Interavia Data: Aircraft Armament (Interavia S.A., Geneva)
Interavia Data: World Aircraft Production (Interavia S.A., Geneva)
International Air Forces and Military Aircraft Directory (Aviation Advisory Services, Stapleford, UK)
Jane's All the World's Aircraft (Macdonald & Co., London)
Jane's Fighting Ships (Macdonald & Co., London)
Jane's Infantry Weapons (Macdonald & Co., London)
Jane's Weapon Systems (Macdonald & Co., London)
Jane's Armour and Artillery, C. F. Foss (Macdonald & Co., London)
'Military Aircraft of the World' and 'Missile Forces of the World', annually in *Flight International* (IPC Transport Press, Sutton, UK)
The Military Balance (International Institute for Strategic Studies, London)

VI. Conventions

The following conventions are used in the arms production and trade registers:

Conventions

.. Information not available
( ) Uncertain data or SIPRI estimate

Abbreviations and acronyms

AA	Anti-aircraft
AAG	Anti-aircraft gun
AALC	Amphibious assault landing craft
AAM	Air-to-air missile
AAV	Anti-aircraft vehicle
AC	Armoured car
Acc to	According to
ADV	Air defence version
Adv	Advanced
AEV	Armoured engineering vehicle
AEW	Airborne early-warning system
AF	Air Force
ALCM	Air-launched cruise missile
Amph	Amphibious vehicle/amphibian aircraft
APC	Armoured personnel carrier
ARM	Anti-radar missile
ARV	Armoured recovery vehicle
AShM	Air-to-ship missile
ASM	Air-to-surface missile
ASSV	Assault vehicle
ASuM	Air-to-submarine missile
ASW	Anti-submarine warfare
ATM	Anti-tank missile
ATW	Anti-tank weapon
BL	Bridge-layer
Bty	Battery
COIN	Counter-insurgency
CPC	Command post carrier
ECM	Electronic countermeasures
FAC	Fast attack craft (missile/torpedo-armed)
FSCV	Fire support combat vehicle
FY	Fiscal Year

Hel	Helicopter
ICV	Infantry combat vehicle
IDS	Interdictor/strike version
Incl	Including/includes
Landmob	Land-mobile (missile)
LAV	Light armoured vehicle
LSH	Heavy-lift ship
LST	Tank landing ship
LT	Light tank
Mar patrol	Maritime patrol aircraft
MBT	Main battle tank
MG	Machine-gun
MICV	Mechanized infantry combat vehicle
Mk	Mark
MPWS	Mobile protected weapon system
MRCA	Multi-role combat aircraft
MSC	Minesweeper, coastal
MSO	Minesweeper, ocean
MT	Medium tank
PC	Patrol craft (gun-armed/unarmed)
Port	Portable
Recce	Reconnaissance (aircraft/vehicle)
Repl	Replenishment
RL	Rocket launcher
SAM	Surface-to-air missile
SAR	Search and rescue
SC	Scout car
ShAM	Ship-to-air missile
ShShM	Ship-to-ship missile
ShSuM	Ship-to-submarine missile
SLBM	Submarine-launched ballistic missile
SPG	Self-propelled gun
SPH	Self-propelled howitzer
SSBN	Nuclear-powered, ballistic missile-equipped submarine
SShM	Surface-to-ship missile
SSM	Surface-to-surface missile
SuAM	Submarine-to-air missile
Sub	Submarine
SuShM	Submarine-to-ship missile
TD	Tank destroyer
TG	Towed gun
TH	Towed howitzer

Region codes

1 USA	9 South Asia
2 USSR	10 Far East
3 China	11 Oceania
4 NATO, excl. USA	12 North Africa
5 WTO, excl. USSR	13 Sub-Saharan Africa
6 Other Europe, Eastern[1]	14 Central America
7 Other Europe, Western[1]	15 South America
8 Middle East	16 International

[1] Regions 6 and 7 are given together as one region in the military expenditure data.

12. Soviet arms exports[1]

Square-bracketed numbers, thus [1], *refer to the list of references on page 369.*

I. Introduction

The Soviet Union is one of the two leading sources of arms supplies in the world. The USA and the USSR between them have supplied some two-thirds of all major weapons exported to Third World countries during the past five years. However, it is not easy to go beyond this crude general assessment to a more precise comparison of the two major suppliers. The problems of such a comparison are multiple.

There is a high degree of uncertainty about the basic data—the record of actual transactions. Information about Soviet arms exports is not derived from Soviet sources: the Soviet Union does not publish any such information. The public sources (which SIPRI uses) consist mainly of reports from recipient countries, or accounts in the large number of newsletters, journals and reference works which attempt to identify arms transactions and inventories. The SIPRI arms trade register is based on a careful study of these reports. The US government publishes its own estimates of the numbers of particular weapons which the Soviet Union exports: these are based on intelligence sources. However, the United States does not publish a register of transactions; the US figures consequently cannot be checked against a detailed record of transactions.

The simple comparison of numbers of weapons is not, of course, an adequate basis for comparison. It will tend to produce an exaggerated impression of the Soviet Union's export effort, since in general the level of sophistication of the arms exported by the Soviet Union is lower than that of the United States. This is not a minor point in estimating weapon sales. The real cost of a new generation of weapons tends to exceed the cost of the generation it replaces by at least a factor of two, and sometimes by as much as a factor of six. Estimates of the trade in tanks, for example, cannot simply be based on numbers, all given the same value.

Valuation of arms sales, again, is not an easy problem. The reported price of transactions will not serve the purpose: it is never easy to establish what is included in the price—the inclusion of spares and maintenance can double the price of a transaction, and sales may be made at subsidized prices. Comparisons of costs of production are virtually impossible to make, and in any case would raise all the problems of choosing an appropriate exchange-rate. The SIPRI approach is to attempt a process of

[1] This chapter was written by Ulrich Albrecht, Freie Universität, Berlin (West).

'weapon matching'; this approach, with the help of military advice, tries to find the Western weapon system most closely analogous to the Soviet weapon system, and the Western price is then used for the Soviet valuation. This approach avoids complications of cost assessment, or the choice of appropriate exchange-rates. Of course there is a significant margin of uncertainty. There is an element of 'military use value' in comparisons of this kind, and these are much disputed questions. Many of the users of Soviet armour report very favourably on their military utility [1]; however, a rather different impression is given in some reports of combat engagements with Western weapons.[2]

The relative size of US and Soviet exports of major weapons, both total exports and exports to the Third World, is discussed in chapter 11.

II. Soviet production and exports

The Soviet Union has, of course, a very substantial military–industrial base. The classic Pentagon statement reads as follows: "The Soviet and non-Soviet Warsaw Pact military industrial base is by far the world's largest in number of facilities and physical size. The Soviet Union alone produces more weapons systems in greater quantities than any other country" [2].

This is evidently true; however, there are a number of points to make on this statement. Sheer size says little: indeed, very extensive floor space can indicate low levels of productivity. The large number of units produced is partly a consequence of the Soviet preference for numbers rather than sophistication. Further, WTO military production is heavily concentrated in the Soviet Union. In NATO, the West European countries have much more substantial production facilities than the non-Soviet WTO (and the Soviet Union must consider Chinese and Japanese military output as well).

It is unfortunate that virtually all the information publicly available about the Soviet Union's armaments industry comes from official sources in the United States. There is no independent check, and there is a dearth of scientific literature, with no recent monographs about the Soviet arms industry.

Table 12.1 gives US intelligence estimates of Soviet production and trade for various military items over the five years 1977–81. This comparison gives some idea of the importance of exports. However, it should not be assumed that all items exported in this period were produced in this period; some may be older items, drawn from stocks or withdrawn from

[2] A test case was the recent war in Lebanon, where the Israeli use of Grumman E-2 Hawkeye airborne warning and control aircraft was apparently decisive in the defeat of Soviet anti-aircraft missiles.

Table 12.1. Exports and production of Soviet major weapon types, 1977–81

Type	Export	Total production	Ratio
Naval equipment			
Major naval combatants	32	55	1:1.7
Minor naval combatants[a]	181	260	1:1.4
Submarines	6	59	1:9.8
Army equipment			
Tanks and SP guns[b]	7 050	16 700	1:2.4
Other armoured vehicles	8 640	25 500	1:2.9
Air equipment			
Combat aircraft	2 520	6 450	1:2.6
Helicopters	915	3 750	1:4.1

[a] Including guided missile vessels.
[b] Including SP anti-aircraft guns.

Source: Computed from data in: *Allocation of Resources in the Soviet Union and China—1982*, Statement of Lt. General James A. Williams before the Subcommittee on International Trade, Finance, and Security Economics of the Joint Economic Committee (Defense Intelligence Agency, Washington, D.C., 29 June 1982).

Soviet use and refurbished. For example, it is known that in this period T-54 and T-55 tanks were still being exported, although they were no longer being produced. It could well be, therefore, that—if exports are of older models than those in production—the ratio of exports to production would be significantly lower in value than in numbers.

The export figures are of transfers to Third World countries only—intra-WTO transfers would of course raise the numbers. On the other hand, the output of other WTO countries, not included in the production data, may well be included in the export data. Intelligence services which identify a T-55 tank, say, in Libya are unlikely to be able to establish whether it was produced in the Soviet Union, Czechoslovakia or Poland.

The output of tanks in non-Soviet WTO countries is about one-quarter to one-third of that in the Soviet Union; the same ratio holds for other armoured fighting vehicles. However, there is probably no need for any significant adjustment to the other weapon categories. In sum, the 'export dependence' is probably between one-quarter and one-third for that part of Soviet military industry which produces conventional weapons.

According to the most recent US estimate, the Defence Intelligence Agency (DIA) reports that some $35 billion worth of Soviet military equipment was delivered during 1977–81. Sales contracts signed in 1981 reportedly totalled about $8 billion [3]. The Middle East–North African region is the main recipient of Soviet weaponry: deliveries are concentrated on Syria, Libya, Iraq and Algeria. The main customers outside this region are India, Cuba and Viet Nam. The Soviet Union has relatively

few recipients for its arms sales. The SIPRI arms trade registers (see appendices 11B and 11C), covering major weapons on order or under delivery in 1982, show that 26 countries currently buy arms from the Soviet Union. The corresponding figures for the USA and France, for example, are 73 and 56, respectively.

Syria recently concluded a $2 000 million deal with the Soviet Union. This contract reportedly includes five squadrons of MiG-23/25 fighters, four squadrons of Su-22s, two Tu-126 early-warning aircraft, 800 BMP vehicles, 700 howitzers, and four Nanuchka-class missile-armed corvettes. Syria is also taking delivery of SA-6/7/8/9 surface-to-air (SAM) missiles, and in January 1983 it was reported that Syria had taken delivery of 12 SA-5 Gammon long-range SAM missile canisters including electronic tracking and guidance equipment. This is the first reported delivery of the missile outside the USSR.

Libya has recently signed a major contract with the Soviet Union. The exact coverage of the deal has not been revealed. However, Libya has recently received MiG-23/25 fighters armed with advanced air-to-air (AAM) missiles, T-72 tanks, Nanuchka-class corvettes and Foxtrot-class submarines.

India is currently receiving some 95 An-32 transports, 85 MiG-23s, some 18 MiG-25s, and Nanuchka corvettes. Licensed production of the MiG-21 and the AA-2 Atoll AAM continues and it is reported that the Soviet Union has offered India licensed production rights for the MiG-27—to begin once the current MiG programme is completed. Items on order for India include Il-76 transport aircraft, SA-9 and Frog missiles, and Kashin-class destroyers. There are also unconfirmed reports of the imminent delivery of a batch of Mi-24 Hind helicopters—if so, a highly sensitive transfer due to its current use against the Afghan resistance.

Returning to the DIA figures in table 12.1, it is useful to compare them with the total of Soviet arms transfers over time. Estimates of the total number of Soviet military aircraft exported outside the WTO since the mid-1950s range from 6 000 to nearly 10 000. A transfer of 2 520 combat aircraft in the past five years suggests a rising trend. The SIPRI values of annual deliveries to the Third World (appendix 11A) lead to a similar conclusion. During the five-year period 1978–82, the total value of Soviet arms exports to the Third World—expressed in constant prices—was about double the value for the preceding five-year period.

III. The export of modern weapons

Many customers in the Third World now receive modern weapons as early as the Soviet forces themselves, and before other WTO countries.

The MiG-23 was transferred to Iraq, Syria, Egypt, Libya, Ethiopia and Cuba before other WTO countries received substantial numbers of the aircraft; Bulgaria and Czechoslovakia were the first recipients. (The MiG-23 appears to resemble the Tornado: when a Panavia team plotted the configuration of the Tornado against the MiG-23, the computer print-outs proved to be virtually identical.) India received the T-72 tank in the spring of 1979, again before other WTO countries. The same is true for the MiG-25—with sales to Algeria, India, Libya and Syria, while no deliveries to a WTO country have been reported as yet.

IV. Soviet arms trade policy

Policy is a difficult subject to analyse. Statements on policy are often not very helpful: the stance on policy has to be deduced from what governments do rather than from what they say. Policy is rarely monolithic—the product of a single idea, or of one person; it is almost always the composite consequence of a mix of determinants which vary in strength from time to time. It is often a committee product, and changes with the changing power of different parts of the bureaucracy.

This view of policy casts an initial doubt over the simple view sometimes put forward that Soviet arms trade policy is a straightforward expression of the strong Soviet drive for expansion, hegemony or for the spread of revolutionary doctrines: a product of a coherent expansionist geopolitical strategy. This view finds expression in, for example, the (US) *Air Force Magazine*, discussing Soviet arms sales to Peru in 1980:

> They offered bargain-basement prices, non-interest financing with a long grace period and up to forty years to repay, and a willingness to consider taking some of the price in commodities such as fish meal. . . . Americans and foreign experts always cite this Soviet willingness to grant virtual giveaway terms to prospective customers as a major reason for the USSR's export success. . . . Future trends in Soviet military aviation exports can be summarized very simply: 'More of the same'. . . . The exports will be aimed at serving Soviet expansionist goals, and to frustrate or displace Western influence. . . . The concessionary terms and giveaway prices will continue. . . . The same observers also note that the customer pays eventually, just as Dr Faust had to pay Mephistopheles: it may get modern aircraft cheaply or even free, but also takes on the risk of Soviet penetration and possibly eventual dominance. [4]

Against this rather simplistic view, there is a good deal of evidence to suggest that Soviet arms trade policy has been much less uniform and much less coherent than this. It is not difficult to show that the Soviet Union does not simply pour in arms wherever there is an opportunity. The regional distribution is marked by unevenness and massive local concentrations with little evidence of any strategic plan. Professor Uri Ra'anan comments: "Evidence is sparse that the USSR has been guided by a single, uniform

policy in its arms transfer transactions to different regions of the globe, over several distinct operational periods, and through the various generations of a rapidly evolving military technology" [5a].

Professor Schmiederer puts the point even more strongly: "There are no coherent criteria, and no evidence of a detailed strategy; there does not seem to be any consistent Soviet theory about the Third World" for those developing countries which are "under Soviet influence" [6a]. "The Third World with its array of new states is seen by the Soviet Union principally as empty space, as a hunting ground in the poker for power, as an inroad for influence, alliances, pacts . . . Soviet politics in the Third World have been and are opportunistic: they take what they can get." [6b] Soviet arms trade policy is pictured by these authors as being much more opportunistic, reacting to circumstances as they develop. These are some of the elements in this more complex picture of Soviet policy.

First, the regional distribution of Soviet weapons does not fit the hypothesis that this trade is mainly meant to serve the objective of world revolution; it is only necessary to consider some of the substantial arms deliveries which have been made to governments which suppress the Communist Party—for instance Egypt, Libya, Guinea and Algeria.

Second, it is no longer possible to neglect the commercial motives of Soviet arms sales. It is true that when the Soviet Union began to transfer arms to Third World countries, credit terms were very generous and payment could be made in cotton or some other national produce. Those days seem to have passed. Countries which buy modern Soviet arms now have to pay in cash, apparently hard currency, even if they are 'friends' in an emergency (during the 1973 October War, Egypt had to pay in cash for equipment brought in by Soviet airlift). The Soviet Union recalls only too well the enormous losses which it suffered from generous arms transfers. The cancellation of repayment by Egypt is estimated to have cost the Soviet Union $5 billion; the collapse of relations with Indonesia led to a loss estimated at $3 billion. Now transfers on generous terms appear to be the exception rather than the rule. It is estimated that military equipment accounts for more than 10 per cent of all Soviet exports; together with sales of energy and gold, arms sales are one of the main sources of hard currency.

Linked with this view that commercial motivation can no longer be neglected, there is the importance of looking at the demand side, as well as the supply side, to explain the pattern of export sales. The demand side often tends to be neglected, as if the supplying country could just supply arms to any country which it chose. It is difficult to see any strategic reason, for example, for the massive transfer of Soviet weapons to Libya, which has a population only a little greater than that of West Berlin, and which now appears to maintain a larger stock of main battle tanks

than the inventories of France and the UK combined. The most plausible explanation of these massive Soviet sales is quite simply that they earned hard currency. (Another reason is probably the possibility for Libya to re-export these weapons to third countries—countries with which the Soviet Union for various reasons does not want to have open arms trade links.) This is, of course, not to suggest in any way that commercial considerations are now dominant—merely that they are there. Obviously there are still strategic motivations and the desire, through arms sales, to establish a position of influence. Many commentators have pointed out that, compared with the Soviet Union, Western countries have many more instruments of policy to use in influencing Third World countries: their economic aid is much greater, and their commercial and financial ties are much more diverse. Third World countries are, in aggregate, massively in debt—not to the Soviet Union, but to Western banks.

Certainly arms sales are relatively a more important instrument of policy for the Soviet Union than for Western countries. However, the extent to which arms sales provide 'control leverage' is probably quite limited. It is too easy for a recipient country to turn to another supplier. In this study of Soviet arms sales to Egypt, Ra'anan comments on 'Soviet leverage' policy as follows:

> Undoubtedly, there have been such episodes in Soviet–Egyptian relations, and they may very well occur again. Nevertheless, there is a substantive difference between a Soviet tactic of "technical delays" in delivery schedules, shortfalls in spare parts and ammunition, and less than "all deliberate speed" in granting licenses for Egyptian indigenous assembly or production of Soviet hardware, on the one hand, and a full-scale, irreversible, de facto Soviet embargo, on the other. [5b]

V. The role of WTO allies

It does appear that there is a certain division of labour between the Soviet Union and its allies. It is left to the Soviet Union's main Third World ally—Cuba—to provide direct support to certain forces engaged in open military conflict. So far as other members of the WTO are concerned, it does appear that the main function they have been given is that of providing Third World countries with military instruction and training, based naturally on Soviet equipment.

Thus the German Democratic Republic has a substantial military aid programme, which overlaps closely—to the extent of about 90 per cent—with the Soviet clientele of 22 arms recipients in the Third World. The GDR's military aid also goes to countries in which the Soviet Union may not wish itself to play too prominent a role: for example, 65 per cent of the

countries receiving French military support also obtain military aid from the GDR.

In 1971 the "peace programme" of the 24th Party Congress of the Communist Party in the Soviet Union emphasized the commitment of the armed forces in the WTO countries to the liberation movements of the Third World. Thereafter, there has been a certain role differentiation in military training, along the following lines: artillery and tank equipment (Czechoslovakia); reconnaissance and air traffic control equipment (GDR); pilot and parachute training (Poland); and general infantry training (Hungary). However, the Soviet Union is still itself active in this field of training—judging, as usual, from US figures. These figures suggest that foreign military trainees in the Soviet Union from the Third World rose from 6 760 in 1977 to 11 200 in 1981; over the same period—still according to US figures—the number of Soviet military advisers and technicians abroad roughly doubled (from 10 615 in 1977 to 19 590 in December 1981).

The non-Soviet WTO countries appear now to have a smaller role than before in actual sales of major weapons. The main export area in which the WTO arms producers can play an independent role is the small arms sector. This technologically insignificant area, which has drawn little public attention, is expanding significantly. To the Soviet potential of some 400 000 infantry weapons produced annually, the output of other WTO producers should be added: their output of infantry weapons was, in 1976, 140 000; in 1977, 120 000; in 1978, 200 000; in 1979, 115 000; and in 1980, 100 000.

It is impossible to make any statement about how many of these small arms have been exported. There is no comprehensive study of the trade in small arms which could indicate the figures. Given the long lifetime of items such as rifles and machine-guns, and the lack of evidence of any major re-equipment programmes in the WTO, it seems highly likely that a substantial share of these hundreds of thousands of infantry weapons are exported.

VI. Soviet export licensing

Western arms manufacturers are increasingly licensing their production to Third World countries. The Soviet Union does not. It had been expected, when the Indian MiG-21 programme began, that this would start a new trend. This has not been the case: the Indian example remains one of a handful of exceptions to the rule.

Indeed, it seems that the production of modern major weapons is increasingly concentrated in the Soviet Union itself. In the earlier period,

East European factories had long production runs of MiG-21s (Czechoslovakia), T-54/55 tanks (Poland and Czechoslovakia), and many other military items. Poland now produces rather unsophisticated Mi-2 helicopters and An-2 and An-28 transports. The PZL plant also contributes to the manufacture of Soviet civil transport aircraft, notably the Il-76. The Czech factories turn out L-39 Albatross trainer aircraft. No Soviet follow-on aircraft, from the MiG or Sukhoi series of fighters, are now manufactured in Eastern Europe.

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   (a) —, p. 131.
   (b) —, p. 154.
6. Schmiederer, U., 'Die "weigen" Ziele Russlands, Hintergründe der gegenwärtigen sowjetischen Aussenpolitik', in *Weltpolitik, Jahrbuch für internationale Beziehungen* (Campus, Frankfurt a.M., 1981).
   (a) —, p. 60.
   (b) —, p. 53.

13. French arms trade: the economic determinants[1]

Square-bracketed numbers, thus [1], *refer to the list of references on page 389.*

I. Introduction

Economic considerations have had a powerful and pervasive influence on French Fifth Republic policy toward the transfer of arms and military technology. These may be seen to have evolved through two stages of development. The first period extends roughly from the inception of the Fifth Republic in 1958 until the internal upheavals of May 1968. During this initial phase, the economic rationale for foreign military sales was predominantly concerned with the search for ways to cut the costs of arms production, research and development. Arms sales were viewed as a means of lightening the burden of defence expenditure and so helping to meet the demand of French military forces for adequate supplies of suitable arms.

The second phase, which commenced with the Pompidou Administration in 1969, continues until the present. Emphasis is placed on transferring arms and technology as a contribution to public welfare. Cost-cutting measures, such as joint programmes with other countries to develop new arms, are still vigorously pursued, but these efforts are promoted within a larger policy framework that simultaneously seeks to respond to domestic economic imperatives through the sale of arms and technology to other states, particularly those in the Third World. Data are presented in this chapter to illustrate the economic importance of arms transfers for the French economy. They also help to explain why French arms sales behaviour has not appreciably changed despite the election in 1981 of a Socialist government and president who had previously expressed serious reservations about France's position as the world's third most important arms supplier.[2]

Since the late 1960s, France has been the foremost supplier of arms and military technology after the USA and the USSR. Successive Fifth Republic regimes on the right and the left have shown no serious interest, aside from periodic disclaimers, in the idea of relinquishing France's current position to other states [2]. Since 1960, France has transferred weapons and

[1] This chapter was written by Edward A. Kolodziej, Office of Arms Control, Disarmament and International Security, University of Illinois, Urbana, Illinois.

[2] See the remarks of François Mitterrand: "For the limitation of [arms] sales, the common programme [of the Socialist and Communist parties] has progressively envisioned a draconian measure: *the cessation of any sale of arms and war materials to colonial, racist, or fascist governments:* South Africa, Chile, Brazil, Argentina will be among the first proscribed . . . The Socialists are of the opinion that a reorientation of sales should equally be rapidly undertaken" [1]. Brazil and Argentina no longer fall under a Socialist embargo, nor has there been a reorientation of the arms trade under the Mitterrand government.

production know-how, covering all major categories of arms for ground, sea and air forces, to over 100 states around the world. In annual current prices, the total value of French arms and military technology delivered abroad between 1970 and 1980 is estimated at $26 billion.[3] Orders for new arms contracts reached a record total of $8.8 billion in 1980 [5].[4] This impressive level of effort reflects the view, shared by all Fifth Republic governments, that the transfer of arms and technology is a critical component of an overall economic strategy. This strategy has as its main elements the modernization of the French economy; the preservation of full employment, with particular emphasis on employment in sectors of advanced technology; the pursuit of economic growth; the importance of France's international competitive position, so as to avoid balance of payments deficits; the development of a global market for French goods; and adequate access to raw materials, especially oil.

II. Economic stages of arms transfer growth

Cutting costs and maintaining demand

The production of arms and the development of a large and complex defence industry in France after World War II were, and still are, responses to perceived external threats and security imperatives. Successive governments under the Fourth and Fifth Republics have viewed France's autonomous capacity to make and develop arms as an indispensable requirement to ensure its political independence and national security [6]. General accord on this requirement has been translated into a long-term commitment to construct a broadly based arms industry capable of furnishing (with some notable exceptions like air defence and battlefield control equipment) almost all the arms and related support equipment needed by French armed forces. These range from light arms and armour to combat vessels and supersonic aircraft. They also include nuclear weapons and their delivery systems.

The decision to maintain a military–industrial complex to meet France's security needs implies a major commitment of economic resources which is not easily shouldered by a middle-range power. The ability of the French economy to maintain such a complex industrial system at full employment is limited. On the other hand, for many weapons and weapon systems France's productive capacity exceeds the military requirements of

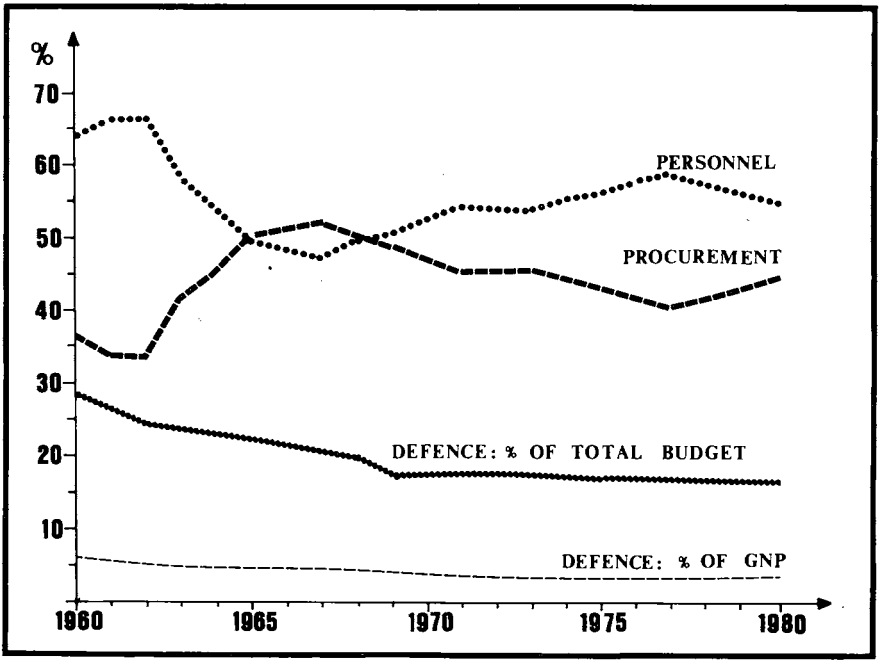
[3] Country figures are drawn from references [3, 4]; based on figures presented in table 13.2.
[4] The exchange-rate is drawn from figures supplied by the International Monetary Fund, with the franc quoted at 4.2260 for 1980. Orders for the first six months of 1982 totalled $3.8 billion (compared to the 1981 12-month total of $5.9 billion), not including the Mirage 2000 contract signed with India in late 1982.

its armed services. The introduction of five-year defence planning and budget cycles, begun in 1960, was designed to rationalize defence spending partly in terms of these broad resource parameters while assuring a steady flow of financial support for the equipment and modernization of France's armed forces [7]. Limits have had to be set, therefore, on the amount of resources that would be devoted to defence spending. Consequently, internal demand for arms has persistently fallen below the full employment requirements of the defence industry. The Fifth Republic has until recently devoted a steadily decreasing amount of the gross national product (GNP) and government spending to defence. Between 1960 and 1976 defence expenditures as a percentage of GNP have fallen each year from a high of 6.2 per cent of GNP in 1960, at the height of the Algerian War, to a low of 3.4 per cent in the three years immediately following the oil crisis of 1973. The quadrupling of oil prices in the aftermath of the Yom Kippur War placed a great strain on government spending. Defence, along with other sectors of the budget, had to absorb cuts to keep public spending under control and resist major inflationary pressures. Only with the initiation of the fourth defence law-programme in 1977 has defence spending as a percentage of GNP gone up. It has slowly climbed from 3.4 in the middle 1970s to 3.8 per cent of GNP by 1980 and may yet reach a targeted level of 4 per cent.

Defence spending, as a share of government spending, has clearly fallen below early projections. It was scheduled to rise to 20 per cent by the end of the fourth defence budget cycle in 1982. In fact defence expenditure, as a percentage of government spending, changed very little between 1969 and 1980, ranging from a high of 17.8 per cent in 1969 to a low of 16.8 per cent in 1979—a difference of only one point—despite the announced commitment of the Giscard d'Estaing government to an increase. Between 1960 and 1980, GNP and overall government spending (at constant 1959 prices) increased roughly tenfold; defence spending increased by only a little more than half as much [8] (figure 13.1).

The problem of sustaining sufficient internal demand for indigenously produced arms was further complicated by two other policy decisions. The first was the priority given to the development of a nuclear force. Even before the Algerian War ended, an increasing proportion of the procurement portion of the defence budget was reserved for nuclear arms and delivery systems. Programmes were established to develop atomic bombs of kiloton yields approximately three times the size of the Hiroshima explosion, to produce Mirage IV aircraft to deliver these weapons, to build an isotope separation plant at Pierrelatte to facilitate production of thermonuclear weapons, and to plan for the construction of a land-based deterrent composed of intermediate-range missiles. Spending for nuclear arms climbed rapidly to more than 50 per cent of French procurement in

Figure 13.1. Percentage of the French defence budget spent on procurement and personnel, and percentage of total budget and GNP spent on defence, 1960–80[a]



[a] There is considerable variation among official French sources and sources of other national and international agencies regarding French defence spending, the division of expenditures between personnel and capital purchases, total central government spending, and GNP. Compare official French sources over five years: France, Assemblée Nationale, Commission de la Défense Nationale et des Forces Armées, 'Avis sur le projet de loi finances pour 1978', No. 3150, *Défenses en Capital*, 1977, pp. 13–17; Commission des Finances, 'Rapport sur le projet de loi de finances pour 1980', No. 1292, *Défense: Considérations Générales*, 1979, pp. 27, 81, 108–10; Sénat, Commission des Finances, *Rapport Général: Défense*, No. 98, 1980, p. 7; and Ministère de Défense SIRPA, *Le Budget de la Défense National pour 1981* (Paris, 1981), pp. 5–7.

Defence expenditure from: 'Rapport', No. 1292, 1979, p. 81; percentage division personnel/capital expenditure for 1960–74 from: 'Avis', No. 3150, 1977, p. 17 (initial budget figures); and for 1975–80 from SIRPA, *Le Budget de la Défense National pour 1981*.

Central government expenditure percentages from: 'Avis', No. 3150, 1977, p. 16 (initial budget figures) for 1960–74; and Sénat, *Rapport*, No. 98, 1980, p. 7 for 1975–80.

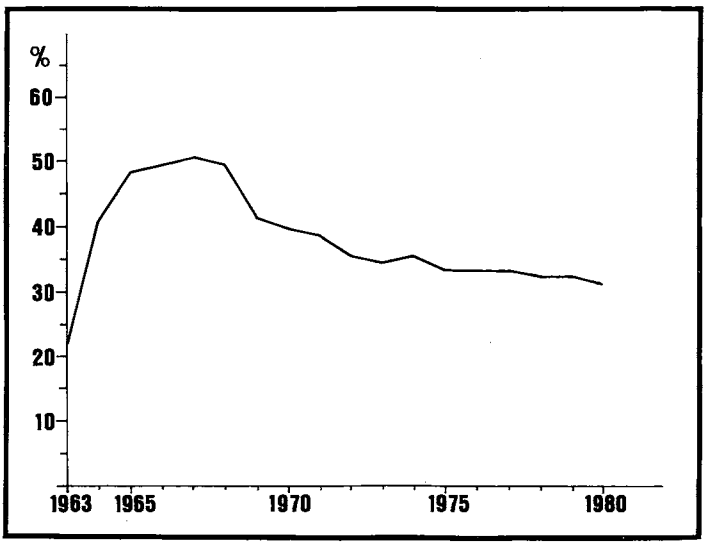
Percentage of GNP spent on defence, calculated in terms of defence budget, based on Sénat, *Rapport*, No. 98, 1980, p. 7 for 1960–80. Percentages rounded to nearest 0.1 per cent.

Exchange-rates from: IMF, *International Financial Statistics: 1977*, Vol. 21, No. 5, May 1977, pp. 166–67 and *1981*, May 1981, p. 152. Note discrepancies between IMF figures for GNP and those deriving from French parliamentary sources, which are lower. Differences partly due to different base on which GNP is calculated. Parliamentary reports depend on calculations for *produit intérieur brut*, a formula that generally leads to lower estimates of internal GNP.

These French sources conflict with other open sources for defence spending, GNP and central government expenditure. Compare with ACDA, *World Military Expenditures and Arms Transfers: 1970–1979* (GPO, Washington, D.C., 1982), p. 38; IISS, *Military Balance: 1982–1983* (London, 1982), p. 124; and SIPRI, *World Armaments and Disarmament, SIPRI Yearbook 1982* (Taylor & Francis, London, 1982), p. 150. The latter three sources generally cite higher ratios for defence spending relative to GNP and central government expenditure than does French Ministry of Defence or parliamentary reports.

For an alternative estimates of defence spending for 1945–76, see Martin, M., *Warriors to Managers: the French Military Establishment since 1945* (University of North Carolina, Chapel Hill, 1981), p. 54.

Figure 13.2. Expenditure on French strategic and tactical nuclear forces, 1963–80
Percentage of total procurement.



Sources: France, Assemblée Nationale, Commission de la Défense Nationale et des Forces Armées, 'Avis sur le projet de loi de finances pour 1978', No. 3150, *Défense: Dépenses en Capital*, 1979, pp. 22–23; Commission des Finances, 'Rapport sur le projet de loi de finances pour 1979', No. 570, *Considérations Générales et Dépenses en Capital*, 1978, p. 84; Commission des Finances, 'Rapport sur le projet de loi de finances pour 1980', No. 1292, *Défense: Dépenses en Capital*, 1979, p. 22.

1967, before levelling off at approximately one-third of equipment and capital purchases during the 1970s (figure 13.2). The significance of this level of expenditure for nuclear arms is that procurement of non-nuclear arms and equipment was neglected. Purchase of conventional arms was arrested at the very time that French strategy was calling for a fundamental reorganization and modernization of French armed forces in the wake of the momentous decision to abandon a century-old policy of colonial empire in favour of a nuclear deterrent posture. To maintain efficient arms production, orders for non-nuclear arms had to be sought abroad to compensate for lagging domestic demand and the priority assigned to nuclear weapons, which would not be sold to foreign governments for obvious reasons.

Adding to the difficulty of sustaining sufficient demand to keep France's arms industry at efficient levels of operation was the domestic upheaval of the late 1960s, commencing with the May riots of 1968. This forced the de Gaulle and, later, the Pompidou governments not only to allocate more resources for civilian welfare programmes, symbolized by the Grenoble accords of spring 1968 to increase wages, but also to shift priorities within the French budget in favour of spending on personnel, that is, military welfare at the expense again of military procurement, particularly non-nuclear weapons.

These varied constraints—decreasing defence spending as a percentage of GNP and government expenditures, the priority assigned to nuclear weapons, and the demand of the public and defence forces for more spending on civilian and military welfare—set in train pressures to reconcile these broad welfare imperatives with perceived security needs by increasing the amount and the sophistication of arms and technology sold abroad. By the late 1960s, France rose to third place among arms suppliers. Its rise was indirectly fostered by the preoccupation elsewhere of its potential competitors. US arms production was concentrated on meeting the demands of the Viet Nam War. Under the Labour government, Great Britain temporized for almost a decade over the decision whether to follow France's decision to pursue an aggressive arms sales programme abroad. FR Germany and Japan, as defeated powers, faced political and psychological barriers in responding to the rising global demand for arms. Besides, they were so successful in penetrating foreign civilian markets that they were little concerned with the search for arms outlets. The elite corps within the *Délégation Générale pour l'Armement* (DGA), responsible for directing France's arms industry, developed a global market network to sell arms.[5] Within the DGA the *Direction Internationale*, charged with overseeing the process by which arms sales are authorized, also assumed the role of France's foremost agent to discover, develop and promote arms sales abroad. French diplomatic missions stationed in countries around the world were enlisted into the sales service. A large, specialized technical office was established in Washington to assist potential arms clients. Government corporations were established to promote arms sales. Advantageous credit arrangements, often at concessionary rates, were made available through such organizations as COFACE to facilitate arms contracts. These wide-ranging efforts were given official sanction in the only White Paper issued on defence policy under the Fifth Republic. Increased arms sales were justified in the name of economic efficiency: "One has already noted the advantages of exports: a better balance of production scheduling, an increase of quantities produced, and therefore a spreading of fixed costs over longer series runs . . ." [10].

These general economic considerations have been extended to the development of joint research, development and production arrangements with other arms producers. Such programmes have also been viewed as a way of lowering the overall national costs of developing new systems, of keeping pace with innovation in military technology, and of creating ready-made markets for arms through guaranteed arms purchases by the co-operating states. These incentives have proved powerful enough to overcome the reluctance of French governments, which have always

[5] For a description of the structure of the French arms industry, consult reference [9].

preferred national, autonomous development of weapons to co-operation with other states. French rhetoric is not a good guide to French arms production behaviour. On a pragmatic, weapon-by-weapon basis, France has signed more contracts to promote specific arms projects of interest to French armed forces than has any other country. These have been pursued principally with other European states, especially FR Germany and Great Britain. France has also joined the Independent European Programs Group (IEPG) within the Atlantic alliance in order to promote joint weapons development, although it still refuses to return to NATO or participate in the Eurogroup, whose aim is to define European interests within the alliance.

Table 13.1 summarizes the major weapon programmes that have been undertaken with other states, under the Fifth Republic. The list is confined to projects for joint design, development and production. These are distinguished from contracts to transfer military technology, know-how, production services and equipment to arms recipients as part of France's military sales activity. These elements now form a larger proportion of French sales contracts than a decade ago, as weapon recipients insist increasingly, in their purchase of arms, on access to weapon design, production, licences and technical assistance to build their own arms complexes.

The same pragmatic attitude which characterizes French acceptance of the principle of international co-operation in developing weapons has been carried over to the creation of organizational mechanisms in contract execution. In some cases, separate corporate structures have been established. These include *Euromissile* (Aérospatiale and Messerschmitt–Bölkow–Blohm, MBB), *Société Européenne de Production de l'Avion Ecole de Combat et Appui Tactique* (or SEPECAT, composed of Dassault–Bréguet and British Aerospace) and *Société Européenne de Téléguidage* (or SETEL, forming a European consortium under the leadership of Thomson–Houston). Bilateral arrangements have also been used. These include accords between Dassault–Bréguet and Dornier to build the Alpha Jet, between Matra and British and Italian firms to develop tactical missiles, and between Aérospatiale and Turboméca and several British firms to produce the Lynx, Puma and Gazelle helicopters. It is somewhat ironic that the British government contributed one-sixth of the cost of developing the Exocet missile, which was successfully employed against the British fleet in the Falklands/Malvinas war (see also chapter 16). In addition to these established programmes, France is also currently pursuing co-operative research on at least nine other weapon systems with FR Germany, Great Britain and the United States.[6]

[6] These include: with FR Germany, a combat tank, a sea-to-sea missile and a combat helicopter; with the UK, an anti-missile surface missile; with the USA, the Roland system; with the FRG and the UK, an anti-tank missile and a medium-range ground-to-air missile; and with all three countries, a multiple rocket launcher and the development of weapon families [11a].

Table 13.1. Selected joint military development and production programmes between France and other European states

Programme	Co-operating nations	Contracted or start of study[a]	Service
Aircraft			
Atlantique naval patrol aircraft	FRG, UK, Belgium, Netherlands	1960	Navy/Air Force
Transall	FRG	1959	Air Force
Jaguar dual-purpose training and attack aircraft (various models)	UK	1964	Air Force
Alpha Jet trainer	FRG	1969	Air Force
Helicopters			
Puma[b]	UK	1967	Air Force/Army
Gazelle	UK	1967	Air Force/Army
Lynx	UK	1967	Air Force/Army
Missiles[c]			
Martel ASM anti-radar (AS.37) TV-guided version (AJ168)	UK	1963	Air Force/Navy
Milan anti-tank missile (mid-range)	FRG	1963	Army
HOT anti-tank (long-range)	FRG	1964	Army
Roland I (clear-weather) and II (all-weather) SAM	FRG	1964	Army
Otomat (SSM, ASM) (several successive versions)	Italy	1969	Navy
Hawk SAM missile[d]	Italy, FRG, UK, Netherlands	1960	Army
Ground equipment			
Ratac, radar-controlled artillery	FRG	—	Army
Rita, communications system	Belgium	—	Army
Argus, observation platform	FRG	—	Army
Naval vessels			
Minesweeper	Belgium, Netherlands	—	Navy

[a] The sources are not always clear on these two points, i.e., whether a signed accord signifies an immediate start of a programme.
[b] Design is French; production essentially licensed by France to Great Britain.
[c] Exocet air-to-surface and surface-to-surface naval missiles developed by French with financial support from Great Britain.
[d] Licensed for the USA under NATO arrangements.

Sources: Various sources have been consulted. The most important are: the annual review of world armaments issued by SIPRI, *World Armaments and Disarmament, SIPRI Yearbooks*; *Jane's All the World's Aircraft* (Macdonald, London, 1959–75); 'Defense marketing systems', *Foreign Military Markets, France* (Greenwich, Conn.); and France, Assemblée Nationale, Commission de la Défense Nationale et des Forces Armées, 1974, 'Avis sur le projet de loi de finances pour 1975', *Défense: Dépenses en Capital*, No. 1233, pp. 93–96, and 1981, *Avis, Défense: Politique de Défense de la France*, No. 473, pp. 122–23.

Arms supply and welfare

France entered a new arms marketing phase in the 1970s. The shift was gradual and imperceptible at first. In the first phase, the object was to lower the burden of the defence budget and the high fixed costs of maintaining a large and complex arms system. These pressures focused on several economic targets at the same time: large series runs to cut unit costs, full employment of productive resources, the expansion and periodic modernization of the nation's arms production base, and foreign support for research and development. In this initial phase the main concern was the effective utilization of largely fixed factors of production to furnish arms required by national forces. Sales abroad maintain demand for weapons at levels approaching full and efficient employment of productive resources.

As the French arms industry has matured and as it has successfully developed a global market for its products, arms are treated like any other goods or service that can be exchanged to benefit public and private welfare. Considerations that loom large in this phase are concern for the state's balance of payments position, the price of weapons and terms of international trade and competition, access to markets and raw materials, creation of new markets for the sale of arms, product leadership in arms sales to penetrate civilian markets, economic growth and investment opportunities.

The economic benefits of arms transfers are seen as sources of socio-political stability. The sale of arms and technology abroad assumes a life of its own, progressively detached from the foreign policy and strategic objectives that initially prompted the decision to develop weapons indigenously. Arms are no longer tools of national defence but commodities in international trade and instruments of economic growth. Previous concerns with sustaining demand and cutting costs are not abandoned or necessarily neglected. Rather, they are overtaken by commercial, public welfare and private profit motives that drive the sale of military arms and technology forward. Claims are made, furthermore, that the production and sale of arms have civilian spin-offs that create new employment and foreign markets. The choice traditionally posed between defence spending (guns) and public welfare (butter) is changed. The emphasis is no longer on selling arms abroad to relax this tension between guns and butter. This phrasing of the problem, which underlay the initial development of the French arms industry, has been recast in the form of public welfare *because* of arms; that is, more butter *because* of guns.

Socialist Minister of Defence Charles Hernu captured much of the spirit of this welfare orientation of arms sales in an interview given to *Le Figaro* in September 1982:

Charles Hernu: I am always surprised when people talk about arms sales in that reproachful tone. People forget that the defense minister is not only responsible for military personnel. Out of 720,000 people who work for the Defense Ministry, there are 143,000 civilians and 90,000 arsenal workers. In addition, there are the armaments enterprises—the National Aerospace Industry Company, Thomson–CSF, Dassault, Renault Industrial Vehicles, Panhard and the Saint-Etienne Arms Company employ 300,000 workers and engineers. As for subcontracting, do you know how many it employs? One million!

Christine Clerc: Those figures are all very convincing, but why were they ignored for so long? In opposition, Pierre Mauroy expressed indignation that France had become the third biggest arms exporter in the world. And yet we have advanced . . .

Charles Hernu: I would like to remind you of the arms industries' contribution to research. Do you know that we are the envy of the Americans in the sphere of lasers, carbon fibers, and the detection of submarines and nuclear weapons? Do you know that Thomson–CSF is one of the world's leading exporters of advanced military technology? Do you know that we are making great strides in research on infra-red night sights? At the 14 July parade nobody noticed that the helicopters were flying at night. However, that is a considerable advance.

Christine Clerc: What about you? Did you know all that before you took office?

Charles Hernu: No. As mayor of Villeurbanne I was unaware that there was a factory in my own city manufacturing carbon fiber elements. [12a]

Table 13.2. French arms transfers related to exports, oil imports and commercial balances, 1970–80

Figures are in US $ billion.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Exports	17.9	20.6	26.1	35.9	45.9	52.2	55.8	63.5	76.4	97.5	116.1
Of which arms exports	0.4	0.5	0.8	1.2	1.4	1.9	2.4	3.0	3.8	4.8	5.8
Arms deliveries/ exports (per cent)	*2.2*	*2.4*	*3.0*	*3.3*	*3.0*	*3.6*	*4.3*	*4.7*	*5.0*	*4.9*	*5.0*
Imports	19.1	21.3	26.9	37.3	52.8	54.2	64.5	70.4	81.5	107.6	130.4
Of which oil imports	1.7	2.2	2.7	3.5	9.9	9.7	11.5	11.9	12.0	17.2	26.2
Arms deliveries/ oil imports (per cent)	*23.5*	*22.7*	*29.6*	*34.3*	*14.1*	*19.6*	*20.9*	*25.2*	*31.7*	*27.9*	*22.1*
Balance: exports and imports	−1.2	−0.7	−0.8	−1.4	−6.9	−2.0	−8.7	−6.9	−5.1	−10.1	−14.3
Deficit without arms sales	−1.6	−1.2	−1.6	−2.6	−8.3	−3.9	−11.1	−9.9	−8.9	−14.9	−20.1

Sources: For 1970–79, see France, Assemblée Nationale, Commission des Finances (1980), 'Rapport sur le projet de loi de finances pour 1981', No. 1976, *Défense: Considérations Générales—Dépenses en Capital*, p. 196. For 1980, consult Commission de la Défense Nationale et des Forces Armées (1981), *Avis sur le Projet de Loi de Finances pour 1982*, No. 473, p. 119; and International Monetary Fund, *International Financial Statistics*, July 1982, pp. 166–69, for export, import figures and exchange-rates. See also same source, May 1977, pp. 166–69, for remaining exchange-rates.

The sale of arms and military technology has therefore become a critical component of French economic activity (table 13.2). Proposals to check or reduce such sales imply, at least in the short run, either the creation or discovery of new outlets for goods and services in the civilian sector to compensate for losses in military sales, or absorption of these losses in business activity and employment for the sake of arms control and disarmament objectives. Neither the announced policy of the Socialist government nor the economic realities with which it must currently deal suggest that there will be any downturn in the current level of arms transfers. Exports of French products, including arms, have increased approximately 550 per cent between 1970 and 1980. Arms exports, meanwhile, have increased at twice that rate. While general exports in constant 1969 francs approximately doubled in the 1970s, arms exports in the same period quadrupled [13]. These arms exports are largely in advanced technology sectors. The value added to these products through indigenous production is, therefore, substantial. It is precisely in these areas of major capital exports that France has lagged behind its principal competitors in the developed world, including the United States, Japan, FR Germany, the United Kingdom and Italy. French arms sales are a motor force of overall French exports and constitute a large share of all deliveries of heavy equipment and advanced technology items.

At this point in its industrial development France enjoys a comparative advantage in military sales markets. Its commercial success is partly due to the lethality and effectiveness of its military products. They have been tested in several wars, including those in South Asia (India and Pakistan), the Middle East (Israel and the Arab states, and Iraq and Iran) and the South Atlantic (Argentina and the UK). French equipment is now found in the arsenals of rival combatants, as was the case, for example, of Exocet missiles, possessed both by Argentina and the United Kingdom.

France also enjoys several political advantages over its competitors in selling arms and military technology. First, unlike the USA and the USSR, its sale of arms does not immediately ensnare a client into the web of entangling politico-security relations implied by military assistance from the United States or the Soviet Union. The French are conscious of their position as an alternative to the two great powers as suppliers. The 1972 White Paper identified this political factor as a critical determinant of French sales to Third World states [10]. This view was reaffirmed by Minister of Defence Hernu when he justified France's liberal arms sales policy in terms reminiscent of classic Gaullist doctrine:

> Ought we to leave friendly nations alone in face of the two superpowers? At present, when a country is armed by one of those two superpowers the neighboring country, if it feels threatened, immediately asks for arms from the other. That opposition

between the two blocs presents the most serious threat to world conflict. So, yes, I have a clear conscience when I sell arms to a country, if that prevents it from buying from one of the two superpowers. [12b]

Second, the economic benefits of selling arms offset, if they do not entirely negate, foreign policy and strategic objections, and restrictions that might be effectively imposed. While France joined the UN embargo on arms to South Africa, these limitations did not extend to licensing accords with South Africa for the production of weapons and parts that were signed before the embargo was set in place. The sale of Mirage aircraft to Libya in the early 1970s was motivated largely by economic considerations. The restrictions that were placed on Libyan transfer of these aircraft to third states were largely nullified when Libya sent some of these aircraft to Egypt during the Yom Kippur War. The ineffectual response of the French government in preventing these transfers signalled the high priority that France attaches to its reputation as a reliable arms supplier. The Vedette affair in December 1969, when Israeli agents spirited away patrol craft from Cherbourg despite an embargo against arms sales to Israel, illustrates further the weak political controls that are exercised over foreign governments when arms contracts are written or after weapons have already been purchased. There appeared to be more than coincidence, moreover, in the timing of the lifting of the embargo in 1974 against Middle East countries which were "on the field of battle". The French action was taken at approximately the time that the Saudi Arabian government was in the process of searching for suppliers to equip its ground forces. In lifting this self-imposed limitation, France was able to compete successfully for over $1 billion in ground arms contracts from Saudi Arabia and position itself for access to the Iraqi market.

It is difficult to determine how many sales France has rejected on security or foreign policy grounds. Israel did suffer after the June 1967 War when Mirage aircraft were impounded and an embargo was imposed. However, the Vedette affair and remarks by an important Gaullist parliamentarian that Israel eventually received spare parts for its Mirage aircraft reinforce the image of a France bent more on selling arms than on restricting access to the French arms market or on directing their use after delivery [14].

Finally, domestic opposition to arms transfers has been weak and scattered. Previous Socialist criticism has been stilled by the responsibilities of office. On coming to office Socialist Prime Minister Pierre Mauroy explained that "French policy aims for peace and detente. Our country will, therefore, try world wide to curtail and moralize arms exports" [12b]. These high hopes have since been overshadowed by the Socialist government's approval of billions of dollars worth of arms

contracts with foreign governments. If some contracts with authoritarian regimes, like those of Chile and South Africa, have been annulled, foreign sales contracts remained essentially at the high levels established in the late 1970s. (France continues to supply South Africa with assistance in building a light-water nuclear reactor which, conceivably, could aid the country in developing nuclear weapons.)

Arms exports also play an important role in meeting French energy needs. Even before the oil crisis of the mid-1970s, France had already shown concern for access to adequate oil resources and for dollar reserves to pay for its energy needs. Approximately two-thirds of France's energy needs are met by oil and over 90 per cent of its requirements for oil must be filled by imports, principally from the Middle East. This poses a serious problem of reliable supplies at affordable prices. The quadrupling of oil prices placed a heavy strain on the French economy, fuelling inflation and reducing the competitiveness of French products in world markets. Arms transfers to the Arab states of the Middle East have been one of the major instruments by which to assure oil supplies and to pay for soaring oil prices. Official estimates of the geographic distribution of arms deliveries are not available from French sources in a form to identify flows to specific regions, like the Middle East or Sub-Saharan Africa. Published data from official sources essentially divide arms deliveries between developed and developing states. In the 1960s, the balance was roughly divided between the two. From the 1970s to the present, however, the bulk of French arms has gone to developing countries. These countries have taken well over 80 per cent of French arms exports, and passed the 90 per cent mark in 1980 [11b]. Of these, press and secondary sources indicate that the Middle East is the major recipient. Figures for 1980 suggest the following division [15]:[7]

Middle East (including North Africa)	78.8%
Latin America	7.0%
Far East	2.8%
Sub-Saharan Africa	2.8%
Europe and North America	7.4%
Other	1.2%

In the Middle East, Egypt, Iraq, Saudi Arabia and the United Arab Emirates have been the largest recipients. Excluding Egypt, these three states are among France's principal suppliers of oil. Arms deliveries in the past decade have been sufficient, on average, to pay for approximately one-quarter of France's oil imports. Because of the rise in oil prices, more arms

[7] ACDA data [16] suggest the same conclusion, although the percentage of transfers sent to the Middle East and North Africa are lower than those cited in reference [15]. The ACDA figures cover 1975–79 inclusive.

must now be sold to maintain approximately the same percentage of energy coverage as a decade ago. The French arms industry has had to become more export-oriented in order to contribute to the same extent as it did before the oil crisis of the 1970s to France's energy solvency.

The contribution made by arms deliveries to France's financial solvency is also important. France has run an overall trade deficit for the past decade with a growing imbalance since the late 1970s. In the absence of arms sales, France's deficits would have been even bigger. In 1980, for example, almost $6 billion in new foreign market sales would have had to be found to compensate for the trade receipts from arms and military technology. Critics have a point when they argue that such civilian markets are available. Japan and FR Germany are often cited as evidence for a re-allocation of productive resources. While there may be considerable truth in this argument, it currently has little weight in French policy circles. French leaders must solve France's acute balance of payments problem now. Resources to mount the kind of effort needed to reorient the defence industry are lacking. Even if these resources were conceivably available, a shift to civilian investment and a shrinking of the arms industry would mean serious transitional economic disruption and result in high social and political costs that no French regime today could easily tolerate.

Export dependency and arms sales

The export dependency of the French arms industry parallels the increasing dependency of French exports on the sales of arms and technology. Table 13.3 divides arms exports into four categories—aeronautic, ground, naval and electronic equipment. The most important component of foreign arms deliveries has been aircraft, helicopters and tactical missiles. In 1979, these formed 59 per cent of all deliveries, followed by ground equipment (28 per cent), electronics (10.4 per cent), and naval *matériel*

Table 13.3. Exports of arms grouped by category, 1970–80
Figures are in US $ billion.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Aeronautic	0.324	0.379	0.607	0.867	0.873	1.166	1.697	1.832	2.393	2.849	..
Ground	0.072	0.108	0.099	0.180	0.270	0.315	0.513	0.688	0.866	1.333	..
Naval	0.050	0.016	0.022	0.092	0.116	0.196	0.038	0.175	0.272	0.127	..
Electronic	—	—	—	—	0.129	0.257	0.188	0.299	0.288	0.498	..
Total[a]	**0.446**	**0.503**	**0.728**	**1.139**	**1.388**	**1.934**	**2.436**	**2.994**	**3.819**	**4.807**	**5.775**

[a] Errors due (*a*) to rounding when compared to figures in table 13.2 and (*b*) to incomplete data supplied by parliamentary reports noted in table 13.2.

Source: Table 13.2.

(2.6 per cent). In earlier years, the percentage of exported aerospace equipment has often been higher. Among the most prominent aerospace weapons that have been sold abroad, aside from those listed in table 13.1, are Mirage III, V and F-1 fighters. Orders have also been signed for the follow-on Mirage 2000. The Alouette series of helicopters, France's most successful helicopter in foreign markets, antedated the Lynx, Puma and Gazelle, currently produced jointly with British firms. The Super Frélon, a heavy duty helicopter, has also enjoyed large foreign sales. A wide range of tactical missiles has also been sent to other countries: anti-tank (Harpon), air-to-air (Matra R550 and R530), air-to-surface (AS-11, AS-12, Exocet AM-39), and surface-to-surface (Exocet MM-38 and MM-40, SS-10 and SS-12). France has assisted South Africa with the development of the Crotale surface-to-air missile and Saudi Arabia with a similar version of the missile, designated Shahine. Earlier, it assisted Israel in the development of the surface-to-surface Jericho missile. Ground equipment is varied. Key elements include the AMX-series of armour, covering heavy tanks to bridge-crossing equipment, armoured personnel carriers, specialized transport vehicles and motorized artillery. Naval sales largely cover fast patrol boats and submarines. Electronic equipment for detection, guidance, communications and control looms increasingly important in the future as a source of sales, as developing states increase demand for these items to modernize their armed forces.

If the value of arms delivered to foreign countries is compared to the procurement portion of the French defence budget between 1970 and 1980 it becomes clear that the French arms industry is heavily export dependent. In 1970 arms deliveries accounted for only 14.8 per cent of the total of arms purchases, measured by the sum of French defence procurement and foreign deliveries (table 13.4). This percentage rose steadily each year to a high of 38.1 per cent in 1977, where it remained until the end of 1980. Viewed from another angle, the share of arms deliveries in the defence procurement budget has increased from 17.3 per cent in 1970 to 61.4 per cent in 1977, and has remained steady at this level.

This general picture is confirmed at a sectoral and company level if one examines the proportion of business turnover of leading French companies that is the result of military sales, including foreign and domestic purchases. Table 13.5 lists the percentage of business activity devoted to civilian contracts, French arms purchases and foreign military exports by France's leading arsenals, and firms and nationalized corporations in the arms industry for 1978. The industry is under tight government control and most of its units are either run by the government (arsenals and personnel of DGA) or controlled through public corporations (SNIAS, SNECMA and SNPE), or directed through government ownership of a majority share of stock (Dassault, Matra and Thomson–Brandt).

Table 13.4. Business turnover in France measured as the sum of domestic arms procurement (Title V and VI) and arms deliveries, 1970–80

Figures are in US $ billion

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Domestic procurement	2.31	2.37	2.83	3.58	3.55	4.45	4.38	4.87	6.31	7.83	9.44
Delivery of arms to other states	0.4	0.5	0.8	1.2	1.4	1.9	2.4	3.0	3.8	4.8	5.8
Total	2.71	2.87	3.63	4.78	4.95	6.35	6.78	7.87	10.11	12.63	15.24
Percentage of arms sales to procurement and deliveries	*14.8*	*17.4*	*22.0*	*24.1*	*27.2*	*30.4*	*35.7*	*38.1*	*37.6*	*38.0*	*38.1*
Percentage of arms deliveries to domestic procurement	*17.3*	*21.1*	*28.3*	*31.8*	*37.5*	*43.7*	*55.6*	*61.4*	*60.2*	*61.3*	*61.4*

Source: See table 13.2 and figure 13.1.

Table 13.5. Percentage of business turnover of major French arms producers dependent upon national and foreign arms purchases, 1978

Sector	Civilian	Arms purchases	Military exports
Aeronautics			
DGA (Ministry of Defence)	—	100	—
SEP (missile propulsion)	40	59	1
SNECMA (aircraft motors)	17	36	47
Turbomeca (aircraft motors)	47	35	18
SNIAS (helicopters, missiles, aircraft)	30	29	41
Matra (missiles)	41	27	32
Dassault–Bréguet (fighter aircraft)	9	22	69
Ground armaments			
DGA (arsenals)	0.5	57	42.5
Manurhin	21	19	60
Luchaire	66	13	21
Thomson–Brandt	88	1	11
Panhard	—	1	99
Naval armaments			
DGA (arsenals)	4	91	5
CMN	3	1	96
Electronics			
EMD	23	26	51
Thomson–CSF	47	18	35
Explosives			
SNPE	36	42	22

Source: France, Ministère de Défense, *Données Économiques sur les Dépenses Militaires* (Paris, 1978), chapter 8.

In the aerospace industry, all of the major firms depend on military contracts for most of their work. France's four leading aerospace firms are especially tied to foreign sales. Aérospatiale (SNIAS), France's largest aerospace group, depends on sales abroad for approximately 40 per cent of its activity, principally tactical missiles and its highly successful helicopter industry. A separate division within Aérospatiale is responsible for developing strategic missiles for France's land- and sea-based deterrent. These are not for sale. In 1978, Dassault, France's second largest firm, relied on foreign sales for almost 70 per cent of its business turnover. Throughout the 1970s, more than 60 per cent of its annual production has, on the average, been for foreign governments. SNECMA and Matra, the next largest aeronautics firms, owed 47 and 32 per cent, respectively, of their business receipts to foreign military buyers.

Other important sectors of the French arms industry are similarly dependent on foreign contracts. National arsenals produce over 40 per cent of their work for the military establishments of other countries. Manurhin, a high technology firm in ground equipment, earns three times as much from military exports as from domestic arms purchases by French armed forces. Panhard, a producer of motorized small armour, produces almost exclusively for the international arms market. The electronics firm of Dassault exports half of its military production, and Thomson–CSF, France's principal military electronics firm, depends for a third of its receipts on military exports. As table 13.3 suggests, exports of naval vessels have lagged behind those of other arms sectors. The government-run yards principally respond to French needs, including surface combatants and nuclear submarines. The smaller *Construction Mécanique de Normandie* builds fast patrol boats, minesweepers and coastal escorts, primarily for foreign purchasers. Finally, the *Société Nationale des Poudres et Explosives* (SNPE) owes a fifth of its production to foreign contracts.

The arms industry employs approximately 300 000 military and civilian personnel. This comprises about 1.3 per cent of the active population and 5.5 of the industrial labour force. There may be as many as one million workers indirectly contributing to arms production, if the remarks cited above of Defence Minister Hernu are given credence. Those directly involved in arms manufacture may be divided into the following groups [17]:

DGA (ground and naval arsenals)	73 000
Atomic Energy Commission	12 000
Aeronautics industry	80 000
Electronics industry	42 000
Diverse industry (mechanical, explosives, etc.)	80 000

Personnel engaged in exports are officially estimated at approximately 103 000 [17]. This estimate would appear to be low in light of the increasing dependency of the arms industry on exports. A more realistic figure would be around 130 000–140 000. Arms plants and laboratories are spread throughout the country. Approximately 40 per cent are found in the Paris region; the others are distributed along the Atlantic and Mediterranean coasts as well as in the southwestern and southeastern regions of the country. For historical reasons, the northeast, the traditional route of foreign invasions, has little in the way of a developed arms industry.

Despite the success of the French arms industry in exporting arms, it still faces an uncertain future. Much depends on its ability to keep pace with rapid technological changes and to meet rising competition for sales from the USA, the USSR, other European states, and, increasingly, the Third World. Israel, Brazil, India and Argentina, for example, have become important arms suppliers. Like France, these states have few political inhibitions about selling abroad. Even small states, like Singapore, are developing selected markets where their specialized capabilities give them an edge.

France's future as an arms exporter hinges then on its research and development effort and on its ability to develop new, militarily effective and economically competitive arms. During the 1970s, spending for military R&D, measured in constant 1959 francs, climbed very slowly, rising approximately 20 per cent from 1972 to 1979 [17]. Since 1979, funds earmarked for R&D have increased another 20 per cent, partly in response to criticism within the defence industry that insufficient funds were being allocated to keep the industry abreast of its competitors. A confidential evaluation written by an *Inspecteur de Finances* reportedly complained that investment in the arms industry was stagnating. The state did not allocate sufficient funding nor did private firms plow back guaranteed earnings into research and development, preferring that the government foot the bill for such expenditures. The problem is now generally understood within the government. The nationalization of much of the arms industry by the Socialist regime also affords the government the possibility of mobilizing needed funds for high-priority research and development projects. Whether enough will be available to meet rising demands for modernization of French armed forces and the competitive demands of international trade remains an open question. The French military is pressing to increase spending for a wide range of programmes. These include a seventh nuclear submarine of advanced design, a new, mobile nuclear land-based system, lasers, satellite and launch technology, and a neutron bomb.

Meanwhile, unemployment is at a record level. French competitiveness in world markets is slipping. While a 20 per cent devaluation of the franc

makes French goods, including arms, more attractive, inflation and higher labour costs are offsetting this transitional advantage. France must meet its military needs within a constrained economic environment. Hard choices lie ahead, and it is by no means certain that security and economic imperatives can be addressed successfully or that arms transfers can be pushed much further than they are now to relax the choices facing the government.

III. Conclusions

Sales of arms and military technology are critical to the French economy from several perspectives. They ensure employment for 300 000 workers, many of whom are highly trained personnel directly engaged in arms research, development and production. Exports are critical to full employment within the industry. They permit more efficient series runs. Whatever their inconveniences for French armed forces, including delayed deliveries in favour of foreign purchasers, they hold unit costs down, permitting larger purchases of arms and equipment than might otherwise be possible. They also contribute to France's balance of payments position and help to recycle funds needed to pay for large oil purchases to keep the French economy running.

These benefits have largely been accepted as part of French doctrine by successive French governments. Questions such as whether greater profits and welfare could have been generated through civilian investment or whether the arms industry is run efficiently have not been openly addressed or debated. The Right and the Left are agreed on the need for an autonomous arms industry directed by the central government. The recent nationalizations by the Socialist government on taking office affirmed these principles. There is also wide public and partisan support for continued high levels of arms exports. The economic pressures arising from the civilian economy and the constraints imposed on investment, employment and reallocations weaken further what little incentive there is to examine seriously the possibility of decreased investment in the arms industry. It remains to be seen whether nationalization and the expanded bureaucracy that it implies will lead to greater efficiency and more investment. In any event, major changes in size and export orientation of the French arms industry are not likely in the immediate future.

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14. Chemical and biological warfare: developments in 1982[1]

Square-bracketed numbers, thus [1], *refer to the list of references in the bibliography on page 411.*

I. Introduction

This chapter records developments in the field of chemical and biological warfare (CBW) since the review published in *SIPRI Yearbook 1982* [137]. The perspective is, once again, that of a Western observer. The treatment is brief, but there is a detailed bibliography for readers who wish for more information.

The overall picture remains unchanged except that its principal features have been thrown into sharper relief by the events of 1982. The menace to international security from CBW developments during prior years, especially 1979–81, has become more evident, and the choice of response to it that now faces governments is displayed more starkly. Still open in Geneva is the option of negotiated CW disarmament, but unless the avowals of commitment to it that certain world leaders have been uttering are soon matched by deeds—by negotiating behaviour that is correspondingly positive and constructive—that option will be closed. Instead, unilateral pursuits of increased military preparedness for CBW may soon accelerate, irreversibly, into a grotesque new arms race. The prospect then may be one of CBW weapons becoming 'conventional': poised for use wherever and whenever military necessities may be satisfied by their special properties. It is this process of assimilation, in its early stages, that has begun to threaten the regime of CBW arms control and disarmament established by the 1972 Biological and Toxin Weapons Convention (BW Convention), the 1925 Geneva Protocol and the associated body of customary international law. Developments concerning the BW Convention in 1982, including the ratification by Japan and FR Germany, are reviewed in chapter 20.

The chief developments of the year were threefold. There were new attempts by the international community to respond effectively to the charges of CBW treaty non-compliance directed against the Soviet Union and other states. The United States moved further towards CW rearmament, impelled by the momentum of its binary munitions programme and by its perceptions of threat in current Soviet CBW capabilities,

[1] This chapter was written by Julian Perry Robinson, Science Policy Research Unit, University of Sussex, Brighton, UK.

intentions and activities. And in June there were major new negotiating proposals from the Soviet Union, proposals which for the first time envisaged measures of *systematic* international on-site inspection for verification purposes. It remains to be seen whether this Soviet move will afford the so-far-absent basis for consensus on the central issue in the CW disarmament negotiations.

II. Allegations of CBW

During the past year there have been reports of use of CBW weapons in 13 different parts of the world: Afghanistan, Angola [157], Burma [151], Cuba [106, 148], El Salvador [58a, 97], Eritrea [67, 180, 191, 213, 215, 224], the Falkland/Malvinas Islands [158, cf. 181], Guatemala [8], Iraq [207], Kampuchea, Laos, Lebanon [91, 102] and Thailand [56]. On the information available, the reliability of these reports varies greatly. In two cases the governments implicated have acknowledged resort to chemical weapons of the 'tear gas' type [180, 207].

Because of the scale on which the weapons were allegedly being used, and because of their implications for East–West relations, the reports relating to Afghanistan, Kampuchea and Laos attracted the widest attention, as they had during 1981.[2] By early 1982 the US State Department was describing the 1981 findings of epoxytrichothecene mycotoxins in environmental samples said to have come from Kampuchea and Laos as "compelling evidence" of "Soviet involvement" in the use of those and other substances as weapons [61]; and in his *Annual Report to the Congress* the US Defense Secretary described them, together with the Afghanistan CW reports and the Sverdlovsk anthrax matter,[3] as "a most serious problem for any new arms agreement with the Soviet Union" [33a]. The Reagan Administration thus appeared at that time to be making its participation in *any* future arms control contingent upon resolution of

[2] Statements by the US government on the CW reports and on its mycotoxin findings up to mid-November 1981 are cited on page 342 of *SIPRI Yearbook 1982*. The Senate hearing on 10 November 1981 has since been published [83], as have earlier House hearings that included Defense Department testimony on the matter [32]. Subsequent official statements over the two following months included State Department commentaries on prominent newspaper editorials [59, 60, cf 62], a speech in the UN General Assembly [66], and on the first disclosure of evidence suggesting the presence of epoxytrichothecenes in samples of blood drawn from purported victims of CW attack [52].

[3] Washington's perception of the Spring 1979 outbreak of anthrax in the Sverdlovsk region of the USSR as a likely consequence of activities proscribed by the 1972 BW Convention is described on pages 343–44 of *SIPRI Yearbook 1982*, since when there appear to have been no significant developments. More detailed reviews of the affair are, at the time of writing, in press [e.g., 142].

these CBW treaty compliance issues. Then, on 16 February at the CSCE review meeting in Madrid, the US delegation directly charged the USSR with "seriously and deliberately" violating both the 1972 BW Convention and the Geneva Protocol [68]. The Soviet delegation rejected the charges as "monstrous accusations, false from beginning to end" and denied that the USSR had ever used chemical weapons "anywhere under any circumstances or by any means" [229].

Neither then nor later in 1982 did the US government press its charges through the channel provided in the BW Convention, formal complaint to the UN Security Council.[4] It followed, instead, a course of publicizing the charges in order, so it explained, "to persuade other governments that the Soviet Union and its allies are indeed engaged in chemical warfare, and to secure their support for efforts to halt this activity" [64]. This course included active support for the inquiries of the UN Group of Experts whose mandate to investigate CW allegations had been extended through 1982 by the UN General Assembly, and which finally reported to the Secretary-General at the end of November [2, cf. 1]. It also included the dispatch, on 29 March, of an eight-person briefing team to ten of the world's capitals [64, 167, 214], Peking among them, and reiteration of the charges by President Reagan in June [28] and November [29].

At the centre of this effort was a report released by the then US Secretary of State Alexander Haig on 22 March [53]. The Haig Report summarized the evidence up to January 1982 from which the US government had drawn its conclusions. Its "key judgements" are reproduced in table 14.1, together with the main points made in the detailed critique issued two months later by the Soviet government [89]. The Haig Report is powerfully and persuasively written; and the Soviet critique, by failing to address adequately all of its main contentions, will probably not have impaired the overall impression left in the minds of many of those who have actually read the US document.

It is evident from subsequent Congressional concern [e.g., 78], media comment [e.g., 178, 235, 236, 242, 245] and other such indicators, that US opinion has largely accepted the Haig Report and its addenda of 13 May [54] and 29 November [56] as establishing Washington's case. Few people in the United States, it would seem, now care any longer to dissent from the view which a State Department official put forward when introducing the Haig Report to a Senate Committee: "There are some who will never be persuaded, but this report leaves them little to justify their skepticism" [63]. Such a claim might better be made on the basis of the voluminous Special National Intelligence Estimate (SNIE) from which the Haig Report

[4] One of the five permanent members of the UN Security Council, the UK, does not regard the prohibitions provided by the Geneva Protocol as falling within customary international law.

Table 14.1. The 'key judgements' of the Haig Report, and the main points in the Soviet critique of it

Verbatim extracts from US Department of State Special Report No. 98 of 22 March 1982
LAOS. The US Government has concluded from all the evidence that selected Lao and Vietnamese forces, under direct Soviet supervision, have employed lethal trichothecene toxins and other combinations of chemical agents against H'Mong resisting government control and their villages since at least 1976. Trichothecene toxins have been positively identified, but medical symptoms indicate that irritants, incapacitants, and nerve agents also have been employed. Thousands have been killed or severely injured.[a] Thousands also have been driven from their homeland by the use of these agents.
KAMPUCHEA. Vietnamese forces have used lethal trichothecene toxins on Democratic Kampuchean troops and Khmer villages since at least 1978. Medical evidence indicates that irritants, incapacitants, and nerve agents also have been used.
AFGHANISTAN. Soviet forces in Afghanistan have used a variety of lethal and nonlethal chemical agents on *mujahidin* resistance forces and Afghan villages since the Soviet invasion in December 1979. In addition, there is some evidence that Afghan Government forces may have used Soviet-supplied chemical weapons against the *mujahidin* even before the Soviet invasion. Although it has not been possible to verify through sample analysis the specific agents used by the Soviets, a number of Afghan military defectors have named the agents[b] brought into the country by the Soviets and have described where and when they were employed. This information has been correlated with other evidence, including the reported symptoms, leading to the conclusion that nerve agents, phosgene oxime, and various incapacitants and irritants have been used. Other agents and toxic smokes also are in the country. Some reported symptoms are consistent with those produced by lethal or sublethal doses of trichothecene toxins, but this evidence is not conclusive.[c]
THE SOVIET CONNECTION. The conclusion is inescapable that the toxins and other chemical warfare agents were developed in the Soviet Union, provided to the Lao and Vietnamese either directly or through the transfer of know-how, and weaponized with Soviet assistance in Laos, Vietnam and Kampuchea. Soviet military forces are known to store agents in bulk and move them to the field for munitions fill as needed. This practice also is followed in Southeast Asia and Afghanistan, as evidenced by many reports which specify that Soviet technicians supervise the shipment, storage, filling, and loading onto aircraft of the chemical munitions. The dissemination techniques reported and observed evidently have been drawn from years of Soviet chemical warfare testing and experimentation. *There is no evidence to support any alternative explanation, such as the hypothesis that the Vietnamese produce and employ toxin weapons completely on their own.*

Verbatim extracts from the Soviet critique, transmitted to the UN Secretary-General on 20 May 1982

The report is built on unconfirmed hearsay, interviews with persons claiming to be eyewitnesses and other circumstantial material of dubious origin. This "information" is in no way supported by independent sources, and the conclusions drawn from it not only are unconvincing but contradict objective medical and technical data.

It cannot stand up to scientific criticism, nor even to elementary logical analysis. Conceived with the unseemly aim of slandering the Soviet Union and charging it with involvement in the use of chemical weapons, it is intended to distract attention from the real chemical warfare conducted by the United States in the South-East Asia years ago and from its extensive preparations for renewed chemical warfare.

[*Note*: The many detailed points made in rebuttal, including the suggestion that the *Fusarium* mycotoxins of the trichothecene type described in the Haig Report are explicable in terms of epiphytotic fusariosis brought on by the after-effects of US herbicide operations in Vietnam, are not summarized in the critique, nor do they lend themselves to summary. The full text is to be found in UN document A/37/233 of 21 May 1982.]

[a] In the body of the Haig Report, it is stated that there are references to at least 6 310 dead in the reports received by the USA of CW in Laos; at least 981 dead in Kampuchea; and at least 3 042 dead in Afghanistan. According to US Department of State Special Report No 104, *Chemical Warfare in Southeast Asia and Afghanistan: An Update*, Report from the Secretary of State George P. Schultz, November 1982, CW attacks continued in Laos and Kampuchea at least until the end of June 1982, and in Afghanistan at least until the end of October 1982.

[b] In the Shultz Report cited in note *a*, these agents are identified as tabun and phosgene oxime.

[c] The Schultz Report states: "we have obtained convincing evidence of the use of mycotoxins by the Soviet forces through analyses of two contaminated Soviet gas masks acquired from Afghanistan".

had been derived.[5] For all the outside world can tell, that Estimate may indeed be compelling.

However, anyone turning only to the Haig Report and its two addenda will in fact fail to find in them more than a detailed statement of the charges, selective summaries of some of the evidence, and assurances that the full body of evidence really is conclusive. Those assurances are ones which many people may be ready to accept because of the high authority with which they are given, and because of the sheer enormity of the crime and the attendant human suffering which they imply. Others may be less trustful of the US Administration. The absence of any indication even of the standards that have been applied in adducing key evidence,[6] let alone

[5] Published reference to the existence and content of the SNIE, which was (and is) a classified document, appeared in the *Wall Street Journal* shortly before publication of the Haig Report [233, 234], coinciding with releases by the State Department to Congressional committees of new information about the Afghanistan CW reports [57, 58]. It seems that the Estimate described and collated all available intelligence, including that from secret 'national technical means' and other sensitive sources, and presented conclusions drawn from it. Its issuance as an NIE implied that all relevant agencies of the US government had scrutinized it in draft and either affirmed their concurrence with its conclusions or enunciated minority dissent from them [76, 84]. That there were in fact no dissenting opinions is implied in the letter of transmittal of the Haig Report to the Congress: "The enclosed report ... presents conclusions which are fully shared by all relevant agencies of the United States Government" [53]. The extent to which agencies other than the Bureau of Information and Research of the State Department and the Medical Intelligence and Information Agency of the Army were actively involved in the formulation of the conclusions, or in the intelligence gathering effort, is, however, unclear [cf. 238]. Against the day when the Estimate becomes available for inspection in the US National Archive, it may be noted here that its identification is SNIE 11/50/37–82: *Use of Toxins and Other Lethal Chemicals in Southeast Asia and Afghanistan* [87].

[6] Take, for example, the information provided to US investigators by H'Mong refugees in Thailand, which is the bedrock of the US case. What criteria had to be satisfied before any one such item of information was accepted as evidence? Consistency in repetition to different interviewers? Corrobation by one or more fellow refugees? Absence of contradictory information from, for example, inquiries made to other refugees or to disinterested parties inside Laos or from medical examinations? And what sort of controls were applied to the total body of information, including that derived from Kampuchean sources—controls for pre-existing disease, social and ethnic background and other factors whose assessment would be a matter of routine in any normal social survey or epidemiological inquiry? Such tests are being applied most rigorously in the official Agent Orange inquiries among US veterans of the Viet Nam War [110, cf. 50]. These questions are fundamental. The circumstances of urgency and of war must certainly have greatly constrained application of sociologically sound techniques, but that is a separate matter. Because the Haig Report and its addenda keep silent on their standards of evidence, their readers are given cause for doubt about the solidity of the conclusions, especially in the light of publications in the past year suggesting that the standards applied have actually been low [117, 126, 152, 153, 220]. There have even been reports of falsified evidence [113, 155]. Even with all the information now publicly available, which includes much supportive independent reporting during 1982 [e.g., 120, 186, 227, 231, 239–41, 243, 244], objective readers of the official US statements cannot even dismiss the possibility of the whole hideous picture presented being no more than a reflection, at least in its Laotian aspect, of collective fabulation around events of much lesser magnitude. Such an alternative reading is developed in detail, on the basis of inquiries in Laos and Thailand, in a forthcoming book by the Australian academic sociologist Grant Evans, *The Yellow Rainmakers*. Nor does the question of standards relate only to the refugee evidence. It is apposite also to the analyses for mycotoxins of the physical and medical samples. What criteria had to be satisfied before a particular sample could be admitted as evidence? The general public does not even know who provided some of the key samples (since that is being treated as classified information [42]),

a full account of the evidence itself, may then justify not a little scepticism. Since these omissions rendered the Haig Report largely unverifiable, it is not surprising that the UN Expert Group was able, in its final report, to accept so little of it. Indeed, it is a measure of the strength of Washington's case that the overall conclusion of the Expert Group, guarded though it was, lent it any support at all: "While the Group could not state that these allegations had been proven, nevertheless it could not disregard the circumstantial evidence suggestive of the possible use of some sort of toxic chemical substance in some instances" [2a]. The concluding paragraphs of the final report of the UN Expert Group are given in appendix 14A.

It might perhaps have been expected that a two-year expert investigation would have yielded more positive results. However, quite apart from the debilitating political background, that would be to presuppose that the UN Group of Experts had access to all areas in which CW was alleged to have occurred; resources commensurate with the magnitude of its task; and a degree of co-operation from certain well-placed UN member states that matched their protestations of support. In the circumstances, so it appears, the activities of the Group were tightly circumscribed by due processes of UN bureaucracy so that the Group was forced to rely heavily on the investigations of others, cross-checking them as best it could. This, and the limited initiatives that it was able to take, the Group performed most creditably. The venture was an important test case of the ability of the United Nations to verify compliance with arms control agreements. Though it is too early yet to draw from it all the lessons that are there to be learned, they must not be ignored; and there could be considerable value in a research organization independent both of the UN and of individual governments undertaking a detailed and candid study of the Group's performance.

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let alone whether the precautions taken to protect the samples from tampering or contamination were adequate. What degree of reproducibility was expected of any one set of analytical results [201]—a consideration made especially pertinent by the bizarre results received by the UN Expert Group from its own analysts [2b]? For example, in one set of tests two laboratories found no trace of trichothecenes in any of the samples, including those that had been deliberately spiked with trichothecenes. A third laboratory found such traces in all the samples, including the unspiked control that had been made up in Sweden to resemble the authentic sample. It would seem from the detailed scientific reports presented at scientific meetings in the autumn [48, 49, cf. 47] that, in the tests conducted for the US government, not much attention was paid to this question of reproducibility. What array of control samples was considered adequate to exclude the possibility of the mycotoxins not being unnatural in their occurrence in the samples analysed? Small, it would seem; and some (though not all) of what were described in the Haig Report and its addenda as being 'control' samples actually appear to have been little more than analytical blanks. Underlying all this is the more fundamental question of how high the standards of evidence ought to have been. There is no court of law involved, such as would set its own standards. The question would seem to be answerable only in terms of the objective sought in making the charges, more particularly in terms of the balance of benefits and disbenefits likely to arise from pursuit of that objective. To the US Administration during 1981–82, the disbenefits of presenting only a weak case may have appeared trivial.

Besides the US and the UN reports, much additional information on the South-East Asia allegations has been furnished by Canadian investigators [5, 6, 149]. Other countries, too, are reported to have been conducting their own inquiries—Australia [168, 193, 238], China [187, 238], Denmark [238], France [147, 208, 238], FR Germany [208, 238], Israel [238], Japan [230], New Zealand [238], Norway [238], South Africa [238], Sweden [238], Thailand [5, 6], the UK [208, 214, 228, 230, 238] and an unidentified Latin American country [238]—but their findings (if, indeed, these reports are true) have yet to be disclosed. An official French report may, it is rumoured, be released during spring 1983. Inquiries seeking more than anecdotal information have also been instituted by private US bodies, including a television company [156], which in December 1981 announced an independent analytical finding of both mycotoxins and a man-made substance in a purported Yellow Rain sample [211, 226]; a relief organization, which has been acquiring highly detailed testimony from H'Mong and other refugees [145, 154] and which has served as a major conduit for physical and medical samples from afflicted areas; and medical aid workers in one refugee camp whose preliminary epidemiological observations suggest an incidence there of lung disease that may be significantly abnormal, and which, if it is, might eventually be explicable in terms of past respiratory exposure to toxic agents [6e, 109, 122, 123]. Pre-eminent in the Canadian studies was a detailed epidemiological investigation focusing on particular incidents: one in Laos during 1981, and five in Kampuchea and Thailand during 1982 [6]. Referring to this work, the UN Expert Group stated, surely correctly, that it "has demonstrated, in an impressive way, the usefulness of an epidemiological approach to investigations of alleged use of chemical weapons in situations when a timely access to areas allegedly subjected to attack is not possible" [2c].

The Canadian epidemiologists (from the Canadian Forces Medical Service) concluded that "CW/BW agents" were indeed being used in South-East Asia [67], but on the identity of those agents they differed strikingly from the US government in their conclusions. While they did not exclude the possibility of epoxytrichothecene mycotoxins explaining some of their observations, they came close to doing so in the case of the incident in Kampuchea from which the US investigators (who had arrived on the scene in the middle of the Canadian inquiries) had derived the data announced in the State Department release of 13 May [54], data that were later to be described in US official and media comment [e.g., 65, 170, 206, 242] as "compelling", even "conclusive", evidence of mycotoxin employment. What the Canadians actually concluded about this incident warrants quotation here in full: "The only group of agents which fit the symptomatology exhibited by the casualties from Tuol Chrey is the incapacitating agents. All other classes of agent can be eliminated, including

mycotoxins unless mixtures of mycotoxins can produce the same symptoms as incapacitating agents." [6b] If this is a well-founded conclusion, and unless it be assumed that the Tuol Chrey weapons were atypical, it seems that few, if any, of the many hundreds of people supposedly dead from toxic attacks in Kampuchea—and, it might also follow, the many thousands of similar dead in Laos—could have been killed directly by epoxy-trichothecene mycotoxins.[7] More recently, too late for consideration by the UN Expert Group, the US government has announced sample-analysis findings which suggest that mycotoxins have been used in Afghanistan too, alongside classical CW agents [56].

It is still the case that samples of actual munitions, or reliable autopsy findings from bodies of people patently dead from poison, have not been brought forward as evidence.

The government of the USSR continues to deny in the strongest terms the accusations made against it by the United States. In a note to Washington, the text of which was released in Moscow on 5 April 1982 and which Soviet spokesmen have since quoted frequently, it stated:

> The Soviet Union undeviatingly honours its international commitments. Being true to the 1925 Geneva Protocol the USSR has never resorted to the use of chemical weapons anywhere itself and neither has it handed over such weapons to other countries. . . . The Government of the USSR states its resolute protest to the Government of the United States over the slander that is being spread about the Soviet Union. Such behaviour is unacceptable and impermissible in relations between states. [88]

There was no reference in this note to the BW Convention, but elsewhere—in an earlier statement which said also that there had never been any production of mycotoxins in the Soviet Union—the charge of non-compliance with this treaty, too, was dismissed as "slanderous" [93]. Counter-accusations have been launched from Moscow: that US chemical weapons have been made available to the "bands of interventionists in Afghanistan" [88, cf. 104]; that the USA has shipped BW and CW weapons to El Salvador [97]; that the USA has been engaged in clandestine BW preparations in Pakistan from which actual BW operations in Afghanistan and Cuba have been supplied [92, cf. 212]; and that the

[7] One of the Kampucheans who had come under the attack at Tuol Chrey subsequently died in the hospital to which he had been admitted 26 days later with a suspected attack of malaria [6c]—which was what, in the complicated form of blackwater fever, the Canadian investigators thought it possible had killed him [6d]. The November addendum [56] to the Haig Report (which described the dead man as "one of several victims of toxic agent attack", with no mention of malaria) summarized analytical findings in tissue samples taken from the man at autopsy. These included detectable levels of epoxytrichothecenes; but they also included high levels of aflatoxin—another category of mycotoxin, and one for which analysis of a purported Yellow Rain sample from Laos proved negative [cf. 49]. The results of Canadian analysis of the tissue samples are still awaited. The November addendum has this comment: "the findings of aflatoxin in these tissues is important since the high incidence of exposure to natural outbreaks of aflatoxin contamination in Southeast Asia may induce a greater susceptibility to trichothecenes in this population" [56].

accusations made against the USSR and Viet Nam are "aimed at undermining international agreements on disarmament" [95, cf. 87], and that they are a cover-up for US reluctance to negotiate for CW disarmament [88], a diversionary measure to distract world attention from the consequences of US chemical warfare in Indo-China during 1961–71 [87, 88, 93, 101] and a means for eliciting support for US CW rearmament via the binary-munitions programme [87, 88, 94, 96, 101, 104, 105].[8]

Hanoi has likewise described the US charges as "slanderous", stating that they are aimed at "weakening the impact of Soviet initiatives for peace" [107]. As with the USSR and Laos, the attitude of Viet Nam toward the UN investigation was adamantly hostile, although it contributed to it much information on US CW activities in Indo-China [e.g., 108]. Kabul, too, boycotted the UN investigation, but it has continued to propose the establishment of an international commission of inquiry [25, 104].

In the face of so much conflicting and missing evidence, it does not yet appear possible for an objective observer to make a rational judgement of the truth, one way or the other, of the charges made against the USSR. The only judgements that can readily be made are subjective and intuitive ones. They are poor guidance for the international community on what it should do next, except that they clearly point to a need for pre-existing international machinery that can cope with any future allegations more decisively than the *ad hoc* machinery created by the 35th and 36th sessions of the UN General Assembly. If the international community can develop and agree upon such procedures, it will then have provided some much needed protection against CBW accusations that are maliciously false, and will force any would-be accusers to apply high standards of evidence before launching their charges.

III. Developments in the field of CBW armaments

Vertical proliferation of CW weapons

Of the three principal possessor states, it remains the case that a great deal more information is available about the chemical weapon capabilities of the United States than about those of France or the USSR.

On 8 February 1982, President Reagan certified (by letters to the President of the Senate and the Speaker of the House of Representatives) that "the production of lethal binary chemical munitions is essential to the national

[8] All of these counter-accusations have been strongly denied by US officials [e.g., 55, 58a]. But with respect to this last one, the fact remains that both the Haig Report and its May addendum were released on precisely the days that the funding of the binary programme was prominent on the Congressional agenda: respectively, much-publicized hearings before a Senate subcommittee [81, 169], and a full Senate vote on authorization for the programme [79].

interest" of the USA. Having thus satisfied a provision of US law enacted in 1975 to prevent a secret resumption of chemical weapon production, he requested $54.1 million in binary procurement funds for the Army and the Navy in the budget for fiscal year (FY) 1983 which he submitted to Congress that same day; $30.1 million would be for actual production [34, 82]. He also requested $18.3 million in military construction funds for the Army to continue with the building of the Integrated Binary Production Facility (IBPF) at Pine Bluff Arsenal that had been initiated in October 1981 with the start of construction of a factory for binary howitzer munitions. These sums would in effect be down-payments on a programme that in 1981 was privately estimated by the US Army to require $2 800 million for its initial stages alone [41, 162], the costs of the total programme to completion in the 1990s being estimated, unofficially, at around $9 000 million at 1982 prices [138, 183]. The large US chemical corporations were reported to have little interest in participating [172, 173, 177, 188].

In May the Senate voted 49–45 in favour of authorizing binary production appropriations [79] but, having learned that a large part of the projected programme was intended for the equipment of NATO allies (who had not been formally consulted), imposed ceilings [79, 85, 139]. The House, by a vote in July of 251–159, rejected the procurement request altogether [72]. It was the House position that prevailed in the defence spending legislation finally passed by the Congress. The relevant language specified elimination of "the funding for production this year *without prejudice*" [71], meaning that the way was open for reconsideration during 1983. At the time of writing it is not yet known in what form the Administration will be pressing its request. Nor is the final fate yet known of the FY 1983 military construction request, which is for a Bigeye bomb factory at the IBPF; although approved in full by both Armed Services Committees (as was the procurement funding), the full House rejected the entire request and the Senate all but $7.9 million of it [176]. The binary howitzer munition factory will be unaffected by the outcome. Its construction and equipment are due for completion by February 1985 [175, cf. 184]. That is presumably the earliest date, therefore, that any full-scale production of binary munitions could commence.

The endeavours of the Administration to move the United States away from the moratorium on chemical-weapon production that had been observed since 1969 stimulated an active public debate.[9] There were two

[9] The Administration's overall case for the binary production programme was presented in backgrounders from the White House widely distributed at the time of the Presidential certification action [26] and, in more detail, in a secret report by the Defense Department to the Congress in March [35] amplified in Administration testimony before Congressional committees [especially 80, 81] and in timely publications by Administration officials [e.g., 38, 46] and by supportive members of Congress [e.g., 86], defence analysts [e.g., 115] and academics

main strands in the Administration's case. It is perhaps ironic to find one of them encapsulated in the Arms Control Impact Statements [27] that accompanied the FY 1983 defence budget to the Congress: "[The binary programme is] consistent with US arms control policy and, by helping to eliminate the existing large asymmetry in US–USSR CW capabilities, will increase the US negotiating leverage" [27a]. The other strand was the contention that the existing supply of weaponized CW agents, in its size, composition and condition, was insufficient to support an adequate retaliatory-*cum*-deterrent stance against what was portrayed as a formidable Soviet capability. Of the total US stockpile of mustard and nerve gases, it was stated that 61 per cent was unusable because it was held in unweaponized bulk form [37], and that only 8.7 per cent [43] was held in immediately usable munitions for weapons that had not become obsolete. Such percentage figures have no bearing, of course, on any plausible criteria (whatever they might be) of stockpile adequacy or inadequacy.[10] but they make for impressive testimony. The more pertinent types of figure, namely actual tonnages or numbers, were not publicly disclosed.[11]

Obscured by the binary furore was a programme initiated by the Carter Administration for increasing the US CW retaliatory capability by restoring to full serviceability all otherwise usable CW munitions in need of repair. This programme is due for completion by 1987 at a total cost of about $100 million. Even if binary production does not go ahead, this refurbishment programme will apparently provide an effective retaliatory stockpile some three times larger than that which was available at the beginning of 1982. The $18 million in operations-and-maintenance funding requested for it in the FY 1983 budget [82] passed the Congress largely unnoticed.

[e.g., 114]. The fullest overview of the case made against the programme is provided by the official records of the floor debates preceding the Senate and House votes noted above [72, 79], particularly the House debate. Of the many critical commentaries on the programme that have been published this past year, that of a freelance journalist is outstanding [131, cf. 132]; see also the commentary by two Defense Department personnel [51]. Convenient published sources reflecting both sides of the debate are available [133, 161, 174, 198, 219], as well as the results of a relevant Gallup poll [237].

[10] If the total agent stockpile were 100 per cent usable, it would, on the present '1½-war' basis of planning, be greatly in excess of any US military requirement specified in the normal way—in terms of, for example, densities in the US force structure of weapons that might realistically be assigned to CW agent delivery and anticipated rates of presentation of acquirable targets vulnerable to CW attack. The agent stockpile is the accumulation from a 15-year utilization of production capacities that were originally designed for a China war scenario and subsequently expanded to meet other demands.

[11] Such figures can, however, be inferred very roughly from the newly released percentage data by reference to other stockpile data released over the past decade. Some such estimates have recently been published [141], albeit without their detailed substantiation [140], and are an improvement over the previous estimates given on page 325 of *SIPRI Yearbook 1982*. The actual numbers of toxic chemical munitions available to US forces, including the numbers of munitions designated 'unserviceable', are set out in 'Worldwide Ammunition Report for Toxic Chemical Munitions and Bulk Agents', US Army Armament Materiel Readiness Command, June 1981 [85]; it is a secret document.

As to the situation in France, the subject of French CW weapons moved somewhat closer to public debate during 1982. Following the Huyghes des Étages Report to the National Assembly [10] and the Chaumont Report to the Senate [9] in the autumn of 1981, both of which alluded to the possible importance of a French CW retaliatory capability (although without reference to the existing one), the commandant of the French Army NBC Defence School published an article about CW defence problems which culminated in a reference to the military value of CW retaliatory capability "for nations desiring to have a coherent defence" [11]. In August, at the CW disarmament negotiations in Geneva, the French delegation began to cite explicitly a view of the deterrent value of CW weapons; this occurred in the context of discussions on the question of declaring stockpiles and the timing of such declarations in relation to the course of stockpile destruction operations. But what France might have to declare, even in approximate terms, remains unknown to the public, notwithstanding the detailed inquiries of a French journalist [146a].

In the face of official silence, unconfirmed reports and rumours about French CW weapons have proliferated during the past year. There was reference to the existence of up to a million French VX nerve-gas munitions [134], though this must surely be an exaggeration. Iraq was reported to have acquired 'biological bombs' from France [223]. French 'shock troops' were said to be equipped with 'chemical weapons' [189]. The stocks of nerve gas said to have been made from 1964 at the Braqueville plant of the former Poudrerie de Toulouse, and stored there, were reported to have been destroyed in 1974 pending French acquisition of binary munitions [119], which were said to be under development by the SNPE at Le Bouchet and by the GIAT at its Bourges facility. Rumours in both Paris and Washington early in 1982 of an imminent US–French collaboration in the field-testing in France of the Bigeye binary bomb [174] received what seems to have been only a weak denial from the French Defence Ministry [199, 216]. There was a report that, until France left the NATO military command structure, the US supplies of CW weapons in Europe had for 20 years been held in a depot near Verdun [222].

The Chaumont Report quoted unidentified sources on the magnitude of the Soviet CW weapon capability: as of 1979, it said, 30 per cent of the munitions available to the Soviet Army were chemical, its stockpiles containing 400 000 tons of immediately usable CW agents [9b]. In its 1982 White Paper, the British Defence Ministry put forward, for the first time ever in public, its own such figure: "We estimate that the Soviet Union has a stockpile in excess of 300 000 tonnes of chemical agent" (and it implicitly denied the existence of French CW weapons altogether) [18]. At about the same time, the senior CW official in the office of the US

Secretary of Defense was saying to the Congress: "We do not know very well the size of the Soviet chemical munitions stockpile" [36]. Such candour was a striking departure from previous Defense Department practice when describing its view of Soviet CW capabilities in public. The official went on to express a similar ignorance about where Soviet CW munitions were deployed and about the size and scope of the Soviet CBW R&D effort. On chemical weapon factories he said merely that "there are . . . several suspected production facilities in the Soviet Union" —this in sharp contrast to the Department's testimony the previous year which asserted that the USSR had 14 times as many "active/inactive production facilities" as had the USA [e.g., 31].[12] However, although on these points of detail the appraisal was uncertain, the overall picture of Soviet CW preparedness given to the Congress was, as before, a most menacing one. The Joint Chiefs of Staff had reinforced it: "Soviet doctrine calls for the use of toxic CW agents in both offensive and defensive situations. Chemical weapons are to be used in close coordination with high explosive and nuclear strikes, and may be used independently when their special effects can provide a tactical advantage. . . . For the last five years, the Soviet Union has used chemical warfare agents, either directly or through surrogates, in Southwest Asia and Southeast Asia" [70]. A similar message was conveyed by the Defense Secretary himself in his *Annual Report to the Congress*. In it he also said that the USSR had "a busy and expanding chemical proving ground" [33b]. This was the nearest that any senior US defence official came to saying, again in contrast to earlier years or to the statements of less authoritative spokesmen, that the USSR was engaged in a CW weapon build-up. Such a build-up continued to be asserted, however, by the British Defence Secretary [18].

In public, Soviet officials have for the most part remained silent on the nature of their CW weapon capability and on the purpose it serves. In a rare departure from this norm, a general from the Military Academy of Chemical Defence in Moscow recently spoke as follows to a Western journalist: "All estimates and figures [on Soviet supplies of CW agents] the West operates with are mere inventions[13]. . . . The thesis of American inferiority is unfounded. . . . The concrete data are state secrets" [100]. When asked, on another occasion, what the Soviet response might be to US production of binary munitions, the general replied: "The Soviet armed forces will unquestionably have a counterweight to any weapon, including binary weapons" [99].

[12] An assessment which was, however, repeated in February at the Madrid CSCE review meeting by the head of the US delegation [68].

[13] The general also commented on what SIPRI has in the past written about Soviet CW weapon capabilities: "These are vague assumptions which are not in line with reality" [100].

Faced with a high degree of uncertainty about Soviet CW intentions, Western defence authorities have no prudent option but to assume that they present a threat. If it decided to do so, the Soviet government could probably find a way for reducing the ambiguities attaching to its CW stance in Western (and non-aligned country) eyes without at the same time jeopardizing Soviet security to the point of net detriment. Yet even though the need for such mistrust-reducing measures is so evidently growing, it seems that Moscow has not chosen to act in such a manner, a failure which is becoming more and more conspicuous and damaging. An example may be cited. Given the attention which CW has received in the Soviet media over the past year, it is remarkable that those organs have carried no declaration that the USSR, like the USA, has long been observing a *de facto* moratorium on CW weapon production. There have been several specific instances when such a declaration might conveniently, even properly, have been made [e.g., 98, 103].[14] They include the statements of the Chemical Defence Academy general who is quoted above. In fact he came close to declaring precisely the opposite [100].

Horizontal proliferation of chemical weapons

Vertical proliferation has potential lateral ramifications in the form of dissemination of CW weapons among other NATO or WTO member states. As regards the European members of NATO, the prospect of association with the US binary programme has caused not a little domestic unease. In both Britain and FR Germany, which are the member states perhaps most likely to be affected, the extent to which CW has thus become a public issue is indicated by the fact of several popular books on the subject being published commercially during 1982 [111, 112, 118, 121], with others in preparation. In December 1981, a wire-story of US plans to deploy Bigeye bombs in Britain [217] caused the Defence Secretary to tell the press that "no approach for the deployment of US chemical weapons in this country has been received, nor is one expected" [17]. This minatory language was subsequently repeated by the government in Parliament [23], into which a Private Member's Bill had just been introduced that would make storage of foreign-owned CW weapons in Britain illegal [22].[15] A somewhat similar, but all-party, parliamentary initiative

[14] Under present circumstances it is not improbable that any declaration by the USSR that could not be absolutely verified would be regarded by some people in the West as disinformation. There are, for examples, circles in the United States where the original decision by President Nixon in 1969 to curtail US CW weapon production is now seen as the successful outcome of just such a deception [116, cf. 210].

[15] The Bill would also have prohibited storage of foreign-owned nuclear weapons in Britain. During the debate in the House of Lords on the motion for second reading of the Bill (subsequently rejected), it was of course the nuclear aspect which dominated proceedings. It is significant that the two people outside government who spoke against the Bill in its CW aspect

in the Netherlands within days of President Reagan's certification action had been endorsed by the Dutch government [14]. In FR Germany, where five possible storage locations for binary munitions were said to have been identified in secret US planning papers [221], an action was initiated in the courts to test the constitutionality of the non-binary US CW weapons already there [112]. The impetus behind this action stemmed from the public outcry in Rheinland-Pfalz during 1981 [159] when a site near Pirmasens was identified as a US nerve-gas depot [cf. 196]. It seems to be emerging from the various press and other investigations associated with the action that there is in fact more than one US CW-weapon depot in FR Germany [e.g., 165], and that the US Army may therefore have misled the Congress when stating the contrary in 1978 [39]. If so, the recent allegations of continued US storage of CW weapons in Japan [e.g., 200] and elsewhere may acquire a new cogency.

Although popular sentiment in Western Europe thus appears strongly hostile to governmental policy changes favouring NATO CW rearmament, there is undoubtedly some support for such changes within parts of the military and associated community. A little of this has continued to become evident outside closed circles this past year [e.g., 19, 20]. Possibly as a way of riding these two opposing trends of opinion, West European governments were unusually vociferous during 1982 in public statements of support for the CW disarmament negotiations. The British Prime Minister, for example, spoke at the United Nations in June of the "need to redouble our efforts to bridge the gaps that still remain" after referring to the new Soviet CW proposals [16]. Cynical voices can be heard from the US Army Chemical Corps: "NATO member nations' unswerving support for CW arms control provides a convenient excuse to avoid the serious consideration of measures needed to improve NATO's CW retaliatory posture" [45].

Similar tensions may very well exist within the WTO countries, but no indication of them appears to have surfaced in public. Soviet deployment of CW weapons to East European countries continues to be asserted, if not by the United States (see above), then at least by the Federal Republic of Germany [e.g., 12]. According to a recent British press report, "Western intelligence reckons one Warsaw Pact country has contingency plans to swap two insecticide plants to nerve-agent production within two weeks" [185].

The reports of CW weapon proliferation outside the immediate area of US–Soviet confrontation[16] remain unverified—unless it be supposed that

(amongst other aspects) both displayed an elementary misunderstanding of the subject. One of them evidently thought, for example, that possession of CW weapons by either the United States or Britain was already illegal [24].

[16] References to such reports (involving China, Egypt, Ethiopia, Israel, Libya, Pakistan, South Africa, Syria and Viet Nam) prior to late 1981 are cited on pages 336 and 354 of *SIPRI Yearbook 1982.*

the allegations of chemical and toxin warfare from South-West and South-East Asia are now so well established that Viet Nam, and even Afghanistan too, must be assumed to be CW weapon possessor states. The other allegations noted in section II may likewise mean that the present number of such states should be increased still further, perhaps to include Ethiopia, for example, or South Africa. Reports continued to appear in the US press during 1982 that Cuba had received CBW weapon matériel from the USSR [e.g., 171, 209]. There were allegations from Phnom Penh that both Thailand and Pakistan had received CW weapons from the USA [164]. A West German newspaper reported Indian CW weapons [189]. A US newspaper said that China was capable of waging CBW [246].

Sub-national proliferation

At the end of 1981 there were reports of toxic chemicals being discovered in caches of terrorist weapons in FR Germany [179, 190]; of poison perhaps having been deliberately injected into the water-supply of the US city of Pittsburgh in an incident during 1980 [163]; and of phials of disabling chemicals, not 'tear gases', having been thrown against miners in Poland [255]. Phials of hydrogen cyanide were encountered in PLO weapon caches in Beirut in June 1982 [194]. At a theoretical level, professional publications during 1982 continued to discuss the potentialities of CBW weapons in the hands of terrorists [e.g., 124]. There is the related matter of CBW devices as armament for governmental clandestine services. During 1982 there were reports of such devices, of a type said to have been supplied earlier to Cuba, having been used during the 1979 China/Viet Nam War [e.g., 171].

Weapons in these categories have a long history, one that CBW disarmament negotiators in Geneva have, perhaps necessarily, ignored.

New technology

The military potentials of the DNA hybridization technique again came under public scrutiny during 1982, primarily because of indications of active military interest in particular weapon applications [127, 203]. These indications were apparently false [166, 204]. Public concern had been sensitized by the lifting, in April, of the previous ban on cloning of toxin genes set out in the guidelines promulgated by the US National Institutes of Health that are intended to ensure a proper supervision of recombinant-DNA research in the United States [202]. It is possible that recombinant-DNA technology might indeed be used to furnish pathogenic microbes having properties different from those of currently known microbes [127]. More significantly, perhaps, it is also possible that the technology might

be used to increase the accessibility to large-scale production of particular toxins, of which bizarre new varieties continue to be encountered in nature [e.g., 218]. However, it remains a moot point whether whatever gains in the military utility of pathogens or toxins that might then become available could ever be sufficiently large, or sufficiently assured, for these particular technological opportunities to be judged a significant threat to the 1972 BW Convention—which, as is agreed by all parties, and as was affirmed in the 1980 Review Conference, subsumes molecular cloning within its scope. But the grounds for concern are real enough, whether in relation to the possible terrorist application [130] or any other. It is obviously important that this rapidly developing area, like other facets of biotechnology, be kept under continuing review in disarmament circles. Meanwhile, the practical and political liabilities of biological weaponry continue to manifest themselves.[17]

There appear to have been no technical developments that might significantly change the future character of CW weapons in the short-to-medium term, although the present reawakening (at least in the West) of military interest in toxins is opening up new fields of inquiry. The suggestion that has been advanced by US investigators that the putative Yellow Rain agent might comprise a synergetic mixture of mycotoxins (including aflatoxins), plus a DMSO-type transferral agent (even proteolytic enzyme) to promote tissue penetration, plus a carrier material (such as pollen) to enhance the airborne challenge, plus various other functional additives, indicates the scope for fertile minds. Moreover, some toxins are finding novel peaceful uses [e.g., 232], and this too may increase the resources being applied to the area.

It was disclosed during 1982 that the second generation of US binary munitions is likely to be based not on the standard nerve gases sarin (GB) and VX, but on a new agent of intermediate volatility, identified only by the symbol EA 5774 [183]. The indications are that the agent is a physically modified form of soman (GD) and not, for example, a member of the novel family of nerve gases said to have been discovered around 1970. In the exploratory development work of the US Army, azabutadienes have been studied as possible training-*cum*-riot-control agents, and the incapacitating agent programme includes studies of volatile anaesthetics and of ternary solutions of certain psychotropic glycollates in DMSO, freezing-point depressant and/or the new volatile irritant EA 4923 [40].

[17] The political liabilities were displayed in the fierce controversy that continued in Britain during 1982 on whether Winston Churchill had or had not seriously considered resorting to anthrax bombs during World War II [121, 129]. In Japan, too, the BW weapon programmes of the past, now described in new detail for a mass audience [135, 136], have profoundly stirred public opinion [192, 195, 197]. As to the practical liabilities, these are illustrated in the current attempts in Britain to disinfect a Scottish island used for anthrax-weapon trials four decades ago [21, 182, 205].

IV. Developments in the field of CBW disarmament

Destruction of CW weapons

Early in 1982 it was announced by Indonesia and the Netherlands jointly that 45 tons of mustard gas held in bulk storage near Bandung in West Java had successfully been incinerated during 1979. The mustard gas was what remained from production during 1940–41 by the government of the Netherlands East Indies. The plant had been dismantled during 1949–50. The sealed storage tanks had apparently been forgotten until 1975 when one of the people who had been involved in the plant dismantling drew them to the attention of the Dutch government. The destruction was a joint undertaking between, primarily, the Prins Maurits Laboratorium TNO and PUSNUBIKAD, the NBC Corps of the Indonesian Army. Despite some 40 years of storage, the mustard gas, which had been made by the thiodiglycol process, had retained its full potency and was estimated to be 95 per cent pure. In describing the destruction to the Committee on Disarmament, the Indonesian and Dutch delegations suggested that other countries whose history had placed them in a predicament similar to that of Indonesia might be able to benefit from the practical experiences gained, and that the fact of the operation having been carried out before conclusion of a CW disarmament treaty was a demonstration of goodwill that might be emulated [4, 13, 15]. Indonesia stated that it had considered itself obliged to destroy the stocks because it was one of the parties to the 1925 Geneva Protocol that had not attached any reservations to their adherence [13].

There may indeed be a number of other countries with awkward—or even valued—remnants of World War II CW arsenals. The disclosures made by Canada, the two German states, Japan, the UK and the USA as to how they have destroyed such stocks are recorded in past SIPRI publications. Wartime stocks are also known to have been destroyed by two other countries, but in these cases the details have not been disclosed. South Africa is reported to have destroyed mustard gas that had been manufactured in two plants during World War II [160]. And a Soviet authority has recently referred to the dismantling by the USSR of a German tabun nerve gas factory, in accordance with an Allied Control Council resolution, and to the destruction of the stocks [100].

In FR Germany, operations to dispose of the CW munitions from World Wars I and II that continue to be unearthed are in progress in the newly built incineration facility at Münster. In the United States, operations at the Tooele Army Depot—CAMDS (chemical agent munition disposal system)—have now brought the total quantity of mustard and nerve gases disposed of since 1970 to rather more than 6 700 tonnes, 31 per cent being nerve gas [144]. Remaining in the US stockpiles are

perhaps 30 000–31 000 tonnes, 35–40 per cent being nerve gases [140]. Funds for the construction of a chemical demilitarization plant on Johnston Island, in the Pacific, may be sought in the FY 1984 budget [41].

The CW disarmament negotiations

On the day following President Reagan's certification action, the Director of the US Arms Control and Disarmament Agency told the Committee on Disarmament that the United States would now "concentrate its efforts towards the elaboration of a convention banning chemical weapons in the Committee" [30]. The United States was thereby rejecting the option of resuming the bilateral CW talks with the USSR that had been left open since conclusion of the 12th round in July 1980, and which Moscow had on several occasions since indicated a wish to continue. However, the use of the term 'elaboration' was in effect an acceptance of an expanded mandate for the Committee's CW work during 1982, even though the USA remained unwilling to empower the relevant working group of the Committee actually to 'negotiate'. The mandate of the group subsequently agreed was: "to elaborate such a convention, taking into account all existing proposals and future initiatives, with the view to enabling the Committee to achieve agreement at the earliest date" [3]. Particulars of the Committee's work on CW during 1982 are recorded elsewhere in this volume (see chapter 18).

The major development came at the start of the summer session with the submission by the USSR of the document putting forward "Basic Provisions" that had been presented in June at the UN General Assembly's Second Special Session on Disarmament [90]. Especially with its endorsement of the concept of systematic international on-site inspection as a useful verification technique, the document seemed to go much of the way in general terms towards matching the similar basic provisions for a CW Convention that the United States had submitted to the Committee informally in July 1979 [143]. The document did not go into detail, however, nor did the Soviet delegation elaborate much upon it. The Western response was to withold substantive comment until the clarifications asked for had been received: there were not a few people in Western capitals who suspected the document of being a deceptive and dishonest Soviet diplomatic manoeuvre. In the First Committee of the UN General Assembly in November, the head of the US delegation to the Committee on Disarmament put forward what was in effect a revised set of US basic provisions [69]. It appears to be a good deal more demanding than its 1979 predecessor—requiring, for example, on-site monitoring of CW stockpiles until they are destroyed, and procedures for fact-finding investigations of reports of undeclared stockpiles or facilities.

The Committee's detailed CW work takes place within its *Ad Hoc* Working Group on Chemical Weapons. During 1982, under Polish chairmanship, the *Ad Hoc* Group instituted the novel procedural device of assigning particular subtopics to informal 'contact groups'. This was generally judged a success, and it is probably the case that such a procedure is the only way of handling effectively the many complex problems of technical detail that the negotiations must eventually resolve. The procedure does, however, place heavy demands on delegations if they are to keep themselves informed on what is happening and contribute actively to it. Few delegations, it appears, are yet in a position to do so fully, chiefly because their governments have not provided them with sufficient resources of skilled manpower. It would be invidious to identify the weak delegations here, but they include those of some of the states whose political leaders have been making strong statements of support for the CW negotiations before both international and domestic audiences. Such statements must be regarded as essentially empty unless and until there is a strengthening of practical support for these delegations, especially on the CW technical side.

Even though the negotiations may be unable to progress much further without such increased investment in them, some of the defaulting governments may in fact be unable, for internal reasons, to commit more resources until there is evidence of more progress. For this reason the CW Convention that is being sought may still be a long way off. The slowness of progress has been stimulating interest in a regional approach [e.g., 7]: a "partial measure", as one authoritative commentator has put it, "designed to forestall a plunge into a chemical weapons race between the United States and the Soviet Union" [128]. "It would thus," he went on, "try to buy the time needed for a radical, comprehensive, world-wide solution". He was advocating, in particular, the concept of a chemical weapon-free zone in Central Europe, such as had just been proposed by the Independent Commission on Disarmament and Security Issues under the chairmanship of Olof Palme [125].

Serious and carefully prepared initiatives are unquestionably needed during 1983 if there is to be any hope of a CW disarmament treaty. But these may not get very far while the compliance issues raised by the CBW use allegations continue to poison the atmosphere.

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Appendix 14A

The conclusions section of the Report of the UN Group of Experts to Investigate Reports on the Alleged Use of Chemical Weapons

VII. Conclusions

185. In pursuance of General Assembly resolution 36/96 C, which requested the Secretary-General to continue his investigation pursuant to Assembly resolution 35/144, the Group, *inter alia*, addressed itself to the submissions at hand and undertook on-site visits to Pakistan and Thailand, in accordance with paragraph 5 (b) of resolution 35/144 C. In the course of those on-site visits, it interviewed alleged victims and eyewitnesses of alleged chemical attacks as well as medical personnel and explored other sources of information as well. During the on-site visits, the Group was handed various samples and also collected specimens of blood and urine from alleged victims.

186. In its evaluation of the written submissions, the Group noted that, while alleged victims and/or eyewitnesses would be in a position to provide firsthand accounts, it could not overlook the fact that such accounts might be incomplete or distorted for various reasons. The Group therefore found it difficult to make a definitive assessment regarding the veracity of the accounts given by the alleged victims or eyewitnesses mentioned in the submissions.

187. Many of the medical signs and symptoms reported by the alleged victims and medical personnel, referred to in the submissions, could be explained by trichothecene poisoning whether due to natural occurrence or other causes. However, because of the vagueness of the symptomatology presented in most of the reports, explanations other than the use of trichothecenes cannot be excluded. The Group considers that the methods described in the submissions for trichothecene analysis are adequate to ensure correct identification and to give quantitative results with satisfactory precision. As to the analytical results presented in the submissions, the Group concluded that the presence of T-2 and HT-2 toxins in the blood and urine samples would be consistent with previous exposure of the alleged victims to mycotoxins of the trichothecene type but it was unable to decide from the analytical results whether such exposure was due to a chemical attack or could be attributed to natural causes.

188. The Group considers the reported presence of synthetic substances, such as polyethylene glycol and lauryl sulphate, in samples of yellow powder from Laos to be significant. However, with respect to the origin of the samples, the Group felt that while, on an *a priori* basis, it would not wish to question that the samples were collected in the areas specified in the submissions, it was not in a position to ascertain beyond a reasonable doubt whether or not these samples were obtained from areas that had been exposed to chemical attacks.

189. Because of the prolonged lapse of time between the alleged exposure to chemical attack and the time when it conducted the interviews and medical examinations of the alleged victims during its on-site visits, the Group was not able to detect signs and symptoms pathognomonic of exposure to chemical attack. However, the Group had

the opportunity to interview two Hmong refugees who claimed to have been exposed to the yellow powder only two weeks earlier. Medical examination, in consultation with two dermatologists, proved that their skin condition was due to fungus infection of at least three months' duration. Analyses of their blood did not show any trace of trichothecenes (sensitivity of the method is 10–100 ppb) and there was no leucopenia.

190. As reflected in this report, due to circumstances beyond its control, the Group was not in a position to proceed to the territories where chemical attacks had allegedly occurred and it was, therefore, unable to conduct any on-site investigations on those territories. This made it impossible for the Group itself to collect samples, including munitions and/or remnants thereof, in those territories. Nevertheless, the Group received samples allegedly collected in some of the areas of conflict during its visits to Pakistan and Thailand. The Group also collected blood and urine samples from alleged victims during the on-site visits.

191. The results of chemical analyses of samples received or collected by the Group are inconclusive. In most cases, no presence of chemical warfare agents beyond the detection limits of the analytical methods used could be demonstrated. In one case, a Hmong refugee handed to the Group a sample of granular matter allegedly used to poison food. Analysis of this material showed that it contained a highly toxic substance, carbofuran, in a concentration of 1–5 per cent mixed in sand. But the unclear origin of the sample and the fact that it is probably identical with a commercially available preparation made it difficult for the Group to draw any conclusions from this finding.

192. While the Group was in Thailand in October 1982, it was informed by the Thai authorities about the appearance of a yellow substance, on 19 February 1982, in two Thai villages and it was invited to visit those two villages. This, of course, could not be considered a timely access to those areas. However, from the interviews and medical records available, it was evident that following exposure to the yellow substance there was a marked increase in the incidence of skin complaints in one of the villages, as reported to the Group.

193. In its evaluation of the allegations mentioned in the course of the interviews, the Group noted that some allegations were only supported by scanty circumstantial evidence and that alternative explanations other than the one of chemical warfare agents were possible and, in most of those cases, even likely. One example is the allegations concerning poisoning of water supplies, which could be explained by natural occurrences of pollutants in the water. In some cases, because of lack of adequate information or evidence of any kind presented, it was not possible to arrive at any conclusion.

194. Other allegations were supported by more circumstantial evidence but alternative interpretations of the causative agent could still be possible. This is exemplified by some of the allegations concerning various forms of coloured smokes in Afghanistan, which probably could be attributed to the use of incendiaries.

195. In some cases, however, more circumstantial evidence was obtained by the Group both from written submissions as well as during its on-site visits. One such well-supported allegation concerned the possible use of harassing agents in the underground water canals (*karez*) in Afghanistan.

196. Another example is the allegation of the use of some toxic material in the area in Laos where the Hmong people live. The Group was not able to pin-point any specific

chemical warfare agent or other toxic compounds as the causative agent. Most of the circumstantial evidence concerning the Hmong allegations is contained in the written submissions. Furthermore, additional circumstantial evidence was obtained by the Group during its visit to Thailand.

197. While the Group could not state that these allegations had been proven, nevertheless it could not disregard the circumstantial evidence suggestive of the possible use of some sort of toxic chemical substance in some instances.

Source: United Nations Report of the Group of Experts to Investigate Reports on the Alleged Use of Chemical Weapons, 26 November 1982. In UN document A/37/259, 1 December 1982.

15. The military use of outer space[1]

Square-bracketed numbers, thus [1], *refer to the list of references on page 454.*

I. Introduction

US and Soviet military activities in outer space continue to exploit the space environment to support Earth-based armed forces. As an example, the US fiscal year 1983 military space budget of $8 500 million shows an increase, in real terms, of some 20 per cent over the previous year. The number of military satellites launched during 1982 was as high as in 1981. The use of military reconnaissance, communications, navigation and meteorological satellites in orbit around the Earth continues to enhance the land-, sea- and air-based forces of both the Soviet Union and the United States.

Two of the most significant advances in military space technology were made in 1982 when the US space shuttle made its first operational flight, and when the Soviet Union apparently for the first time tested a re-usable satellite launcher. These and other significant developments in outer space technology are reviewed in this chapter.

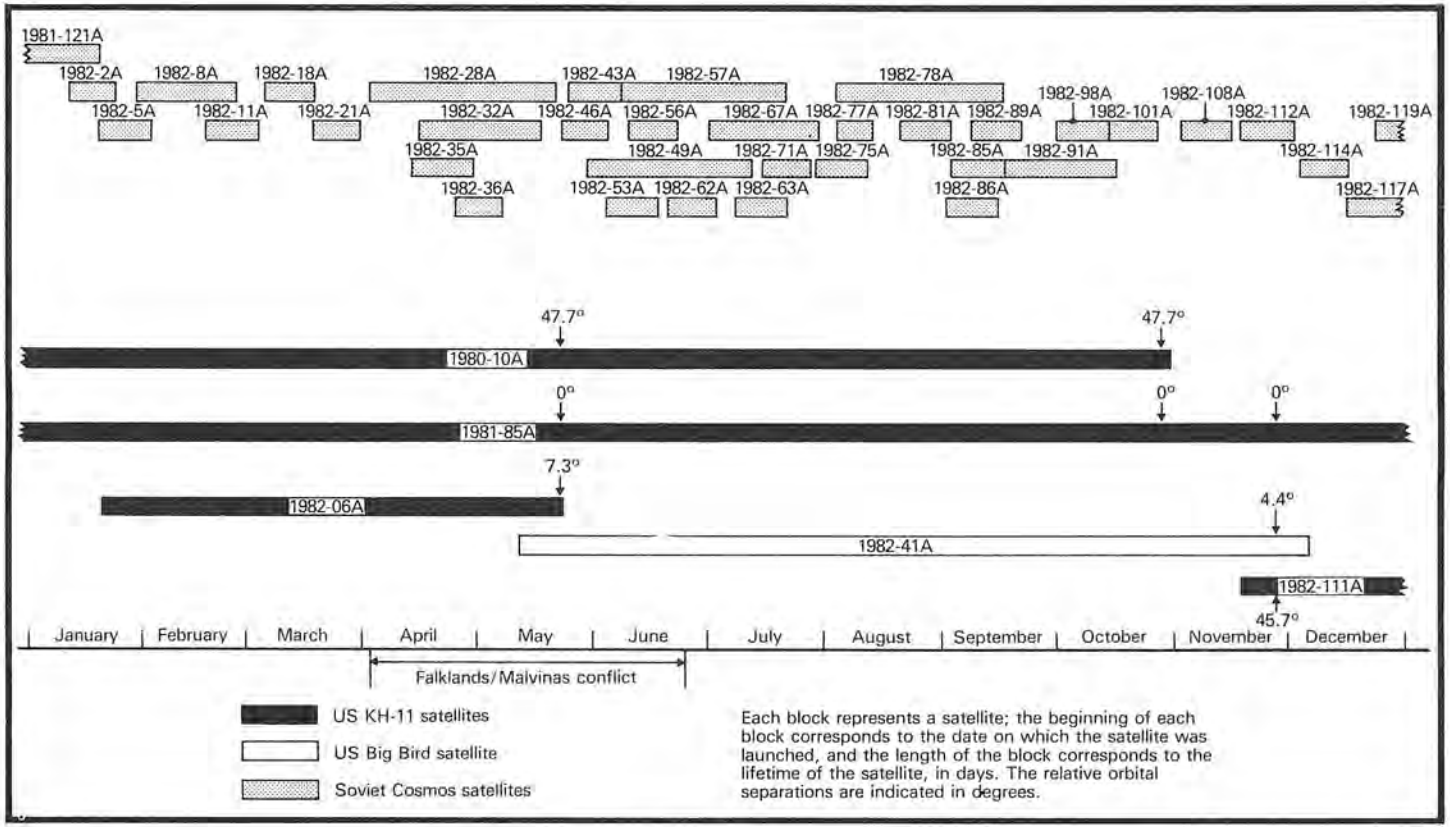
In 1981 the UN General Assembly recommended that the Committee on Disarmament (CD) start negotiations on a treaty banning all types of weapons in space [1]. However, no progress has been made in this forum. By the end of 1982 they had not even set up a working group to look into the problems. The Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82), held in Vienna in August 1982, raised the general issue of the militarization of outer space, but produced nothing more than an expression of concern over the development of military space technology. Some of the arms control or disarmament issues discussed at the UNISPACE conference are briefly reviewed in this chapter.

II. Reconnaissance satellites

The USA launched three photographic satellites and one electronic reconnaissance satellite in 1982, and two US photographic reconnaissance satellites launched earlier were still in orbit (see figure 15.1). (The first, launched in 1980, decayed after orbiting for 996 days, and the latter was

[1] This chapter was written by Bhupendra Jasani.

Figure 15.1. Coverage by US and Soviet photographic reconnaissance satellites during 1982



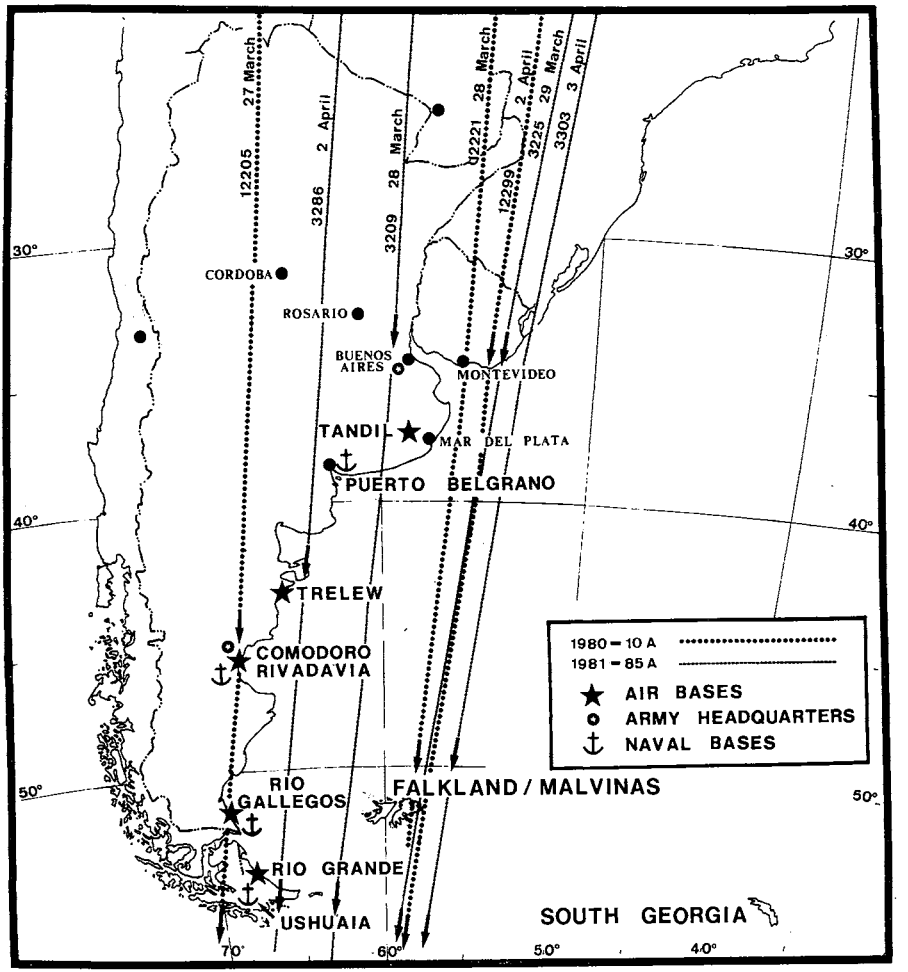
still in orbit at the end of 1982.) The orbital planes of these two satellites were about 48° apart, allowing more frequent coverage of the Earth's surface [2]. On 21 January 1982 a third photographic reconnaissance satellite was orbited: a close-look satellite carrying high-resolution photographic equipment [3]. The day after launch, between the ninth and thirteenth orbits, the path of the satellite around the Earth was made circular and the perigee raised to some 600 km (see table 15.1 for the initial orbital characteristics). The satellite decayed after 122 days in orbit. The orbital characteristics of this spacecraft are different from those of other satellites of this type, so it has been suggested that it may be one of the next generation of the KH-11 type with improved sensors [4].

Two additional photographic reconnaissance satellites were launched in 1982. One was a Big Bird satellite and the second (1982-111A) was probably a KH-11 type. This KH-11 type was launched a month after another of that type (1980-10A) had decayed, suggesting that the second was a replacement for the first since its relative orbital position is similar (see figure 15.1). In this way a two-satellite KH-11 reconnaissance system was maintained.

Reconnaissance satellites of this type are used not only for learning details of military targets, but also for monitoring crisis areas. For example, it has been reported that in 1982 a number of US and Soviet satellites were used to observe the movements of the troops and naval forces of Argentina and the UK [5–10]. While these satellites may not be the only sources of information on troop movements, it appears that the United States had some knowledge of a possible invasion by Argentina around 31 March 1982 [11]. It was reported that, by the end of March, an Argentine task force had left Puerto Belgrano with some 800 marines and army troops for the Falkland/Malvinas Islands [12, 13]. Some of the main Argentine air, army and naval bases, and the ground tracks of two US satellites during the early part of the conflict, are shown in figure 15.2. It can be seen that, during orbits 12205 and 12221, satellite 1980-10A flew over several Argentine military bases on 27 March 1982 and over the Falkland/Malvinas Islands on 28 March and 2 April, the day of the invasion. The altitude of the satellite was about 400 km and the local time was about 1700 hours. Even though the weather over the Islands varied considerably during the crisis period, there were a sufficient number of cloud-free days. For example, photographs taken by the European Meteosat satellite show that on 2 April the conflict area, particularly the Argentine coastal region, was cloud-free. Similar photographs taken on 27 and 29 March show that at least the Argentine coastal region was largely cloud-free and on 3 April the whole region was cloud-free. Another satellite, 1981-85A, also covered the area just before and at the beginning of the invasion (see figure 15.2).

Figure 15.2. Ground tracks over Argentina and the Falkland/Malvinas Islands of US satellites 1980-10A and 1981-85A in March–April 1982 (number and date of each orbit indicated on figure)

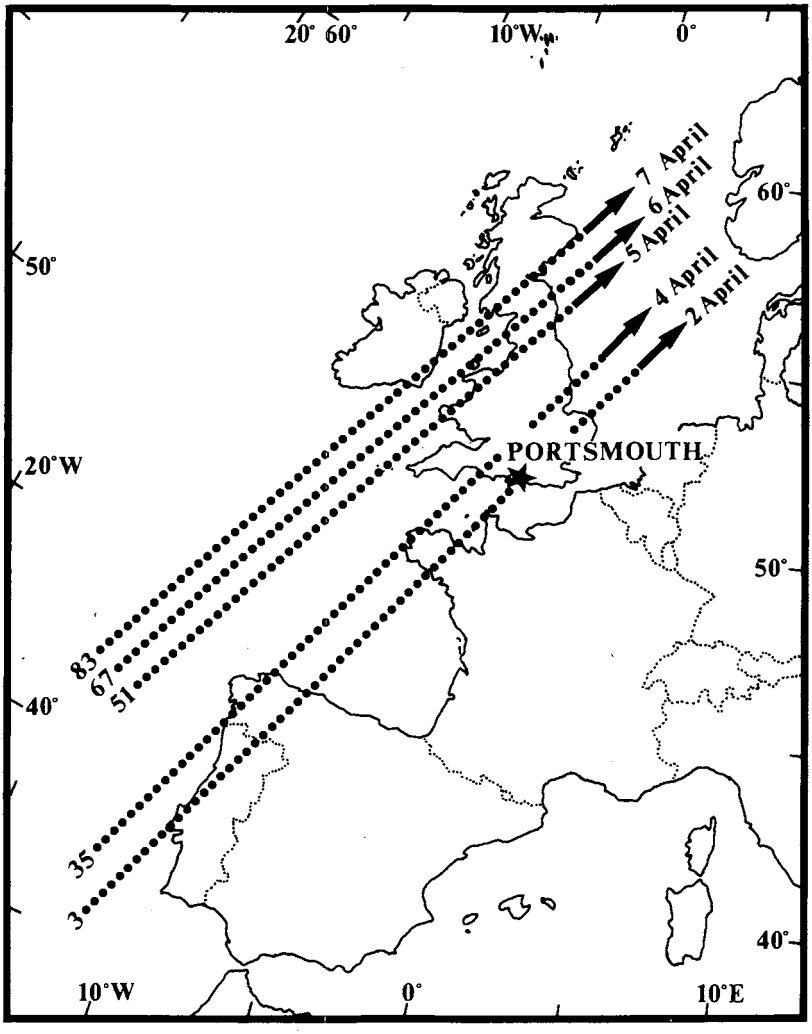
By 27 March, troop concentration at Río Gallegos was completed.



On 3 April it was announced that a large British task force would leave the UK for the Falklands/Malvinas; on 5 April it left Portsmouth harbour. A Soviet satellite, Cosmos 1347, was launched on 2 April and orbited over Portsmouth just before 1520 hours during the third orbit and at an altitude of about 180 km. Figure 15.3 shows the orbital tracks of Cosmos 1347 over the region during the next three days; it can be seen that the satellite could have observed the British task force.

In addition to these photographic reconnaissance satellites, the USA and the USSR also launched several electronic and ocean-surveillance

Figure 15.3. Ground tracks over the UK of the Soviet satellite Cosmos 1347 in April 1982 (number and date of each orbit indicated on figure)



satellites in 1982 (see tables 15.2 and 15.3). The former type are designed to monitor electronic signals generated from various types of military sources, while the latter monitor the movements of surface naval ships. Soviet ocean-surveillance satellites carry radar sensors for reconnaissance tasks even when targets are obscured by cloud; the kind of detail observed with such radar sensors is shown in figure 15.4.

In 1982 China launched its twelfth satellite. Its orbital characteristics were the same as those of US and Soviet photographic reconnaissance satellites, and it was recovered five days after launch. The satellite was

Figure 15.4. A synthetic aperture radar image of Los Angeles, California, taken from the US Seasat 1 satellite from an altitude of about 700 km at about 2030 hours local time. A considerable amount of detail can be clearly seen

launched by an FB-1 (CSL-2) launcher, an adaptation of the Chinese CCS-X-4 intercontinental ballistic missile [14–15]. The FB-1 is capable of orbiting a 1 200-kg payload in a low Earth orbit. (The Chinese launching site is situated at Jiuquan (39.7°N, 98.6°E) in Gansu Province in northwest China, with the main control centre at Weinan (34.3°N, 109.3°E), Shaanxi Province, in central China [15]. China is now developing a larger launcher, the CZ-3, for orbiting satellites in geostationary orbit or large spacecraft in lower orbits. Conventional expendable rockets for launching spacecraft are also under development in China and in some European and other nations. The USA has already developed a reusable space transportation system, and the USSR is in the initial testing stage of its expendable launcher. These developments are reviewed in the next section.

III. Reusable space transportation systems

The development of the US space shuttle reusable space transportation system (STS) was given the go-ahead in 1972. It was developed by the National Aeronautics and Space Administration (NASA) with extensive participation by the Department of Defense (DoD). The main component of the space shuttle is an orbiter similar in configuration to a delta-wing aircraft powered by rockets. The space shuttle is envisaged mainly for placing satellites into orbit, retrieving them from orbit, and repairing and servicing them in orbit. Satellites with propulsive rockets will also be placed in low orbit by the space shuttle for subsequent transfer into higher orbit, including synchronous orbit. The first flight of the orbiter *Columbia*, STS-1, was on 12 April 1981, and the first military-oriented payload was carried on STS-4 on 27 June 1982. A minimum of about one-third of the shuttle flights planned for the next five years will have military payloads. Military use of the shuttle is further emphasized by the fact that the US Air Force is building its own shuttle launch and landing site at the Vandenberg Air Force Base, where most US military satellites are launched today. Moreover, in September 1982 a new Space Command was established to operate the so-called Consolidated Space Operations Center (CSOC) now being built at Peterson Air Force Base near Colorado Springs [16, 17]. The centre will control all the military operations of the shuttle [18, 19]. The Space Command will also acquire and be responsible for all the data obtained by the Strategic Air Command from the world-wide tracking of spacecraft and other artificial objects orbiting near-Earth space as well as data from early-warning satellites. Most importantly, the Space Command will plan orbit strategies not only for satellites performing such military missions as reconnaissance, communications and navigation but also for satellites which may carry either anti-satellite weapons or

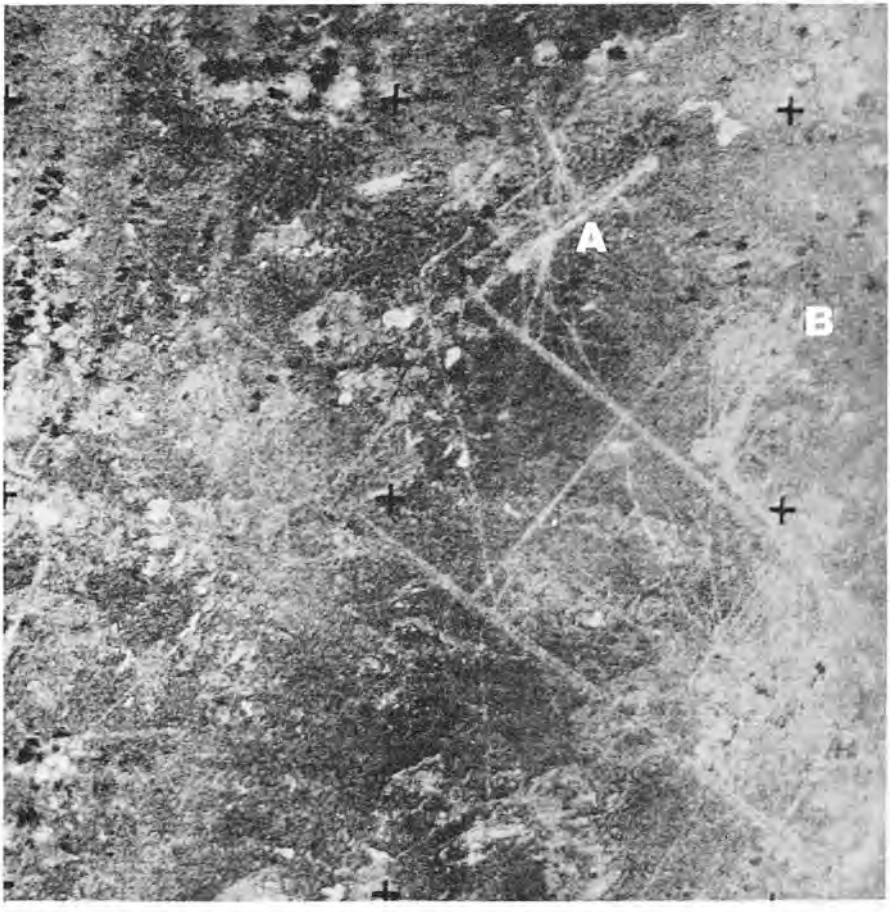
Figure 15.5. Photographs of the Soviet Tyuratam launching facility, taken from the US Landsat 3 satellite in (a) 1979 and (b) 1981

In (*a*) the possible Soviet reusable spacecraft runway (A) and the reusable spacecraft R&D facility (B) can be seen. In (*b*) the extended runway (A) and the completed road leading to it are clearly visible.

(*a*)

weapons to defend against intercontinental ballistic missiles. The Space Command is also in charge of the Defense Meteorological Satellite Program [20].

Future military shuttle flights will be controlled by the Space Command. According to testimony by the Director of the US Defense Advanced Research Projects Agency (DARPA), "the DoD have made a strong commitment to exploit the shuttle and its associated technologies" in



(*b*)

The images were processed by the Tokai University, Research Planning & Coordination Division, Tokyo, Japan.

future US space planning [21]. In fact, a number of US Air Force personnel were involved in the launching of the first space shuttle, STS-1 [22].

The first five shuttle flights are listed in table 15.9. The table indicates the gradual decrease in the orbiter's turn-around time (that is, the number of days between the landing of the orbiter *Columbia* and its next flight).

The Shuttle Image Radar-A (SIR-A) and the Shuttle Multispectral Infra-red Radiometer (SMIRA) were developed and orbited in STS-2

under the OSTA-1 programme (of the Office of Space and Terrestrial Applications). The ground resolution of SIR-A, the first side-looking radar to be orbited, is about 80 m (giving an instantaneous field of view of 40 m × 40 m). Observations of the Earth's surface with SIR-A have been remarkable and have illustrated the potential of such a sensor. For example, the radar signals from SIR-A penetrated depths of at least 1 m in drift sand and 2 m in sand dunes in the eastern Sahara Desert, revealing hitherto unknown buried valleys and Stone Age sites which probably were occupied by humans [23].

While the third flight, STS-3, carried a scientific experimental package, it was the fourth flight, STS-4, which carried the first military payload, designated the CIRRIS experiment (Cynogenic Infra-Red Radiation Instrumentation for the Shuttle). This sensor is being tested for the Teal Ruby IR telescope, being developed for detecting strategic aircraft and missiles. The telescope will be the main payload on the Space Test Program satellite P80-1, which may be launched in November 1983 [24].

The fifth shuttle flight carried, for the first time, paying cargo and four astronauts. One of the commercial payloads was the SBS (Satellite Business System) satellite. It is noteworthy that the cost of launching this satellite using a conventional launcher (the US Delta) would have been $23 million, while the shuttle cost was only about $8 million [25].

The sixth shuttle flight was significant since the two-stage inertial upper stage (IUS), developed by the DoD, was used to launch the Tracking and Data Relay Satellite System (TDRSS) into orbit. The orbiter was the *Challenger*, launched on 4 April and returned to Earth on 9 April 1983. The three-satellite system of TDRSS is intended to provide tracking and communications services for up to 100 separate spacecraft [26].

By September 1987, 72 space shuttle flights are planned to take place, of which 25 have DoD payloads (that is, some 35 per cent of the total) [27]. Two significant experiments will be carried out in the near future. One is a test of equipment to be used in conjunction with space-based lasers for target acquisition, tracking and precision pointing. The experiment, designated Talon Gold, consists of a low-power laser which, during tests, will be used against high-altitude aircraft and space targets. The programme includes flights on shuttles using improved inertial reference platforms and sensors [28]. The second one will test the technology for refuelling satellites such as the KH-11 so as to prolong their lifetimes even more [29].

While much is known about US space shuttle activities, little is published on Soviet activities in this field. It was reported as early as 1978 that the USSR had carried out atmospheric tests of its delta-winged reusable manned space vehicle. The vehicle was launched from the top of a Tupolev Tu-95 Bear aircraft [30]. In the same year the USSR confirmed that they

were working on a reusable spacecraft and that it resembled the US X-20 Dyna-Soar spacecraft [31]. (The Dyna-Soar was under development in the USA in the 1960s, but the programme was cancelled.) Later, it was reported that US reconnaissance satellites had observed the construction of a large runway at Tyuratam, the Soviet space launch site. Figure 15.5 shows the Tyuratam launch complex, photographed by US Landsat 3 satellites on two occasions, once in 1979 and again in 1981. By 1981 major roads leading to the landing runway were completed, and the runway itself was extended from about 3.5 km to about 6 km in length. This runway is comparable in size to that used by the USA for the space shuttle. (The shuttle runway is also being extended from 2.4 km to just over 4.5 km.)

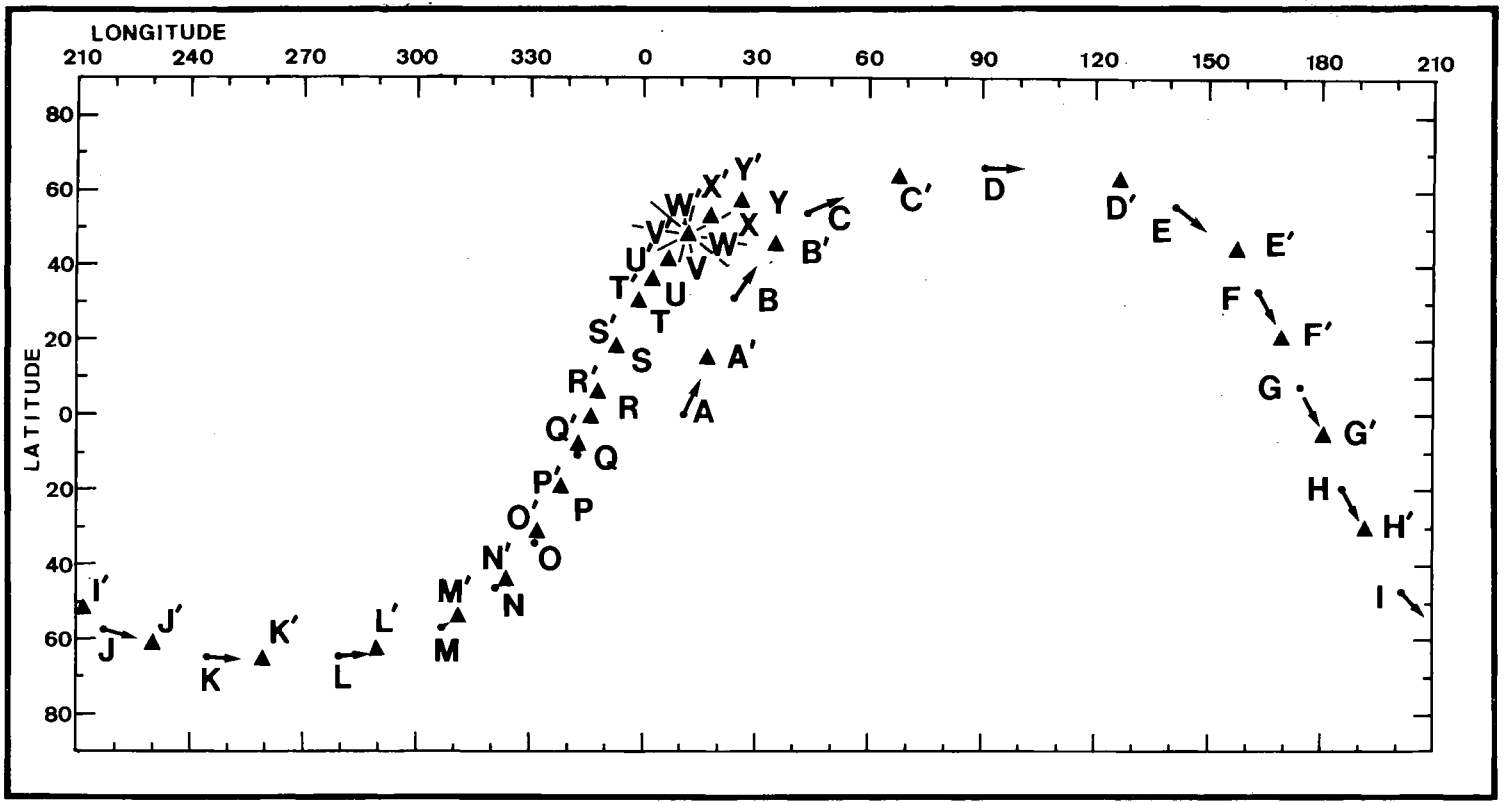
It has been reported that on 3 June 1982 the Soviet Union flight-tested a small test vehicle, using a conventional expendable launcher [32]. A winged vehicle, weighing about 900 kg, was sent up into a low orbit. The unmanned spacecraft, Cosmos 1374, completed just over one orbit before it re-entered the atmosphere and landed over the Indian Ocean in the region of the Cocos Islands. (It is not understood why the craft was recovered over the sea.) Soviet manned flights with this type of spacecraft are expected to begin by about 1985, using a 18 000-kg vehicle, which is about one-quarter the size of the US shuttle (68 000 kg). The payload will thus also be much smaller. (The US shuttle can deliver payloads of 29 500 kg into orbit.)

In addition to these dramatic developments in 1982, the Soviet Union continued with its tests of anti-satellite weapons.

IV. Anti-satellite tests

Just before 1500 hours on 18 June 1982, Cosmos 1379 was launched from Tyuratam. The purpose of the payload, the so-called hunter–killer satellite, was to seek out its target, Cosmos 1375 (launched on 6 June), and to destroy it. (The important orbital parameters of the target satellite were 105.04 min (orbital period), 990–1 030 km (perigee–apogee) and 65.8356° (orbital inclination); the corresponding orbital elements of the killer satellite were 91.37 min, 144–546 km and 65.0947°.) By the beginning of the first orbit the orbital inclination of the killer satellite was corrected by 0.74° to match it with that of the target satellite. The satellite period was also altered, so that it could make a slow approach to the target (the period was changed to 100.4 min). The killer satellite intercepted its prey during the second orbit when the target was in its 162nd orbit. This is depicted in figure 15.6.

Figure 15.6. Ground tracks of the Soviet target satellite Cosmos 1375 (A) and the interceptor satellite Cosmos 1379 (A′). The interceptor caught up with the target satellite at V/V′



These two satellites were part of the Soviet anti-satellite (ASAT) programme which may have begun as early as 1963, involving some 49 target and killer satellites carrying conventional explosives. Although the USA has not tested such a system, it does have an ASAT programme. In 1964 ASAT missiles carrying nuclear warheads were deployed on the ground. However, the US system was dismantled in about 1975, and the development of an air-launched non-nuclear ASAT missile system began. The missile is designed to be launched from an F-15 aircraft flying at an altitude of some 20 km. Operational testing of this ASAT system is planned to begin in 1983.

Thus, less than a decade after the very first launch of a man-made object into orbit round the Earth (Sputnik 1 in 1957), systems to damage or destroy artificial Earth satellites had been developed. This trend is not surprising. Satellite activities—surveillance, navigation, communications, meteorology and geodesy—are an integral component of Earth-based weapon systems since they enhance the performance of the weapons. Satellites have therefore become very important military targets, as illustrated by the latest Soviet ASAT test. It has been suggested that soon after the launch of Cosmos 1379 the USSR launched two intercontinental ballistic missiles, an SS-20 and a submarine-launched ballistic missile, and then conducted two anti-ballistic missile tests. If these tests were co-ordinated with the ASAT test, then they provided, for the first time, an actual nuclear war scenario in which it was envisaged that a nuclear war was started by the destruction of a military satellite, followed by the launch of strategic missiles.

V. Issues at UNISPACE 82

During the UNISPACE 82 conference, concern was voiced about the militarization of outer space. Ninety-four states attended the conference; other participants included representatives of specialized agencies, intergovernmental organizations and non-governmental organizations. The issues discussed also included the saturation of the geostationary orbit, telecommunications and direct broadcasting satellites, disquiet over remote sensing, international co-operation and the role of the United Nations.

The draft report of the preparatory committee contained four paragraphs on the militarization of outer space, on which the committee had not reached agreement. These paragraphs gave rise to considerable discussion. The other major arms control- or disarmament-related issues were the questions of the geostationary orbit and remote sensing satellites.

Prevention of the militarization of space

The militarization of outer space involves not only the possible deployment of weapons in space for use against enemy satellites, but, and perhaps more importantly, the military use of satellites to support Earth-based weapon systems. The four paragraphs of the draft report on the militarization of outer space reflected these trends. Discussions on these issues at the conference were justified on the grounds that the UN was the forum that negotiated the 1967 Outer Space Treaty banning the placing of nuclear weapons and other weapons of mass destruction in orbit. Since the aim of the conference was to produce a report by consensus, after much discussion and considerable opposition from some countries, a compromise was reached. Although in the general debate most countries expressed their concern over "the potential danger implicit in the use of outer space for military purposes" [33], the question of militarization was narrowed down to the issue of weapons deployed in space. The focus thus shifted from the military uses of artificial Earth satellites to the possible banning of the deployment of all types of weapon in space.

Thus the problem is dealt with only in two paragraphs in the introduction of the first part of the final report, entitled "Decisions and Recommendations of the Conference" [33]. These paragraphs state that "The extension of an arms race into outer space is a matter of grave concern to the international community", and that nations with "major space capabilities are urged to contribute actively to the goal of preventing an arms race in outer space and to refrain from any action contrary to that aim". The report urges all states to adhere to the Outer Space Treaty "and strictly to observe its letter and spirit".

Many countries felt that the Committee on Disarmament was the appropriate body to discuss the arms race in outer space, and the conference strongly recommended that the CD give priority to negotiations on this matter.

The report indicates that there are a large number of space objects orbiting the Earth, the majority of which are either inactive satellites or spent rockets and motors or even broken up satellites. By the end of 1981 such Earth-orbiting space debris as could be tracked amounted to 3 482 objects [34]. There are also a large number of very small man-made objects orbiting the Earth which cannot be tracked; it has been estimated that these probably amount to about 5 000 objects [35]. In the vastness of near-Earth space, this number of objects is not large enough to cause appreciable interference or any significant probability of collision with operational satellites. However, there is still a very small probability of collision: for example, about one collision in 20 years at an altitude of 500–1 000 km, but only one collision in a few hundred years at the higher altitude of 1 200–1 300 km [35].

While these probabilities seem small, it is important to note that about eight in every ten satellites in space are military, so any collision is very likely to involve a military satellite. This is illustrated by three events in May 1980 which took place within a period of two weeks.

It was predicted that on 4 and 8 May the US early-warning military satellite 1973-40A and a military communications satellite 1978-16A (FLTSATCOM 1) would come within 9.4 km and 3.5 km, respectively, of each other. On 3 May the satellite 1978-16A took evasive action to avoid a possible collision [36]. On a second occasion, the US satellite 1974-20A (Westar A) and the early-warning satellite 1973-40A were close to each other on two days—9 May and 15 May—although they may not have collided. In this case no manoeuvring was possible since there was no propellant left in either spacecraft. On a third occasion two US military satellites—1979-53A (an early-warning satellite) and 1978-113A (a defence communications satellite DSCS II)—were closing in on each other. In this case the DSCS II was manoeuvred to avoid a collision.

All of these satellites were in geostationary orbit and, except for the Westar, all were extremely sensitive military satellites. In the present political climate, a collision with a military satellite could arouse fears that an anti-satellite weapon had been used. Moreover, the probability of collision will increase in the future since there will be many more nations orbiting spacecraft, and future satellites may be larger than those currently deployed. UNISPACE 82 did not explore the implications.

The report expressed serious concern over the environmental modification caused by gases released from the exhausts of rocket launchers. However, it failed to note that much of this activity was military in nature. An example of the kind of environmental modification expected is dramatically illustrated by the effects caused by the launch of the NASA Skylab 1 orbital laboratory on 14 May 1973. A large and rapid decrease in the total number of ionospheric electrons within a distance of 1 000 km was observed [37]. Such changes affect the propagation of radio waves. More recently it has been shown that with the increased number of space launches, particularly the shuttle-type solid-fuelled booster rockets, there will be changes in the terrestrial radiation balance and the climate [38]. This could result from the chemicals ejected from the rockets which would cause clouds to form. For example, the space shuttle booster rockets emit some 150 000 kg of alumina (Al_2O_3) particles per launch [39]. A more serious environmental modification may be the depletion of the ozone layer. It has been reported that over a period of 10 years, at the planned rate of shuttle launch, the ozone layer will be depleted to such an extent that there will be an increase of about 2 per cent in the ultraviolet radiation reaching the Earth's surface [40]. One of the resultant effects of ozone depletion is an increase in the incidence of skin cancer.

In the report it is recommended that studies be undertaken to determine the environmental effects of rocket launches with a view to recommending some kind of limits on size, frequency or fuel.

Geosynchronous and geostationary orbits

The rate at which an artificial Earth satellite orbits around the centre of the Earth depends partly on its distance from the Earth's centre. At a distance of some 35 787 km from the Earth's surface the time taken to complete an orbit (the period) is 23 h 56 min. The satellite is then said to be synchronous with the rotation of the Earth. Thus the orbit of a synchronous satellite, which may be elliptical or circular and inclined with respect to the equator, is called a *geosynchronous orbit*. If, however, the circular orbit of a synchronous satellite lies in the equatorial plane of the Earth, then the orbit is called a *geostationary orbit*. A satellite in such an orbit appears to be stationary relative to the Earth.

A considerable amount of discussion at UNISPACE 82 centred on the use of the geostationary orbit. Most discussion was on the increasing saturation of this orbit and the space communications frequency bands, owing to the rapid development of global communications using satellites. This concern is based on the fact that only a limited number of satellites can be used in geostationary orbit. The limitation arises not only from the danger of collisions but also from radio-frequency interference from satellites using the same frequencies. If the spacecraft are too close to each other, the communication signals will interfere with each other because a beam of radio-frequency signals fans out. With certain types of antenna and for satellites operating in the 6/4 GHz frequency bands, a maximum of 90 satellites could be used in a geostationary orbit. More satellites could be orbited if they were operated at higher-frequency bands. A summary of the satellites launched in geosynchronous and in geostationary orbits since the first satellite was placed in such an orbit in 1963 is given in table 15.10. It can be seen that at the end of September 1982, 116 satellites—including the inactive ones—were in geostationary orbit. As the Earth's land mass is not evenly distributed along the equator, there are inevitably regions of the geostationary orbit in which there are more satellites. While to some extent such problems will be overcome as antenna technology and high-frequency communication techniques improve, the question of collisions will become acute.

The conference report recommends that studies and research be carried out on the use of high-frequency communication technology. There is also a suggestion that the International Telecommunications Union (ITU) examine the feasibility of including in its future rules a stipulation that a satellite owner is responsible for removing its satellites from orbit when

they become inactive. Moreover, in a long-term perspective, an equitable regime should be worked out. Again, the conference avoided facing the question of militarization. Table 15.10 shows that just over 40 per cent of all the satellites in geosynchronous and geostationary orbits are military satellites, and of these some three-quarters are in geostationary orbit alone. Some of these military satellites, such as the early-warning satellites, are perhaps the most sensitive satellites, and any damage caused to them could well make the two big space powers extremely nervous. It has been suggested that by the year 2000 the probability of a collision in geostationary orbit will be about one collision a year [41]. Thus any study of these orbits must consider their use for military satellites.

Remote sensing

There was considerable discussion on remote sensing from outer space, particularly emphasizing the concerns of many states that sovereign states could be observed without their knowledge or consent. For example, it is possible that information of high economic value obtained from space might be exploited by commercial interests, without being made available to the country under observation. While no restrictions on such unauthorized overflights of spacecraft are sought in the report, a recommendation is made that studies be carried out on a world-wide remote sensing system under some form of international management and control. The conference stressed the importance of reaching an agreement quickly on the principles which should govern satellite remote sensing.

The report concludes that there is a considerable future for using remote sensing from space for managing renewable resources and monitoring the environment. Because both space-based data-gathering and ground-based data-processing devices are extremely complex, it is suggested that there should be a network of close co-operation between national agencies and regional facilities. The report recommends that UN organizations such as FAO, Unesco, UNDP and UNEP should strengthen their programmes and encourage close relationships between member states in order to determine their requirements and needs and ways to fulfil these. A similar suggestion is also made for the World Meteorological Organization.

One far-reaching peaceful activity, namely, monitoring compliance with arms control agreements from space, was not discussed at all when the various implications of remote sensing were considered. As a result of a proposal made by France in 1978, a group of government experts was set up under the United Nations to consider the implications of setting up an International Satellite Monitoring Agency (ISMA) [42]. One of the conclusions of the group was that initially considerable experience could be gained from processing and interpreting data obtained from civil

Figure 15.7(a). The Detroit, Michigan area photographed from a height of about 700 km by the US Landsat 4 satellite

The ground resolution of the sensor is at least 30 m, an improvement of nearly a factor of three over previous Landsat spacecraft. The Ford Motor Co. facility (A), the Detroit Metropolitan/Wayne County Airport (B), Willow Run Airport (C) and such details as ships (D) can be identified. An enlargement of the area (A) is shown in figure 15.7(b).

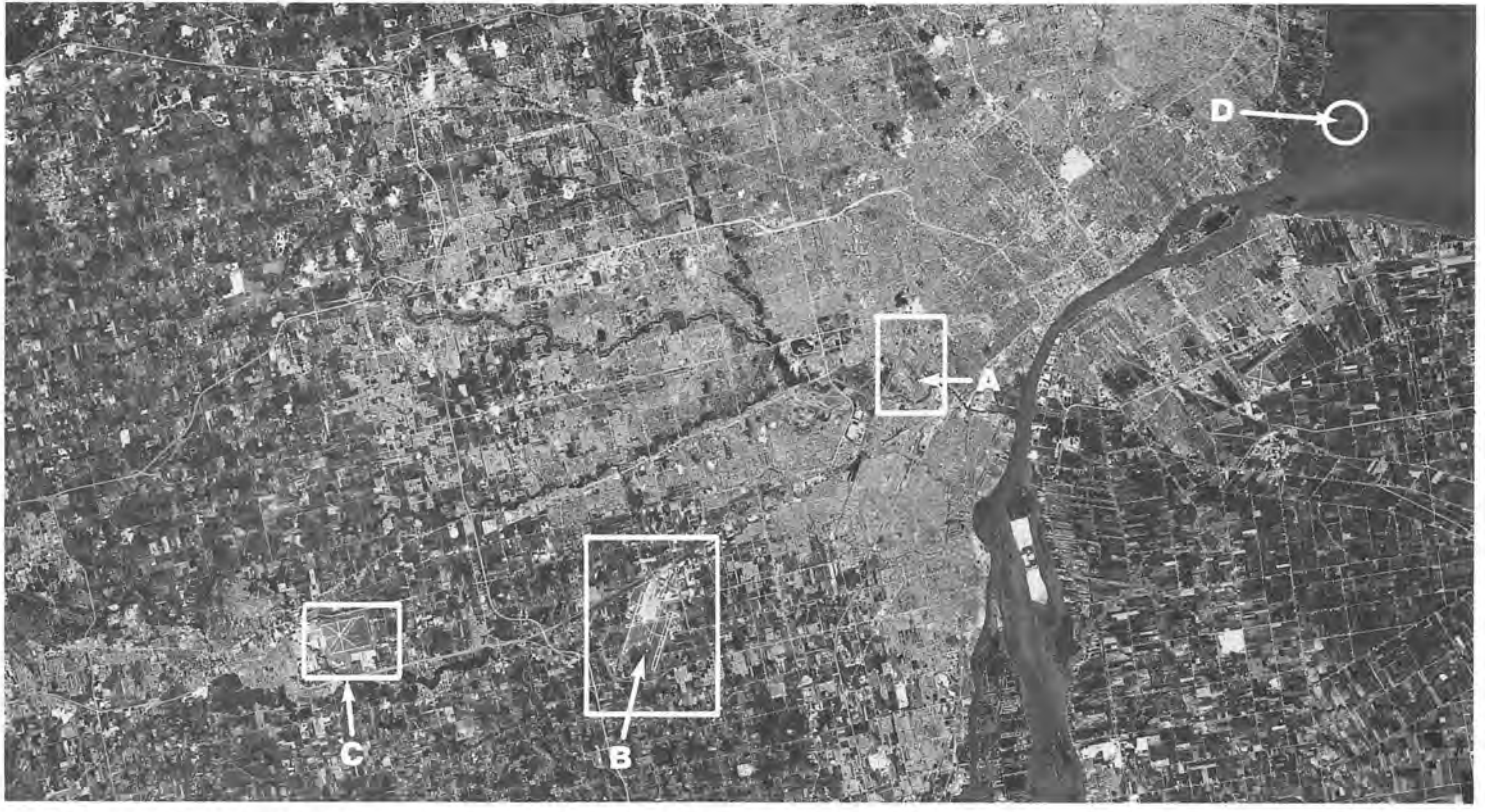


Image from EROS Data Center, USA

Figure 15.7(b). Detroit Metropolitan/Wayne County Airport, shown as an enlargement from figure 15.7(a)
A white dot on the runway (E) probably represents a runway marking. The airport buildings can be seen at (F).

satellites such as the US Landsat spacecraft. Moreover, to some extent such satellites could be used to monitor some arms control agreements. The kinds of result obtained from the most recently launched US Landsat 4 satellite are shown in figure 15.7. It is therefore disappointing that no mention was made of ISMA in the UNISPACE report.

VI. Conclusions

A number of developments in space technology either contribute or will contribute to enhancing the land-, sea- and air-based weapon systems of both the Soviet Union and the United States. The improvements in space-based sensors (as shown by the examples of some of the civil satellites), command and control systems and space-based navigation technology which enhance the accuracies of nuclear weapon delivery systems have contributed not only to the qualitative nuclear arms race but also to the formulation of doctrines for fighting wars using such weapons. If it were not for the development of reconnaissance satellites which can take detailed photographs of enemy terrain, cruise missiles might not have been developed. The essential guidance for such missiles depends on knowledge of the terrain over which they will fly.

Such developments indicate that military spacecraft, or about 8 out of every 10 satellites launched, have become or will soon become components of nuclear and conventional weapon systems. This has resulted in their being listed as important military targets, resulting in considerable effort being devoted to the development of anti-satellite weapons. The recent Soviet ASAT test suggests a nuclear war scenario in which the first targets to be destroyed will be the Earth-orbiting military satellites, followed by the launch of strategic missiles. It should be noted here that such a method is slow. In the Soviet test, the anti-satellite satellite took, from the time of its launch, some three and a half hours to reach its target. The US air-launched anti-satellite missile may take a shorter time, but targets in geostationary orbit will still be difficult to reach in a much shorter time. In view of this, high-energy beam weapons have attracted the attention of the military.

In the past and even today there is considerable reluctance to tackle the problem of the militarization of space. The UNISPACE 82 conference was no exception. However, at least part of the report dealing with the conference proceedings recognized "the potential danger implicit in the use of outer space for military purposes" [33]. In this section note has been made of the fact that all states recommended that the issue of the arms race in outer space should be vigorously considered by the Committee on Disarmament. But since the CD discusses the issues of armaments, the

question of the military use of satellites will remain untouched unless, as some nations have suggested, the UN Committee on the Peaceful Uses of Outer Space takes up this issue simultaneously.

It seems that if the recommendations of the UNISPACE 82 report are taken seriously and attempts are made to implement them, the issue of the military uses of outer space can no longer be avoided—for example, environmental effects of rocket launches must take account of the fact that most of them are military. The UNISPACE report recommends that this problem should be studied with a view to suggesting some limits on the size of launchers and the frequency of launches. Thus, on environmental grounds and from the point of view of avoiding collisions between satellites alone, it is desirable that consideration be given to limiting the number of military satellites launched per year and eventually to stopping such launches. There is still time for such measures, but not much time.

VII. Tables

Table 15.1. Photographic reconnaissance satellites launched during 1982[a]

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USA				
USAF (1982-06A)	21 Jan 1926	97 92	177 550	Lifetime 122 days; see text for details
USAF (1982-41A)	11 May 1843	96 89	177 262	Big Bird satellite; lifetime 208 days; decayed on 5 Dec 1982
USAF (1982-111A)	17 Nov 2122	97 93	280 520	Probably a KH-11 type satellite
USSR				
Cosmos 1332 (1982-02A)	12 Jan 1229	82 89	211 250	Lifetime 13 days; geodesy and mapping; TL recovery beacon
Cosmos 1334 (1982-05A)	20 Jan 1131	73 89	196 290	Lifetime 14 days; high resolution
Cosmos 1336 (1982-08A)	30 Jan 1131	70 90	170 352	Lifetime 27 days; fourth generation; high resolution
Cosmos 1338 (1982-11A)	16 Feb 1117	73 90	186 376	Lifetime 14 days; subsequently orbited at high perigee; medium resolution
Cosmos 1342 (1982-18A)	5 Mar 1048	73 90	230 303	Lifetime 14 days; high resolution
Cosmos 1343 (1982-21A)	17 Mar 1033	73 90	229 288	Lifetime 14 days; high resolution; TF recovery beacon
Cosmos 1347 (1982-28A)	2 Apr 1019	70 90	173 340	Lifetime 50 days; fourth generation; high resolution
Cosmos 1350 (1982-32A)	15 Apr 1438	67 90	172 355	Lifetime 31 days; fourth generation; high resolution
Cosmos 1352 (1982-35A)	12 Apr 0922	70 90	209 361	Lifetime 14 days; medium resolution
Cosmos 1353 (1982-36A)	23 Apr 0950	82 89	212 242	Lifetime 13 days; Earth resources; TF recovery beacon; data received by Priroda Nature Station
Cosmos 1368 (1982-46A)	21 May 1243	70 90	211 341	Lifetime 13 days; high resolution; TF recovery beacon
Cosmos 1369 (1982-48A)	25 May 0853	82 90	269 276	Lifetime 14 days; Earth resources; TF recovery beacon
Cosmos 1370 (1982-49A)	28 May 0907	65 89	197 275	Lifetime 44 days; fourth generation; high resolution
Cosmos 1373 (1982-53A)	2 Jun 1258	70 90	210 347	Lifetime 14 days; medium resolution; TF recovery beacon
Cosmos 1376 (1982-56A)	8 Jun 0755	82 90	261 274	Lifetime 14 days; Earth resources; TF recovery beacon; data received by Priroda Nature Station
Cosmos 1377 (1982-57A)	8 Jun 1200	65 90	173 363	Lifetime 44 days; fourth generation; high resolution

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
Cosmos 1381 (1982-62A)	18 Jun 1258	70 90	208 374	Lifetime 13 days; medium resolution; TF recovery beacon
Cosmos 1384 (1982-67A)	30 Jun 1507	67 90	170 355	Lifetime 30 days; fourth generation; high resolution
Cosmos 1385 (1982-68A)	6 Jul 0755	82 89	186 237	Lifetime 14 days; Earth resources; data received by Priroda Nature Station
Cosmos 1387 (1982-71A)	13 Jul 0810	82 89	212 243	Lifetime 13 days; Earth resources; data received by Priroda Nature Station
Cosmos 1396 (1982-75A)	27 Jul 1229	73 90	198 298	Lifetime 14 days; high resolution; TF recovery beacon
Cosmos 1398 (1982-77A)	3 Aug 1131	82 89	216 234	Lifetime 10 days; geodesy and mapping; TL recovery beacon
Cosmos 1399 (1982-78A)	4 Aug 1131	65 90	171 344	Lifetime 43 days; fourth generation; high resolution
Cosmos 1401 (1982-81A)	20 Aug 0950	82 90	261 274	Lifetime 14 days; Earth resources
Cosmos 1403 (1982-85A)	1 Sep 0907	70 92	354 416	Lifetime 14 days; medium resolution; TF recovery beacon
Cosmos 1404 (1982-86A)	1 Sep 1146	73 92	358 416	Lifetime 14 days; medium resolution; TF recovery beacon
Cosmos 1406 (1982-89A)	8 Sep 1019	82 89	211 230	Lifetime 13 days; Earth resources; data received by Priroda Nature Station
Cosmos 1407 (1982-91A)	15 Sep 1536	67 90	173 339	Lifetime 31 days; fourth generation; high resolution
Cosmos 1411 (1982-98A)	30 Sep 1200	73 90	197 358	Lifetime 14 days; high resolution
Cosmos 1416 (1982-101A)	14 Oct 0922	70 90	231 278	Lifetime 14 days; high resolution; TF recovery beacon
Cosmos 1419 (1982-108A)	2 Nov 0936	70 90	230 282	Lifetime 14 days; high resolution; TF recovery beacon
Cosmos 1421 (1982-112A)	18 Nov 0936	70 90	231 282	Lifetime 14 days; high resolution
Cosmos 1422 (1982-114A)	3 Dec 1148	73 89	228 288	Lifetime 13 days; high resolution
Cosmos 1424 (1982-117A)	16 Dec 0952	65 90	171 349	Still in orbit 31 December 1982; high resolution
Cosmos 1425 (1982-119A)	23 Dec 1203	70 90	348 416	Still in orbit 31 December 1982; medium resolution; only second flight from Tyuratam at this inclination; compare Cosmos 609
People's Republic of China				
China 12 (1982-90A)	9 Sep 0726	63 90	174 385	A capsule was recovered on 14 September

[a] Morse code recovery beacon data supplied by the Kettering Group.

Table 15.2. Possible electronic reconnaissance satellites launched during 1982

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USA				
USAF (1982-41C)	11 May 1843	96 99	701 707	This satellite was ejected into an independent orbit from the Big Bird satellite 1982-41A
USSR				
Cosmos 1335[a] (1982-07A)	29 Jan 1102	74 95	482 518	Lifetime 2 years
Cosmos 1340 (1982-13A)	19 Feb 0141	81 98	626 654	Lifetime 60 years; replaced Cosmos 1206[b]
Cosmos 1345 (1982-26A)	31 Mar 0907	74 95	504 547	Lifetime 5 years; replaced Cosmos 1222[b]
Cosmos 1346 (1982-27A)	31 Mar 1634	81 98	622 661	Lifetime 60 years; replaced Cosmos 1184[b]
Cosmos 1356 (1982-39A)	5 May 0810	81 98	632 671	Lifetime 60 years; replaced Cosmos 1315[b]
Cosmos 1400 (1982-79A)	5 Aug 0658	81 98	630 653	Lifetime 60 years

[a] Orbital period lower than usual.
[b] These are not exact replacements; the whole system appears to be being redistributed some 20° off (G. E. Perry, private communication).

Table 15.3. Ocean surveillance and oceanographic satellites launched during 1982

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USSR				
Cosmos 1337 (1982-10A)	11 Feb 0112	65 93	429 447	Passive satellite with ion thruster
Cosmos 1355 (1982-38A)	29 Apr 1005	65 93	425 443	Passive satellite with ion thruster
Cosmos 1365 (1982-43A)	14 May 1926	65 90	252 264	Nuclear-powered radar; manoeuvred into higher orbit on 27 September
Cosmos 1372 (1982-52A)	1 Jun 1355	65 90	246 270	Nuclear-powered radar; manoeuvred into higher orbit on 11 August
Cosmos 1378[a] (1982-59A)	10 Jun 1746	83 98	634 663	Presumed to be oceanographic
Cosmos 1402 (1982-84A)	30 Aug 1005	65 90	251 265	Nuclear-powered radar; attempts to manoeuvre into higher orbit appeared to have failed; satellite broke up; power reactor entered the Earth's atmosphere on 7 February 1983

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
Cosmos 1405 (1982-88A)	4 Sep 1746	65 93	429 445	Passive satellite with ion thruster
Cosmos 1408[a] (1982-92A)	16 Sep 0502	83 98	633 667	Presumed to be oceanographic; replaced Cosmos 1378
Cosmos 1412 (1982-99A)	2 Oct 0000	65 90	251 266	Nuclear-powered radar; manoeuvred into higher orbit on 10 November

[a] Probably heavier Elint (electronic intelligence) type (G. E. Perry, private communication).

Table 15.4. Possible early-warning satellites launched during 1982

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USA				
IMEWS-13 (1982-19A)	6 Mar 2015	2 1 424	35 520 35 598	
USSR				
Cosmos 1341 (1982-16A)	3 Mar 0546	63 708	631 39 251	Replaced Cosmos 1247
Cosmos 1348 (1982-29A)	7 Apr 1341	63 709	593 39 316	Replaced Cosmos 1172
Cosmos 1367 (1982-45A)	20 May 1312	63 707	581 39 264	Filled the empty ninth location
Cosmos 1382 (1982-64A)	25 Jun 0224	63 711	592 39 436	Replaced Cosmos 1223
Cosmos 1409 (1982-95A)	22 Sep 0629	63 717	613 39 690	Replaced Cosmos 1217

Table 15.5. Meteorological satellites launched during 1982

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USSR				
Meteor 2-08 (1982-25A)	25 Mar 0950	83 104	942 964	
Meteor 2-09 (1982-116A)	14 Dec 2359	81 102	812 892	

Table 15.6. Communications satellites launched during 1982[a]

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USA				
DSCS II-15 (1982-106A)	30 Oct ..	3 1 438	35 772 35 865	
DSCS III-16 (1982-106B)	30 Oct ..	3 1 440	35 845 35 877	
USSR				
Cosmos 1331 (1982-01A)	7 Jan 1536	74 101	774 812	Possibly store-dump communications satellite; replaced Cosmos 1302
Molniya 1-53 (1982-15A)	26 Feb 2010	63 735	476 40 743	Replaced Molniya 1-47
Cosmos 1354 (1982-37A)	28 Apr 0253	74 101	794 815	Possibly store-dump communications satellite; replaced Cosmos 1190
Cosmos 1358–Cosmos 1364 (1982-40A–H)	6 May 1800	74 115	1 400 1 480	Octuple launch
Cosmos 1366 (1982-44A)	17 May 2346	2 1 437	35 803 35 803	Experimental communications satellite
Molniya 1-54 (1982-50A)	28 May 2248	63 763	627 40 631	Replaced Molniya 1-44
Cosmos 1371 (1982-51A)	1 Jun 0434	74 101	790 812	Possibly store-dump communications satellite; replaced Cosmos 1140
Cosmos 1388–Cosmos 1395 (1982-73A–H)	21 Jul 0629	74 115	1 395 1 518	Octuple launch
Molniya 1-55 (1982-74A)	21 Jul 0950	63 701	617 38 917	Replaced Molniya 1-46
Cosmos 1420 (1982-109A)	11 Nov 0614	74 101	780 811	Possibly store-dump communications satellite; replaced Cosmos 1331
Cosmos 1423 (1982-115A)	9 Dec 0346	63 94	405 515	Should have replaced Molniya 1-48; broke up at the time of injection into elliptic orbit[b]

[a] In previous tables Ekram 1-7 and Molniya 3 have been included. These satellites are used for broadcasting and civil communications purposes and probably do not carry military communications.

[b] G. E. Perry, private communication.

Table 15.7. Navigation satellites launched during 1982

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USSR				
Cosmos 1333 (1982-03A)	14 Jan 0755	83 105	971 1 017	Replaced Cosmos 1153; No. 3
Cosmos 1339 (1982-12A)	17 Feb 2150	83 105	955 1 018	Replaced Cosmos 1092; No. 14; civil navigation
Cosmos 1344 (1982-24A)	24 Mar 1938	83 105	971 1 012	Replaced Cosmos 1244; No. 1
Cosmos 1349 (1982-30A)	8 Apr 0014	83 105	970 1 014	Replaced Cosmos 1153[a]; No. 4
Cosmos 1380 (1982-61A)	18 Jun 1200	83 93	145 659	Should have replaced Cosmos 1225 but failed to reach required orbit
Cosmos 1383 (1982-66A)	29 Jun 2150	83 105	991 1 029	Replaced Cosmos 1168; part of a civil system
Cosmos 1386 (1982-69A)	7 Jul 0950	83 105	955 1 011	Replaced Cosmos 1225 and Cosmos 1380; No. 2
Cosmos 1413–Cosmos 1415 (1982-100A, D, E)	12 Oct 1507	65 673	19 069 19 070	Triple GLONASS (Global Navigation Satellite System); nearly semi-synchronous orbit; experimental; initially satellites were close together then gradually separated
Cosmos 1417 (1982-102A)	19 Oct 0600	83 105	962 1 012	Replaced Cosmos 1308

[a] Cosmos 1153 has been renumbered No. 7, and Cosmos 1184 renumbered No. 8 (G. E. Perry, private communication).

Table 15.8. Possible interceptor/destructor satellites launched during 1982

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USSR				
Cosmos 1375 (1982-55A)	6 Jun 1702	66 105	981 1 011	ASAT target; orbital height similar to Soviet navigation satellites
Cosmos 1379 (1982-60A)	18 Jun 1102	65 91	144 546	Interceptor passed close to Cosmos 1375 on 18 June; de-orbited and burnt up on re-entry

Table 15.9. US space shuttle flights during 1981 and 1982

Flight number	Date	Flight duration (days)	Payload	Orbiter turn-around time (days)	Number of astronauts
STS-1 (1981-34A)	12 Apr 1981	2.27	–	–	2
STS-2 (1981-111A)	12 Nov 1981	2.26	SIR-A SMIRA	212	2
STS-3 (1982-22A)	22 Mar 1982	8	OSS 1 IECM	128	2
STS-4 (1982-65A)	27 Jun 1982	7.1	CIRRIS 1 (Teal Ruby) DoD 82-1	89	2
STS-5 (1982-110A)	11 Nov 1982	5.1	SBS-C Telsat-E OSTA-2	129	4

Table 15.10. Classification of satellites in geosynchronous or geostationary orbit launched between 1963 and 1982. 'Geostationary orbit' is defined here by the satellite orbital inclination of 0°–3° to the equatorial plane[a]

Type	Geostationary orbit		Geosynchronous orbit		Geostationary and geosynchronous orbits	
	Number of satellites	Per cent of total	Number of satellites	Per cent of total	Number of satellites	Per cent of total
Civil	*95*	*49*	*8*	*4*	*103*	*53*
Communications	84	43	5	3	89	45
Meteorological	10	5	1	0.5	11	6
Research	1	0.5	2	1	3	2
Military	*62*	*32*	*26*	*13*	*88*	*45*
Communications	50	26	12	6	62	32
Early-warning	9	5	10	5	19	10
R&D and military scientific	3	2	4	2	7	4
Multi-purpose	–	–	*5*	*3*	*5*	*3*
Total, all types					**196**	

[a] Full details of the satellites are available on request.

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Appendix 15A

Nuclear power sources on satellites in outer space

Square-bracketed numbers, thus [1], *refer to the list of references on page 463.*

I. Cosmos 1402 and earlier satellite accidents

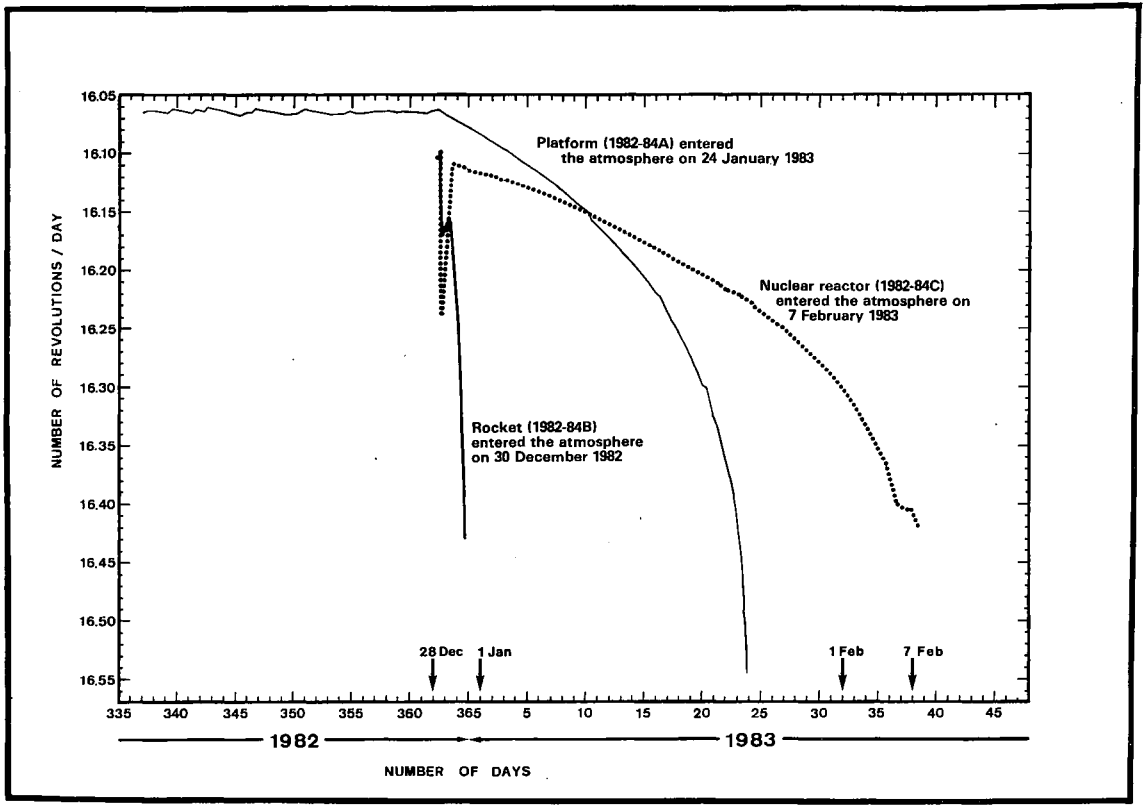
On 28 December 1982 a Soviet military ocean-surveillance satellite, Cosmos 1402, was split up some time between the 1920th and 1926th orbits, into three components—the rocket, the main satellite and the nuclear reactor (see figure 15A.1). Normally, the reactor is then placed into a higher orbit, in which it circles the Earth for some 500 years, a sufficient time for the short-lived radioactive fission products generated within the reactor to decay. But on this occasion attempts to achieve the higher orbit failed, and the section carrying the nuclear reactor entered into an ever decreasing circular orbit which brought it back into the Earth's atmosphere on 7 February 1983.

Such accidents have occurred before. On 24 January 1978, a similar Soviet satellite, Cosmos 954, entered the Earth's atmosphere and partially burned up, contaminating the atmosphere with radioactivity. The remaining debris landed on northern Canada, contaminating parts of the land there. Another accident, resulting in substantial contamination of the atmosphere and the Earth's surface, involved a US satellite. A US Navy satellite launched on 21 April 1964 carried a nuclear power generator which used plutonium-238. The spacecraft failed to orbit and the payload re-entered the Earth's atmosphere in the Southern Hemisphere. The power generator was completely burned up during re-entry, and the resulting radioactive particles were distributed at about 50 km above the Earth's surface. Some 95 per cent of the radioactivity eventually landed on the Earth. Soil samples taken from 65 sites around the world between October 1970 and January 1971 showed that most of the plutonium-238 from the satellite power generator was deposited in the Southern Hemisphere. The fallout in this region was some 2.5 times that in the Northern Hemisphere. It is also interesting to note that plutonium-238 fallout from the satellite was nearly twice that which resulted from atmospheric nuclear tests conducted by the end of 1970 [1].

In table 15A.1 the Soviet and the US spacecraft which have carried nuclear power sources are summarized. A large fraction (some 70 per cent) of these have been military satellites.

[1] This appendix was written by Bhupendra Jasani.

Figure 15A.1. Number of revolutions made by Cosmos 1402 each day over the period 3 December 1982 to 7 February 1983. It can be seen that on 28 December 1982 the satellite (1982–84A) separated from its rocket and the nuclear reactor



II. The perceived need for nuclear power on satellites

In order to increase the capability of military reconnaissance satellites, long-range radars, microwave and infra-red radiometers, radar altimeters, and other microwave devices are often used aboard satellites. Some of these are used to detect and track military surface ships (the main function of Cosmos 1402), while others are used to determine various ocean properties—the knowledge of which is essential, for example, for the development and use of sensors needed for the detection and tracking of enemy submarines. These sensors require considerable power. In most satellites the power is generated by solar cells. However, many such cells have to be used, so that the spacecraft experiences considerable drag, causing it to fall back to the Earth's surface unless a large amount of fuel is spent to keep it in orbit. Moreover, concern has recently been expressed because such large solar power panels become vulnerable to nuclear or beam weapon attack. In order to extend the life and efficiency of military satellites and make them capable of surviving nuclear attack and possible attack from hunter-killer satellites, considerable impetus was given to the development of nuclear power generators.

The two most commonly used nuclear energy sources are the energy released when a radionuclide decays and the energy released when a fissile atom fissions. In the former, the heat produced by decaying radionuclides can be converted into electricity in two ways: (*a*) by dynamic conversion using a turbogenerator, or (*b*) by static conversion mainly using thermoelectric devices. Of the more than 1 300 available radionuclides, only eight have characteristics suitable for use as power device fuels. Of these the most commonly used is plutonium-238, an alpha radiation emitter with a half-life of 87.8 years. In the centre of the typical radionuclide thermoelectric generator (RTG), there is a thick cylindrical fuel capsule which serves as the heat source. Surrounding the fuel capsule are thermoelectric energy converters. Such power sources have been used by both the USA and the Soviet Union on several satellites and deep space probes. The power output has ranged from 2 watts to about 500 watts.

The power generated by RTG sources is not enough for sensors such as the synthetic aperture radar which requires at least 3.5 kilowatts of power. As an alternative, nuclear reactors have been developed both in the Soviet Union and the USA for use in satellites. Both RTGs and nuclear reactors have been developed in the USA, under the programme known as Space Nuclear Auxiliary Power (SNAP). The first reactor ever to be placed in space, SNAP-10A, was orbited on 3 April 1965 at 13 000 km, but it failed after 45 days. This reactor will re-enter the Earth's atmosphere after about 4 000 years. Currently the USA is working on a reactor, SP-100, capable of

Table 15A.1. Summary of satellites with nuclear power generators launched between 1961 and 1982. Of the 53 nuclear power sources, 10 RTGs (8 US and 2 Soviet) and 26 reactors (1 US and 25 Soviet) were orbited on military satellites[a]

	USA			USSR			
	Number of power generators			Number of power generators			Total number of power generators
Year	RTG	Reactors	Number of accidents	RTG	Reactors	Number of accidents	
1961	2	–	–	–	–	–	2
1962	–	–	–	–	–	–	–
1963	2	–	–	–	–	–	2
1964	1	–	Seriously contaminated the Earth's surface	–	–	–	1
1965	–	1	–	2	–	–	3
1966	–	–	–	–	–	–	–
1967	–	–	–	–	1	–	1
1968	2	–	Satellite exploded; power units recovered; no contamination	–	1	–	3
1969	5	–	–	–	–	–	5
1970	1	–	Power unit jettisoned into ocean, no contamination	–	1	–	2
1971	2	–	–	–	2	–	4
1972	4	–	–	–	1	–	5
1973	1	–	–	1	1	–	3
1974	–	–	–	–	2	–	2
1975	2	–	–	–	3	–	5
1976	2	–	–	–	2	–	4

1977	–	–	–	–	3	Reactor launched in 1977; crashed in 1978, contaminating the Earth's environment	3
1978	–	–	–	–	–	–	–
1979	–	–	–	–	–	–	–
1980	–	–	–	–	1	–	1
1981	–	–	–	–	3	–	3
1982	–	–	–	–	4	Reactor crashed in Feb 1983, contaminating the Earth's environment	4
Total	**24**	**1**	**3**	**3**	**25**	**2**	**53**

[a] Further details of the power generators deployed can be found in *SIPRI Yearbook 1979* and in the SIPRI Fact Sheet 1983:1, January 1983.

producing 100 kilowatts of electrical power [2]. The electrical power from SNAP-10A was about 600 watts.

By the end of 1982 the Soviet Union had launched about 25 satellites carrying nuclear reactors. Their early reactors were known as Romashka and the recent ones are known as Topaz. Such reactors produce about 150 kilowatts of thermal or about 40 kilowatts of electrical power, and they are fuelled with about 50 kg of highly enriched uranium [3]. Since 1974 the Soviet Union has been operating two satellites at a time. Satellites are orbited in the same orbital plane but about 25 minutes apart. The USA uses four ocean-surveillance satellites at a time. Again, the satellites are in the same orbital plane but they are separated from each other in time and distance along their orbital paths. The use of such groups of satellites indicates that they are probably used to determine the position and velocity of the naval vessels being surveyed.

III. Implications

In response to concerns expressed during the first week of January 1983 regarding the re-entry of Cosmos 1402 into the Earth's atmosphere, the Soviet news agency Tass announced on 7 January that the satellite "was divided into separated fragments by commands from Earth in order to isolate the active part of the reactor, which ensured its subsequent complete combustion in the dense atmospheric strata". While this may be so, the radioactivity, however small, eventually will fall on the Earth's surface, as past experience has shown. Contamination of the Earth's environment from such sources is small at present, but in future this may not be the case, as there are plans to orbit much larger nuclear reactors in space.

As a result of the Cosmos 954 accident, President Carter pledged that the United States would pursue a ban on nuclear power in space. However, this position was later abandoned. The United Nations Sub-Committee on the Peaceful Uses of Outer Space examined the issues of nuclear power sources on board satellites. Both the United States and the USSR participated in this technical study. The main recommendation of the Sub-Committee was that appropriate measures for adequate radiation protection during all phases of the flight of a spacecraft carrying a nuclear power source should be mainly based on existing and internationally recognized standards recommended by the International Commission on Radiological Protection (ICRP) [4]. It is interesting to note here that the Working Group of the Sub-Committee took particular note of one of the ICRP recommendations which states that "no practice shall be adopted unless its introduction produces a positive net benefit" [5].

It is difficult to imagine how the current practice of using nuclear power sources on military satellites—which mainly enhance the efficiency of weapons, particularly nuclear weapons, on Earth—can have any positive benefit.

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Part III. Latin America: a regional study

16. The Falklands/Malvinas conflict—a spur to arms build-ups[1]

Square-bracketed numbers, thus [1], *refer to the list of references on page 494. A bibliography of other sources used appears on page 518.*

I. Introduction

The war waged between Argentina and Great Britain in 1982 was the first major armed conflict since World War II between a Latin American state and an extra-hemispheric power. The dispute, which started 150 years ago, was over the Falkland/Malvinas Islands and the dependencies administered from the Falklands/Malvinas—mainly South Georgia and the South Sandwich Islands. A chronological account of the events of the war and of the diplomatic transactions is given in appendix 16A.

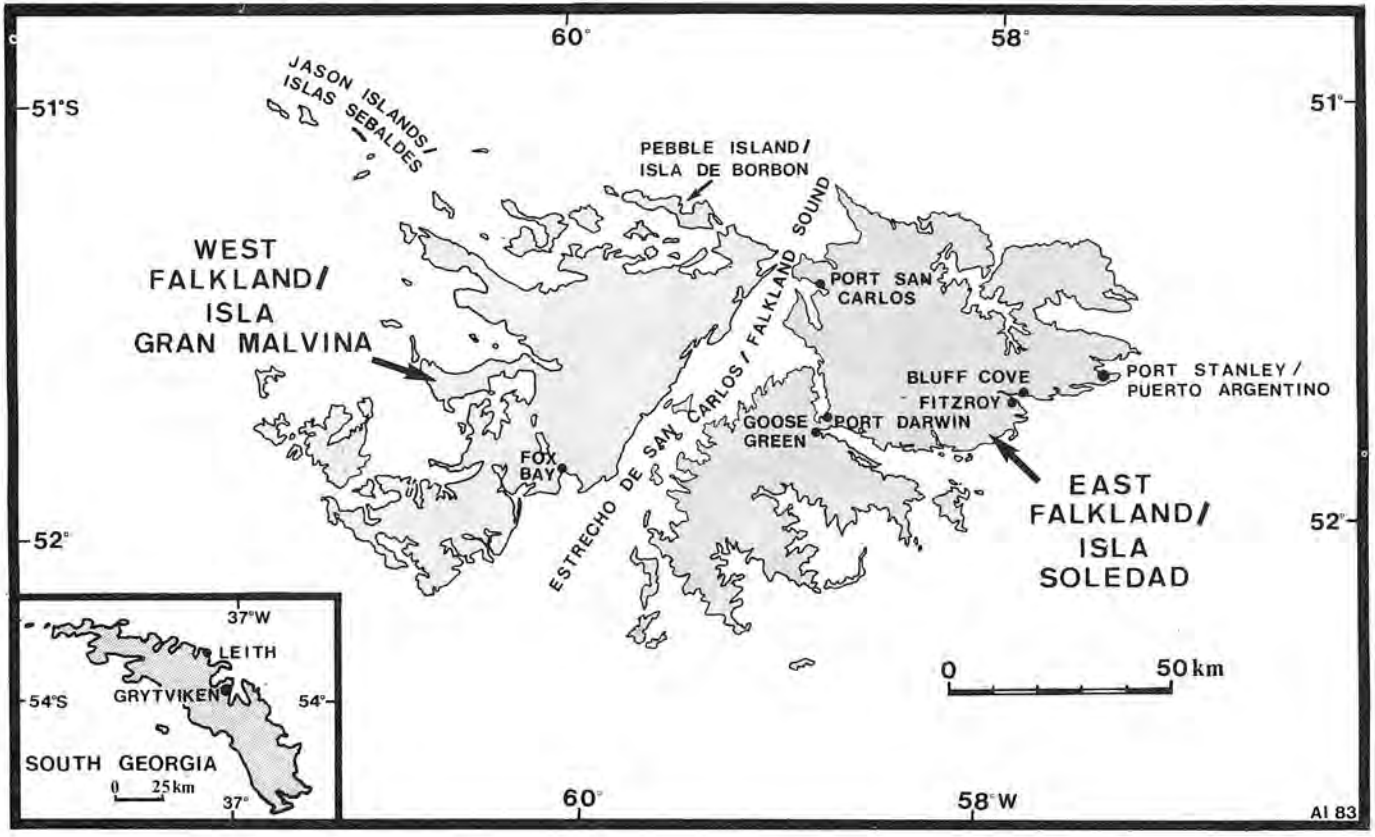
The Falkland/Malvinas Islands lie in the South Atlantic Ocean, off the South American continent, some 770 km north-east of Cape Horn, and over 12 000 km from the UK. They form an archipelago of about 200 small and 2 large islands—East Falkland/Isla Soledad and West Falkland/Gran Malvina, separated by the Falkland Sound/Estrecho de San Carlos—with a total land area of approximately 12 000 square kilometres. South Georgia is situated about 1 300 km east-south-east of the Falklands/Malvinas, while the South Sandwich Islands lie some 750 km east-south-east of South Georgia.

The double English/Spanish names used in this chapter reflect the conflicting British and Argentine claims, which are summarized in section III. The name 'Falkland' was given by an English explorer in 1690 to the strait between the two principal islands in honour of Viscount Falkland, Treasurer of the Navy. Soon afterward, the name came to be applied to the whole group of islands, previously known as Sansón or Islas de los Patos. The name 'Malvinas', used by Argentina, is a hispanized French name ('Les Malouines') used by the French sailors from the seaport St Maló who settled on the Islands at the beginning of the 18th century.

According to the 1980 census, the population of the Islands, overwhelmingly of British origin, numbers some 1 800 (including 30 Argentine residents). Port Stanley/Puerto Argentino, with about 1 000 inhabitants, is the capital and the only town. Sheep breeding is practically the sole basis of the economy. The Falkland Islands Company (FIC), registered in the UK in 1851 and purchased in 1977 by the Coalite Group from

[1] This chapter was written by Jozef Goldblat and Victor Millán.

Figure 16.1. The Falkland/Malvinas Islands and South Georgia



Charrington Industrial Holdings, owns half the land and almost half the number of sheep, employs a large proportion of the work force, and controls much of the local banking, commerce and shipping. The climate is rather severe, with strong winds and day-to-day variability in weather. There are hilly grasslands and shrubs, but few trees and less than 100 km of roads. Although there have been some indications of offshore gas and oil resources, there is no reliable evidence that these are readily exploitable. It was not the economic attractiveness of the Islands that provided a compelling impulse for the parties to resort to force. The reasons for opening hostilities were geopolitical.

In spite of the bloodshed and losses suffered by both sides, described in section V, the political status of the Islands has remained unchanged. Nevertheless, the consequences of the war for arms build-ups and for the state of security in Latin America may be far reaching (sections VI and VII). The chief purpose of this study is to describe these consequences.

II. Historical background

Before 1833

The Argentine version

The Malvinas Islands were discovered by the Spaniards some time in the first half of the 16th century and already in 1522 appeared on Spanish nautical charts. The first occupant of a small sector of the archipelago was the French navigator Louis-Antoine de Bougainville who in 1764 founded on Isla Soledad a small settlement called Port Saint Louis. A year later, the British commodore John Byron explored Isla Trinidad (called Saunders in English), and in 1766 the British established the port of Egmont.

In 1767, at the insistence of Spain, France recognized the sovereignty of the Spanish crown over the Islands by virtue of discovery and on the basis of the 1494 Treaty of Tordesillas, which divided the New World between Spain and Portugal. (The dividing line ran from the north to the south pole, 370 leagues to the west of Cape Verde; the area to the east of the line was to be Portuguese; that to the west, Spanish.)

The French left in 1767, and the British, who had settled in Port Egmont, were forced to leave in 1770 by an expedition sent by the governor of Buenos Aires. Under military pressure Spain returned Port Egmont to Britain in 1771, but it reasserted its sovereign rights over the Islands. It then relied on a 'secret' pledge of British evacuation, which materialized in 1774. After the evacuation Spain maintained control uninterruptedly until 1810, when Argentina started its war of independence.

With the proclamation of independence in 1816, Argentina took over the historical and juridical rights of Spain in the South Atlantic, and in 1820 took formal possession of the Malvinas. In 1829 Argentina decreed that the Malvinas Islands and the islands adjacent to Cape Horn in the Atlantic would be governed by a political and military governor appointed by its government.

In 1833 British naval forces took over the Islands and the Argentine population was expelled. After formally protesting to the British government, Argentina put forward its claims in 1834.

The British version

The Falkland Islands are believed to have been first sighted by the British Captain John Davis in 1592, and two years later Sir Richard Hawkins sailed along their northern coast. In 1690 Captain John Strong of the British Navy made the first known landing on the Islands. In 1765 Commodore John Byron, sent by the British Admiralty, proclaimed that the Islands were uninhabited and claimed them for Great Britain. A year later the Admiralty decided that the occupation of the Islands was "the key to the whole of the Pacific Ocean" and sent Captain John MacBride to complete the occupation by settling about 100 people at Port Egmont and to build a fort. The French settlers found by the British were told to leave. France relinquished its claims to Spain in 1767. The Spaniards then compelled the British to leave Port Egmont, but in 1771 the Port was returned to Britain. British settlers came back and then left voluntarily in 1774 for "economic reasons". However, Britain maintained its claims to sovereignty. In 1806 the Spanish settlement at Soledad was abandoned, leaving the Islands uninhabited.

After the proclamation of independence from Spain, Argentina, which claimed sovereignty over Spanish lands in the region, sent a ship under the command of Colonel Jewitt to take possession of the Islands. The first Argentine governor was appointed in 1828 in spite of British protests. In 1832 the US ship *Lexington* arrived at the Falkland Islands and destroyed the colony set up by Buenos Aires in reprisal for the seizure of US seal-hunting vessels. The colonists fled. Some were captured and taken to Uruguay, and the captain of the *Lexington* declared the Islands free of all government.

In 1833 the British government reasserted its sovereignty over the Falklands by sending the ship *Clio*. The commander of the ship, Captain Onslow, occupied Port Egmont and ordered the "some fifty inhabitants" to leave the Islands. The UK claimed that the colony was established as of that date.

After 1833

In 1841 British administration was organized in Port Louis. Three years later, the capital of the Islands was moved to Port Stanley, and in 1845 a governor was appointed and legislative and executive councils were set up. Elections to the Legislative Council were instituted in 1949 on the basis of universal suffrage. The constitutional arrangements were later amended to increase the number of elected members of the Legislative Council as compared to the number of those appointed by the Governor, as well as to lower the voting age [1, 2].

Argentina never acquiesced to the British occupation. It used every occasion to reassert its claim to sovereignty to, and demand the return of, what it considered to be its territory and has reserved its position on the issue in a number of international treaties.

By the 1960s the Falklands/Malvinas issue had been caught up in the general move towards decolonization, and in 1964 it was discussed in the UN Special Committee on Decolonization. A year later, the UN General Assembly recognized the existence of the dispute between Argentina and the United Kingdom regarding sovereignty over the Islands and invited both states to initiate negotiations in order to find a peaceful solution. Due account was to be taken of the UN Charter and of the 1960 General Assembly resolution on decolonization, as well as of the interests of the population of the Islands [3]. Preliminary talks started in 1966.

In 1971 the two countries reached agreement on measures for establishing regular sea and air communications between the Argentine mainland and the Falklands/Malvinas, improving postal, cable and telephone connections and admitting inhabitants of the Falklands to schools and hospitals in Argentina [4].

Further agreements were signed in 1974: one to facilitate trade and the transport of goods between the Islands and the mainland, and the other to have the Argentine state oil company supply the Islands with petroleum products [5].

In a declaration adopted in 1975 the foreign ministers of the non-aligned countries, meeting in Peru, expressed support for the claim of Argentina and urged the United Kingdom to continue negotiations in order to restore the Malvinas Islands to Argentine sovereignty [6]. In the meantime, the Argentine government made an attempt to gain control of a majority of the shares in the Falkland Islands Company—and thereby of the economy of the Islands—by buying up the stocks through an intermediary at the London Stock Exchange. The attempt failed when the identity of the bidder was prematurely disclosed [7].

A shooting incident took place in 1976 when an Argentine destroyer tried to stop a British research ship about 80 miles south of the Falkland/

Malvinas Islands. The incident led to the mutual recalling of ambassadors and the scaling down of diplomatic representation.

Talks between Argentina and the United Kingdom were held in Rome in April 1977, and were followed by further discussions in New York, where it was agreed to establish two parallel working groups—on political relations, "including sovereignty", and on economic co-operation. The working groups met in Lima in 1978, and further Argentine–British talks took place in Geneva and New York in 1978–79.

In November 1980 the UK consulted the Islanders on the possibility of either freezing the dispute for 25 years or exchanging the title of sovereignty against a long (99-year) lease of the Islands back to the British government. In January 1981 the Falkland Islands Legislative Council favoured a freeze of the dispute. Argentina made it plain that this was unacceptable. A year later, in February 1982, another round of Argentine–British talks took place in New York.

In spite of several UN resolutions adopted over the years, calling on the parties to settle the dispute, the talks had produced no results. However, the last joint Argentine–British communiqué, on 27 February 1982, stated that the talks had been held in a "cordial and positive spirit", and that the two sides had reaffirmed their resolve to find a solution to the dispute and considered an Argentine proposal for procedures to make better progress.

III. The conflicting claims

No one can provide definitive proof as to who first discovered the Falkland/Malvinas Islands. Therefore, discovery is less relevant in this case than effective possession by one side and continuous assertion of sovereign rights by the other. It is basically on these issues that the British and the Argentinians disagree. Not being certain which way a decision by a judicial organ would go, neither side has chosen to take the issue to the International Court of Justice.

The Argentine case

The argument put forward by Argentina is that it inherited the sovereign rights to the Islands which Spain had abandoned. Argentina refers to the principle of *uti possidetis, ita possideatis* ('as you possess, so may you possess') which, in the absence of any formal transfer of territories by the Spanish Crown, was applied by the emergent Spanish-American republics. It meant that each new South American nation succeeded to the former Spanish territories in the respective areas, as of 1810, the year of the

general uprising against Spanish domination. Thus, since the Malvinas were administered by a Spanish governor responsible to the resident Spanish authority in Buenos Aires in the last decades of Spanish colonial rule, they could only pass under the control of the United Provinces of La Plata, later the Republic of Argentina.

In 1833 the Malvinas were invaded by the British, even though in recognizing the independence of Argentina in 1825 Great Britain made no reservation regarding the Islands. The occupation was carried out with the use of force and was, therefore, from the point of view of international law, illegal.

Argentina asserts that the Islands also belong to it because of their geographical propinquity, and because they are geologically part of Patagonia, which forms part of Argentina. Its right to South Georgia and the South Sandwich Islands is based upon the decree issued by the Argentine government in 1829.

The British case

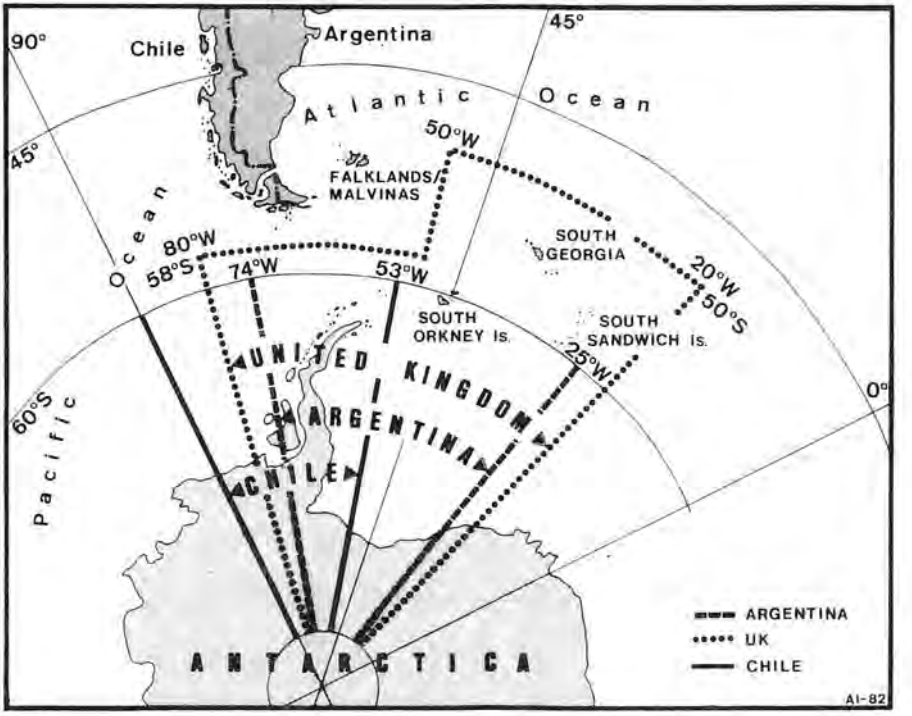
Britain contends that Spanish withdrawal from the Islands in 1810, and subsequent destruction by the USA in 1832 of the settlement set up by Buenos Aires, made the Islands *res nullius*, and therefore open to any power. The British occupation of the Islands in 1833 was justified as a continuation of the jurisdiction which Great Britain had exercised in the 18th century.

As regards the dependencies, Great Britain asserts that it formally took possession of South Georgia and the South Sandwich Islands in 1908 and has administered them continuously since that date. It claims that the dependencies were never occupied by Argentina.

The Antarctic implications

Legal arguments have also been used by both sides to substantiate the overlapping claims to part of the Antarctic continent. The sector claimed by Argentina is contained between longitude 25° and 74° West, while the sector claimed by Britain lies between longitude 20° and 80° West. However, the 1959 Antarctic Treaty introduced a moratorium on claims, implying neither renunciation nor recognition of "previously asserted rights of or claims to" territorial sovereignty in Antarctica, and prohibiting the making of new claims or the extension of existing ones. This moratorium can be terminated 30 years from the date of entry into force of the Treaty—that is, after 1991, at which time any party may request the convening of a conference to review its operation.

Figure 16.2. Antarctic claims of Argentina, the UK and Chile



The Antarctic Treaty prohibits any measures of a military nature, such as the establishment of military bases or fortifications, the carrying out of military manoeuvres or the testing of any type of weapon. Each party is obliged to inform the other parties of all expeditions to and within Antarctica and of any military personnel or equipment intended to be introduced there for scientific research or other peaceful purposes. Complete freedom of access by the parties to any area of Antarctica is also provided for. All this means that, having been declared a demilitarized area, Antarctica cannot be used for military ends, unless a party decides to break its clear-cut international obligations.

IV. The military potential of the adversaries

The military potential of Great Britain considerably exceeds that of Argentina, in both quantitative and qualitative terms. The balance which existed at the outbreak of hostilities is presented below. The figures are approximate and serve only the purpose of rough comparison.

Quantitative indicators

Table 16.1. Total military manpower of the UK and Argentina as of April 1982

	United Kingdom	Argentina
Total active	327 600[a]	180 500[b]
Army	163 100	125 000
Navy	73 000	36 000
Air Force	91 500	19 500
Reserves	217 200	250 000

[a] All professional, including some 10 000 recruited outside the UK.
[b] Including 118 000 conscripts.

Sources: Jane's Fighting Ships 1982–83; Interavia Data, March 1982; IISS, *Military Balance 1982/83* (London, 1982).

Those actually involved in the Falklands/Malvinas campaign included, on the British side, 28 000 men mainly from the Royal Navy, Royal Marines, Army, parachute troops and auxiliary services; some 10 000 were put ashore.

On the Argentine side, over 13 000 troops occupied and defended the Islands; these were backed up from the mainland by practically the entire Argentine Air Force.

Table 16.2. Major armaments of the UK and Argentina as of April 1982

Type	United Kingdom	Argentina
Warships[a]	192	124
Aircraft[b]	750	240
Helicopters[c]	> 800	80
Tanks[d]	900	275

[a] Submarines, aircraft carriers, cruisers, destroyers, frigates, corvettes, landing ships, minehunters, minesweepers, maintenance boats, troop transporters, and auxiliary ships.
[b] Combat, including naval, aircraft.
[c] Combat and transport helicopters.
[d] Mainly battle tanks.

Sources: Jane's Fighting Ships 1982–83; Interavia Data, March 1982; IISS, *Military Balance 1982/83* (London, 1982).

On the British side, the maximum number of warships (including submarines) active at any one time was 26, in the second half of May. The UK requisitioned passenger and cargo vessels. Over 50 such vessels, including the passenger liners *Queen Elizabeth 2* (67 107 GRT) and *Canberra* (44 807 GRT), from 33 companies, carried over 100 000 tons

Table 16.3. Major armaments directly involved in military operations

Type	United Kingdom	Argentina
Surface warships	62[a]	11[f]
Submarines	6[b]	3[g]
Aircraft	42[c]	102[h]
Helicopters	200[d]	32[i]
Armoured vehicles	16[e]	12[j]

[a] Includes aircraft carriers, assault ships, destroyers, frigates, one offshore patrol ship, countermine ships, one ice patrol ship, survey ships, one mooring and salvage vessel, one tug, tankers, replenishment ships, one stores support ship, one helicopter support ship, and landing ships.
[b] Of which five are nuclear-powered.
[c] Includes RN Sea Harriers and RAF Harriers but not other types.
[d] Of seven types: Sea King, Wessex, Lynx, Gazelle, Wasp, Scout and Chinook.
[e] Of two types: Scorpion—light tank armed with 76-mm gun—and Scimitar—armoured car with 30-mm gun.
[f] Includes one aircraft carrier, one cruiser, destroyers, frigates, patrol ships, landing and transport ships.
[g] Two German-built, one US-built.
[h] Includes Douglas Skyhawks, Dassault Mirages, Dagger/Nesher Mirages, Canberras, Super Etendards and Pucaras. Aermacchi MB-339s are not included in this figure.
[i] Of seven types: Hughes 500-C, Sikorski-61, Bell-212, Augusta-109, Chinook, Alouette and Puma.
[j] Only French-built armoured personnel carriers. Argentine-built TAM tanks as well as US-built LVTP-7 armoured amphibious assault vehicles are not included in this figure.

Sources: The Falklands Campaign: the Lessons (HMSO, London, December 1982); *Military Review*, Vol. 62, No. 11, Fort Leavenworth, November 1982; *Defensa*, Vol. 5, No. 55, Madrid, November 1982; *Aerospacio*, Vol. 42, No. 429, Buenos Aires, 1982.

of freight, 9 000 personnel and 95 assorted aircraft into the operation area.

On the Argentine side, naval activities during the hostilities were minimal. Argentine warships did not venture into the British-declared exclusion zones around the Falklands/Malvinas. It is noteworthy that, while at the outbreak of the hostilities there was only one British warship in the South Atlantic, several dozen ships had already sailed from the United Kingdom by 5 April 1982, that is, three days after the Argentine occupation of the Islands. (The fact that much of the British fleet was in home ports for Easter facilitated the rapid assembly of the force.) The Task Force took away a considerable portion of the British naval and maritime air contribution to NATO.

Qualitative indicators

On the British side, the Falklands/Malvinas campaign was a combined, well-concerted operation between the three armed services and the merchant navy. On the Argentine side, interservice rivalry was an obstacle in planning and executing combined operations, as admitted by the Argentine military officers themselves.

Manpower

The British forces were far superior to those of Argentina in leadership, training and night-fighting.

All British troops were professional, including those recruited outside the UK. Among the latter were Gurkhas (about 4 000)—the elite commandos from Nepal, who are regarded by some as mercenaries (as mentioned by Panama at the United Nations), but are considered by the UK as regular members of the British Army. The Argentine troops were overwhelmingly conscripts and, apart from two battalions of marines and airmen, were generally poorly trained and under poor command. Fulfilling mainly internal security functions, the Argentine armed forces had for generations not engaged in conventional combat and therefore had no operational experience.

Navy

The Argentine surface units were considerably older and equipped with less modern armaments than were the British ships. Only two destroyers (both British-built) out of eight, and three frigates (French-built), as well as two submarines (German-built) out of four, possessed by Argentina, were of post-World War II vintage.

The only Argentine aircraft carrier, *Veinticinco de Mayo*, is an ex-British ship launched as early as 1943. Of the two British aircraft carriers operating off the Falklands/Malvinas, the first, *Hermes*, was launched in 1953 and the other, *Invincible*, in 1977. (It was around these two ships that the British Task Force was formed.) The only Argentine cruiser, *General Belgrano* (sunk by the British), was over 44 years old.

As far as submarines are concerned, the UK not only enjoyed numerical superiority but also had newer and better equipped boats, including those which were nuclear-powered, against which the Argentine fleet had no defence. In addition, because of its anti-submarine equipment, the British fleet was practically immune to possible attacks from Argentine submarines. According to Argentine sources, 3–5 torpedoes were fired by the Argentine Type 209 submarine, presumably against a British aircraft carrier, but they failed to explode. Had the war taken place after the British decision to dispose of a significant part of the Royal Navy had been carried into effect, the disparity between the naval capabilities of the parties would have been much smaller.

Air force

The UK possessed more modern aircraft than Argentina and with all-weather capability. The British also had greater capability for in-flight refuelling than the Argentinians. Furthermore, the reconnaissance potential of the British Air Force (owing mainly to Nimrod maritime surveillance

aircraft) reduced the advantages the Argentines could possibly derive from the otherwise modern Mirage III. In any event, the latter aircraft—flying very low to avoid radar detection and operating at the limits of their range in view of the distance of the Islands from the mainland—had little time to find a target or engage in a dogfight. Only rarely did they utilize their supersonic capabilities, because of the drain a supersonic flight places upon fuel consumption. The Argentinians could, at the very outset of the hostilities, have shipped mobile metallic runways, which they possessed, and moved a significant part of their airpower to the Islands. Had they done so, the course of the war would have been different, because the British would have had much greater difficulty in approaching the Islands.

The extensive use as a staging post of Ascension, situated in the middle of the Atlantic (some 5 800 km from Port Stanley/Puerto Argentino) and belonging to the UK as a dependency of St Helena Island (but used mainly by the USA), as well as the use of several air tankers, enabled the British Air Force to carry out numerous sorties of non-carrier-based aircraft in the direction of the Falklands/Malvinas. The British also made much greater use of electronic countermeasures than the Argentine Air Force.

It is noteworthy that, notwithstanding these advantages, the British Air Force never managed to put the runway at Port Stanley/Puerto Argentino out of action. The airfield was continually used by C-130 Hercules carriers bringing in Argentine reinforcements. According to Argentine sources, during the 74 days of the hostilities, 5 442 tons of supplies and 9 729 persons were transported by air to and from different terminals on the Islands. The last take-off took place on the morning of 13 June 1982, the day before the surrender.

Conventional weapons

Several weapon types were possessed by both sides, such as Exocet, Sea Cat, Sea Dart and Blowpipe missiles; Oerlikon anti-aircraft guns; infantry general-purpose machine-guns and FN automatic rifles; as well as radars.

For Argentina, the possibility of using missiles was severely limited by the fact that many of them were immobilized on ships. Nevertheless, the Argentinians managed to set fire to, and sink or damage, at least 16 British ships, including destroyers and frigates. However, a high percentage of Argentine bombs dropped on British ships failed to explode. One reason for this failure may have been that the bombs were old and their wiring could have deteriorated. Another reason was that, in order to get under British air defences, Argentine aircraft were flying at low altitudes that did not allow sufficient time for the delayed action fuses on the bombs. According to some observers, even the Exocet missile which

Table 16.4. Missiles and torpedoes deployed in the Falklands/Malvinas area during the hostilities

Weapon designation	Description	Supplier country	Range (km)	Speed (Mach)
By Argentina				
AM-39 Exocet	Air-to-ship missile	France	50–70	0.93
AS 11	Air-to-ship/air-to-ground missile	France	0.5–3	0.45
AS 12	Air-to-ship/air-to-ground missile	France	0.8–8	0.78
Martin Pescador (CITEFA)	Air-to-ship/air-to-ground missile	Argentina	2.5–9	2.3
Sea Killer Mk 2 (Marte system)	Air-to-ship missile	Italy	6–25	0.90
MM-38 Exocet	Ship-to-ship/coastal missile	France	42	0.93
Sea Dart Mk 1	Ship-to-air missile	UK	~80	3.5
Sea Cat	Ship-to-air missile	UK	>5	0.9
Roland-1	Ground-to-air missile	France/FR Germany	0.5–6.3	1.6
Blowpipe	Ground-to-air missile	UK	>3	1.5
Tigercat Mk 2	Ground-to-air missile	UK	>5	0.9
SA-7 Grail	Ground-to-air missile	Bulgaria and/or Libya, Peru	7–10	1.5
R-550 Magic	Air-to-air missile	France	10	2
HOT	Anti-tank missile	France/FR Germany	0.075–4	0.75
Mamba	Anti-tank missile	FR Germany	0.3–2	0.42
RB-53 Bantam	Anti-tank missile	Sweden	0.3–2	0.25
By the United Kingdom				
Sea Skua	Air-to-ship missile	UK	>15	High subsonic
AGM-45 Shrike	Air-to-ground/air-to-ship missile	USA	⩽16	2
Sea Dart Mk 1	Ship-to-air missile	UK	~80	3.5
Sea Wolf	Ship-to-air missile	UK	>5	2
Sea Cat	Ship-to-air missile	UK	>5	0.9
FIM-92A Stinger	Ground-to-air missile	USA	⩽5	Supersonic
Rapier	Ground-to-air missile	UK	0.5–7	~2
Blowpipe	Ground-to-air missile	UK	>3	1.5
AIM-9L Sidewinder	Air-to-air missile	USA/European consortium	⩽18	2.5
Milan	Anti-tank missile	France/FR Germany	0.25–2	0.60
Swingfire	Anti-tank missile	UK	0.15–4	0.55
RGM-84A Harpoon	Air-to-ship/ship-to-ship missile	USA	15–110	0.85
UGM-84A Sub-Harpoon	Submarine-launched anti-ship missile	USA	15–110	0.85
Tigerfish Mk 24	Anti-submarine and anti-surface targets torpedo	UK	32	40 knots
Mk 8	Anti-surface targets torpedo	UK	4.5	45 knots
FFV 84-mm Carl Gustav	Light anti-tank gun	Sweden or UK	0.4–1	0.93

Sources: Gunston, B., *The Illustrated Encyclopedia of the World's Rockets and Missiles* (Salamander Books, London, 1979); *Defence and Armament*, No. 9, June 1982; *Defensa*, Vol. 5, 52/53, Madrid, August/September 1982; *Le Monde*, 17 December 1982; *Los Angeles Times*, 6 June 1982; *Financial Times*, 5 January 1983; *Jane's Weapons Systems 1981/82* (Macdonald, London, 1981); *Military Technology*, No. 27, September 1981; *Brassey's: Infantry Weapons of the World* (London, 1975); *The Falklands Campaign: The Lessons* (HMSO, London, December 1982); *Aerospacio*, Vol. 42, No. 430, Buenos Aires, 1982.

hit the destroyer *Sheffield* (see section V) did not explode, and the fire that destroyed the ship was started by the missile's rocket motor fuel, which ignited and set fire to the electric cable insulation. (The captain of the ship discounted this version, insisting that the warhead did explode.)

The Sidewinder missiles on the British Harrier aircraft were used very effectively against the faster Argentine Mirage jets. The Sea Dart ship-to-air missiles also brought down a number of Argentine aircraft.

Certain weapons employed in the conflict proved to be multi-purpose. An example of a non-standard application was when the British Marines used an 84-mm Carl Gustav light anti-tank gun to bring down an Argentine helicopter and also to damage a ship.

While the British weapons were practically all British-built, most Argentine major weapons were of foreign origin (small arms are manufactured indigenously). The arms imported by Argentina came from FR Germany, the USA, France, Israel and the UK. In particular, the UK had supplied Argentina with destroyers, aircraft, helicopters, missiles, as well as military electronics and radar. Therefore, the imposition of an immediate embargo on all military supplies to Argentina could not but have a negative effect on Argentine war capabilities.

Nuclear weapons

The Chairman of the Argentine Atomic Energy Commission accused the United Kingdom of violating the 1967 Treaty for the prohibition of nuclear weapons in Latin America (Treaty of Tlatelolco) by introducing nuclear-powered submarines in the South Atlantic [8]. (Panama supported this charge in a statement to the UN Security Council.) It will be noted that Argentina is not party to the Treaty of Tlatelolco, having only signed the Treaty but not ratified it, while the UK, not being a Latin American state, cannot become party to it. Nevertheless, in 1969 the UK undertook, under Protocol I of the Treaty of Tlatelolco, to apply the statute of denuclearization in respect of warlike purposes as defined, among others, in Articles 1 and 5 of the Treaty in those territories in Latin America for which, *de jure* or *de facto*, it is internationally responsible.

Article 5 defines a nuclear weapon as a device which is capable of releasing nuclear energy in an uncontrolled manner. In this sense, nuclear propulsion of a submarine does not constitute a weapon. The Treaty explicitly excludes from the definition an instrument that may be used for the transport or propulsion of a nuclear device if it is separable from the device and not an indivisible part thereof. Therefore, the Argentine charge seems to have no basis.

However, it should be borne in mind that Article 1 (referred to above) requires that nuclear material and facilities in the region be used "exclusively" for peaceful purposes. It can be argued that a nuclear-powered

submarine transporting weapons of war is not using nuclear energy for peaceful purposes, even if the weapons are 'only' conventional.

A more serious allegation was made in press reports, according to which some British ships—frigates and destroyers—engaged off the Falkland/Malvinas Islands were carrying nuclear weapons designed for anti-submarine warfare [9]. It was claimed that these warships, which routinely carry nuclear depth charges while on operational patrol in the North Atlantic, had no opportunity to off-load the weapons before they were diverted to the South Atlantic, and that those carried by the *Sheffield* sank together with the ship [10].

No conclusive proof was provided, but if the United Kingdom had actually carried nuclear weapons into the waters surrounding the Falklands/Malvinas, it would have been in breach of its obligations under Protocol I of the Treaty of Tlatelolco (although not *vis-à-vis* Argentina, which is not party to the Treaty). For, in undertaking to apply the statute of denuclearization in the territories for which it is responsible, the UK committed itself to respect those provisions of the Treaty which prohibit, *inter alia*, the deployment of nuclear weapons (Article 1b).

In response to the above allegation the British government stated that it had at all times complied with the obligation not to introduce nuclear weapons into the territory or territorial waters for which it is internationally responsible "within the Treaty's zone of application" [11]. It is not likely that any of the large British ships which were alleged to carry nuclear weapons actually navigated within the three-mile territorial waters off the Falklands/Malvinas. But the British government's statement implies that it would have had the right to deploy these weapons outside the territorial waters. Such an interpretation is disputable.

Protocol II of the Treaty of Tlatelolco, which the UK has also signed and ratified, provides that the statute of denuclearization of Latin America, as delimited and set forth in the Treaty, shall be "fully respected" by the parties to the Protocol. And it will be noted that, under Article 4 of the Treaty, the ultimate zone of application has been delimited so as to embrace large areas of the high seas in the Atlantic, hundreds of kilometres off the Falklands/Malvinas. It is true that as long as there are states in the region which have not adhered to the Treaty, the zone of application is restricted to the territorial sea of the parties. Nevertheless, it can be argued that the introduction of nuclear weapons into a zone which is designated to become free of these weapons contradicts the ultimate purpose of both the Treaty and its Protocols. The obligation to keep nuclear weapons out of the area in question is reinforced by the language of Protocol II which requires respect for the statute of denuclearization of Latin America "in all its express aims and provisions"; and the express

aim of the Treaty, as stated in its preamble, is to keep the whole region "forever free from nuclear weapons".

Like all other nuclear weapon powers, the United Kingdom does not disclose the whereabouts of its nuclear weapons. It therefore refused to confirm or deny reports regarding the presence of these weapons in the area in question [12], but stated that there had never been any incident involving a British nuclear weapon "leading to its loss or to the dispersal of radioactive contamination" [13]. This statement only denies the alleged sinking of or damage to nuclear weapons rather than the very presence of these weapons.

No party to the Treaty of Tlatelolco submitted a formal complaint concerning possible breaches. The Council of the Organization for the Prohibition of Nuclear Weapons in Latin America (OPANAL) did discuss the matter but took no action [8, 14].

V. Losses

The largest single loss suffered by Argentina was the sinking of the cruiser *General Belgrano*, an ex-US ship displacing 10 800 tons and equipped with helicopters, surface-to-air missiles and guns. Between 300 and 400 men were killed or missing. The cruiser was hit by two torpedoes fired from the *Conqueror*, a fast nuclear-powered submarine. The torpedoes used were (according to different sources) either Mark 24 Tigerfish, a modern wire-guided torpedo with a range of about 32 km or, more likely, Mark 8, a torpedo designed in the early to mid-1930s, with a range of 4.5 km. The two escort ships which accompanied *General Belgrano* left the area of the attack unharmed, but pursued the British submarine with sonar and depth charges.

On the British side, the most dramatic single loss was the sinking of the destroyer *Sheffield*, displacing 3 500 tons and equipped with a helicopter, surface-to-air missiles, guns and anti-submarine weapons. Twenty men were killed and 27 injured.

The *Sheffield*, not equipped with close-defence missiles or point-defence guns, was hit by an Exocet missile launched from a French-built Dassault–Breguet Super Etendard advanced attack aircraft. The electronic equipment aboard the *Sheffield* detected the approaching missile, but the computer which identified it was programmed to recognize the Exocet as friend rather than foe. The Exocet missile is powered by a two-stage solid-propellant rocket motor, its guidance systems consisting of an inertial mid-course guidance followed by an active radar homing device, assuring very high probability of hitting the target. The missile skims over the water

at an altitude of some 3 metres to reduce the likelihood of detection, and its range reaches from 50 to 70 km.

The successful use of both the Super Etendard aircraft and the Exocet missiles caused a considerable sensation, since just a few of these missiles, costing only a few hundred thousand dollars each, inflicted damages amounting to tens of millions of dollars. It was also apparently a surprise, because Argentina had taken delivery of five such aircraft (out of a total of 14 ordered in 1980) and six missiles only shortly before the armed conflict started. Referring to an account by the leader of the nine-man French technical team from Dassault, the British press alleged that hostilities were already under way when these technicians helped the Argentinians to mount the missiles on the aircraft and render them operational. The French government investigated the charge and concluded that its embargo on military supplies to Argentina, proclaimed on 7 April 1982, including technical assistance, had been observed. According to the French manufacturer of Exocet missiles, Argentina possessed sufficient technical expertise to arm the planes with these missiles without outside help.

All losses, both material and human, are summarized below.

Table 16.5. British and Argentine ships sunk or damaged

United Kingdom			Argentina		
Item	Sunk	Damaged	Item	Sunk	Damaged
British version					
Light cruiser	–	1	Cruiser	1	–
Destroyer	2	–	Submarine	–	1
Frigate	2	2	Corvette	1	–
Landing ship	1	1	Patrol ship	2	–
Container ship	1	–	Trawler	1	–
Not specified	–	6	Resupply ship	1	–
Argentine version					
Aircraft carrier	–	1	Cruiser	1	–
Light cruiser	–	1	Submarine	–	1
Destroyer	2	–	Patrol ship	–	2
Frigate	4	–	Trawler	1	–
Landing ship	3	–	Transport	–	2
Container ship	1	–			
Not specified	–	22			

Sources: Jane's Fighting Ships 1982–83 (Macdonald, London, 1982); *Defence and Armament*, No. 10, July–August 1982 and No. 11, September 1982; *Naval Forces*, Vol. 3, No. 5, 1982; *Defensa*, Vol. 5, Nos. 52–53, Madrid, August–September 1982; *The Falklands Campaign: The Lessons* (HMSO, London, December 1982); *Aerospacio*, Vol. 42, No. 429, Buenos Aires, 1982; *Navy International*, Vol. 88, No. 3, March 1983.

Table 16.6. British and Argentine aircraft shot down or lost

United Kingdom		Argentina	
British version[a]			
RAF Harrier/Sea Harrier	10	Aircraft	72
Helicopter	24	Helicopter	18
Argentine version[b]			
Aircraft	21	Aircraft	72
Helicopter	18	Helicopter	21

[a] The total of Argentine aircraft and helicopters destroyed by weapon systems, *including 'probables'*, and of those *destroyed on the ground*, is estimated by the UK at 117.
[b] The Argentine figures do not include 7 British aircraft and 9 helicopters which are *presumed* to have been shot down. In addition, the Argentinians claim that an unspecified number of aircraft and helicopters were carried disassembled in containers on board the *Atlantic Conveyor* and sank together with the ship.

Sources: Jane's All the World's Aircraft 1981/82 and *Jane's Fighting Ships 1982–83* (Macdonald, London, 1981 and 1982); *Defence and Armament*, No. 10, July–August 1982 and No. 11, September 1982; *Naval Forces*, Vol. 3, No. 5, 1982; *Defensa*, Vol. 5, Nos. 52–53, Madrid, 1982; *The Falklands Campaign: The Lessons* (HMSO, London, December 1982); *Convicción* and *La Nación*, Buenos Aires, 25 and 27 May 1982; *Aerospacio*, Vol. 42, No. 429, 1982; *Defense and Foreign Affairs Daily*, Vol. 11, No. 171, 2 September 1982; *International Defense Review*, No. 8, 1982.

In addition to armaments destroyed or lost in combat, the British Task Force captured in the Falklands/Malvinas substantial quantities of Argentine military equipment. The equipment included 22 IA-58 Pucara twin-turboprop counter-insurgency aircraft, some Aermacchi MB-339A trainer/ground attack aircraft, 14 helicopters, Roland, Tigercat, Blowpipe and SA-7 anti-aircraft missiles, Exocet land-based missiles (one of which struck the British light cruiser *Glamorgan*), long-range air surveillance radars, several TAM tanks, 12 Panhard armoured cars, anti-tank missiles,

Table 16.7. British and Argentine casualties

	United Kingdom[a]	Argentina[e]
Killed or missing	255[b]	500–750
Injured	777[c]	800–1 000
Prisoners of war	80[d]	11 400[d]

[a] Official British figures.
[b] Three Falkland Islanders are not included here.
[c] Including 18 civilians.
[d] All returned.
[e] Unofficial figures.

Sources: The Falklands Campaign: The Lessons (HMSO, London, December 1982); *Research Note: The Falkland Islands Inquiry*, House of Commons Library Research Division, No. 80, London, 7 July 1982; *Defensa*, Vol. 5, No. 54, Madrid, 1982; *Latin American Weekly Report*, 9 July 1982.

rifles, mortars, recoilless guns and howitzers, as well as 150 Mercedes and Volkswagen light trucks. In addition, the British captured some 3 million small arms rounds and about 1 000 artillery shells.

The war disrupted the economic and social life on the Falklands/Malvinas. A power station and a water filtration plant, as well as 27 dwellings, were destroyed or damaged in Port Stanley/Puerto Argentino. Forty-five other dwellings proved to be in need of substantial repairs. Moreover, thousands of mines (some of them plastic and therefore difficult to detect) were scattered by the Argentinians in the fields and beaches, killing many cows and sheep and jeopardizing human lives.

Since the population was prevented from properly maintaining the flocks, the breeding figures fell considerably, affecting stocks for several years and correspondingly diminishing the income of the farming community. The Islanders have been deprived of regular transport and mail services with the mainland.

VI. The cost of the war and the arms build-ups

The United Kingdom

The cost to the UK of the Falklands campaign has been provisionally estimated by British officials at about £950 million, that is, an equivalent of $1.6 billion, up to April 1983 [15].

Already during the conflict a variety of equipment and improvements were specially introduced for the forces engaged in military operations. Thus, Vulcan, Nimrod and Hercules aircraft were equipped for the air-to-air refuelling receiver role, and Vulcan and Hercules aircraft were also converted to the tanker role; Nimrod aircraft were modified to carry bombs, Harpoon anti-ship missiles and Sidewinder AIM-9L air-to-air missiles; additional Sidewinder missiles were purchased for Harriers, and RAF Harrier GR.3 aircraft were converted to carry them; laser-guided bombs were introduced for RAF Harrier aircraft; the Sea Wolf ship-borne missile system was adapted to deal more effectively with low-level aircraft attacks; the introduction into service of the Sea Skua anti-ship missile and the Sub-Harpoon submarine-launched anti-ship missile was accelerated; and electronic countermeasures to deal with sea-skimming missiles were further developed. To replace ships and other equipment lost in the war, and to reinforce the naval and air capabilities, the following items will be ordered: replacement of two Type 42 destroyers and two Type 21 frigates; a replacement for the logistics landing ship *Sir Galahad*; and the replacement of all lost Harrier aircraft and Sea King, Lynx and Chinook helicopters.

Following its experience in the Falklands, the British government announced its decision to have two aircraft carriers available for deployment at short notice. To ensure this a third carrier will be maintained in refit or reserve; the carrier *Invincible* will not be sold as was planned before the war.

Moreover, the British government envisages that the garrison to be maintained on the Falkland Islands should include air defence radars, RAF Phantom, Harrier and Hercules aircraft (the runway at the Port Stanley airfield has been extended), Chinook and Sea King helicopters, Rapier air defence systems, an infantry battalion, and supporting arms. All this is to be reinforced by nuclear-powered submarines, destroyers, frigates, helicopters and patrol craft, with afloat support, deployed in the South Atlantic.

The cost of the campaign, together with the extra costs of maintaining a garrison in the Falklands, are to be found from monies additional to the 3 per cent increase in real terms by which the British defence budget is planned to grow annually over the period until 1985–86. Further additions and improvements to be made to the British armed forces include: the purchase of wide-bodied tankers for the Air Force; the purchase of at least 12 Phantom F-4J aircraft; the purchase of 24 additional Rapier missile units for the Army and the Air Force; the purchase of five more Chinook medium-lift helicopters in addition to the replacements mentioned above; an increase in the previously planned number of front-line destroyers and frigates; the provision of point defence for the carriers *Invincible* and *Ark Royal*, the assault ships *Intrepid* and *Fearless*, the destroyer *Bristol* and all the Type 42 destroyers; and the purchase of seven Sea Harrier aircraft and six Sea King ASW helicopters—in addition to replacements. Plans have been made to acquire a new British military satellite and to provide a terminal on all major surface warships [16].

Argentina

The cost of the war to Argentina had not been made public by the end of 1982. The unofficial estimate which appeared in the press is 'only' about $850 million [17]. But by the end of 1982, Argentina had already committed itself to more than $1 billion in arms purchases [18]. While the UK is able to replace most of the lost equipment through its own arms production, Argentina has to resort largely to imports. Special commissions have been set up in the Argentine Army, Navy and Air Force to work out new programmes of armament.

Just before the end of the hostilities, the Argentine Air Force received 10 Mirage V aircraft from Peru and 22 Dagger/Nesher aircraft from Israel, the stock of bombs having been replenished by Libya and Israel.

The shipment of French Super Etendard aircraft and Exocet missiles resumed in November 1982, in spite of strong British objections. Later, a contract was signed with France for the acquisition of 15 Super Puma helicopters [39]. According to press reports, the USSR offered Argentina Tupolev aircraft comparable to the Mirage IVs "free of charge" [21]. Some Soviet assistance in the expansion of Argentina's air early-warning system may have been provided in the latter stages of the war [45].

The Argentine Navy is to receive two submarines under construction in FR Germany, in addition to four others planned to be assembled in Argentina. Also, four highly sophisticated frigates are being built in Hamburg; they are equipped with British Rolls-Royce engines, the UK having made this exception to its embargo on arms shipments to Argentina [46].

The Argentine Army intends to reconstruct the system of air defence, probably with the assistance of the Swiss Oerlikon company, and to buy some 40 French-produced Panhard armoured vehicles, as well as 255 Kürassier tanks from the Austrian Steyr–Daimler–Puch company [39]. While Soviet-produced SA-7 missiles were bought from Bulgaria and/or Libya or Peru, Roland missiles manufactured by Aérospatiale in co-operation with the West German firm Messerschmidt, and ordered before the hostilities, were to be delivered promptly by France [19–23].

Having demonstrated the insufficient degree of military preparedness of Latin American countries, Argentina's defeat may stimulate an escalation of the arms build-up in the region, either through increased imports of arms or through intensified domestic weapon manufacture. In particular, Chile and Brazil—Argentina's immediate neighbours—cannot remain indifferent to the rapid Argentine rearmament.

Chile

Since the Falklands/Malvinas war, Chile has received three Canberra PR-9 bombers, supplied by Britain from RAF surplus stocks (in addition to 12 Hunter FGA-9 jet aircraft, delivered in April 1982). These are the first Canberras to be operated by Chile, and the first PR-9s ever to be sold to an overseas customer [24, 25]. Chile is also planning annual production, from 1983, of 20 Pillan aircraft for both training and light ground attack roles, with about 40 per cent indigenous content, the remainder being supplied by Piper of the USA. The Pillan will also be offered for export to other Latin American countries, and its armed version will have two underwing strongpoints for external loads. These will include two A-6 rocket launchers manufactured by the Chilean industry [26]. By early 1983, the Chilean Air Force had received six Casa C-101 Aviojet trainer and light strike aircraft—four from Spain and two assembled locally [46].

By the end of 1982, Super Puma helicopters had been delivered by Aérospatiale, while the Crotale missiles, ordered by the Chilean government, had yet to be delivered [25, 27].

Chile intends to acquire more warships from Britain (in addition to the destroyer *Norfolk* and the tanker *Tidepool*, bought from the UK on the eve of the war) and will be building a third landing ship at its own shipyard [28]. The first of the two submarines ordered in FR Germany is to be delivered in 1984 [39].

In starting licensed production of Swiss-designed MOWAG Piranha infantry combat vehicles, Chile is the third Latin American country, after Brazil and Argentina, to develop an indigenous industry able to produce modern armoured fighting vehicles for both internal use and export [29].

Brazil

Brazil has even more ambitious plans for the expansion of its armaments.

New equipment for the Brazilian Air Force will most probably include Mirage IV fighters to be ordered from Dassault–Breguet. This transaction may be offset by France's purchase of additional Xingu twin-engine liaison aircraft from Brazil [29].

The Brazilian company Embraer is working full speed to meet its commitment to deliver 118 T-27 Tucano turboprop trainers ordered by the Brazilian Air Force (with options on 50 more) [30]. Embraer is now also engaged in the production of prototypes of the light strike-fighter AM-X, in co-operation with the Italian companies Aermacchi and Aeritalia. Series production is to meet the total order for 266 aircraft, of which 79 will be for the Brazilian Air Force, and the rest for Italy's Air Force, with deliveries starting in 1987. The AM-X will be armed with one or two internally mounted cannons, wingtip-mounted AAMs, and up to 3 800 kg of external stores on four underwing pylons [27]. Production of the Piranha anti-aircraft missile will be speeded up. Other types of missile and rocket will be manufactured in Brazil for its own armed forces and for export in a new arms factory, which is being constructed in Sao Paulo [30]. It is noteworthy that Brazil has registered a patent for its first anti-missile cannon [31]. Increased production of light armoured vehicles—Urutú, Cascavel and Jararacá—is envisaged as well as modernization of the US-produced M-41 light tank [32].

However, the most spectacular developments are expected in naval armaments. Brazil will purchase two or three of FR Germany's modern Type 209 submarines [33]. Under existing plans, Brazilian Navy technicians will participate in the building of the first submarine in Kiel,

paving the way for the construction of the second vessel in Brazil. This acquisition will be an addition to the three British-built Oberon-class submarines and five older US models possessed by Brazil. Recent Brazilian Navy procurement included a multi-million pound order with Marconi in the UK for Mk 24 Tigerfish torpedoes to arm the submarines [34].

The naval shipbuilding programme also provides for 12 corvettes of approximately 1 800 tons to replace the ageing ex-US destroyers. The first four ships are to be built in 1983 [36]. They will be equipped with 12 Exocet missiles (the total number of these missiles acquired by Brazil will thereby reach 22) [35], as well as Bofors 40-mm L-70 anti-aircraft guns (to be produced indigenously under Swedish licence) [40]. Furthermore, the Brazilian government has ordered three feasibility studies for a ship-borne version of a strike fighter aircraft [36].

In September 1982 an agreement was signed by the French and Brazilian defence ministers, calling for transfer of French shipbuilding technology to Brazilian yards [29].

Clearly in response to the 1982 events in the South Atlantic, Brazil is planning to build a combined air and naval base on the island of Trinidade, some 750 miles from the coast of Brazil, to the south-west of Ascension. US assistance will probably be involved in the construction of an appropriate runway on the island together with long-range radar installations and port facilities [26].

Peru

Argentine, Brazilian and Chilean armaments may induce other Latin American countries to continue the arms race. Peru, with its territorial disputes with Chile and Ecuador, is one example.

Peru has placed a contract with Dassault–Breguet for 24 Mirage 2000 fighters, becoming the third country, after Egypt and India, to order this aircraft. A further purchase of Exocet missiles is also planned. Following completion of the delivery of 16 Italian-built Aermacchi MB-339AP armed jet trainers, Peru envisages local co-production of the aircraft. Plans call for manufacture of about 60 MB-339s for the Peruvian Air Force, including some single-seat Veltro II light-strike variants, plus others for possible export. Continuing co-operation with the Italian aerospace industry may result in a Peruvian order for other Italian aircraft [24, 27, 30]. Peru is also said to have ordered Mi-24 combat helicopters from the Soviet Union [43].

The Peruvian Navy has recently bought from the Netherlands a destroyer of the Friesland class. It is now considering the possibility of modernizing it and six other units of the same class, which it acquired in

1980/81, with surface-to-surface missiles and new electronics [37]. Moreover, four Type 209 submarines are being built for the Peruvian Navy at the HDW shipyard in FR Germany [36]. A Lupo-class frigate, equipped with missiles and entirely manufactured in Peru, was launched in October 1982 [44]. A naval base will be established by Peru at a cost of some $600 million [38], providing better access to the area, which is disputed by Ecuador and where an armed conflict took place in 1981. (New armed clashes between the two countries were reported at the beginning of 1983.)

A contract was concluded with Argentina for the supply of 80 TAM tanks to the Peruvian Army; the TAM will subsequently be manufactured in Peru. This transaction took place within the framework of an agreement on co-operation between the Peruvian and Argentine armament production boards [46].

Venezuela and Colombia

Other examples of arms build-ups are the orders placed by Venezuela and Colombia, engaged in a territorial dispute with each other as well as with Guyana and Nicaragua [42].

The Venezuelan Navy has ordered from South Korea six landing ships —four of the LST type and two of the LSM type; the first deliveries are expected in 1984. Two frigates acquired in 1956 will be modernized in Italian shipyards. The Air Force will purchase CF-5 fighter aircraft as well as trainers from Canada. Roland-II surface-to-air missiles are to be supplied by France [39].

The Colombian Navy took delivery of two PG-92 patrol boats from the USA, and the first of four missile-lauching corvettes ordered from FR Germany [46]. An unspecified number of anti-ship Exocet missiles will be purchased to equip the boats now under construction [27]. In 1982 the Colombian Air Force acquired 14 EMB-326 Xavante jet trainer aircraft from Brazil, as well as 240 AIM-7F Sparrow air-to-air and surface-to-air missiles from the USA [41].

VII. Conclusions

The Falklands/Malvinas war was 'unnecessary' in the sense that it was not fought to defend the vital interests of either party. Neither was it a 'just' war fought to liberate people suffering from colonial or racist oppression. Resort to force to settle the dispute was gratuitous, because it was inconceivable that the quasi-colonial status of the Islands could be maintained forever, whatever the merits of the legal arguments adduced by the parties. Having dismantled a colonial empire, Great Britain was

not likely to cling to a few barren islands, which many Britons had hardly any knowledge of, at the expense of relations with the whole Latin American continent and in particular with Argentina, where the question of the Malvinas has a deeply emotional significance.

There exists evidence that responsible diplomats in the United Kingdom had been considering a far-reaching compromise solution. In 1980 the United Kingdom consulted the Islanders over whether they would accept having the title of sovereignty given to Argentina in exchange for a lease of the Islands back to the UK ('the Hong Kong approach') for a specified period of time. The Islanders refused, as expected, preferring a freeze on the sovereignty negotiations, but the mere fact that such a question was asked was indicative of the thinking prevailing at that time in the UK with regard to the Argentine claim. Even practical preparations were made for a possible devolution, as exemplified by the 1971 and 1974 British–Argentine agreements establishing closer ties between the Falklands/Malvinas and the mainland in different areas, including the field of education, and thereby expanding Argentina's role in the day-to-day affairs of the Islands. Indeed, Lord Shackleton's report of 1976, commissioned by the British government, made it clear that any ambitious schemes for expanding the economy of the Islands would require political agreement with Argentina. It was probably because it did not see a long-term future for the Islands under the British flag that the United Kingdom was reluctant to devote resources to their development. Obviously, the Falkland Islands Company and its lobby in the British Parliament would have opposed a change in the *status quo* of the Islands, but the objections could probably have been overcome by way of a negotiated compensation.

The principle of self-determination, re-affirmed in the 1960 UN Declaration on the granting of independence to colonial countries and peoples, cannot be automatically applied in all circumstances. (It is noteworthy that Great Britain, which invariably refers to the principle of self-determination in its dispute with Argentina, did not feel bound by it when it evicted the Diego Garcians from their island and resettled them in Mauritius.) In the case of sovereignty reverting to a pre-colonial era, it is the need to preserve the territorial integrity of states that may prevail. However, in the case of the Falklands/Malvinas no British government could afford to disregard the position of the settlers who, being British, are obviously interested in retaining their relationship with the UK, even though they were denied full citizenship. Neither could the United Kingdom accept a solution which would hurt British national feelings.

It seems that it was only a matter of time before the dispute could be settled to the satisfaction of both sides, with due account being taken at

least of the economic interests of the Islanders. The Argentinians' patience may have been strained by 17 years of fruitless talks, which, in their opinion, were conducted in bad faith by the British, but their precipitate action was miscalculated: it provoked an unexpectedly vigorous response on the part of the UK—diplomatic, economic and military—and antagonized the USA. It may have delayed a judicious negotiated solution for many years ahead, because as a result of the war the United Kingdom finds itself politically more committed to the Islands than before. In this regard, Argentina emerged as the loser. On the other hand, the United Kingdom also miscalculated in underestimating the Argentine determination to fight for the Islands. In restoring the *status quo ante*, the UK could hardly be considered a winner. For, to protect the Islands, the United Kingdom will now have to maintain a garrison considerably larger than before at a cost of hundreds of millions of dollars a year, not to speak of the need to improve the economic viability of the Islands facing a hostile continent.

The war was limited in time, in geographical extent and in the means of warfare used. Nevertheless, both sides suffered considerable losses, both direct and indirect.

Both countries will certainly replace the equipment destroyed or damaged. The United Kingdom will have to spend considerable sums over and above the increase by which its defence budget is planned to grow over the next years. Argentina will have to use its scarce resources to rebuild its decimated air force and to acquire modern, more sophisticated weapons matching those of Britain. Argentina also announced that it would be working towards the acquisition of a nuclear-powered submarine. Even more significant was the statement made by the admiral heading the Argentine Atomic Energy Commission, reiterating his country's opposition to the Treaty on the non-proliferation of nuclear weapons.

It is often contended that one reason, at least for Argentina, to enter into war was to divert the attention of its population from social and economic problems. This may have worked. Greater national cohesion was achieved in both countries, but the prestige of each government in power was so engaged that neither could back down without fatal domestic consequences. The surge of nationalistic, chauvinistic and jingoistic feelings proved to be ephemeral, especially in Argentina, where right after the hostilities the leaders had again to face the divisive forces generated by political and social disarray, as well as the economic realities of inflation, unemployment and growing debts. The Argentine government had to resign and a strong movement was started for a return to civilian administration.

The Falklands/Malvinas conflict put the UN collective security system to a harsh test. It also revealed a lack of confidence in the International

Court of Justice, the principal judicial organ of the United Nations, which could have dealt with the dispute had the parties been willing to recognize its jurisdiction. (Even the third parties involved in the mediation did not suggest recourse to the Court.) The conflict demonstrated once again, but this time in a very dramatic way, the inherent weakness of the inter-American peace and security system based on the treaties in force, in particular the Inter-American Treaty of Reciprocal Assistance.

The USA, which was faced with a choice between Europe and Latin America, chose the former and sided with the United Kingdom in the decisive phase of the crisis. It was accused of 'betraying' the inter-American system to which it belongs, and will need to make strenuous diplomatic efforts to rebuild its image in Latin America. The Latin American members of the system supported Argentina morally in its fight against Great Britain through multiform acts of solidarity (though some of them deplored Argentina's use of force). However, with a few exceptions, they were unwilling to get involved in any way that would hurt them. Even Venezuela, Panama and Guatemala, the countries which could clearly see the relevance of a possible successful Argentine recovery of territory to their own territorial claims, provided little more than lip service. The only Latin American country which apparently was prepared to assist Argentina with military personnel was Cuba—a non-party to the inter-American system. (Its offer was turned down.) Most English-speaking countries in the region went along with the United Kingdom. In view of all these attitudes, Argentina may start gliding away from its pro-Western orientation towards non-alignment.

Another consequence of the war will no doubt be a further arms build-up in the region. The expected rearmament of Argentina is bound to influence the state of armaments both in Chile, which has a long-standing territorial dispute with Argentina, and in Brazil, which is the principal rival of Argentina for economic and political influence in the neighbouring states. Particularly nefarious would be the use of nuclear energy for military purposes, undermining the Treaty of Tlatelolco.

Although the guns have been silenced, there is no real peace in the region. The state of undeclared war may continue as long as the British–Argentine conflict remains unresolved. There are today many international conflicts concerning disputed sovereignty. The principle that force may not be used to resolve these conflicts is fundamental under the Charter of the United Nations. Indeed, in its 4 November 1982 resolution, the UN General Assembly urged the resumption of negotiations for a peaceful solution of the British–Argentine dispute. The United Kingdom voted against the resolution, but the USA, the USSR and China supported it, while France and most other EEC countries abstained (see appendix 16B). If this pattern of voting is maintained in the future, it will be difficult

for the United Kingdom to continue to refuse negotiations and to resist pressure for a negotiated settlement.

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Appendix 16A

Chronology of hostilities in the South Atlantic and diplomatic transactions

Square-bracketed numbers, thus [1], *refer to the list of references on page 515.*

This is an account of the developments as they were described in official documents or were reported in the press. Both sides were engaged in suppressing facts and in spreading disinformation, for example, by exaggerating the losses of the adversary. In the case of conflicting reports, more than one version of the relevant event is given. Comments are made insofar as they are necessary to understand the issues involved.

Events on the eve of the war: 1 March–1 April 1982

Ostensibly, the Falklands/Malvinas conflict started over a trivial incident on the remote and desolate island of South Georgia in the South Atlantic. However, this incident may have been only a prelude to a larger undertaking, for there were indications that the Argentine government had been preparing a military operation to recover the Falklands/Malvinas. These indications were apparently ignored or misunderstood by the British government until the eve of the Argentine landing on the Islands.

1 March: The Argentine Foreign Ministry formally stated that if an early solution of the dispute concerning the Malvinas Islands were not forthcoming, Argentina would consider itself free to choose a "procedure" which best accorded with its interests. This may have been a warning that force could be used.

11 March: A Hercules C-130 of the Argentine Air Force made an emergency landing at Stanley airport, apparently due to "technical troubles".

18 March: An Argentine navy cargo vessel, *Bahia Buen Suceso*, with a group of 60 Argentinians on board (43, according to official Argentine sources) anchored off the island of South Georgia. The purpose of the ship's arrival, as given by the crew, was to dismantle an old whaling station and to recover scrap metal in fulfilment of a commercial contract with a British company.

According to the commander of the British Antarctic survey base at Grytviken on South Georgia who headed some 20 men (the island's only inhabitants), an Argentine flag was hoisted and the Argentinians started setting up camp. The commander told the Argentinians that they

either had to seek permission from the British authorities or leave. The Argentine government argued that the landing had taken place with prior knowledge of the British Embassy in Buenos Aires, and that the Argentine workers were in possession of a document valid for travel in accordance with the 1971 Argentine–British Joint Declaration governing communications between the mainland and the island.

21 March: The Argentine ship left South Georgia, leaving about 10 members of the party.

The Argentine state airline office in Port Stanley was damaged in retaliation for the South Georgia flag-raising incident.

22 March: The US Permanent Representative to the United Nations was 'warned' by the Argentine Ambassador that Argentina would not hesitate to take steps to retrieve the Malvinas.

25 March: Sailing from the Falklands/Malvinas, the British Antarctic patrol vessel *Endurance*, with a crew of 124, and equipped with two lightweight Bofors guns and two helicopters, anchored off South Georgia. The captain had been instructed to arrange for the departure of the remaining Argentinians. On the same day, an Argentine naval transport vessel arrived at Leith harbour to deliver supplies to the Argentinians who had stayed ashore.

26 March: Argentina said that its nationals on South Georgia would be given all necessary protection. According to press reports, Argentine vessels—two corvettes, two destroyers and one submarine—had been ordered into the area.

28 March: In a message to the British Foreign Secretary, the Argentine Foreign Minister proposed that the discussions between the two countries should not be limited to the presence of Argentine citizens in South Georgia, but should also cover the issue of sovereignty.

30 March: The Argentine Foreign Minister declared that his country would not yield to any pressure from the UK to remove the Argentine workers from South Georgia.

1 April: The United Kingdom called an emergency session of the UN Security Council, stating that it had good reason to believe that the Argentine armed forces were about to attempt to invade the Falkland Islands. Newspapers reported that the Argentine aircraft carrier and destroyers, as well as landing craft, were on the way to the Falklands/Malvinas. The movements of the Argentine fleet were probably detected by US satellites.

In a telephone conversation with the President of Argentina, the US President warned that an invasion could be a grave setback to good relations between the two countries, and asked him to call it off.

Argentina complained in a letter to the President of the UN Security Council that it had been the object of aggression by the British government.

The President of the Security Council called upon the parties to exercise utmost restraint, to refrain from the use or threat of force, and to continue to search for a diplomatic solution.

The war and attempts to stop it: 2 April–14 June 1982

The war started with considerable advantages for the Argentine side occupying the Falkland/Malvinas Islands. However, the quick reaction of the United Kingdom, which managed to put together a naval task force of considerable strength, denied the Argentinians any further advantages. The Argentine position was weakened by the economic sanctions imposed by the European Community and by the fact that the USA openly sided with the United Kingdom in the decisive stage of the war.

In spite of strong Argentine resistance, British troops recovered the Islands in the very short time of 74 days. The losses were considerable on both sides. All attempts at mediation failed because of the intransigence of the parties, especially on the part of Argentina.

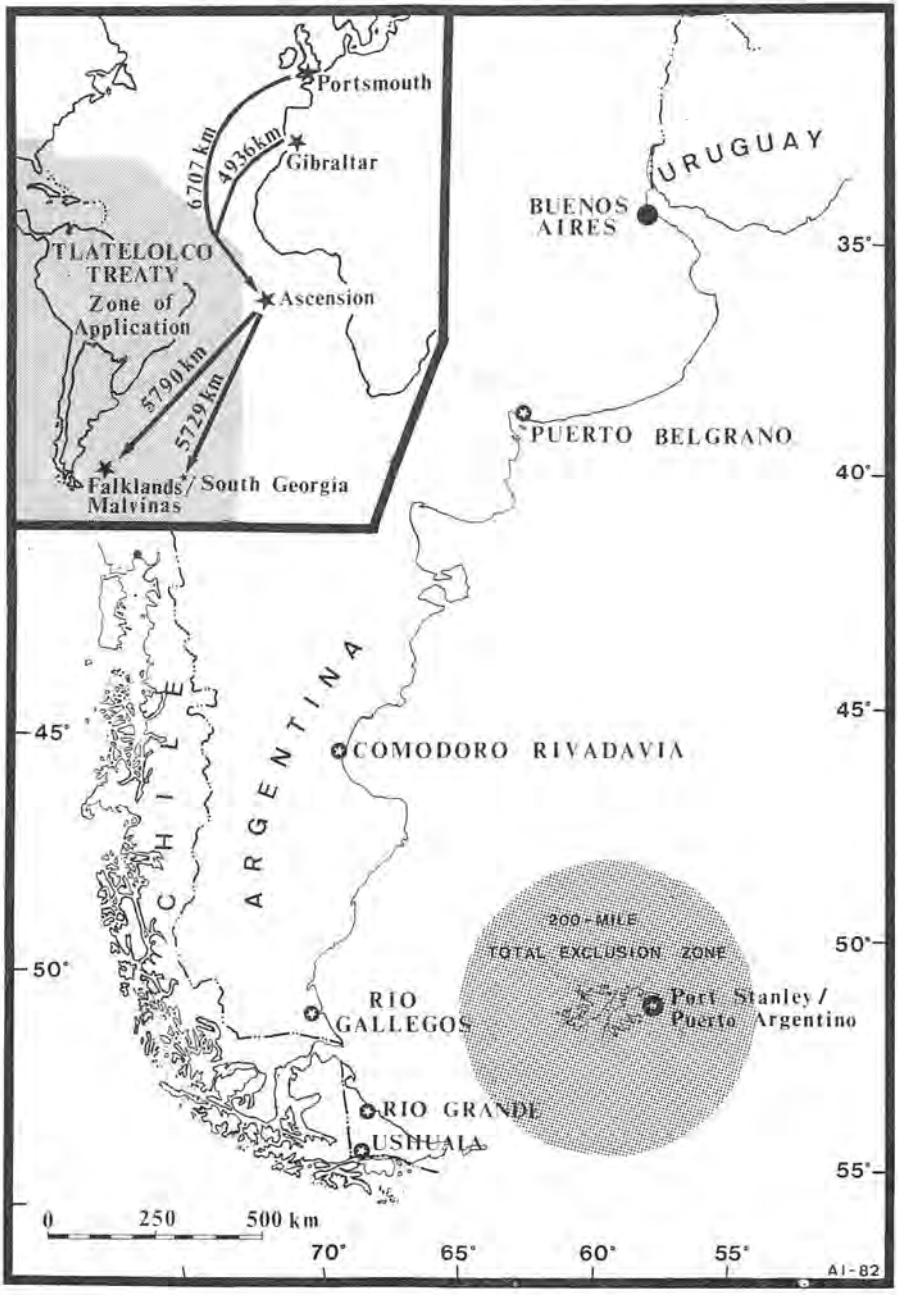
2 April: About 2 000–4 000 Argentine troops landed on the Falklands/Malvinas, overwhelming the 84-man detachment of Royal Marines guarding the Islands. According to the British government's report, 6 450 rounds of small ammunition and 14 rockets were fired at Argentine troops, killing at least five and wounding 17 soldiers, and destroying an armoured car. The Argentine figures were: three Argentinians dead and five wounded. No British casualties were reported. The captured British men and the governor were flown to Uruguay. Argentina proclaimed the recovery of its national sovereignty over the territories of the Malvinas, South Georgia and the South Sandwich Islands and appointed a military governor.

In a joint statement, members of the European Community condemned the armed intervention in the Falklands, and appealed to Argentina to withdraw its forces immediately and refrain from the use of force. The US government also urged Argentina to withdraw its forces and seek a peaceful solution to its claim.

A British nuclear-powered submarine was reported to be heading from Gibraltar to the conflict area.

3 April: With 10 votes in favour (out of 15) the UN Security Council adopted Resolution 502 (1982) demanding an immediate cessation of

Figure 16A.1. The theatre of military operations in the South Atlantic



hostilities and the withdrawal of all Argentine forces from the Falklands/Malvinas, and called on the parties to seek a diplomatic solution. Panama voted against, while China, Poland, Spain and the USSR abstained.

The British Prime Minister announced that the aircraft carriers *Invincible* and *Hermes* would lead a naval Task Force from Portsmouth to the Falklands.

Argentine forces landed on South Georgia. Putting up resistance, 22 British marines destroyed an assault helicopter and hit a corvette with an anti-tank missile, but were overrun. Three Argentinians were killed; no British casualties were reported.

The UK broke off diplomatic relations with Argentina, froze Argentine assets in Britain, and banned arms sales and suspended export credits to Argentina.

4 April: Argentina suspended the transfer of Argentine or foreign funds to the United Kingdom.

5 April: The British Foreign Secretary resigned, saying that the invasion had been a humiliating affront to his country. (The British Defence Secretary's offer of resignation was refused.)

The British Task Force, comprising a large part of the Navy, sailed from Portsmouth to the South Atlantic. The British Defence Ministry requisitioned the civilian ships *Canberra*, *Queen Elizabeth 2* and *Uganda* for the transport of troops, military equipment and medical supplies, as well as several tankers.

6 April: The Argentine C-130 and Fokker-28 transport aircraft continued to supply troops and weapons to the Falklands/Malvinas from Comodoro Rivadavia, one of the main bases on the Argentine coast, over 900 km from Port Stanley/Puerto Argentino.

7 April: France, Belgium, the Netherlands, FR Germany and Canada decided to prohibit arms sales to Argentina. Over the past five years FR Germany had been Argentina's largest supplier of major weapon systems, mainly submarines, destroyers and armoured vehicles. (On 7 May, Israel also announced that it would make no further arms deals with Argentina, but would meet the contractual obligations already incurred.)

8 April: The US Secretary of State started mediation between the UK and Argentina.

9 April: The United Kingdom announced that, as from 12 April 1982, a maritime exclusion zone would be established around the Falkland Islands. The outer limit of this zone would be a circle of 200 nautical miles' radius from latitude 51° 40'S and longitude 59° 30'W. Any Argentine

warships or naval auxiliaries found within the zone would be treated as hostile and liable to attack. Argentina interpreted this announcement as a notification of blockade—an act included among those defined as aggression by UN General Assembly resolution of 14 December 1974—and stated that it would exercise the right of self-defence under Article 51 of the UN Charter. In response, the United Kingdom argued that the delaration of the exclusion zone fell short of the concept of blockade as understood in international law. (International law defines blockade as the blocking by men-of-war of the "approach" to the enemy coast, or a part of it, for the purpose of "preventing ingress or egress" of vessels or aircraft of all nations [1].) It also pointed out that the reference (in the UN resolution defining aggression) to the blockade of the ports or coasts of a state by the armed forces of "another side" was irrelevant, since the zone surrounded British territory. In the British view, the article of the definition, which states that "the first use" of armed force in contravention of the Charter constitutes *prima facie* evidence of an act of aggression, was more relevant.

10 April: Members of the European Economic Community (Belgium, Denmark, France, FR Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands and the United Kingdom) placed on embargo on the export of arms and military equipment to Argentina, and decided to take measures necessary to ban all imports of Argentine origin into the Community. The EEC called on other governments to associate themselves with these decisions, so as to ensure the full implementation of Resolution 502.

The Argentine government ordered mobilization of nearly 100 000 reservists.

Pope John Paul II appealed to both sides to settle the conflict peacefully.

11 April: The government of Peru proposed to the Argentine and British governments the establishment of a 72-hour truce, pending the exercise of the US government's good offices. The UK said that the first requirement for any solution of the conflict was the withdrawal of Argentine forces from the Falklands and the dependencies in accordance with Resolution 502.

Argentina stated that it would refrain from any action that could bring the parties to armed clashes. However, if the UK carried into effect the announced blockade, Argentina would have no alternative but to react to the aggression.

12 April: The British Defence Ministry made it known that its submarines in the exclusion zone around the Falklands would enforce the proclaimed restrictions. The Argentine aircraft carrier, the cruiser, seven destroyers (out of the total of eight), two frigates (out of three), and all of the submarines were reported to be back in mainland ports.

13 April: The Permanent Council of the Organization of American States (OAS) adopted a resolution expressing concern over the situation and hope that a rapid peaceful solution could be found. Co-operation was offered in the peace efforts already under way.

14 April: The EEC promulgated regulations on economic sanctions against Argentina, suspending the imports of all Argentine products until 17 May 1982.

The UK decided to convert the container ship *Atlantic Conveyor* into a semi-aircraft carrier.

15 April: Three Brazilian frigates and five torpedo boats sailed from Rio de Janeiro for 'routine' manoeuvres off the southern coast of Brazil. The operation was to include a submarine and a staff vessel already in the area. The Brazilian spokesman said that this training exercise had nothing to do with the Falklands/Malvinas crisis.

The air force chiefs from 18 American states, including the USA, met in Buenos Aires.

16 April: Brazil rejected Great Britain's request to use Brazilian ports for refuelling and taking on supplies.

The British Task Force arrived at Ascension, over 6 700 km from Portsmouth.

19 April: Argentina requested the convocation of the Organ of Consultation, pursuant to the Inter-American Treaty of Reciprocal Assistance (also called the Rio de Janeiro Treaty), to consider measures for the maintenance of peace and security in the hemisphere. This treaty, concluded in 1947, is a mutual defence pact for the countries of Latin America and the USA.

In private meetings with representatives of Argentina and the United Kingdom, as well as with the representative of the USA, the UN Secretary-General outlined the assistance that the United Nations could render in pursuance of an agreement that the parties might reach in accordance with Resolution 502. He mentioned the possibility of using UN observers to supervise the withdrawal of armed forces and of establishing a temporary UN administration.

20 April: Responding to the US Secretary of State's mediation efforts, the President of Argentina stated that Argentine sovereignty over the Malvinas was not negotiable.

22 April: The British Task Force reached the strength of 15 surface combat vessels, 3 submarines, 38 civilian ships and 17 Royal Fleet Auxiliary support ships. The Mexican President offered mediation if the US Secretary of State's mission should fail.

23 April: The United Kingdom warned that any approach by Argentine warships, naval auxiliaries or military aircraft, which could amount to a threat to interfere with the mission of the British forces in the South Atlantic, would encounter an 'appropriate' response. All Argentine aircraft, including civil aircraft engaging in surveillance of these British forces, would be regarded as hostile.

24 April: The US Defense Department denied reports that US SR-71 'Blackbird' aircraft were providing the UK with reconnaissance data on Argentina and the Falkland Islands. (The USA does not normally comment on SR-71 operations, but made an exception in this case [2].)

25 April: British troops landed on and recovered South Georgia. The Argentine garrison surrendered after limited resistance, and the submarine *Santa Fé* was damaged by missiles and depth charges from British helicopters when it was unloading provisions in the port of Grytviken. About 180 Argentinians were captured, one of whom died.

26 April: The United Kingdom announced that on 25 April, in exercise of the right of self-defence under the UN Charter, British forces re-established British authority on South Georgia. This act was qualified by the Argentine government as an "act of perfidy".

28 April: With 17 votes in favour, and the United States, Chile, Colombia, and Trinidad and Tobago abstaining, the foreign ministers attending the Meeting of Consultation of the OAS (requested by Argentina under the terms of the Rio de Janeiro Treaty) adopted a resolution, based on a Peruvian–Brazilian draft. The resolution urged the UK to cease hostilities, and appealed to Argentina to refrain from actions that could exacerbate the situation. Both countries were asked to call a truce and resume negotiations for a peaceful settlement to the conflict, taking into account the "interests of the Islanders". The ministers deplored the measures adopted by the EEC against Argentina as incompatible with the UN and OAS Charters and with the General Agreement on Tariffs and Trade (GATT). In the part dealing with the question of sovereignty, the OAS resolution cited the 1976 declaration of the Inter-American Juridical Committee that Argentina has "an undeniable right of sovereignty over the Malvinas Islands". (It should be noted, however, that the Committee referred to is a consultative body for the OAS in "juridical" matters and has no judicial authority in regard to specific disputes, including territorial disputes.)

The United Kingdom announced that, as from 30 April 1982, a 200-mile "total exclusion zone" would be established around the Falkland Islands. Any ship or aeroplane, military or civilian, found in this zone without due authorization by British authorities would be considered as supporting

the occupation of the Islands by Argentina and, consequently, would be treated as hostile and subject to attack. The Argentine government protested against this "new act of aggression" as violating the UN Charter and Resolution 502.

30 April: In response to the establishment of a total exclusion zone by Great Britain, Argentina announced that all British ships, including merchant and fishing vessels, operating within the 200-mile zone off the Malvinas, South Georgia and the South Sandwich Islands would be considered hostile, and that any British aircraft, whether military or civilian, flying through Argentine airspace would also be considered as hostile and treated accordingly.

Having failed to reconcile the two countries' positions, the USA abandoned its mediation and stated that it would apply the following sanctions against Argentina: suspension of all military sales; withdrawal of certifications for military sales; suspension of credits from the US Export and Import Bank; and suspension of guarantees of the US Commodity Credit Corporation. In addition, the USA was acceding to British requests for certain military material. Information about these acts was provided to the UN Secretary-General in a letter from the US Secretary of State.

1 May: The British Air Force attacked Port Stanley.

According to Argentine reports, two Harrier aircraft were shot down and a third was hit.

According to British reports, British Vulcan and Sea Harrier aircraft severely damaged the runway at the Port Stanley airfield, as well as the surrounding military installations and stores. (The Port Stanley airfield had only one operable runway, 1 250 m long and 45 m wide.) Goose Green was also attacked and the local airstrip was damaged together with a number of Argentine military aircraft. There were no British casualties. Three Argentine aircraft were shot down, while one British frigate was superficially damaged by attacking Argentine aircraft.

2 May: The Argentine cruiser *General Belgrano* was hit by torpedoes fired from the British submarine *Conqueror*. Great Britain stated that the cruiser posed a significant threat to the British Task Force.

Argentina reported that *General Belgrano* (with 1 000 men on board) was torpedoed by a British submarine; it added that the vessel was outside the 200-mile exclusion zone established by the UK. The cruiser sank and hundreds of people lost their lives.

In an effort to promote a settlement, the UN Secretary-General handed over to the two sides an *aide mémoire*, suggesting that at a specified time they take simultaneously the following steps, which were conceived as provisional measures without prejudice to the rights, claims or positions

of the parties concerned: (*a*) Argentina should begin withdrawing its troops from the Falklands/Malvinas, and the United Kingdom should redeploy its naval forces and begin withdrawing them from the area, all withdrawals to be completed by an agreed date; (*b*) both governments should commence negotiations to seek a diplomatic solution to their differences by an agreed target date; (*c*) both should rescind their respective announcements of blockades and exclusion zones and cease all hostile acts against each other; (*d*) both should terminate all economic sanctions; and (*e*) transitional arrangements should come into effect under which the above steps would be supervised and interim administrative requirements met.

3 May: British Lynx helicopters armed with Sea Skua air-to-ship missiles attacked two Argentine patrol craft, sinking one and damaging the other.

4 May: The British destroyer *Sheffield* was hit by an Exocet missile fired from an Argentine (French-made) Super Etendard aircraft and subsequently sank. Of 270 crew, 20 died and 27 were injured. A British Sea Harrier aircraft was shot down over Goose Green by an Argentine anti-aircraft gun.

5 May: The Co-ordinating Bureau of the Movement of Non-Aligned Countries expressed regret at the mounting loss of human life, and reiterated the view that the use of force or threat of the use of force in relations between states were acts contrary to the purposes of the Movement.

5–6 May: The UN Secretary-General received responses to his *aide mémoire* of 2 May from the Argentine and British governments. Both accepted the Secretary-General's approach as a framework for an agreement.

7 May: The British government announced that any Argentine warships or military aircraft which were found more than 12 nautical miles from the Argentine coast would be regarded as hostile. The UK considered this measure necessary because of the proximity of Argentine bases, the threat posed by Argentine carrier-borne aircraft and the ability of the aircraft to approach the British Task Force undetected in bad weather and at low level. Argentina qualified this as a further act of aggression.

NATO defence ministers condemned Argentina's armed invasion of the Falklands and the dependencies, as well as its failure to comply with Resolution 502, while the New China News Agency accused Great Britain of practising "gunboat diplomacy" in its attempts to recover the Islands.

The UN Secretary-General started formal talks with the two sides on the basis of his *aide mémoire*.

9 May: Argentina reported to the Security Council that British forces had started a simultaneous attack on Puerto Argentino and Puerto Darwin. Puerto Argentino was fired upon by two ships located approximately 20 km from the coast. The operation against Puerto Darwin was carried out by five helicopters equipped with missiles and 30-mm guns.

Two British Sea Harrier aircraft sank the Argentine trawler *Narwal*, which had been shadowing the British Task Force.

10 May: The United Kingdom declared a "controlled airspace" of 100 miles' radius around Ascension. The island served as a staging post for the British Task Force.

11 May: The British frigate *Alacrity* sank the Argentine store ship *Cabo de los Estados* in the Falkland/San Carlos Sound.

12 May: Queen Elizabeth 2, with several thousand troops aboard, sailed for the South Atlantic.

14 May: The Soviet Union stated that British warnings to keep ships out of the area around the Falklands/Malvinas were "unacceptable and provocative", and that they contradicted the 1958 Convention on the High Seas and were therefore unlawful. The USSR denied any involvement in the British–Argentine crisis.

15 May: British forces carried out a raid on military installations and aircraft on an airstrip on Pebble Island to the north of West Falkland. A number of aircraft on the ground and a large ammunition dump were destroyed.

16 May: The press reported the Argentine President's statement before Mexican television to the effect that Argentina was ready to see 4 000 or 40 000 Argentinians die if necessary to preserve its honour.

17 May: The EEC decided to extend the duration of the sanctions against Argentina. Italy and Ireland dissociated themselves from this decision.

According to press reports, not all EEC members strictly observed the declared embargo against Argentina. It was alleged that FR Germany continued shipping, via Brazil, engines and optical equipment used in the Argentine-built TAM tanks; that Italy, which considered that the embargo did not cover contracts already concluded, continued supplying the Argentine armed forces with munitions; and that the Netherlands had not stopped the supplies of electronic equipment for the Argentine submarine under construction in FR Germany [3].

The British government submitted to the UN Secretary-General a draft interim agreement providing, *inter alia*, for the following measures:

(*a*) each party would cease, effective from a specified time, all firing and other hostile actions; (*b*) both sides would carry out a phased and parallel withdrawal of their armed forces within a fixed time-limit, to at least 150 nautical miles away; (*c*) exclusion zones and economic sanctions would be lifted; (*d*) a UN administrator would be appointed by the Secretary-General; (*e*) one Argentine resident of the Islands could participate in each of the two representative institutions on the Islands; (*f*) the parties would enter into negotiations under the auspices of the UN Secretary-General with a view to completing them by 31 December 1982; and (*g*) each party would have an equal number of observers on the Islands during the interim period.

18 May: The Argentine government submitted to the UN Secretary-General a draft interim agreement, which differed considerably from the British draft. In particular, Argentina proposed more rigorous terms for the withdrawal of British armed forces and demanded that the envisaged UN interim administration should cover both the main islands and the dependencies—South Georgia and the South Sandwich Islands—for a predetermined period, while substantive negotiations were under way. Moreover, it insisted that the Argentine flag should fly on the Malvinas Islands, that there should be no restriction on immigration to the Islands, and that the United Nations should perform *all* legislative, executive, judiciary and security functions there, employing officials other than Argentine or British subjects. During the period of the negotiations, the Islands would have to be open for Argentine aeroplanes and merchant ships, as well as for all types of communications and services.

The North Atlantic Council meeting in ministerial session condemned Argentina for its aggression against the Falkland Islands and the dependencies, and deplored the fact that after more than six weeks Argentina had still not withdrawn its forces in compliance with UN Security Council Resolution 502.

19 May: In a further *aide mémoire*, the UN Secretary-General listed the points on which he felt agreement had been reached and the four crucial questions which remained unresolved. The latter concerned the interim administration of the territory; the time-frame for completion of negotiations; certain aspects of the withdrawal of forces; and the geographic area to be covered by the agreement. He provided suggestions on each of these points.

20 May: The UN Secretary-General informed the President of the Security Council that the efforts in which he had been engaged (since 7 May he had held some 30 separate meetings with the two sides) offered no prospects either for bringing about an end to the British–Argentine crisis

or preventing the intensification of the conflict. The British government stated that its earlier proposals towards compromise were "no longer on the table".

The US government said that several KC-135 aerial tankers had already been assigned to Great Britain.

21 May: The UN Secretary-General made a statement to the Security Council describing his actions in pursuit of the objectives of Resolution 502.

The United Kingdom reported that its forces, launching a major attack, had landed in the area of San Carlos on East Falkland. Three British helicopters and one Harrier aircraft were lost. The Argentine Air Force, attacking British vessels, lost nine Mirage aircraft, five Skyhawks and two Pucara aircraft, as well as four helicopters. The British frigate *Ardent* sank after being hit by bombs and rockets. Four British warships suffered damage. British casualties were estimated at 49 missing or dead and 55 wounded.

According to Argentine reports, the British forces had lost three Harrier aircraft and two helicopters; eight frigates suffered damage and one was sunk. Argentina lost three aircraft, and three of its helicopters were damaged.

23 May: Argentine aircraft attacked British ships in San Carlos waters. The frigate *Antelope* was seriously damaged and was abandoned. According to British reports seven Argentine aircraft were shot down.

24 May: The United Kingdom informed the UN Security Council that eight Argentine aircraft had been shot down, and two British support vessels had suffered damage. The frigate *Antelope* sank.

Argentina admitted the loss of one aircraft and claimed that one British frigate and one troop- and helicopter-carrier were damaged.

Brazil submitted to the Security Council a proposal for immediate cessation of hostilities; simultaneous withdrawal of Argentine and British forces; appointment by the UN Secretary-General of a provisional administration for the Islands to hold consultations with representatives of the inhabitants; and the establishment of a committee, presided over by the UN Secretary-General, to conduct negotiations for a permanent settlement of the dispute.

25 May: Argentina announced that five Argentine aircraft attacking British ships had been shot down.

The British destroyer *Coventry* was hit by several bombs and capsized; 19 men died. The British transport vessel *Atlantic Conveyor*, on its way to San Carlos, was attacked by Super Etendard aircraft of the Argentine

Navy. The vessel (which lacked early-warning protection) was hit by an Exocet missile, set on fire and abandoned; 12 lives were lost.

The destruction of the *Atlantic Conveyor* was also a serious blow to British Task Force logistics. The material losses included three Chinook helicopters, at least six Wessex helicopters, tents to accommodate some 4 000 men, mobile landing strips for the Harriers and a water desalination plant.

British forces established a beach-head, which was being reinforced with equipment and personnel amounting to approximately 2 000 men.

26 May: In the unanimously adopted Resolution 505 (1982), the UN Security Council requested the Secretary-General immediately to contact the parties to negotiate conditions for a cease-fire, including, if necessary, measures for the dispatch of UN observers to check compliance.

27 May: Argentina reported that between 1 and 26 May 1982 British losses had amounted to 22 surface navy units and 30 aircraft (including helicopters) destroyed or damaged.

In an interview with US television, the Argentine Foreign Minister said that since the USA had sided with "our enemies" closer ties between Argentina and the USSR as well as Cuba were possible.

28 May: Argentina said that, as a result of actions carried out in the area of Darwin, two British helicopters had been shot down and one British frigate damaged. The United Kingdom announced that Goose Green and Port Darwin had been captured and 1 600 Argentine soldiers taken prisoner.

The Goose Green battle turned out to be the fiercest of the war, with as many as 250 Argentinians and 18 British killed. It also proved to be a turning point in the campaign.

29 May: With 17 votes in favour and 4 abstentions (the USA, Chile, Colombia, and Trinidad and Tobago), the Meeting of Consultation of Ministers of Foreign Affairs of the OAS resolved to condemn the armed attack by the UK; to reiterate the demand that the UK should cease acts of war against Argentina; to urge the USA to lift the coercive measures applied against Argentina and to refrain from providing material assistance to the UK in observance of the principle of hemispheric solidarity under the Rio de Janeiro Treaty; to urge the members of the EEC to withdraw the measures taken against Argentina; and to request the parties to the Rio de Janeiro Treaty to give Argentina the support that each of them judges appropriate. (The US Secretary of State said that the Rio de Janeiro Treaty was not applicable to the Argentine–British conflict, because it was not the extra-hemispheric power that had been the first to use force.)

It will be noted that in its failure to call for the withdrawal of Argentine forces the OAS resolution was inconsistent with UN Resolution 502.

30 May: British forces established themselves in the area of Port Darwin–Goose Green. Argentina informed the United Nations that its Super Etendard aircraft armed with Exocet missiles, and A4C aircraft armed with bombs, attacked a British aircraft carrier and put it out of action. As a result of British anti-aircraft fire two Argentine aircraft were shot down. Argentina also announced that from 2 April to 30 May 1982 its forces had suffered the following casualties: 82 dead, 106 wounded and 342 missing.

Subsequently, it turned out that it was not the British carrier *Invincible* that was hit, but the *Atlantic Conveyor*, a ship already put out of action by a previous Argentine attack.

1 June: Referring to the presence of British nuclear-powered submarines in the South Atlantic, the Chairman of the Argentine Atomic Energy Commission accused the United Kingdom of violating the Treaty of Tlatelolco prohibiting nuclear weapons in Latin America.

2 June: Argentina announced that, until 31 May, 19 or 20 British ships had been sunk or damaged. The President of Argentina stated that his country would accept "any helping hand offered".

The UN Secretary-General reported to the Security Council that the positions of the parties did not offer possibilities of developing mutually acceptable terms for a cease-fire, but he would maintain close contact with the parties.

Government representatives of the Latin American Economic System (SELA), an organization of 26 states established in 1975, condemned the coercive economic measures adopted by the UK, the USA, the EC and other industrial countries. They agreed to extend to Argentina the co-operation necessitated by the emergency which it faced as a result of those measures.

3 June: Argentina said that Britain had ordered the destroyer *Glasgow* and the frigate *Argonaut* to be withdrawn from the operation area in order to repair damage suffered in a clash with Argentine forces.

The Argentine Foreign Minister denounced presumed plans for the establishment of a military system of security in the South Atlantic with the participation of the USA and South Africa.

4 June: A draft resolution submitted in the Security Council by Panama and Spain, and calling for an immediate cease-fire, was vetoed by the UK and the USA, and thereby failed to obtain the required majority. The US representative later explained that the USA had meant to abstain, but the Secretary of State's voting instructions had arrived too late.

5 June: The Co-ordinating Bureau of the Movement of Non-Aligned Countries adopted a resolution supporting Argentina's claim; it reiterated its solidarity with Argentina's efforts "to bring an end to the anachronistic colonial presence in the Malvinas Islands".

7 June: The Commander of the British troops appealed to the Argentine Governor on the Falklands to surrender. The President of Argentina told the press that his country would never accept a return to the *status quo* prior to 2 April.

8 June: The British forces landing at Bluff Cove were attacked by Argentine aircraft. Two landing craft, *Sir Galahad* and *Sir Tristram*, were hit and caught fire when they were at anchor waiting to put troops ashore. In this most costly incident for the British, 51 men died and 46 were injured. The frigate *Plymouth* was damaged and a landing craft from the assault ship *Fearless* sank.

11 June: Argentina stated that the British forces bombarding Puerto Argentino had killed two civilians and wounded four others.

12 June: British forces began a landing attack against Argentine positions in the area of Port Stanley. A shore-launched Exocet missile hit and set fire to the British light cruiser *Glamorgan*. The damage was not particularly great. The ship's Wessex helicopter and its hangar were destroyed but the ship was capable of sailing a short while later.

13 June: British forces launched a large-scale attack with artillery, naval and air bombardments.

14 June: Argentina brought to the attention of the Security Council the text of its communication addressed to the Regional Delegation for Latin America of the International Committee of the Red Cross and concerning the establishment of a neutral zone in Puerto Argentino on the basis of the 1949 Fourth Geneva Convention (Article 15). This zone was designed to shelter combatants and non-combatants who were wounded and sick, civilians who were not participating in the hostilities and who were performing no task of a military nature during their stay in the zone, as well as personnel entrusted with the organization, administration and control of the zone, designated by the local authorities.

British forces overwhelmed the Argentine defences, destroying their artillery and severely damaging their communications. A cease-fire was arranged in the area of Port Stanley/Puerto Argentino.

The Commander of the Argentine forces on the Falklands/Malvinas signed an instrument of surrender, by which all Argentine weapons and war equipment were to be handed over to the British forces and all

Argentine personnel taken prisoner of war (over 11 000 men, including those already in custody).

Upon termination of hostilities: 17 June–4 November 1982

The surrender of the Argentine garrison on the Falklands/Malvinas did not end the state of war between the countries. While most economic sanctions against Argentina were lifted promptly upon the termination of the hostilities, British-imposed restrictions on the movement of Argentine ships and aircraft remained in force. The British–Argentine conflict was discussed at the 37th UN General Assembly, which, on 4 November, adopted a resolution urging the resumption of negotiations for a peaceful solution to the dispute.

17 June: Leopoldo Galtieri resigned as President, Commander-in-Chief of the Army and member of the ruling military junta of Argentina.

18 June: Argentina announced that, having surrendered in order to avoid greater loss of human life, it could not accept the situation of force which Great Britain had sought to impose. In a letter to the Security Council, it complained that the United Kingdom had attacked the scientific station *Corbeta Uruguay*, which Argentina had maintained since 1977 in the South Sandwich Islands.

In admitting a *de facto* cessation of hostilities, Argentina claimed that total cessation would be achieved only when the UK had agreed to lift the naval and air blockade and the economic sanctions, and when it had withdrawn the military forces occupying the Islands, as well as the naval Task Force and nuclear submarines which it had deployed in the area.

19 June: Argentina complained to the Security Council that British helicopters had fired shots at the Argentine station *Corbeta Uruguay* on the South Sandwich Islands and that the station was later surrounded by British troops.

21 June: The United Kingdom announced the recovery of the South Sandwich Islands, asserting that it had never authorized the establishment of an Argentine station there.

22 June: The EEC lifted the economic sanctions against Argentina.

23 June: The United Kingdom described as unacceptable the Argentine conditions for a total cessation of hostilities, as put forward on 18 June.

24 June: Argentina stated that it did not accept the British claim to sovereignty over the South Sandwich Islands and did not recognize the military occupation of these islands as having any effect.

12 July: The US government lifted the economic sanctions against Argentina.

20 July: In a note addressed to the President of the Commission of the European Community, the Argentine government protested against the approval of the UK's request for emergency assistance for the Falklands/Malvinas.

22 July: The British government decided to remove the total exclusion zone of 200 nautical miles around the Falkland Islands, which was established on 30 April. Nevertheless, Port Stanley harbour and airfield, together with the three-mile territorial sea around the Falklands, remained closed to commercial shipping and aircraft until further notice for reasons of safety. The warning on 7 May that any Argentine warship or military aircraft found more than 12 miles from the Argentine coast would be regarded as hostile similarly no longer applied. To minimize the risk of misunderstanding the Argentine government was asked (via the Swiss government) to ensure that its warships and military aircraft did not enter a "protection zone" of 150 miles around the Islands where they would pose a potential threat to the British forces. Argentine civil aircraft and ships were also requested not to enter this zone, unless by prior agreement with the British government, and also to stay clear of other British dependencies in the South Atlantic.

28 July: The British Foreign Secretary stated that all Argentine prisoners had been repatriated.

9 August: The French government decided to lift the ban on arms sales to Argentina, which had been imposed on 7 April.

13 August: Argentina complained to the Security Council that its fishing vessels were intercepted by British warships and military aircraft and were forced to withdraw from the area in which they were operating. The Argentine government considered this action as interference with the right of free navigation as well as the right of states to permanent sovereignty over their natural resources.

20 August: Replying to the Argentine complaints, the United Kingdom recalled that it had never accepted any Argentine claim to fisheries or continental shelf jurisdiction beyond the median line between the Falkland Islands and Argentina, and that it had reserved the rights of the Falkland Islands over their own maritime resources under international law. Explaining that the 150-mile protection zone was necessary to ensure the defence of the Islands, the UK pointed out that Argentina had been

unwilling to declare the hostilities definitely at an end or to renounce the possibility of further unlawful use of force.

23 August: The Commission of the European Economic Community rejected the protest of the Argentine government against the granting of emergency assistance to the Falklands/Malvinas. It explained that since the accession of the United Kingdom to the Community in 1973 the Islands and the dependencies had been associated with it and had been entitled to various types of aid. This did not prejudge the status of the territories in question.

24 August: Argentina informed the Security Council that one of its fishing vessels as well as Argentine-registered factory ships were overflown and buzzed by helicopters bearing British identification outside the "protection zone".

27 August: Argentina again complained that an armed helicopter with British markings had buzzed Argentine-registered fishing vessels; this occurred 20 miles outside the "protection zone".

The United Kingdom informed the Security Council that in neither of the encounters between Argentine fishing boats and British forces in the vicinity of the Falkland Islands was there any threat or use of force by the Royal Navy. Argentine ships and aircraft were again requested not to enter the protection zone except by prior agreement with British authorities.

13 September: The British government decided to discontinue the financial restrictions imposed on Argentine residents and the Argentine government on 3 April 1982.

14 September: The Argentine government lifted the financial restrictions against the UK.

23 September: Argentina reported a further 19 "acts of harassment", carried out from 24 August to 15 September 1982 by British vessels and aircraft against fishing vessels of Argentine and other nationalities, mostly outside the "protection zone".

28 September: The USA eased its arms embargo on Argentina by lifting the ban on spare parts for aircraft and other materials supplied under previously agreed contracts.

8 October: The United Kingdom notified the Security Council that, following clearance work undertaken by British forces, the harbour at Port Stanley and the territorial sea around the Falkland Islands, which had been closed for safety reasons, were already open to commercial shipping.

20 October: Argentina reported a further 16 "acts of harassment", carried out from 10 to 18 September 1982 by British vessels and aircraft against Argentine fishing vessels outside the "protection zone".

Italy abrogated the decrees by which it had suspended the sale of military and strategic material to Argentina.

1 November: In a letter to the President of the Security Council, Argentina confirmed its readiness to take the interests of the population of the Malvinas Islands into account in reaching the definitive solution of the dispute with the United Kingdom, "with the necessary safeguards and guarantees regarding the particular life-styles and interests of the Islanders". Argentina also reported a further 21 "acts of harassment" carried out from 21 September to 7 October 1982 by British vessels and aircraft against Argentine fishing vessels outside the "protection zone".

4 November: By a vote of 90 in favour, 12 against (the UK and some members of the British Commonwealth) and 52 abstentions, the UN General Assembly adopted a resolution (sponsored by 20 Latin American states) requesting the governments of Argentina and the United Kingdom to resume negotiations in order to find as soon as possible a peaceful solution to the sovereignty dispute relating to the Falkland/Malvinas Islands.

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Appendix 16B

UN General Assembly resolution on the question of the Falkland/Malvinas Islands, A/RES/37/9 of 4 November 1982

The General Assembly,

Having considered the question of the Falkland Islands (Malvinas),

Aware that the maintenance of colonial situations is incompatible with the United Nations ideal of universal peace,

Recalling its resolutions 1514 (XV) of 14 December 1960, 2065 (XX) of 16 December 1965, 3160 (XXVIII) of 14 December 1973 and 31/49 of 1 December 1976,

Recalling also Security Council resolutions 502 (1982) of 3 April 1982 and 505 (1982) of 26 May 1982,

Taking into account the existence of a *de facto* cessation of hostilities in the South Atlantic and the expressed intention of the parties not to renew them,

Reaffirming the need for the parties to take due account of the interests of the population of the Falkland Islands (Malvinas) in accordance with the provisions of General Assembly resolutions 2065 (XX) and 3160 (XXVIII),

Reaffirming also the principles of the Charter of the United Nations on the non-use of force or the threat of force in international relations and the peaceful settlement of international disputes,

1. *Requests* the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland to resume negotiations in order to find as soon as possible a peaceful solution to the sovereignty dispute relating to the question of the Falkland Islands (Malvinas);

2. *Requests* the Secretary-General, on the basis of the present resolution, to undertake a renewed mission of good offices in order to assist the parties in complying with the request made in paragraph 1 above and to take the necessary measures to that end;

3. *Requests* the Secretary-General to submit a report to the General Assembly at its thirty-eighth session on the progress made in the implementation of the present resolution;

4. *Decides* to include in the provisional agenda of its thirty-eighth session the item entitled "Question of the Falkland Islands (Malvinas)".

The Resolution was adopted by a recorded vote of 90 in favour to 12 against, with 52 abstentions, as follows:

In favour: Afghanistan, Albania, Algeria, Angola, Argentina, Austria, Benin, Bolivia, Botswana, Brazil, Bulgaria, Burundi, Byelorussia, Cape Verde, Central African Republic, Chile, China, Colombia, Comoros, Congo, Costa Rica, Cuba, Cyprus, Czechoslovakia, Democratic Kampuchea, Democratic Yemen, Dominican Republic, Ecuador, El Salvador, Equatorial Guinea, Ethiopia, Gabon, German Democratic Republic, Ghana, Greece, Grenada, Guatemala, Guinea, Guinea-Bissau, Haiti, Honduras, Hungary, India, Indonesia, Iran, Iraq, Israel, Ivory Coast, Japan, Lao People's Democratic Republic, Liberia, Libya, Madagascar, Malaysia, Mali, Malta,

Mexico, Mongolia, Morocco, Mozambique, Nicaragua, Nigeria, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Romania, Rwanda, Sao Tome and Principe, Spain, Suriname, Syria, Togo, Tunisia, Uganda, Ukraine, USSR, United Arab Emirates, United Republic of Tanzania, United States, Upper Volta, Uruguay, Venezuela, Viet Nam, Yemen, Yugoslavia, Zambia, Zimbabwe.

Against: Antigua and Barbuda, Belize, Dominica, Fiji, Gambia, Malawi, New Zealand, Oman, Papua New Guinea, Solomon Islands, Sri Lanka, United Kingdom.

Abstaining: Australia, Bahamas, Bahrain, Bangladesh, Barbados, Belgium, Bhutan, Burma, Canada, Chad, Denmark, Egypt, Finland, France, Federal Republic of Germany, Guyana, Iceland, Ireland, Italy, Jamaica, Jordan, Kenya, Kuwait, Lebanon, Lesotho, Luxembourg, Maldives, Mauritania, Mauritius, Nepal, Netherlands, Niger, Norway, Portugal, Qatar, Saint Lucia, Saint Vincent, Samoa, Saudi Arabia, Senegal, Sierra Leone, Singapore, Somalia, Sudan, Swaziland, Sweden, Thailand, Trinidad and Tobago, Turkey, United Republic of Cameroon, Vanuatu, Zaire.

Absent: Djibouti, Seychelles.

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Part IV. Developments in arms control

17. The Second UN Special Session on Disarmament[1]

Square-bracketed numbers, thus [1], *refer to the list of references on page 553.*

I. Introduction

The UN General Assembly held the second special session devoted exclusively to disarmament problems from 7 June to 10 July 1982. The agenda before the Second Special Session on Disarmament (SSD II) included the following items: a review of the implementation of the recommendations and decisions of the First Special Session (for a review of the 1978 SSD, see *SIPRI Yearbook 1979*, chapter 11); the adoption of a comprehensive programme of disarmament; the consideration of initiatives and proposals of UN member states; the enhancement of the effectiveness of the disarmament negotiating machinery; the strengthening of the role of the United Nations in the field of disarmament; and measures for mobilizing world public opinion in favour of disarmament [1].

Most participants, especially those from non-aligned countries, had expected the Second Session to translate the general strategy of disarmament, as outlined in the Final Document of the First Session, into a sequence of concrete measures to be carried into effect within agreed timeframes. However, as described in section II of this chapter, the attempts to reach this goal were unsuccessful. SSD II also failed to provide any impetus to the existing arms control negotiations. Difficult and drawn-out transactions were needed to obtain a reaffirmation of the programme of action adopted four years before (section IX). Perhaps the only achievement was the launching of a world campaign to foster the objectives of disarmament (section IV).

Governments presented some new ideas and suggestions about arms control measures and the machinery necessary to negotiate them (section VII). The text of the Session's conclusions is reproduced in appendix 17A.

II. Comprehensive programme of disarmament

The General Assembly had before it a draft comprehensive programme of disarmament which had been prepared by the Geneva Committee on Disarmament [2]. The draft dealt with the objectives and principles of disarmament, as well as the first-stage measures regarding nuclear weapons, other weapons of mass destruction, conventional weapons and armed

[1] This chapter was written by Jozef Goldblat.

forces, and military expenditures. Separate sections were devoted to verification, the negotiating procedures, measures to build confidence among nations, prevention of the use of force in international relations, education for disarmament, disarmament and development, and disarmament and international security. However, the full text was more or less an agglomeration of the divergent views of individual states or groups of states in one incoherent working document. More than 400 brackets around headings, words, phrases, paragraphs or whole sections illustrated the differences.

The Special Session did not resolve, and indeed could not have resolved, the disagreements, many of which concerned such fundamental questions as: whether or not the conclusion of a nuclear test ban treaty was a matter of urgency; what should be the starting point for negotiations on reductions of strategic nuclear arms, and which measures could bring about the cessation of the nuclear arms race; which nuclear weapons were to be subject to limitations and reductions in Europe; in what way non-nuclear weapon states could be involved in nuclear disarmament negotiations; how further proliferation of nuclear weapons could be prevented; whether nuclear weapon-free zones could be established outside the framework of a nuclear disarmament process; how one could avoid the emergence of new types of weapons of mass destruction; which countries should be the first to negotiate conventional arms reduction and disarmament; which conventional weapons should be dealt with in the first place and how to limit the international transfers of these weapons; what were the prerequisites for bringing about a reduction of military expenditures; which steps needed to be taken to prevent an arms race on the sea-bed and in outer space; and what should be the role of the United Nations in monitoring compliance with disarmament agreements. Even the title of the convention dealing with the prohibition of chemical weapons, which is being negotiated in Geneva, proved to be controversial.

The sections agreed were in most cases taken directly from the Final Document of the First Special Session [3], and were related to the objectives and principles of a comprehensive programme of disarmament rather than to concrete measures. Thus, there was consensus on the following issues: that the ultimate objective of the programme was to ensure that general and complete disarmament under effective international control should become a reality, and that, throughout the implementation of the programme, international peace and security as well as the security of individual states should be strengthened, the sovereignty and independence of all states safeguarded, an effective contribution made to the economic and social development of states, in particular developing states, international confidence increased, international tension eased, and broad international co-operation established. The agreed portion of the draft also

contained a commonplace statement, figuring in several international documents, to the effect that a relationship exists between disarmament, relaxation of international tension, respect for the right to self-determination and national independence, peaceful settlement of disputes, and strengthening of international peace and security. It furthermore included an important, but in the given context, redundant, reaffirmation of the commitment of the United Nations member states to the purposes of the UN Charter and to the generally accepted principles of international law.

Given that agreement appeared possible only on what were essentially anodyne propositions, there was neither room for nor even sense in discussing the duration of a comprehensive programme or its legal format. It is noteworthy, however, that the chairman of the working group dealing with the comprehensive programme of disarmament had envisaged a procedure in which a personal representative of the UN Secretary-General would carry a copy of the programme to the capitals of all UN member states in order to have it signed by the heads of state or government.

III. Prevention of nuclear war

The regular UN General Assembly had in 1981 appealed to the nuclear weapon states to submit to SSD II their views and proposals for the prevention of nuclear war [4]. This subject received considerable attention at the 1982 Special Session.

In a message from President Brezhnev, transmitted to the General Assembly on 16 June 1982, the Soviet Union assumed an obligation not to be the first to use nuclear weapons. This was a unilateral commitment, declared to be effective from the moment it was announced; however, the USSR stated that it expected its action to be reciprocated by the other nuclear states. A caveat was added to the effect that, in the formulation of its policy, the Soviet Union would take into account whether other powers followed its example [5].

The US government said it believed that the key element in diminishing the risk of nuclear war was to reduce significantly and verifiably the quantities of nuclear weapons themselves [6]. It referred to its proposals both for the complete elimination of intermediate-range nuclear missiles and for substantial reductions to equal levels of strategic ballistic missile forces, so that there would be a nuclear balance, which in its view was essential for maintaining stability and minimizing the danger of war. Furthermore, to increase understanding and communication with the Soviet Union in times of peace and of crisis, the United States proposed reciprocal exchanges in such areas as advance notification of major strategic exercises that otherwise might be misinterpreted; advance

notification of ICBM launches within, as well as beyond, national boundaries; and an expanded exchange of strategic forces data [7].

However, the USA found it impossible to renounce the first use of nuclear weapons as long as the threat of war remained. This position was shared by several other Western states, including the United Kingdom, which pointed out that the purpose of NATO was to prevent any war and that the nuclear members of the Atlantic alliance had already pledged themselves not to use any of their weapons, nuclear or conventional, except in response to attack [8]. Accordingly, in a text proposed for adoption by the Special Session, the Federal Republic of Germany, Japan and the Netherlands referred to the provisions of the UN Charter calling upon governments to refrain from any threat or use of force against the territorial integrity or political independence of other states. They urged adherence to a policy of restraint to prevent the development of situations which could dangerously exacerbate inter-state relations, so as to avoid military confrontations and preclude the outbreak of war, in particular nuclear war, between nuclear weapon states and between any of them and other states. They emphasized, however, the importance of Article 51 of the UN Charter, proclaiming the inherent right of individual or collective self-defence, which is the article that is usually quoted to validate the option of using nuclear weapons against aggression committed with conventional means of warfare [9].

Conversely, in a proposal for the prevention of nuclear war which was put forward by Bulgaria and which embodied the views of the Soviet Union and the other members of the Warsaw Treaty Organization, all nuclear weapon states were urged to undertake not to be the first to use nuclear weapons. No mention was made of means to prevent a conventional war [9].

As regards the non-aligned countries, their overwhelming opinion was that, pending nuclear disarmament, any use or threat of use of nuclear weapons should be prohibited. India argued that the right to self-defence is not unlimited, and that it cannot be interpreted to mean that in pursuit of its national security a state may jeopardize the security of other states, as well as the very survival of mankind [17]. Consequently, it proposed the conclusion of a convention under which states would solemnly undertake not to use nuclear weapons in any circumstances. Such use would be considered a violation of the UN Charter and a crime against humanity [10]. (Declarations to this effect have been adopted several times in the past by a majority of UN members [4, 11–16].) Furthermore, India suggested that a nuclear freeze should be agreed to prevent the further growth of nuclear weapon arsenals and that, pending a comprehensive ban, there should be an immediate suspension of all testing of nuclear weapons [9]. (The 'freeze' proposals are discussed in section VI.)

In a jointly sponsored draft resolution, India and Mexico suggested that the UN Secretary-General should appoint a representative group of eminent persons—statesmen, scientists, physicians, jurists, religious leaders, philosophers and others—to advise him on measures and procedures for the collective control, management and resolution of critical situations which could escalate to nuclear war [18].

Although the problem of preventing nuclear war is very complex and can be approached from different angles, it was reduced by many delegations to a simple controversy over whether or not the use of nuclear weapons should be outlawed. However, a no-use commitment, if accepted, would require a profound change in prevailing strategic doctrines. This was unlikely to occur on the occasion of or during the Special Session.

IV. Mobilization of public opinion

World Disarmament Campaign

As recommended by the General Assembly at its 1981 regular session, the Special Session launched the World Disarmament Campaign under UN auspices [19]. According to the document, which was adopted by SSD II on the basis of the Secretary-General's report, the purpose of the campaign is to inform, to educate and to generate public understanding and support for the objectives of the United Nations in the field of arms limitation and disarmament. The campaign is to be carried out in all regions of the world in a "balanced, factual and objective manner". Its universality should be guaranteed by the participation of all states and by the widest possible dissemination of relevant information and unimpeded access for all sectors of the public to a broad range of opinions. Thus, the Secretary-General would bring to the attention of the public through the UN Information Centres and other UN offices the statements made in the general debate at the Second Session, as well as the texts adopted.

In carrying out the campaign, emphasis should be placed on the relationship between disarmament and international security, and between disarmament and development. The campaign should provide an opportunity for discussion of all points of view relating to disarmament, and encourage exchanges among government officials, experts, scholars and journalists of different countries. The United Nations would supply the substance of information to be disseminated in the course of the World Disarmament Campaign at global, regional and national levels. The guidance in co-ordinating the campaign activities would be provided by the Centre for Disarmament. Programmes of information, research, education and training in the areas of disarmament should be encouraged, particularly in the developing countries. In this connection, considering the

activities of Unesco in promoting disarmament education, the programme of action to be implemented by the campaign should set out tasks for Unesco in its fields of competence [20].

The following specific proposals were made during the Session for inclusion in the World Disarmament Campaign: the convening of a world conference on the role of the mass media in promoting the ideals of peace (Romania); instituting a "universal council of conscience" consisting of eminent persons, for example, Nobel Prize winners, former heads of state or government, or representatives of the principal religions, faiths and philosophies, to provide at the UN General Assembly's request information on the various aspects of the problems relating to disarmament and arms control, international security and the link between disarmament and development (France) [21]; a world-wide collection of signatures in support of disarmament (Bulgaria) [22]; the deposition in the United Nations of the documentation and materials concerning Japan's atomic experiences (Japan) [23]; banning war films and war toys (Egypt) [24]; televising or disseminating in other effective ways addresses and discussions by world statesmen of various regions, as well as widely disseminating "in an unhindered way" relevant materials provided by governments and recognized international institutes (USA) [25]; and strengthening the regional UN information centres to enable them to play an active role in the campaign (Sierra Leone) [26]. No decision was taken on these proposals. The Secretary-General was requested to submit at each regular session of the General Assembly a report on the previous year's implementation of the World Disarmament Campaign.

As regards financing, the Secretary-General was asked to explore the possibility of redeploying existing resources, while member states and non-governmental organizations were invited to supplement the available resources with voluntary contributions. During the Session such contributions were announced only by the governments of India, Mexico and Sweden, and by the Friends' World Committee for Consultation. An envisaged pledging conference did not take place.

On the whole, there was relatively little enthusiasm for the proposed campaign. Several Western states expressed doubts as to whether the campaign could reach the Soviet Union and Eastern Europe and, if so, whether it would be free of governmental control and reflect the wide variety of viewpoints represented in the UN. Certain UN members feared that the campaign might degenerate into a form of cold war propaganda licensed by the United Nations. Others voiced concern at the lack of precise structure and coherent programme; they were uncertain how the campaign would work and who would actually run it. Still others suggested that an advisory board for the campaign should be set up to include the participation of non-governmental organizations (NGOs) and independent

research institutes, whose role in achieving the objectives of the campaign had been formally acknowledged. Hopes were expressed that these deficiencies could be corrected in the course of the campaign itself.

Fellowships on disarmament

The United Nations has since 1979 conducted a programme of fellowships for government officials to promote expertise in disarmament, particularly in the developing countries. The training course of up to six months takes place in Geneva during the summer session of the Committee on Disarmament, and in New York during the annual session of the UN General Assembly. In addition, there is a one-week briefing at the International Atomic Energy Agency in Vienna. Short trips are arranged to individual countries to study selected activities in the field of disarmament; so far, the governments of the German Democratic Republic, the Federal Republic of Germany, Hungary and Sweden have hosted the fellows. The programme includes lectures, seminars, observation of the proceedings of the disarmament bodies, some research, and visits to specialized facilities and scientific institutions. The fellowship undertaking has proved to be a success.

In view of the growing interest in the programme, the Special Session decided to increase the number of fellowships from 20 to 25, as from 1983 [27]. It also welcomed the offer of the government of Japan to enable the fellows to visit Hiroshima and Nagasaki [28].

V. Disarmament and development

The most important UN study put before the Special Session for consideration was that dealing with disarmament and development [29].

In a common note of 28 June 1982, Denmark, Finland, Iceland, Norway and Sweden expressed the view that action should be taken to involve United Nations agencies and organs continuously in activities on the relationship between disarmament and development. In particular, the Secretary-General, assisted by qualified experts, should at regular intervals update the UN study on the economic and social consequences of the arms race; develop methods for identifying and analysing the benefits that would be derived from disarmament and the ensuing reallocation of military resources to economic and social development, particularly in the developing countries; investigate the nature and amount of information on military use of resources and arms transfers that member states ought to supply to the United Nations; explore methods for the collection, reporting and dissemination of information on experiences in conversion; and investigate the administrative and technical modalities of an international disarmament fund for development.

It was further suggested in the note that, at the national level, UN member states, in particular the major military powers, should analyse and inform the public about the economic and social consequences of their military spending, develop methods for identifying and analysing benefits that would come from the reallocation of military resources, create the necessary prerequisites for facilitating the conversion of resources freed through disarmament measures to civilian purposes, and make conversion experiences internationally available by submitting reports on the matter to the General Assembly.

In the field of information the United Nations was asked, *inter alia*, to publish scientifically comparable data on the military expenditures of all countries, military use of human and material resources and military transfers between countries, as well as the necessary scientific analysis and commentary relating to those data; and to collect, analyse and disseminate information on the social and economic consequences—nationally, regionally and globally—of military spending and arms transfers [30].

VI. Arms control proposals

A large number of proposals for arms control and disarmament measures were put forward at the Special Session. The most important of these are discussed below under the respective subject headings.

Nuclear arms control

A popular proposal, especially among the non-aligned countries and also among the non-governmental organizations attending SSD II, was that for a nuclear freeze. Over the years the concept of stopping the arms race, or 'freezing' it, before reversing the trend by reducing the levels of armaments, had been frequently referred to in the course of disarmament deliberations. The First Special Session on Disarmament included in its Final Document (paragraph 50) a formal requirement for the cessation of the qualitative improvement and development of nuclear weapon systems, as well as the cessation of the production of all types of nuclear weapons and their means of delivery, and of the production of fissionable materials for weapons purposes. At that time, it was the Soviet Union that was the main proponent of the freeze idea. But the same idea found its way to the forum of the Second Session through the peace movement in the USA.

Thus, in a draft resolution submitted to SSD II, Mexico and Sweden literally incorporated the initiative launched by the US National Nuclear Weapons Freeze Campaign and asked for: (*a*) a comprehensive test ban of nuclear weapons and of their delivery vehicles; (*b*) the complete cessation

of the manufacture of nuclear weapons and of their delivery vehicles; (*c*) a ban on all further deployment of nuclear weapons and of their delivery vehicles; and (*d*) the complete cessation of the production of fissionable material for weapons purposes. The freeze would be proclaimed by the USSR and the USA, either through simultaneous unilateral declarations or through a joint declaration [31].

Somewhat less elaborate freeze proposals were advanced by India [32] and Ireland [33]. India called upon all nuclear weapon states to agree to a simultaneous total stop of any further production of nuclear weapons and a complete cut-off in the production of fissionable materials for weapon purposes. Ireland suggested that the USA and the USSR should agree on a limited but renewable moratorium on the "introduction" of any further strategic nuclear weapons or delivery vehicles. The initial agreement would be for a period of two years.

Canada reiterated its proposal, made at the First Special Session, for halting the technological momentum of the nuclear arms race. This 'strategy of suffocation' would include the following elements: (*a*) a comprehensive test ban to impede the further development of nuclear explosive devices; (*b*) an agreement to stop the flight-testing of all new strategic delivery vehicles; (*c*) an agreement to prohibit the production of fissionable material for weapons purposes; and (*d*) an agreement to limit and then progressively reduce military spending on new strategic nuclear weapon systems. Each element would involve the negotiation of verifiable agreements among the nuclear powers [34].

The German Democratic Republic proposed early negotiations on a convention prohibiting the production, stockpiling, deployment and use of nuclear neutron weapons. Non-nuclear weapon states were called upon not to permit the deployment of such weapons on their territories [35].

Finland suggested that a study be made on the question of nuclear weapon-free zones to supplement the UN report prepared in 1975 by a group of governmental experts [36].

The USA recalled its offer regarding intermediate-range nuclear forces: to cancel the deployment of Pershing II ballistic missiles and ground-launched cruise missiles in exchange for the elimination of Soviet SS-20, SS-4 and SS-5 missiles (see also chapter 1). It also reiterated its phased approach to the reduction of strategic arms by the USA and the USSR: in the first phase to reduce the number of ballistic missile warheads on each side to about 5 000 (no more than half the remaining warheads would be allowed on land-based missiles), while all ballistic missiles would be reduced to an equal level at about one-half the current US number; and in the second phase to reduce each side's overall destructive power to equal levels, including a mutual ceiling on ballistic missile throw-weight below the current US level [7] (see also chapter 3).

The Soviet Union restated its preparedness to agree on a total renunciation of all types of medium-range nuclear weapons capable of striking targets in Europe, or on a substantial mutual reduction of their numbers, and announced that it had unilaterally ceased further deployment of these arms in the European part of the USSR. The Soviet Union also said that it could agree that the strategic arms of the USSR and the USA be quantitatively frozen and that their modernization, or the development of new types of such weapons, should be either banned or limited to the extent possible. It was ready to resume the trilateral talks with the USA and the UK on a comprehensive test ban treaty and was willing to consider a cessation of the production of fissionable materials for weapon purposes in the overall context of limiting and ending the nuclear arms race. Furthermore, to meet the postulates of the non-nuclear weapon countries, and following the example set up by the other three nuclear weapon powers—the USA, the UK and France—the Soviet Union announced that it would place part of its peaceful nuclear installations (several atomic power plants and research reactors) under the control of the International Atomic Energy Agency [37, 38].

France declared its inability to participate, directly or indirectly, in nuclear arms control negotiations, unless the arsenals of the USA and the USSR were reduced to such levels that one could consider the gap between capabilities "to have changed in its nature"; unless the defensive strategic systems that might be able to neutralize nuclear deterrence were limited quantitatively and qualitatively; and unless significant progress were made in the reduction of imbalances in conventional arms and the elimination of the threat of chemical warfare in Europe. Neither could France, at this stage, give up underground nuclear testing without endangering what it called an essential element of its independence in this area. But it did support negotiations for a convention prohibiting anti-satellite weapons to maintain the stability of the strategic balance, and was prepared to associate itself with a general treaty banning anti-ballistic missile defences. To reconcile the necessary guarantees of non-proliferation of nuclear weapons with the spread of non-military nuclear technology, France suggested the establishment of zones of peaceful nuclear co-operation with regional centres for the enrichment and reprocessing of nuclear fuels. And in the field of negative security assurances France moved closer to the positions of the USA and the UK. It stated that it would not use nuclear arms against a state that "does not have these weapons and has pledged not to seek them", except in the case of an act of aggression carried out in association or alliance with a nuclear weapon state against France or against a state with which France had a security commitment [39].

China said that if the USA and the USSR took the lead in halting the testing, improvement and manufacture of nuclear weapons and in reducing

their nuclear arsenals by 50 per cent, China would be ready to join all the other nuclear states in stopping the development and production of nuclear weapons and in reducing these weapons and means of their delivery in reasonable proportion and according to a procedure to be agreed upon [40].

Chemical disarmament

The Soviet Union submitted draft provisions of a convention on the prohibition of the development, production and stockpiling of chemical weapons and on their destruction, defining the scope of the prohibitions as well as the procedure to verify compliance.

In the field of verification the Soviet Union made a step towards the positions of the West by admitting the possibility of having "systematic", as opposed to sporadic, international on-site inspection (for example, on the basis of an agreed quota) of the destruction of stocks at a converted or specialized facility or facilities. A possibility of carrying out international on-site inspections of the production of super-toxic lethal chemicals for permitted purposes (purposes not connected with the use of chemical weapons) was also envisaged [41].

The German Democratic Republic considered that all states should refrain from actions which could impede negotiations on the prohibition of chemical weapons, specifically, the production, stockpiling and deployment of binary and other new types of chemical weapons, as well as the deployment of chemical weapons on the territories of states where there are no such weapons at present [42].

The Federal Republic of Germany circulated a document setting out principles and rules for verifying compliance with a chemical weapons convention. Noting that consensus already existed on establishing an international consultative committee, open to experts from all states to ensure verification, FR Germany suggested the following guidelines for the work of the committee: confidentiality of deliberations; readiness of the parties to supply reliable information and permit investigations including, if necessary, on-site inspections; restraint and moderation, meaning that the committee should be called in only after attempts at bilateral consultations had failed, and that states should be protected against evidently unfounded allegations; as well as impartiality and non-discrimination of the parties.

The West German document drew a clear distinction between on-challenge verification and regular checks. The former would be necessary if a party had grounds to believe that another party had violated the convention. The latter, labelled as a "businesslike procedure", would be limited to those items and activities which had to be declared under the

convention, that is: existing chemical weapon stocks and the production units subject to destruction in accordance with the convention; industrial plants which could potentially produce supertoxic agents; and the production facilities of those quantities of supertoxic agents allowed under the terms of the convention. The checks would be based on a system of random selection of installation. So-called dual-purpose agents, which are widely used for civilian purposes, would not be covered [43]. As a contribution to the solution of the problem of verifying a ban on chemical weapons, the Federal Republic of Germany announced that it would convene an international seminar of experts in 1983 [44].

Much attention was devoted to allegations of use of chemical weapons in violation of the 1925 Geneva Protocol. The USA called upon the Soviet government, as well as the governments of Laos and Viet Nam, to grant full and free access to areas where chemical attacks had been reported so that the group of experts established by the United Nations could conduct an effective, independent investigation, in accordance with its mandate [45].

France put forward a proposal for fact-finding arrangements to be resorted to in cases of suspected violation of the Geneva Protocol. A major role in the envisaged procedure would be assigned to the World Health Organization (WHO). This organization, having an international network of experts, would be called upon to take prompt action, whenever necessary, to assess the medical symptoms exhibited by suspected victims and to diagnose poisoning by chemical agents. WHO could also draw up a list of institutions which might be asked to make the analysis of samples collected on the spot [46].

In announcing that it had started a parliamentary procedure to accede to the 1972 Convention on the prohibition of biological and toxin weapons, France said that it would support and propose various steps to meet the "flagrant inadequacies" of the provisions of this convention concerning the procedure of consultation among the parties and verification [39].

An elaborate proposal for a protocol to monitor the prohibition of the use in combat of chemical and biological or toxin weapons was worked out by Belgium. The protocol would establish an advisory committee of states parties to it, as well as parties to the 1925 Geneva Protocol and the 1972 Biological Weapons Convention. Chaired by the UN Secretary-General, who would act as the depositary of the new protocol, the advisory committee would meet every four years to define and assess its methods of work, and to discuss technical and budgetary matters. Questions relating to the application of the protocol would be dealt with, between the sessions of the advisory committee, by a permanent committee composed of 10 members appointed for a renewable four-year term by the depositary. Both committees would be assisted by a technical secretariat responsible for designing and improving monitoring procedures—fact-finding, collection

and impartial analysis of samples. A complaint might be brought before the permanent committee by one or more members of the advisory committee, by the depositary of the protocol, or by the director of the technical secretariat. The permanent committee, convened immediately, would first investigate whether a bilateral solution to the dispute was possible, failing which it might decide to dispatch a fact-finding mission to the area. Samples collected on the spot would have to be analysed by at least two laboratories from a list of establishments proposed by the members of the advisory committee.

The committees would take procedural decisions whenever possible by consensus but otherwise by majority, and a decision to dispatch a mission would be regarded as procedural. Substantive matters would not be put to a vote. If a unanimous decision with respect to determination of facts could not be reached, an account should be rendered of the different views [47].

Conventional arms control

The USA announced a Western initiative for the Vienna negotiations on mutual force reductions in Europe. The new approach called for common collective ceilings for both NATO and the Warsaw Treaty Organization: a total of 700 000 ground force personnel and 900 000 ground and air force personnel combined. A package of associated measures to encourage co-operation and to verify compliance was included in the proposal [7] (see also chapter 19).

France referred to its proposal for a conference to deal with tensions and the build-up of conventional forces in Europe. In its view, confidence must be restored by lessening the threat of a surprise attack. Subsequently, the existing imbalance must be corrected by effective and verifiable reductions of the offensive military potential on the entire European continent, from the Atlantic to the Urals [39].

China proposed that, as a first step towards conventional disarmament, all foreign occupation troops must be withdrawn. The USA and the USSR should reduce substantially their "heavy and new-type conventional weapons", especially those for offensive purposes. Other militarily significant states should join these two powers in reducing their respective conventional armaments in reasonable proportion and according to a procedure to be agreed upon [40].

Romania favoured an agreement between the two blocs on a maximum ceiling for the main armaments—aircraft, tanks, battleships, missiles, heavy guns and others. It also considered it important that states should agree to withdraw all foreign troops, and undertake a firm commitment not to deploy armed forces on the territory of other countries [48].

Italy proposed that the UN Centre for Disarmament should keep a register of all international transactions in conventional weapons, on the understanding that member states would regularly provide relevant information. Appropriate consideration should be given to all suggestions relating to the problems of controlling and limiting the volume of international transfers of conventional weapons [49].

The Soviet Union said that it was prepared to resume the suspended talks with the United States on the limitation of sales and deliveries of conventional arms, and that it had no objection to inviting other states to take part in the consideration of this problem [37, 38].

Regional arms control

Referring to the UN study of regional disarmament [50], Belgium proposed a resolution requesting governments to take initiatives and to consult with each other in various regions with a view to adopting regional disarmament measures. Governments should be encouraged to establish or to strengthen, on a regional level, institutional arrangements which could promote the implementation of such measures [51].

Many delegations referred to possible arms control measures in Europe, in both the nuclear and non-nuclear fields. Yugoslavia drew attention to the Mediterranean dimension of European security and proposed action to transform the Mediterranean into a zone of peace and co-operation. The measures which it envisaged would ultimately include the elimination of foreign military bases, the withdrawal of foreign fleets, armed forces and armaments, as well as the denuclearization of the Mediterranean and its hinterland. The denuclearization of the Balkans would also contribute to a wider process of European denuclearization [52]. These views coincided with those of Romania, which called for a Balkan meeting at the level of heads of state and government [48].

Military expenditures

To promote conditions for negotiations on the reduction of military expenditures, UN groups of experts have in recent years developed a standardized instrument for reporting these expenditures.

The USA proposed that an international conference under UN auspices be convened to review the progress made on reporting, as well as on the comparison and verification of military expenditures; to examine the reasons for the lack of widespread reporting; to consider modalities for encouraging wider participation; to consider means for further refinement in the reporting instrument and for the comparison and verification of data; and to consider ways in which military expenditure information could be

disseminated and used to increase openness on matters affecting collective security. In presenting this proposal the USA said that the practice of hiding true military spending contributes to distrust and fear about the intentions of states, and urged the Soviet Union to revise the official figures it publishes [53].

Romania suggested freezing military expenditures at the 1982 level and reducing them by 10–15 per cent until 1985. Thirty to fifty per cent of the funds thus saved should be used to support the developing countries, and the rest for economic and social measures in the countries operating the reductions [48]. In a similar vein, France reiterated its plan, put forward in 1978, for the creation of an international disarmament fund for development [39].

Confidence building

Referring to the 1981 UN study on confidence-building measures, the Federal Republic of Germany suggested that the United Nations should elaborate a code of conduct of general validity for confidence-building measures. Such a code could contain guidelines relating to the following activities: manoeuvres and other military movements; observation of manoeuvres; notification of arms projects; making defence budgets public and comparable; border incidents; incidents on the high seas and in the air; and convening regional conferences [54]. FR Germany announced that it would convene in 1983 an international symposium of experts on confidence-building measures [44].

Romania suggested a renunciation of military manoeuvres and military demonstrations, particularly those with the participation of several states, near the national borders of other countries [48].

Austria pleaded for efforts to increase the flow of information on military matters and to enhance its reliability and objectivity. Besides measures to enhance openness about military data, mechanisms for establishing and evaluating the state of armaments could fulfil a useful function. Assessments of the military situation undertaken by independent organs could contribute to defusing international tension, building confidence and promoting peace. Such mechanisms might be usefully employed at regional, inter-regional or global levels [55].

Norway suggested that to increase confidence among states all governments should, as a general rule, undertake to assess the long- and short-term impacts on arms control and disarmament efforts of national decisions about the procurement of major weapon systems and other important defence measures [56].

Turkey emphasized that, to be credible, confidence-building measures must be militarily significant, verifiable and obligatory [57].

Other measures

Sweden proposed that the UN Secretary-General, in co-operation with the UN Environment Programme, should undertake a continuous assessment, monitoring and evaluation of the impact of military activities on the environment. It suggested that more attention must be given to the problems presented by the naval arms race, emphasizing that the developments in anti-submarine warfare capabilities might lead to technological breakthroughs which could have destabilizing effects and thereby increase the risk of outbreak of nuclear war [58].

A study on military research and development and its impact on the arms race, with particular regard to concrete measures for preventing the further use of science and technology for military purposes, was also deemed important by Sweden [59]. In a related move, India suggested that legally binding restrictions should be devised on various types of scientific and technological research for purposes that are inconsistent with humanitarian laws and principles, and suggested that the UN Secretary-General should make an independent expert study of this matter [60].

Peace keeping

Japan proposed that a group of experts be established to undertake technical studies about strengthening and expanding the UN peace-keeping functions with a view to promoting disarmament. Such a study could cover the following questions: the possibility of establishing a mechanism whereby both global and regional military situations could be monitored and made public; ways and means of strengthening the fact-finding functions of the United Nations; modalities of co-operation by member states in peace-keeping operations, which would enable the United Nations to act in international conflicts according to the requirements of the situation; and the setting up of a UN training programme for peace-keeping operations [61].

France placed emphasis on regional security arrangements, which would make it possible to set up local forces to monitor peace at the request of the states concerned, or even to maintain contingents on a permanent basis to verify and guarantee compliance with the commitments entered into among neighbouring states. Such structures would remove the possibility of interference by external powers [39].

VII. The disarmament machinery

Proposals relating to disarmament machinery concerned the role of the United Nations and, in this context, the status of the UN Centre for

Disarmament, the composition and the methods of work of the Geneva-based Committee on Disarmament, as well as the possible establishment of new disarmament bodies.

Sweden proposed that an independent UN disarmament agency be set up within the UN system, with adequate and regular funding and with a governing body elected by the UN General Assembly. As a first step towards such an agency, the Centre for Disarmament could be transformed into a department for disarmament affairs within the UN Secretariat [58]. France considered that the status of the Centre within the Secretariat must be altered, so as to make it commensurate with the role of the United Nations in the field of disarmament. To this end, a new Secretariat department should be created, headed by an Under-Secretary-General [62]. Turkey also thought that the standing of the Centre for Disarmament should be upgraded [63].

Norway underlined the importance of the existing Advisory Board on disarmament studies and said that its functions should be as follows: to advise the UN Secretary-General on the initiation of studies and research under UN auspices; to serve as a scientific board for the UN Institute for Disarmament Research, and review and approve the Institute's annual programmes of work; to advise the Secretary-General on any matter within the area of arms limitations and disarmament on which the Secretary-General might request advice; and to assess the activities carried out in connection with the World Disarmament Campaign [64]. In the view of Turkey, the Advisory Board might also elaborate general guidelines for a programme of studies to be eventually integrated in the comprehensive programme of disarmament [63].

A number of countries expressed the desire to join the Disarmament Committee. On the whole, the reaction of the members of the Committee to a limited expansion was favourable. The Netherlands considered that the Committee on Disarmament, as the main multilateral disarmament organ, should be in session all year round to cope adequately with its negotiating tasks. Also, the structure of the Committee should be improved to enable its working groups to act more efficiently and more independently, and to make fuller use of expertise [65].

The Netherlands also suggested setting up an organization to deal with the implementation of disarmament agreements; it would be affiliated to the United Nations, but separate from the UN Centre for Disarmament. The functions of this body would include: organizing verification (and, if necessary, on-site inspection); handling complaints of violation; preparing review conferences of the parties to the agreements; and serving as a clearing-house for information in the field of disarmament. Communications satellites could be used for specific verification purposes, but the establishment of an international satellite monitoring agency to verify arms

control agreements, as proposed by France, would, in the view of the Netherlands, be premature: it could give rise to serious political and practical problems, because an intrusive and indiscriminate collection of information by observation satellites might not be acceptable to all nations [66].

Italy also saw the need for a permanent international body entrusted solely with the task of verifying the observance of arms control agreements. Such a body could be created in successive stages. In the first stage, an *ad hoc* section would be set up within the unit of the UN Secretariat dealing with disarmament and under its jurisdiction. This section would have the following responsibilities: (*a*) to act as a centre for the collection of data and information related both to the application of disarmament agreements and to compliance with the provisions of such agreements; (*b*) to disseminate the data and information to the parties, and to submit to UN members an annual report on the "review of the implementation" of each agreement; (*c*) to act as a secretariat for the various consultative committees of experts envisaged by existing and future arms control and disarmament agreements in order to provide the support necessary for the implementation of the complaints procedures; (*d*) to prepare background papers for review conferences; (*e*) to assist the work of disarmament bodies in the field of verification, especially the work of the Committee on Disarmament, and to provide scientific and technical information on the issues under discussion, including factual analyses of monitoring measures; (*f*) to develop knowledge and expertise on verification options and verifiability of weapon categories for which multilateral disarmament negotiations were anticipated; and (*g*) to maintain liaison with other UN bodies and specialized agencies on matters of common interest. At a later stage, the proposed section might be transformed into a 'Centre for the verification of disarmament agreements', still under the control of a UN official responsible for disarmament matters. The functions of this new body would remain essentially the same as at the initial stage, but the nucleus of a corps of international inspectors might be established within its structure along the lines of the provisions of the IAEA. In a third and final stage, the centre could be made independent, or an agency for verification of disarmament agreements might be established [67].

A suggestion similar to that of Italy was made by Japan—that an international verification unit with impartial authority be formed within the framework of the United Nations. As a first step toward this long-term objective, the UN Centre for Disarmament should, in the view of Japan, make the following arrangements: (*a*) establish a special division responsible for collecting information concerning compliance with and verification of disarmament agreements; (*b*) prepare lists of experts in order to develop and maintain the capabilities of the United Nations to offer technical

assistance, especially in the area of fact-finding; (*c*) examine the possibility of investing the Secretary-General with the power to mediate and arbitrate, if and when necessary, in consultation with states concerning problems which might arise in the application of the provisions of agreements; and (*d*) carry out a study on ways of assuring compliance with the agreements that lacked provisions of verification, such as the 1925 Geneva Protocol, the 1963 Partial Test Ban Treaty, and the 1980 Convention on the prohibition of 'inhumane weapons', as well as those agreements which had inadequate provisions for verification, such as the 1967 Outer Space Treaty [68].

VIII. The conclusions of the Special Session

In the conclusions contained in its report [69], the Second Special Session noted that the objectives, priorities and principles laid down in the Final Document of the First Special Session [3] had not been generally observed, and that the programme of action included in that document had remained largely unimplemented. Negotiations had produced little tangible result, while the arms race, in particular the nuclear arms race, had assumed more dangerous proportions and global military expenditures had increased sharply. Moreover, the years between the two sessions had witnessed increasing recourse to the use or threat of use of force against the sovereignty and territorial integrity of states, military intervention, occupation, annexation and interference in the internal affairs of states, as well as denial of the right to self-determination and independence of peoples under colonial or foreign domination.

The General Assembly expressed its regret that SSD II had been unable to adopt a document on a comprehensive programme of disarmament and on a number of other items on its agenda. It decided to refer the draft programme back to the Committee on Disarmament, together with the views expressed at the Special Session, and requested the Committee to submit a revised draft to the General Assembly at its 38th regular session. The Assembly also recommended that other items on the agenda on which SSD II had not reached decisions should be taken up at the 37th session of the General Assembly for further consideration.

Nevertheless, the Assembly was encouraged by the "unanimous and categorical" reaffirmation by all member states of the validity of the Final Document of the First Special Session, as well as their solemn commitment to it and their pledge to respect the priorities in disarmament negotiations as agreed to in its programme of action. Taking into account the aggravation of the international situation, the Assembly urged all member states to consider as soon as possible relevant proposals designed to secure the

avoidance of war, in particular nuclear war. The need to strengthen the central role of the United Nations in the field of disarmament was stressed. The Committee on Disarmament was requested to report on its consideration of an expansion of its membership, "consistent with the need to enhance its effectiveness". The Assembly also expressed the hope that the World Disarmament Campaign would contribute to the mobilization of public opinion for the cause of disarmament and would provide an opportunity for discussion and debate in all countries on disarmament issues, objectives and conditions. And, finally, it was suggested that the Third Special Session devoted to disarmament should be held at a date to be decided by the General Assembly at its 38th regular session in 1983.

The concluding document of the Special Session was adopted by consensus. Nevertheless, several delegations put on record their dissenting views and reservations.

Thus, Brazil said that if the report had been put to a vote it would not have been able to support it because, in its view, there were important discrepancies between its contents and reality [70].

India dissociated itself completely from the conclusions of the report. It said that the report did not measure up to expectations that the narrow security concerns of the major powers would not stand in the way of adopting certain urgent and necessary measures for the prevention of nuclear war and for nuclear disarmament [70].

Argentina made it clear that it did not endorse the bulk of the conclusions of the Session because, in its view, the adopted text did not adequately reflect the vital issues discussed at the session or the concern of a great many delegations of the non-aligned group. The "timid language and serious omissions" which characterized the report and the absence of steps hoped for by the international community meant that the document did not reflect the existing circumstances [70].

Cuba stated that it would have preferred conclusions that were more objective and realistic than those included in the report [70].

IX. Assessment

The UN General Assembly held its Special Session devoted to disarmament at a time which was hardly congenial to disarmament. Several major and a number of smaller wars over the globe were being waged—in the Middle East, in the Persian Gulf, in Central and South-East Asia, in different parts of Africa, in Central America, and in the South Atlantic. Arms control negotiations were at a standstill, while the war industry was expanding in a world suffering from economic depression. The attitudes of the USA and the USSR were becoming ever more intransigent, and cold

war polemics were almost as shrill as in the early 1950s. The non-aligned states, as a group, no longer played the independent stimulative role they used to play on similar occasions. Mistrust and a sense of insecurity prevailed.

In these conditions of political and military confrontation the disarmament debate seemed an incongruous or even misplaced exercise. Indeed, in certain speeches expressions of devotion to disarmament were adulterated with expressions of faith in weapons, especially nuclear weapons, as guarantors of peace and justice. Some people argued that it would have been better not to convene the session. It seems, however, that SSD II was needed, precisely because of the deplorable state of world affairs, to alert world opinion and arouse public concern.

However, irrespective of the disturbing political situation the session was so poorly prepared that it was in any case doomed to fail. The main mistake was to make the adoption of a comprehensive programme of disarmament the central feature of the session and to insist that the programme should be adopted by consensus. The proponents of this idea were asking for the impossible, because the draft programme presented to the session contained sharply conflicting views on most issues. To settle the often very fundamental controversies within a few weeks, and to achieve thereby what the Committee on Disarmament had been unable to do after several years of work, would have been a miracle. In any event, since it was out of the question to make the programme legally binding and to set target dates for its implementation, even such a miracle would not have been particularly meaningful.

Neither was it realistic to expect, as some delegations seemed to, that on the occasion of the Special Session the nuclear weapon powers would modify their military doctrines to the extent of giving up the strategy of deterrence, to which they had clung for years, or change their political structure to the extent of dropping secretiveness and accepting unhindered control of their military activities.

Instead of furthering the processes initiated by the First Special Session, which in its Final Document laid down the foundations for an international disarmament strategy, the Second Special Session unnecessarily reopened the discussion on points which had been agreed to four years before. Considerable time and effort were needed to reconfirm the validity of the document. It would have certainly been more useful to deal with just a few measures, with a view to assuring progress towards, and providing concrete guidelines for negotiations of, individual arms control agreements. These could have been measures which are generally recognized as significant and urgent, and which had already been extensively examined in negotiating forums, such as the cessation of nuclear weapon tests or the prohibition of chemical weapons. It is important to concentrate on those

areas where the arms race, if allowed to continue unchecked, could cross a point from which it may be very difficult to return.

Too much energy was invested in reviewing the events since the First Special Session in the context of the implementation of the 1978 Final Document. After all, it was crystal clear that almost nothing had been accomplished, and no constructive purpose could be served by apportioning blame.

The ideas put forward at the session by governments were, on the whole, not very imaginative. In particular, they showed the inability of the proponents to come to terms with the nuclear threat. None was of a nature to speed up the current US–Soviet nuclear arms control talks.

Proposals for 'no use' or 'no first use' of nuclear weapons could not carry adequate weight, because they all ignored the imbalances, real or perceived, in conventional armaments. The proposal for a bilateral US–Soviet nuclear freeze, launched by the US peace movement, proved to be a popular initiative in the USA itself, but its impact on the session's deliberations was small, probably because it was not clear how such a sweeping concept could be translated into a concrete, negotiable arms control measure. No impetus was given to negotiations on a comprehensive nuclear test ban, the oldest single item on the arms control agenda. Prospects for reaching the ban, an important first step towards halting the nuclear arms race, diminished.

Most other proposals, such as those concerning methods for checking the destruction of chemical weapon stockpiles, verification of allegations of use of chemical weapons, controlling conventional armaments or monitoring military expenditures, will require detailed elaboration before becoming subjects of serious negotiations.

Proposals concerning the disarmament machinery were discussed only very superficially. In the circumstances, there was no urge to deal with procedural and organizational matters or to decide on modifications in the existing deliberative and negotiating bodies.

On the positive side, the Special Session induced many governments to develop their disarmament policies, and provided an opportunity for heads of state or government, as well as foreign ministers and other high state officials, to present these policies to the world. The addresses by non-governmental organizations and peace and disarmament research institutions were a recognition of the value attached by the United Nations to non-governmental activities in the field of arms control and disarmament. (For the statement delivered by SIPRI, see appendix 17B.)

Moreover, the Special Session became a focus of attention and a rallying point for world-wide demonstrations in favour of peace. The June 12th rally of at least three-quarters of a million people in the City of New York was the largest manifestation yet seen of public involvement in

matters of disarmament. This manifestation came too late to affect the policies of states, but it helped in reaching consensus on the World Disarmament Campaign, the only tangible result of the Special Session other than the enlargement of the UN disarmament fellowship programme. Nevertheless, the future of the campaign is uncertain. There are grounds for apprehension that its incorporation in the UN bureaucratic machinery may sterilize its contents politically. It could happen that in the absence of non-governmental participation in directing the campaign, propagandizing UN resolutions, reports and fact sheets would replace the provocative debates which are necessary to generate public understanding and to transform public attitudes towards disarmament. And since there is no particular enthusiasm on the part of most governments for financing the campaign, even this modest undertaking could be stifled simply through a lack of funds.

In short, the Special Session may have made some progress on secondary matters, but it was a frustration as far as primary disarmament issues were concerned.

The future of special disarmament sessions will depend on whether there is movement in the disarmament negotiations. Besides a consciousness-raising function, periodic gatherings of representatives of UN members at the highest possible level may be useful in removing certain residual obstacles to agreements. They can also serve as a forum for the presentation of different disarmament 'philosophies', and as a kind of clearing house for new ideas to be taken up by specialized organs. And there is no need for each session to come up with a high-sounding declaration. Common points of view could, of course, be recorded in a generally acceptable resolution, but normally a simple routine report should suffice. In any event, to survive as an institution special sessions must be well prepared and must not be seen as substitutes for negotiating bodies.

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38. UN document A/S-12/PV.12.
39. UN document A/S-12/PV.9.
40. UN document A/S-12/AC.1/23.
41. UN document A/S-12/AC.1/12 and Corr.1.
42. UN document A/S-12/AC.1/29 and Corr.1.
43. UN document A/S-12/AC.1/37 and Corr.1.
44. UN document A/S-12/PV.10.
45. UN document A/S-12/AC.1/53.
46. UN document A/S-12/AC.1/41.
47. UN document A/S-12/AC.1/18.
48. UN document A/S-12/AC.1/24.
49. UN document A/S-12/AC.1/20.
50. UN document A/35/416.
51. UN document A/S-12/AC.1/17.
52. UN document A/S-12/AC.1/64.
53. UN document A/S-12/AC.1/52.
54. UN document A/S-12/AC.1/38.
55. UN document A/S-12/AC.1/59.
56. UN document A/S-12/PV.13.
57. UN document A/S-12/AC./34.
58. UN document A/S-12/AC.1/39.
59. UN document A/S-12/AC.1/66.
60. UN document A/S-12/AC.1/22.
61. UN document A/S-12/AC.1/45 and Corr.
62. UN document A/S-12/AC.1/25.
63. UN document A/S-12/AC.1/54.

64. UN document A/S-12/AC.1/32.
65. UN document A/S-12/AC.1/35.
66. UN document A/S-12/22.
67. UN document A/S-12/AC.1/19/Rev.1.
68. UN document A/S-12/AC.1/43.
69. UN document A/S-12/32.
70. UN document A/S-12/AC.1/PV.15.

Appendix 17A

Conclusions of the Second UN Special Session on Disarmament

57. The tenth special session of the General Assembly, the first special session devoted to disarmament, held in 1978, was an event of historic significance. The special session was convened in response to a growing concern among the peoples of the world that the arms race, especially the nuclear-arms race, represented ever-increasing threats to human well-being and even to the survival of mankind. At that session the international community of nations achieved, for the first time in the history of disarmament negotiations, a consensus on an international disarmament strategy, the immediate goal of which was the elimination of the danger of nuclear war and implementation of measures to halt and reverse the arms race. The final objective of the strategy was to achieve general and complete disarmament under effective international control. The conviction that all peoples had a legitimate right to expect early and significant progress in disarmament and a vital interest in its success led to the United Nations being given a central role and primary responsibility in the field of disarmament.

58. The historic consensus embodied in the Final Document of the Tenth Special Session of the General Assembly (resolution S-10/2) was rooted in a common awareness that the accumulation of weapons, particularly nuclear weapons, constituted much more a threat to than a protection of mankind. It was also based on recognition that the time had come to put an end to that situation, to abandon the use of force in international relations and to seek security in disarmament, that is to say, through a gradual but effective process beginning with a reduction in the current level of armaments. The Final Document recognized that in the contemporary world, the security of States could be greatly enhanced by effective action aimed at preventing nuclear war, ending the arms race and achieving real disarmament. Progress in disarmament would significantly contribute to pursuing the goals of economic and social development, particularly of developing countries. The consensus embodied in the Final Document sought to place disarmament negotiations in a unified perspective and became a most significant and integral part of the context within which negotiations on disarmament have been pursued.

59. In the course of the twelfth special session, the second special session devoted to disarmament, the General Assembly has noted that developments since 1978 have not lived up to the hopes engendered by the tenth special session. Despite the efforts that have been made by the international community to implement the decisions and recommendations of that session on a multilateral, bilateral and regional level, including action in the General Assembly and the Committee on Disarmament, and steps that have been taken on some specific measures contained in the Final Document, the objectives, priorities and principles there laid down have not been generally observed. The Programme of Action contained in the Final Document remains largely unimplemented. A number of important negotiations either have not begun or have been suspended, and efforts in the Committee on Disarmament and other forums have produced little tangible result. There has been some progress in certain negotiations and bilateral negotiations in the nuclear field have been initiated. The arms race, however, in particular the nuclear-arms race, has assumed more dangerous proportions and

global military expenditures have increased sharply. In short, since the adoption of the Final Document in 1978, there has been no significant progress in the field of arms limitation and disarmament and the seriousness of the situation has increased.

60. The Final Document stated that disarmament, relaxation of international tension, respect for the right to self-determination and national independence, the peaceful settlement of disputes in accordance with the Charter of the United Nations and the strengthening of international peace and security are directly related to each other. Progress in any of these spheres has a beneficial effect on all of them; in turn, failure in one sphere has negative effects on others. The past four years have witnessed increasing recourse to the use or threat of use of force against the sovereignty and territorial integrity of States, military intervention, occupation, annexation and interference in the internal affairs of States and denial of the inalienable right to self-determination and independence of peoples under colonial or foreign domination. The period has also witnessed other actions by States contrary to the Final Document. The consequent tensions and confrontations have retarded progress in disarmament and have in turn been aggravated by the failure to make significant progress towards disarmament.

61. It was stressed that in a world of finite resources there is an organic relationship between expenditures on armaments and economic and social development. The vastly increased military budgets since 1978 and the development, production and deployment, especially by the States possessing the largest military arsenals, of new types of weapon systems represent a huge and growing diversion of human and material resources. Apart from the significant capital costs that these military expenditures represent, they have also contributed to current economic problems in certain States. Existing and planned military programmes constitute a colossal waste of precious resources which might otherwise be used to elevate living standards of all peoples; furthermore, such waste greatly compounds the problems confronting developing countries in achieving economic and social development.

62. The General Assembly regrets that at its twelfth special session it has not been able to adopt a document on the Comprehensive Programme of Disarmament and on a number of other items on its agenda. However, on two agenda items, relating to the United Nations programme of fellowships on disarmament and the World Disarmament Campaign, there are agreed texts (see annexes IV and V) for consideration and appropriate action by the General Assembly. The General Assembly was encouraged by the unanimous and categorical reaffirmation by all Member States of the validity of the Final Document of the Tenth Special Session as well as their solemn commitment to it and their pledge to respect the priorities in disarmament negotiations as agreed to in its Programme of Action. Taking into account the aggravation of the international situation and being gravely concerned about the continuing arms race, particularly in its nuclear aspect, the General Assembly expresses its profound preoccupation over the danger of war, in particular nuclear war, the prevention of which remains the most acute and urgent task of the present day. The General Assembly urges all Member States to consider as soon as possible relevant proposals designed to secure the avoidance of war, in particular nuclear war, thus ensuring that the survival of mankind is not endangered. The General Assembly also stresses the need for strengthening the central role of the United Nations in the field of disarmament and the implementation of the security system provided for in the Charter of the United Nations in accordance with the Final Document and to enhance the effectiveness of the Committee on Disarmament as the single multilateral negotiating body. In this regard the Committee on Disarmament is

requested to report to the General Assembly at its thirty-seventh session on its consideration of an expansion of its membership, consistent with the need to enhance its effectiveness.

63. Member States have affirmed their determination to continue to work for the urgent conclusion of negotiations on and the adoption of the Comprehensive Programme of Disarmament, which shall encompass all measures thought to be advisable in order to ensure that the goal of general and complete disarmament under effective international control becomes a reality in a world in which international peace and security prevail, and in which a new international economic order is strengthened and consolidated. To this end, the draft Comprehensive Programme of Disarmament is hereby referred back to the Committee on Disarmament, together with the views expressed and the progress achieved on the subject at the special session. The Committee on Disarmament is requested to submit a revised draft Comprehensive Programme of Disarmament to the General Assembly at its thirty-eighth session.

64. The other items on the agenda on which the special session has not reached decisions should be taken up at the thirty-seventh session of the General Assembly for further consideration.

65. The General Assembly is convinced that the discussion of disarmament problems, which it has undertaken at the special session and in which representatives of Member States—among them some heads of State or Government and many Foreign Ministers—have participated, and the active interest shown by peoples all over the world will provide a powerful impetus to Member States to redouble their efforts in the cause of disarmament. The General Assembly hopes that the World Disarmament Campaign, which it solemnly launched at the opening meeting of the special session, will further contribute to the mobilization of public opinion to the cause of disarmament and the strengthening of international peace and security. In this regard the campaign should provide an opportunity for discussion and debate in all countries on all points of view relating to disarmament issues, objectives and conditions.

66. The third special session of the General Assembly devoted to disarmament should be held at a date to be decided by the General Assembly at its thirty-eighth session.

Source: UN document A/S-12/32.

Appendix 17B

SIPRI statement to the Second UN Special Session on Disarmament

The Stockholm International Peace Research Institute is now in its fourteenth year of work on questions of armaments and disarmament. It is an international institute with researchers from countries with different political and social systems.

In making suggestions for what might be done in the field of disarmament there is always a dilemma. Ambitious proposals are open to the objection that they are politically unrealistic. Proposals which are judged to be in the range of the politically possible are open to the objection that their effects may be very small.

We have some ideas to put into the current debate. They do not form a comprehensive programme; they should be taken rather as suggestions for possible directions of movement. In these suggestions we concentrate primarily on areas of real and present danger, where the arms race is on the brink. If it is allowed to continue unchecked it will cross a point from which it may be very difficult to return. We have suggestions about chemical weapons, about outer space, about nuclear weapons, about negotiations in Europe, and about the production and transfer of conventional weapons.

First, regarding chemical weapons, for the past 12 years, since 1969, there has been no production of filled poison-gas munitions in the United States, and there is no hard evidence of Soviet production either during those years. Now the constraints are breaking down. Binary chemical weapons are more attractive to the military than the older types; they are safer to produce, to store and to handle, and easier to use in combat. Production of these weapons may indeed be imminent, but real negotiations between the major Powers for a ban on chemical weapons have not yet begun.

What can be done, pending a comprehensive ban, by nations other than the chemical Powers themselves? To be militarily useful chemical weapons have to be deployed outside the territory of the chemical Powers themselves. Some countries have already said that they will not allow chemical weapons on their soil. If enough countries did this, the world might advance towards the idea of chemical weapon-free zones. In such a world there would be much better prospects for doing away with these weapons altogether.

Secondly, regarding space, three-quarters of all satellites launched since Sputnik, in 1957, have been launched for military purposes. Because of their increased dependence on such spacecraft, the military are now turning their attention to sophisticated weapons for disabling the satellites of the other side and so gaining military advantage. Here again is a development still in its early stages. Every year without some arms-control constraints will make the possibility of control more difficult. As a first modest step towards reducing the military use of outer space, the two major Powers should at least agree to a treaty banning anti-satellite operations.

On nuclear weapons, of course, the negotiations between the major Powers are central to any disarmament process. For all its deficiencies, the SALT II treaty was a move in the right direction, and pending further negotiations the major Powers should continue to observe its main provisions. The SALT II negotiations took seven years. The world cannot afford another seven years of wrangling on this matter while all kinds of destabilizing developments take place. We would point to two such developments.

First, there are many plans for increasing the number and variety of weapon platforms which can carry long-range and highly accurate missiles with nuclear warheads, a development which is bound to complicate the problem of verification. There are also suggestions to renegotiate or, indeed, abandon the anti-ballistic missile treaty, without any adequate regard to the damage so obvious a backward step would do to the cause of arms control.

A more comprehensive test ban is obviously important here. It would help to inhibit the development of ever more sophisticated nuclear warheads, and it might also help the cause of non-proliferation. If there were a treaty banning nuclear tests signed by all the nuclear-weapon States and many other nations, there would be great pressure on the near-nuclear States also to sign, and they might be deterred from crossing the nuclear threshold.

There is another barrier which is being threatened by present developments—the barrier between civil nuclear power and nuclear-weapon production. The demand for weapon-grade plutonium for new nuclear warheads is such that there are proposals for taking the plutonium contained in spent fuel from civil nuclear reactors and enriching it for use in weapons. This should not be done. The barrier between the civil and the military use of nuclear power should at all costs be preserved.

In Europe, obviously, the negotiations at Geneva on long-range or intermediate theatre nuclear forces should be settled by a compromise which reduces and does not increase the total number of such weapons. As the next move, we suggest the exploration of an area of disengagement of, say, an agreed number of kilometres either side of the dividing line in central Europe. All nuclear weapons and major conventional weapons particularly suited for offensive operations should be removed from this area to provide a buffer security zone down the middle of Europe. In time, the idea could be extended to become a nuclear-weapon-free zone in central Europe. This idea of a buffer zone between the countries of the North Atlantic Treaty Organization (NATO) and those of the Warsaw Pact is also inherent in the proposals for nuclear-weapon-free zones in northern Europe and in the Balkans.

In the past decade arms transfers of major weapons to third-world countries have risen in volume three times faster than world trade in general. The concern about the proliferation of nuclear weapons has not been accompanied by any such concern about the proliferation of advanced conventional weapons around the world. Yet it is these weapons which have been and are being used to kill people. It is generally agreed that any constraint on arms transfers has to be accompanied by a constraint on production as well. The United Nations could begin to explore the possibilities of such a joint constraint, perhaps beginning with advanced weapons of an obviously offensive nature.

Finally, there are two points we wish to make about the conduct of negotiations. The offer to negotiate about arms control or disarmament should not be treated as a favour done to another State or as a reward for good international behaviour. Arms limitation and disarmament agreements serve the interests of all parties. If, every time there is tension between the major Powers, arms-control negotiations are suspended or postponed, there is little hope of progress.

The second point on negotiations is one which was made in SIPRI's presentation to the 1978 special session. There is a case for negotiations about packages of measures rather than separate negotiations about small individual steps. Any individual proposal, however carefully constructed, may often be seen to benefit some participants in the negotiations more than others. Negotiations about a package of measures could make more trade-offs possible.

To sum up, in the four years since the first special session on disarmament no progress has been made towards a more peaceful and less dangerous world. In this statement we

suggest some directions of movement which should be in the range of the politically possible and some areas where the arms race is on the brink of developments which would be very difficult to reverse, if they occurred. We can but hope that in the next four years Governments will contribute to the cause of arms control and disarmament something more than words.

Source: UN document A/S-12/AC.1/PV.8/Add. 1 (statement delivered on 25 June 1982).

18. Arms control efforts in the UN and the CD[1]

Square-bracketed numbers, thus [1], *refer to the list of references on page 573.*

Another year of stagnation in the multilateral negotiations for arms control passed in 1982.

The Committee on Disarmament (CD) devoted most of its meetings to drafting a comprehensive programme of disarmament, which proved to be a labour in vain. Much of the remaining time of this 40-member Geneva-based negotiating body was spent on debating procedure and methods of work, and on drafting reports. Among the substantive issues discussed, chemical disarmament stood highest on the agenda.

The UN General Assembly adopted at its annual session a record number of 60 resolutions on matters related to arms control, in continuation of the inconclusive work of the Second Special Session on Disarmament held in the summer. With few exceptions, the resolutions contained appeals or solemn declarations no different in content from those which have been made each year since the 1960s. In general, sponsors of the resolutions showed little interest in negotiating the texts to get consensus support: in several instances, two or even three resolutions on the same topic were adopted embodying the views of different groups of nations. The voting pattern in the Assembly, as usual, reflected political sympathies or alliance allegiance more than arms control interests.

A brief review of arms control efforts in the CD and the UN General Assembly during 1982 and the first three months of 1983 is given in the following sections.

I. Chemical disarmament

Verification continues to be the most difficult problem for the negotiations on a convention on the prohibition of the development, production and stockpiling of chemical weapons and on their destruction. Nevertheless, some progress seems to have been made.

The Soviet Union, which for a long time had been opposed to regular control of its territory, agreed to provide for the possibility of international on-site inspections not only in case of suspicion that the convention had been violated, but also to verify whether the destruction of stocks of chemical weapons was actually taking place. Such 'systematic' inspections would

[1] This chapter was written by Jozef Goldblat.

be carried out on the basis of an agreed quota. Similarly, the production of super-toxic lethal chemicals for "permitted purposes" (a term which still needs clarification) at a specified facility (presumably to make sure that the maximum amount allowed was not exceeded) could be checked through on-site inspections [1].

The Soviet Union thereby recognized that national means alone were not sufficient to verify a chemical weapon ban, but it did not explain what it meant by an "agreed quota" of inspections; whether near-site use of technical means of verification of the destruction of chemical weapon stockpiles would be allowed; or why systematic on-site inspections were not envisaged for the shut-down, destruction or dismantling of facilities. These and other relevant questions asked in the CD [2] remained unanswered.

The USA insisted that the following should be subject to appropriate forms of systematic international on-site inspection on an "agreed basis": declared chemical weapon stockpiles and the process of their elimination; declared chemical weapon production and filling facilities and the process of their elimination; and declared facilities for "permitted" production of chemicals which pose a particular risk. At the same time the USA emphasized that it did not believe it necessary to subject the entire chemical industry of states to inspection, nor to have inspectors "roam" throughout the territory of a party [3].

The United Kingdom stressed the significance of detailed declarations for adequate verification of a chemical weapons convention. Declarations to be made soon after the convention entered into force should cover the following areas: whether or not a state possessed chemical weapons and facilities for their production; the stocks of chemical weapons and facilities for production and filling of such weapons held by states; plans for the destruction or diversion for "permitted" purposes of declared stocks of chemical weapons; and plans for the destruction, dismantling or conversion of the declared facilities. The second type of declaration, to be made at periodic intervals, would contain progress reports on the destruction process. The third type would be required throughout the lifetime of the convention, since a number of activities would continue to require monitoring; these would cover any production of super-toxic agents for such purposes as medical and protective measures. Declarations would also need to be made about the production for civilian purposes of dual-purpose agents above a certain level of toxicity [4]. The United Kingdom proposed the development of a system of non-discriminatory routine inspections to provide confidence that those substances which pose the greatest threat were not being produced in violation of the convention [42].

There appeared to be consensus that a consultative committee would have to be established as a permanent body for the monitoring of the implementation of compliance with the terms of a chemical weapons

convention. But the actual composition, prerogatives and functions of the committee are subject to further consideration.

Other unresolved issues of importance which are being discussed in a special working group, set up within the CD, concern the scope of the prohibitions and the related definitions. An important outstanding problem is whether or not the prohibition on the use of chemical weapons should be included in the convention prohibiting the possession of these weapons and, if so, how to harmonize such a ban with the 1925 General Protocol which already bans their use. A question also remains open whether the convention should provide for the prohibition of the planning and organization of, as well as training in, chemical warfare.

Neither is it clear to what extent the convention would apply to precursors, that is, chemical substances which can produce warfare agents when combined with other substances. Similarly, coverage of toxins, incapacitating compounds and herbicides remains a moot point.

In expressing regret that agreement had not yet been reached, the UN General Assembly urged the CD, as a matter of high priority, to intensify its work with a view to elaborating a convention for the "complete and effective" prohibition of chemical weapons [5]. It also took note of the proposals for the creation of chemical weapon-free zones; appealed to the USSR and the USA to resume their bilateral negotiations on chemical weapons; and called upon states to refrain from the production and deployment of binary chemicals, and from stationing any chemical weapons on the territory of other states [6].

A novelty was the resolution of the General Assembly to establish an international mechanism for prompt, competent and impartial investigation of allegations of violations of the 1925 Geneva Protocol, pending formal arrangements to be made within the framework of a comprehensive chemical weapons convention [7]. This decision was prompted by a multitude of allegations, put forward in recent years and implicating a number of governments, of the use of gas and toxins in armed conflicts. Because the Geneva Protocol does not provide for investigation of reports concerning activities prohibited by the Protocol, most allegations have remained unchecked. In 1980, when the UN General Assembly initiated an expert inquiry into reports of the alleged use of chemical and toxin weapons in South-East Asia, the experts asked for access to the areas where the prohibited agents had allegedly been used. But since such access, which is absolutely essential for a meaningful investigation, was denied, the findings were bound to be inconclusive. All that the experts were able to say two years later, on the the basis of information collected outside the area in question, was that "circumstantial evidence suggestive of the possible use of some sort of toxic chemical substance in some instances" could not be disregarded [8].

According to the new procedures proposed by France (the depositary of the Geneva Protocol) with a view to ensuring respect for the Protocol, information concerning activities that may constitute a violation of this instrument or of the "relevant rules of customary international law" is to be investigated by the Secretary-General with the assistance of qualified experts. The facts will have to be ascertained and the results reported to all UN members and to the General Assembly. The Secretary-General will compile and maintain lists of qualified experts whose services could be made available at short notice to undertake investigations, and of laboratories with the capability to undertake testing for the presence of agents the use of which is prohibited. In addition, the Secretariat will assemble and organize documentation relating to the identification of signs and symptoms associated with the use of such agents as a means of facilitating investigations and medical treatment that may be required.

The recommended procedures were criticized by a number of countries, mainly the Soviet Union and its allies (there were 19 votes against the resolution and 33 abstentions). The criticism was that, by modifying the *modus operandi* of the Geneva Protocol, and by conferring treaty rights upon a third party (the UN Secretary-General), these procedures could erode the international legal basis of the Protocol, and that because they were to apply both to parties and non-parties, they contradicted a fundamental rule of treaty law. Misgivings were also voiced that a UN investigatory mechanism could be used to interfere in the internal affairs of states. The proponents, however, denied legal inappropriateness and argued that their aim was to strengthen the Geneva Protocol. They pointed to the fact that for many years the United Nations had been stressing the necessity of strict observance of the principles and objectives of the Protocol by *all* states, and had been doing so unanimously, with no objections on the part of non-parties. Indeed, according to widely shared opinion, the Protocol forms part of customary law. It did not even establish an entirely new rule, certainly not in the part dealing with gases. For by stating that the use of gases had already been condemned "by the general opinion of the civilised world", it simply reaffirmed a pre-existing prohibition "binding alike the conscience and the practice of nations". Moreover, in a resolution adopted in 1969 by an overwhelming majority, which included the Soviet Union and its allies, the UN General Assembly confirmed that the Geneva Protocol "embodies the generally recognized rules of international law prohibiting the use in international armed conflicts of all biological and chemical methods of warfare".

Frequent accusations made of the use of chemical and biological weapons do not mean that these weapons have been frequently resorted to. Because of the repulsive nature of poison, be it chemical or biological, allegations of its use have often been made simply to discredit the alleged

user. Suspicions of breaches, which have been neither proved nor disproved, have negatively affected the international climate, weakened confidence in arms control treaties and cast a shadow on disarmament efforts. The establishment of an effective fact-finding mechanism by the United Nations may contribute to deterring possible violations. It may also discourage making ill-considered charges as well as using doubtful information for propaganda purposes.

In the same vein, the UN General Assembly recommended that the parties to the 1972 Biological Weapons Convention, which does not contain verification provisions, should hold a special conference to establish a "flexible, objective and non-discriminating procedure" to deal with issues of compliance [9]. As explained by Sweden, the main sponsor of the resolution, the adequacy of the complaints procedure requires further consideration. In particular, it is deemed essential to obtain reassurances that permanent members of the Security Council would not prevent an investigation [10].

II. Comprehensive nuclear test ban

The trilateral British–US–Soviet talks on the cessation of nuclear weapon test explosions, which were suspended in 1980, were not resumed in 1982. Although nuclear weapon states bear special responsibility in this respect, many other states have repeatedly expressed interest in the early conclusion of a treaty. It was only upon the insistence of non-nuclear weapon countries, mostly non-aligned, that in April 1982 an *ad hoc* working group was set up to consider the issue. However, China asserted that a "mere cessation of nuclear testing would not lessen the threat of nuclear war, let alone eliminate it" [4], while France declared that it could not help elaborate a treaty which it could not sign because "the conditions for an undertaking on its part had not been met" [11]. Both powers withheld their participation in the working group.

The mandate of the group was limited to discussing and defining, through substantive examination, "issues relating to verification and compliance" [12]. The group was not authorized to conduct negotiations leading to the conclusion of a comprehensive test ban treaty. In these circumstances, only a general exchange of views could take place. Indeed, in the absence of an agreement on the subject of the prohibition, it is difficult to discuss meaningfully and conclusively substantive issues of verification. As pointed out in the Final Document of the 1978 UN Special Session on Disarmament, the "form and modalities of the verification to be provided for in any specific agreement depend upon and should be determined by the purposes, scope and nature of the agreement" [13].

Several delegations referred to an authoritative statement by the Secretary-General made some 10 years ago that "all the technical and scientific aspects of the problem have been so fully explored that only a political decision is now necessary in order to achieve final agreement" [14]. Apparently such a decision has not yet been taken.

In 1982, the US government formally announced that it would set aside efforts to negotiate a comprehensive ban on nuclear testing [15], on the grounds that such a ban could not help "to reduce the threat of nuclear weapons or to maintain the stability of the nuclear balance" [16]. This announcement met with criticism in the CD. It was considered by some delegations as incompatible with previously contracted commitments [17]. Indeed, a comprehensive test ban has all along been regarded as a matter of highest priority in the disarmament forums. As early as 1963, in signing the Partial Test Ban Treaty, the British, US and Soviet governments declared their determination to "continue negotiations" to achieve the discontinuance of all nuclear test explosions, including explosions underground, for all time. This determination was reiterated in the 1968 Treaty on the Non-Proliferation of Nuclear Weapons, under which the parties undertook to "pursue negotiations" in good faith on effective measures relating to cessation of the nuclear arms race "at an early date" and to nuclear disarmament.

The United States' unwillingness to seek agreement amounts to non-fulfilment of the obligation to negotiate, while its insistence that a comprehensive test ban is no more than a "long-term" goal of US policy [18] amounts to postponing indefinitely any agreement, and this contradicts the commitment to bring about a rapid halt to the nuclear arms competition.

It is worth noting that the 1974 US–Soviet Threshold Test Ban Treaty (TTBT), which prohibits underground nuclear weapon tests with a yield exceeding 150 kt, and the 1976 Peaceful Nuclear Explosions Treaty (PNET), which governs nuclear explosions conducted outside the weapon test sites, have still remained unratified. The USA now demands a revision of these treaties with the view to strengthening verification [19], even though at the time of signing the US government was confident that violations could be detected. Indeed, the verification clauses of both treaties are extraordinarily elaborate. Under the TTBT the parties have obliged themselves to conduct all nuclear weapon tests solely within specified testing areas and to exchange detailed information in order to improve each side's assessments of the yields of explosions based on the measurements derived from its own seismic instruments. The PNET envisages on-site observation of certain explosions in addition to the exchange of relevant information. A special protocol contains provisions regulating the number of observers, the geographical extent of their access, and their equipment, records and immunities.

Because the threshold agreed to by the parties is high, the TTBT and the PNET (the latter being an indispensable complement of the former) cannot *per se* contribute to the cessation or even slowing down of the nuclear arms race. But an early entry into force of these treaties and the experience gained from their operation could perhaps start a process of gradually lowering, through successive agreements, both the yield ceiling and the number of tests conducted annually by *all* the nuclear weapon powers.

The UN General Assembly requested the CD to take the necessary steps to initiate substantive negotiations, so that the draft of a comprehensive treaty might be submitted "at the earliest possible date", and urged the nuclear weapon states to co-operate in fulfilling these tasks [20].

However, the UK and the USA, two of the three depositaries of the Partial Test Ban Treaty and the Non-Proliferation Treaty (the third being the USSR), opposed the General Assembly's call upon them to halt as a provisional measure all nuclear test explosions through a trilaterally agreed moratorium or through unilateral moratoria [21]. The two were joined by China and France in voting against a resolution which called upon all the nuclear-weapon states not to conduct nuclear explosions as from an agreed date until a comprehensive test ban treaty is concluded [22].

III. Prohibition of radiological weapons

Since 1979, the CD has been considering the question of an international convention prohibiting the development, production, stockpiling and use of radiological weapons. A joint US–Soviet proposal on major elements of the convention constitutes the basis for the discussion. The main divergences which have arisen concern the definition of the weapon to be prohibited and the scope of the prohibition [23].

The two powers define a radiological weapon as any device, other than a nuclear explosive, specifically designed to employ radioactive material by disseminating it to cause destruction, damage or injury by means of the radiation produced by the decay of such material, as well as any radioactive material, other than that produced by a nuclear explosive device, specifically designed for such use. This definition, which explicitly excludes nuclear explosives, has been objected to by several nations because, in their opinion, it would "legitimize" the use of nuclear weapons. Attempts to develop an acceptable "positive" definition have so far proved unsuccessful.

As regards the scope of the convention, Sweden insisted that an agreement along the lines suggested by the original drafters was of very limited value, and proposed to include the protection of nuclear facilities from

attacks which could cause the release of radioactive material and contamination of the environment. Since there is no immediate threat that a specific militarily useful radiological weapon will be developed, such attacks would be at present the only effective way of dispersing radioactivity (besides a nuclear explosion), and thereby the only conceivable way of waging a radiological war. The merit of the issue was widely acknowledged. Certain delegations in the CD favoured a ban covering both military and civilian nuclear facilities. Others considered that military objects would have to be excluded. Still others preferred establishing a threshold with a view to leaving out installations on which an attack would not cause mass destruction.

The effects of an attack on nuclear facilities would depend on such factors as the type of weapon used, the point of impact, the type of installation attacked and its design, the nature of nuclear substances contained in the facility, the extent of the destruction caused, the prevailing meteorological conditions and the physical possibilities to limit the damage. According to the studies made in 1977–80, a large reactor accident in Sweden could have consequences of the order of hundreds to thousands of early deaths, thousands to tens of thousands of cases of late cancer, and thousands to tens of thousands of square kilometres of contaminated area [24]. In more populated areas correspondingly more severe consequences would result. For example, another source cites cases with up to 10 000 early deaths [25].

Several countries were opposed to dealing with the protection of nuclear facilities in a radiological weapons convention. They argued that provisions concerning this matter were already covered by the 1977 Protocol to the 1949 Geneva Conventions, relating to the protection of victims of international conflicts, and that any further measures should be considered within the framework of international humanitarian law. Reference was made to Article 56(6) of the 1977 Protocol urging the parties to conclude agreements to provide "additional protection for objects containing dangerous forces".

It is true that according to the 1977 Protocol, "nuclear electrical generating stations" shall not be made the object of attack, if such attack may cause the release of dangerous forces and consequent severe losses among the civilian population. However, the protection will cease if the station provides electric power "in regular, significant and direct support of military operations and if such attack is the only possible way to terminate such support". This reservation is vague enough to bring to nothing the ban to which it is attached. It means giving precedence to military imperatives over humanitarian considerations. Moreover, the Protocol prohibition does not cover facilities committed to military use, while in the field of civilian use it leaves aside installations with large quantities of

radioactivity, such as research reactors; cooling ponds which contain spent fuel elements removed from the reactor before they are shipped to reprocessing plants; reprocessing plants themselves; mixed oxide fuel fabrication plants; or storage tanks containing high-level radioactive wastes.

FR Germany proposed to provide for the establishment of protective zones around civilian nuclear installations, which would be kept free from military targets. Relevant information would be made internationally known, for instance through an exchange of lists of the protected installations, while conspicuous markings, visible from a distance, could contribute to the efficacy of the measure. In practice, this would mean setting up sanctuaries, which in countries with many nuclear installations would cover a substantial part of the territory. An alternative solution, also proposed by FR Germany, would be to improve the protection already accorded under the 1977 Protocol by stipulating that certain types of military activity were not permitted within a specific area around nuclear installations [26].

Seeking to break the deadlock, Japan suggested an agreement on the prohibition of attacks against nuclear facilities as an optional protocol to the treaty prohibiting radiological weapons. The parties to the protocol would undertake not to make an object of attack any nuclear facility where IAEA safeguards were applied. The protected facilities would be marked with a special sign (to be agreed upon) in order to facilitate their identification [27].

The elaboration of a radiological weapons convention and the search for a solution to the question of protection of nuclear facilities (either within the framework of the convention or separately) are to continue in the CD in accordance with the UN resolution [28].

IV. Arms control in outer space

The CD had before it three proposals for the prevention of an arms race in outer space.

One proposal, formulated by the USA and its allies, concerned negotiations for an "effective and verifiable" agreement to prohibit anti-satellite systems, which, according to the proponents, was the most urgent task to undertake. Another proposal, put forward by the USSR, was to negotiate a treaty prohibiting the stationing in outer space of weapons of "any kind". In this approach the question of anti-satellite systems would be considered within the context of other arms control measures. Still another proposal, submitted by the group of 21 non-aligned countries, was to strive for an agreement or agreements to prevent an arms race in outer space "in all its

aspects" [29]. Efforts made to set up a working group within the CD to discuss all these proposals as well as future initiatives were unsuccessful.

The UN General Assembly expressed concern over the possible extension of the arms race into outer space [30], reaffirmed "the will of all States" that outer space should be used exclusively for peaceful purposes, and requested the CD to undertake appropriate negotiations [31].

V. Prevention of nuclear war

Of the other resolutions adopted by the UN General Assembly, the most remarkable were those dealing with the nuclear freeze and the prohibition on the use of nuclear weapons.

The call on all nuclear weapon states to stop simultaneously the production of nuclear weapons and of fissionable material for weapon purposes was opposed by most NATO countries, including the three Western nuclear weapon powers. China abstained, while the Soviet Union voted in favour [32]. Another freeze resolution was addressed only to the USA and the USSR. It urged a ban of five years' duration, but subject to prolongation if other nuclear weapon states joined, on testing, deployment and manufacture of nuclear weapons and the means of their delivery, as well as a cut-off in the production of weapon-grade fissionable material. Here again, France, the UK and the USA voted against [33].

The voting results were similar when it came to adopting a resolution expressing the hope that all nuclear weapon states would make declarations not to be the first to use nuclear weapons [34], as well as a resolution requesting the CD to agree on a convention prohibiting the use of nuclear weapons under any circumstances [35]. However, there was no opposition to calling upon the CD to undertake negotiations with a view to achieving agreement on "appropriate and practical" measures for the prevention of nuclear war [36].

VI. Studies

Several studies were initiated in 1982 by the UN General Assembly:

1. To review and supplement the 1975 UN comprehensive study of the question of nuclear weapon-free zones "in all its aspects" [37].

2. To undertake the task of constructing price indices and purchasing-power parities for the military expenditures of states; this task should encompass a study of the problem as a whole, which would include (*a*) an assessment of the feasibility of such an exercise; (*b*) project design and choice of methodology; (*c*) determination of the types of data required,

such as production descriptions, prices and statistical weights; and (*d*) construction of military price indices and purchasing-power parities [38].

3. To carry out a comprehensive study on the scope, role and direction of the military use of research and development, the mechanisms involved, its role in the overall arms race, in particular the nuclear arms race, and its impact on arms limitation and disarmament, particularly in relation to major weapon systems, such as nuclear weapons and other weapons of mass destruction, with a view to preventing a qualitative arms race and to ensuring that scientific and technological achievements may ultimately be used solely for peaceful purposes [39].

4. To investigate—with due regard to the capabilities of existing agencies and institutions currently responsible for the international transfer of resources—the modalities of an international disarmament fund for development [40].

5. To prepare a comprehensive study on the consequences of the Israeli armed attack against the Iraqi nuclear installations devoted to peaceful purposes [41].

The purposes of UN studies, as defined by the Secretary-General's Advisory Board, are: to assist in ongoing negotiations; to assist in the identification of specific topics with a view to initiating new negotiations; to provide a general background to current deliberations and negotiations; and to assess and promote public awareness of the threat posed by nuclear weapons and the continuing arms race. The studies hitherto made by the United Nations have met these purposes in part. Some were mere collections of official government views. Only when they are conducted by qualified experts, preferably independent, can they provide useful information, in-depth analysis of the relevant problems and well-considered suggestions.

References

1. Committee on Disarmament document CD/294.
2. Committee on Disarmament document CD/308.
3. Committee on Disarmament document CD/PV.193.
4. Committee on Disarmament document CD/PV.178.
5. UN General Assembly resolution 37/98B.
6. UN General Assembly resolution 37/98A.
7. UN General Assembly resolution 37/98D.
8. UN document A/37/259.
9. UN General Assembly resolution 37/98C.
10. UN Document A/C.1/37/PV.38.
11. Committee on Disarmament document CD/PV.176.
12. Committee on Disarmament document CD/291.
13. UN document A/Res/S-10/2, paragraph 31.

14. Conference of the Committee on Disarmament document CCD/PV.545.
15. *New York Times*, 21 July 1982.
16. Committee on Disarmament document CD/PV.152.
17. Committee on Disarmament document CD/PV.187.
18. Address by the Vice President of the USA, George Bush, to the Committee on Disarmament on 4 February 1983.
19. *International Herald Tribune*, 10 February 1983.
20. UN General Assembly resolution 37/73.
21. UN General Assembly resolution 37/72.
22. UN General Assembly resolution 37/85.
23. Committee on Disarmament document CD/292.
24. Committee on Disarmament document CD/RW/WP.34.
25. Ramberg, B., *Destruction of Nuclear Energy Facilities in War: The Problem and the Implications* (Lexington Books, Lexington, Mass., 1980).
26. Committee on Disarmament document CD/331.
27. Committee on Disarmament document CD/323.
28. UN General Assembly resolution 37/99C.
29. Committee on Disarmament document CD/335.
30. UN General Assembly resolution 37/99D.
31. UN General Assembly resolution 37/83.
32. UN General Assembly resolution 37/100A.
33. UN General Assembly resolution 37/100B.
34. UN General Assembly resolution 37/78J.
35. UN General Assembly resolution 37/100C.
36. UN General Assembly resolution 37/78I.
37. UN General Assembly resolution 37/99F.
38. UN General Assembly resolution 37/95B.
39. UN General Assembly resolution 37/99J.
40. UN General Assembly resolution 37/84.
41. UN General Assembly resolution 37/18.
42. Central Office of Information (London), Verbatim Service 022/83, Speech to the Committee on Disarmament by the Rt. Hon. Douglas Hurd, 10 March 1983.

Appendix 18A

UN General Assembly resolutions on disarmament, 1982

I. UN member states and year of membership

The following list of names of the 157 UN member states is provided for convenience in reading the record of votes on the UN General Assembly resolutions listed in section II. The countries marked with an asterisk are also members of the Geneva-based Committee on Disarmament (CD).

Afghanistan, 1946
Albania, 1955
*Algeria, 1962
Angola, 1976
Antigua and Barbuda, 1981
*Argentina, 1945
*Australia, 1945
Austria, 1955
Bahamas, 1973
Bahrain, 1971
Bangladesh, 1974
Barbados, 1966
*Belgium, 1945
Belize, 1981
Benin, 1960
Bhutan, 1971
Bolivia, 1945
Botswana, 1966
*Brazil, 1945
*Bulgaria, 1955
*Burma, 1948
Burundi, 1962
Byelorussia, 1945
Cameroon, 1960
*Canada, 1945
Cape Verde, 1975
Central African Republic, 1960
Chad, 1960
Chile, 1945
*China, 1945
Colombia, 1945
Comoros, 1975
Congo, 1960
Costa Rica, 1945
*Cuba, 1945
Cyprus, 1960
*Czechoslovakia, 1945
Denmark, 1945
Djibouti, 1977
Dominica, 1978
Dominican Republic, 1945
Ecuador, 1945
*Egypt, 1945
El Salvador, 1945
Equatorial Guinea, 1968
*Ethiopia, 1945
Fiji, 1970
Finland, 1955
*France, 1945
Gabon, 1960
Gambia, 1965
*German Democratic Republic, 1973
*FR Germany, 1973
Ghana, 1957
Greece, 1945
Grenada, 1974
Guatemala, 1945
Guinea, 1958
Guinea-Bissau, 1974
Guyana, 1966
Haiti, 1945
Honduras, 1945
*Hungary, 1955
Iceland, 1946
*India, 1945
*Indonesia, 1950
*Iran, 1945
Iraq, 1945
Ireland, 1955
Israel, 1949
*Italy, 1955
Ivory Coast, 1960
Jamaica, 1962
*Japan, 1956
Jordan, 1955
Kampuchea, 1955
*Kenya, 1963
Kuwait, 1963

Lao People's Democratic Republic, 1955
Lebanon, 1945
Lesotho, 1966
Liberia, 1945
Libya, 1955
Luxembourg, 1945
Madagascar, 1960
Malawi, 1964
Malaysia, 1957
Maldives, 1965
Mali, 1960
Malta, 1964
Mauritania, 1961
Mauritius, 1968
*Mexico, 1945
*Mongolia, 1961
*Morocco, 1956
Mozambique, 1975
Nepal, 1955
*Netherlands, 1945
New Zealand, 1945
Nicaragua, 1945
Niger, 1960
*Nigeria, 1960
Norway, 1945
Oman, 1971
*Pakistan, 1947
Panama, 1945
Papua New Guinea, 1975
Paraguay, 1945
*Peru, 1945
Philippines, 1945
*Poland, 1945
Portugal, 1955
Qatar, 1971
*Romania, 1955
Rwanda, 1962
Saint Lucia, 1979
Saint Vincent and the Grenadines, 1980
Samoa, 1976
Sao Tome and Principe, 1975
Saudi Arabia, 1945
Senegal, 1960
Seychelles, 1976
Sierra Leone, 1961
Singapore, 1965
Solomon Islands, 1978
Somalia, 1960
South Africa, 1945
Spain, 1955
*Sri Lanka, 1955
Sudan, 1956
Suriname, 1975
Swaziland, 1968
*Sweden, 1946
Syria, 1945
Tanzania, 1961
Thailand, 1946
Togo, 1960
Trinidad and Tobago, 1962
Tunisia, 1956
Turkey, 1945
Uganda, 1962
*UK, 1945
Ukraine, 1945
United Arab Emirates, 1971
Upper Volta, 1960
Uruguay, 1945
*USA, 1945
*USSR, 1945
Vanuatu, 1981
*Venezuela, 1945
Viet Nam, 1977
Yemen Arab Republic, 1947
Yemen, People's Democratic Republic of, 1967
*Yugoslavia, 1945
*Zaire, 1960
Zambia, 1964
Zimbabwe, 1980

II. Resolutions

Only the essential parts of each resolution are given here. The texts have been abridged, but the wording is close to that of the resolution.

The resolutions are grouped according to disarmament subjects, irrespective of the agenda items under which they were discussed in the General Assembly.

Nuclear weapons

37/78 F 9 December 1982

Expresses its deep concern over the constant deterioration of international relations, as well as the intensification of the arms race, particularly the nuclear arms race, which directly threatens international peace and security and increases the danger of outbreak of war, in particular nuclear war; invites all states, particularly nuclear weapon states and especially those which possess the most important nuclear arsenals, to take urgent measures to implement the General Assembly recommendations and decisions concerning nuclear disarmament; urges all states to exert the greatest effort to stimulate and accelerate disarmament negotiations in good faith at all levels; calls upon the Committee on Disarmament to proceed to negotiations on nuclear disarmament without further delay and to elaborate, as soon as possible, drafts of international agreements on those disarmament issues which have been the object of negotiations over a number of years, particularly a treaty on a nuclear weapon test ban, and on a treaty on the complete and effective prohibition of the development, production and stockpiling of all chemical weapons and on their destruction; calls upon members of the CD, particularly the nuclear weapon states, to show a greater measure of readiness and flexibility in further negotiations on the elaboration of a draft comprehensive programme of disarmament; and invites all states engaged in disarmament and arms limitation negotiations outside the framework of the UN to keep the General Assembly and the CD informed of the results of such negotiations.

In favour 134
Against 0
Abstaining 12: Belgium, Colombia,[a] France, FRG, Italy, Japan, Lebanon, Luxembourg, Netherlands, Turkey, UK, USA
Absent: Dominica, Equatorial Guinea, Gambia, Lesotho, St Vincent, Samoa,[a] Senegal, Seychelles, Zimbabwe

Albania announced that it was not participating in the vote.

37/78 C 9 December 1982

Calls upon the Committee on Disarmament to proceed without delay to negotiations on the cessation of the nuclear arms race and nuclear disarmament in accordance with paragraph 50 of the Final Document of the First Special Session on Disarmament, and especially to elaborate a nuclear disarmament programme, and to establish for this purpose an *ad hoc* working group.

In favour 118
Against 19: Australia, Belgium, Canada, Denmark, France, FRG, Iceland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Turkey, UK, USA
Abstaining 9: Greece, Guatemala, Lebanon, Paraguay, Philippines, Saudi Arabia, Somalia, Uruguay, Zaire
Absent: China, Dominica, Equatorial Guinea, Kampuchea, Lesotho, St Vincent, Samoa,[a] Seychelles, Zimbabwe

Albania announced that it was not participating in the vote.

37/99 A 13 December 1982

Requests the Committee on Disarmament to proceed without delay to talks to elaborate an international agreement on the non-stationing of nuclear weapons on the territories of states where there are no such weapons at present; calls upon all nuclear weapon states to refrain from further action involving the stationing of nuclear weapons on the territories of other

states and to freeze qualitatively nuclear weapons on the territories of other states.

In favour 70
Against 18: Australia, Belgium, Canada, Denmark, France, FRG, Iceland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Turkey, UK, USA
Abstaining 51: Algeria, Austria, Bahamas, Bangladesh, Bolivia, Brazil, Burma, Cameroon, Chile, Colombia, Comoros, Costa Rica, Cyprus, Djibouti, El Salvador, Gabon, Greece, Guatemala, Guinea-Bissau, Haiti, Ireland, Israel, Jamaica, Kampuchea, Lebanon, Liberia, Malawi, Morocco, Nepal, Oman, Pakistan, Paraguay, Peru, Philippines, Saudi Arabia, Senegal, Sierra Leone, Singapore, Solomon Islands, Somalia, Sri Lanka, Sudan, Suriname, Sweden, Tanzania, Thailand, Togo, Tunisia, Uruguay, Yugoslavia, Zaire
Absent: Albania, Antigua and Barbuda, Belize, Cape Verde, China, Dominica, Equatorial Guinea, Gambia, Iran, Ivory Coast, Maldives, Malta, St Lucia, St Vincent, Samoa, Seychelles, Zimbabwe

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37/78 E 9 December 1982

Reaffirms its request to the Committee on Disarmament to start without delay negotiations within an appropriate organizational framework with a view to concluding a convention on the prohibition of the development, production, stockpiling, deployment and use of nuclear neutron weapons.

In favour 81[b]
Against 14: Australia, Belgium, Canada, France, FRG, Israel, Italy, Japan, Luxembourg, New Zealand, Portugal, Turkey, UK, USA
Abstaining 52: Argentina, Austria, Bahamas, Bangladesh, Bhutan, Bolivia, Brazil, Burma, Chile, Colombia, Comoros, Denmark, Djibouti, Egypt, El Salvador, Greece, Guatemala, Guyana, Iceland, Ireland, Ivory Coast, Jamaica, Kampuchea, Lebanon, Liberia, Malawi, Malaysia, Maldives, Morocco, Nepal, Netherlands, Niger, Nigeria, Norway, Pakistan, Paraguay, Peru, Philippines, St Lucia, Saudi Arabia, Singapore, Somalia, Spain, Sri Lanka, Sudan, Sweden, Thailand, Tunisia, Upper Volta, Uruguay, Venezuela, Zaire
Absent: China, Dominica, Equatorial Guinea, Lesotho, St Vincent, Samoa,[a] Seychelles, Zimbabwe

Albania announced that it was not participating in the vote.

37/99 E 13 December 1982

Requests the Committee on Disarmament, at an appropriate stage of its work, to pursue consideration of the question of adequately verified cessation and prohibition of the production of fissionable material for nuclear weapons and other nuclear explosive devices and to keep the General Assembly informed of the progress of that consideration.

In favour 121[c]
Against 0
Abstaining 22: Afghanistan, Argentina, Brazil, Bulgaria, Byelorussia, Czechoslovakia, France, GDR, Guyana, Hungary, India, Lao Republic, Mexico, Mongolia, Mozambique, Panama, Poland, UK, Ukraine, USA, USSR, Viet Nam
Absent: Albania, Antigua and Barbuda, Belize, Cape Verde, China, Dominica, Gambia, Ivory Coast, Nicaragua, St Vincent, Samoa,[a] Seychelles, Zimbabwe

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37/78 A 9 December 1982

Noting that the USSR and the USA have been carrying out at Geneva two series of bilateral nuclear arms negotiations, begun on 30 November 1981 and 29 June 1982 respectively, requests the governments of both powers to transmit to the Secretary-General, not later than 1 September 1983, a joint report or two separate reports on the stage reached in their negotiations, for consideration by the General Assembly at its thirty-eighth session; and requests the negotiating parties to bear in mind that not only their national interests but also the vital interests of all the peoples of the world are at stake.

In favour 114
Against 1: USA
Abstaining 32: Australia, Belgium, Bulgaria, Byelorussia, Canada, Cuba, Czechoslovakia, Denmark, France, GDR, FRG, Greece, Grenada, Hungary, Iceland, Israel, Italy, Japan, Lao Republic, Luxembourg, Mongolia, Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Turkey, UK, Ukraine, USSR, Viet Nam
Absent: Dominica, Equatorial Guinea, Lesotho, St Vincent, Samoa,[a] Senegal, Seychelles, Zimbabwe

Albania announced that it was not participating in the vote.

37/100 A 13 December 1982

Calls upon all nuclear weapon states to agree to a freeze on nuclear weapons which would,

inter alia, provide for a simultaneous total stoppage of any further production of nuclear weapons and a complete cut-off in the production of fissionable material for weapons purposes.

In favour 122
Against 16: Australia, Belgium, Canada, France, FRG, Israel, Italy, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Turkey, UK, USA
Abstaining 6: China, Denmark, Guatemala, Iceland, Japan, Somalia
Absent: Albania, Antigua and Barbuda, Belize, Cape Verde, Dominica, Gambia, Ivory Coast, Kampuchea, St Vincent, Samoa,[a] Seychelles, Zimbabwe

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37/100 B 13 December 1982

Urges the USSR and the USA, as the two major nuclear weapon states, to proclaim, either through simultaneous unilateral declarations or through a joint declaration, an immediate nuclear arms freeze which would be a first step towards a comprehensive programme of disarmament. It would embrace: a comprehensive test ban of nuclear weapons and of their delivery vehicles; the complete cessation of the manufacture of nuclear weapons and of their delivery vehicles; a ban on all further deployment of nuclear weapons and of their delivery vehicles; and the complete cessation of the production of fissionable material for weapons purposes. The freeze would be subject to all relevant measures and procedures of verification which have already been agreed to in the SALT I and SALT II treaties, as well as those agreed upon in principle during the preparatory trilateral negotiations on a comprehensive test ban held at Geneva.

The freeze would be of an original five-year duration, subject to prolongation if other nuclear weapon states join.

In favour 119
Against 17: Australia, Belgium, Canada, France, FRG, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Turkey, UK, USA
Abstaining 5: Denmark, Guatemala, Iceland, Philippines, Somalia
Absent: Albania, Antigua and Barbuda, Belize, Cape Verde, China, Dominica, Gambia, Ivory Coast, Kampuchea, Morocco, St Vincent, Samoa,[a] Seychelles, Thailand, Zimbabwe

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Nuclear tests

37/73 9 December 1982

Reiterates its grave concern that, despite the express wishes of the overwhelming majority of states, nuclear weapon testing continues unabated; notes that the Committee on Disarmament established on 21 April 1982 an *ad hoc* working group and requested it to discuss and define, through substantive examination, issues relating to verification and compliance with a view to making further progress towards a nuclear test ban; and to take into account all existing proposals and future initiatives and report on the progress of its work. Requests the CD to continue the consideration of the issues under its mandate and to take the necessary steps to initiate substantive negotiations in order that the draft of a comprehensive nuclear test ban treaty may be submitted to the General Assembly at the earliest possible date; and urges all members of the CD, in particular the nuclear weapon states, to co-operate in fulfilling these tasks. Also requests the CD to determine the institutional and administrative arrangements necessary for establishing, testing and operating an international seismic monitoring network and an effective verification system.

In favour 111
Against 1: USA
Abstaining 35: Afghanistan, Angola, Argentina, Bolivia, Brazil, Bulgaria, Byelorussia, Chile, China, Cuba, Czechoslovakia, France, GDR, Grenada, Hungary, India, Israel, Lao Republic, Madagascar, Mexico, Mongolia, Mozambique, Nicaragua, Nigeria, Panama, Peru, Poland, Sao Tome and Principe, Tanzania, Uganda, UK, Ukraine, USSR, Venezuela, Viet Nam
Absent: Dominica, Equatorial Guinea, Iran, Lesotho, St Vincent, Samoa,[a] Seychelles, Zimbabwe

Albania announced that it was not participating in the vote.

37/72 9 December 1982

Reiterates its grave concern that nuclear weapon testing continues unabated against the wishes of the overwhelming majority of states; urges all states that have not yet done so to adhere without further delay to the Treaty banning nuclear weapon tests in the atmosphere, in outer space and under water and, meanwhile, to refrain from testing in the

environments covered by that Treaty; and urges the three original parties to that Treaty (the UK, the USA and the USSR) to achieve the discontinuance of all test explosions of nuclear weapons for all time and to continue negotiations to this end.

Urges likewise all members of the Committee on Disarmament: to assign to its *ad hoc* working group a mandate which should provide for the multilateral negotiation of a treaty for the prohibition of all nuclear weapon tests, to be initiated immediately after the 1983 session of the CD has begun; and to exert their best endeavours in order that the CD may transmit to the General Assembly at its thirty-eighth regular session the multilaterally negotiated text of such a treaty.

Calls upon the states depositaries of the Partial Test Ban Treaty and the Non-Proliferation Treaty, by virtue of their special responsibilities under those two treaties and as a provisional measure, to bring to a halt without delay all nuclear test explosions, either through a trilaterally agreed moratorium or through three unilateral moratoria.

In favour 124
Against 2: UK, USA
Abstaining 19: Australia, Belgium, Canada, China, Denmark, France, FRG, Greece, Iceland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Turkey
Absent: Antigua and Barbuda, Dominica, Equatorial Guinea, Kampuchea, Lesotho, St Lucia, St Vincent, Samoa,[d] Seychelles, Zimbabwe

Albania announced that it was not participating in the vote.

37/85 9 December 1982

Urges the Committee on Disarmament to proceed promptly to practical negotiations to elaborate a draft treaty on the complete and general prohibition of nuclear weapon tests; refers to the CD for its consideration the basic provisions of such a treaty submitted by the USSR, the text of which is annexed to the present resolution, as well as the proposals and observations of other states on the question, made in the course of the current session; calls upon all the nuclear weapon states, as a gesture of goodwill and with a view to creating more favourable conditions for the formulation of a treaty, not to conduct any nuclear explosions as from the date agreed among them and until the treaty is concluded, with appropriate declarations being made by them to that effect well in advance.

In favour 115
Against 5: Australia,[d] China, France, UK, USA
Abstaining 25: Belgium, Canada, Denmark, FRG, Greece, Guatemala, Iceland, Israel, Italy, Ivory Coast, Japan, Lebanon, Luxembourg, Malawi, Netherlands, New Zealand, Norway, Papua New Guinea, Paraguay, Portugal, Saudi Arabia, Solomon Islands, Somalia, Spain, Turkey
Absent: Antigua and Barbuda, Comoros, Dominica, Equatorial Guinea, Kampuchea, Lesotho, St Vincent, Samoa,[a] Seychelles, Zimbabwe

Albania announced that it was not participating in the vote.

Non-use of nuclear weapons and prevention of nuclear war

37/80 9 December 1982

Welcomes the conclusion of the Committee on Disarmament that there is continuing recognition of the urgent need to reach agreement on effective international arrangements to assure non-nuclear weapon states against the use or threat of use of nuclear weapons; requests the CD to continue negotiations and calls upon states to elaborate and conclude an international instrument of a legally binding character, such as an international convention, on this matter. Calls once again upon all nuclear weapon states to make solemn declarations, identical in substance, concerning the non-use of nuclear weapons against non-nuclear weapon states having no such weapons on their territories, as a first step towards the conclusion of an international convention, and recommends that the Security Council should examine such declarations and, if they all meet the above-mentioned objective, should adopt an appropriate resolution approving them.

In favour 108
Against 17: Australia, Belgium, Canada, Denmark, France, FRG, Iceland, Italy, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Turkey, UK, USA
Abstaining 19: Austria, Burma, Guatemala, India, Ireland, Israel, Ivory Coast, Japan, Lebanon, Malawi, Paraguay, Peru, Philippines, Saudi Arabia, Singapore, Somalia, Sweden, Uruguay, Zaire

Absent: Bhutan, China, Dominica, Equatorial Guinea, Kampuchea, Lesotho, Malta, St Vincent, Samoa,[a] Seychelles, Zimbabwe

Albania announced that it was not participating in the vote.

37/81 9 December 1982

Notes with satisfaction that in the Committee on Disarmament there is no objection, in principle, to the idea of an international convention to assure non-nuclear weapon states against the use or threat of use of nuclear weapons; appeals to all states, especially the nuclear weapon states, to demonstate the political will necessary to reach agreement on a common approach and, in particular, on a common formula which could be included in an international instrument of a legally binding character; recommends that further intensive efforts should be devoted to the search for such a common approach or common formula and that the CD should actively continue negotiations to reach early agreement.

In favour 144
Against 0
Abstaining 3: India, UK, USA
Absent: Bhutan, Dominica, Equatorial Guinea, Lesotho, St Vincent, Samoa,[a] Seychelles, Zimbabwe

Albania announced that it was not participating in the vote.

37/78 J 9 December 1982

Considers that the solemn declarations by two nuclear weapon states made or reiterated at the Second Special Session on disarmament, concerning their respective obligations not to be the first to use nuclear weapons, offer an important avenue to decrease the danger of nuclear war, and expresses the hope that the other nuclear weapon states will consider making similar declarations.

In favour 112
Against 19: Australia, Belgium, Canada, Denmark, France, FRG, Iceland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Turkey, UK, USA
Abstaining 15: Austria, Bahamas, China, Finland, Guatemala, Ivory Coast, Malawi, Malaysia, Paraguay, Philippines, Rwanda, Saudi Arabia, Singapore, Uruguay, Zaire
Absent: Dominica, Equatorial Guinea, Kampuchea, Lesotho, Malta, St Vincent, Samoa,[a] Seychelles, Zimbabwe

Albania announced that it was not participating in the vote.

37/100 C 13 December 1982

Requests the Committee on Disarmament to undertake, on a priority basis, negotiations with a view to achieving agreement on an international convention prohibiting the use or threat of use of nuclear weapons under any circumstances, taking as a basis the text of the annexed draft.

In favour 117
Against 17: Australia, Belgium, Canada, Denmark, France, FRG, Iceland, Italy, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Turkey, UK, USA
Abstaining 8: Austria, Finland, Greece, Guatemala, Ireland, Israel, Japan, Paraguay
Absent: Albania, Antigua and Barbuda, Bahamas, Belize, Cape Verde, Dominica, Gambia, Ivory Coast, Kampuchea, St Vincent, Samoa,[a] Seychelles, Upper Volta, Zimbabwe

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37/78 I 9 December 1982

Requests the Committee on Disarmament to undertake, as a matter of the highest priority, negotiations with a view to achieving agreement on appropriate and practical measures for the prevention of a nuclear war.

In favour 130
Against 0
Abstaining 17: Australia, Belgium, Canada, Denmark, France, FRG, Iceland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Turkey, UK, USA
Absent: Dominica, Equatorial Guinea, Lesotho, Oman,[a] St Vincent, Samoa,[a] Seychelles, Zimbabwe

Albania announced that it was not participating in the vote.

Nuclear weapon-free zones

37/71 9 December 1982

Regrets that the signature of Additional Protocol I of the Treaty of Tlatelolco by France has not yet been followed by ratification, and urges France not to delay the ratification any further.

In favour 136
Against 0
Abstaining 7: Argentina, Cuba, France, Guyana, Malawi, Mali, Venezuela
Absent: Antigua and Barbuda, Bahamas,[a] Belize, Djibouti, Dominica, Equatorial Guinea, Lesotho, St Lucia, St Vincent, Samoa,[a] Seychelles, Zimbabwe

Albania announced that it was not participating in the vote.

37/74 A 9 December 1982

Reiterates its call upon all states to consider and respect the continent of Africa and its surrounding areas as a nuclear weapon-free zone; calls upon all states, corporations, institutions and individuals to terminate forthwith all military and nuclear collaboration with the racist regime of South Africa, including the provision to it of such materials as computers, electronic equipment and related technology; requests the Security Council to take enforcement measures to prevent any racist regimes from the acquisition of arms or arms technology; and demands that South Africa submit all its nuclear installations and facilities for inspection by the International Atomic Energy Agency.

In favour 134
Against 0
Abstaining 13: Belgium, Canada, France, FRG, Israel, Italy, Luxembourg, Malawi, Netherlands, Portugal, Sao Tome and Principe,[a] UK, USA
Absent: Dominica, Equatorial Guinea, Guatemala, Lesotho, Paraguay, St Vincent, Samoa,[a] Seychelles, Zimbabwe

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37/75 9 December 1982

Urges all parties directly concerned to consider taking the practical and urgent steps required for the implementation of the proposal to establish a nuclear weapon-free zone in the Middle East and, as a means of promoting this objective, invites them to adhere to the Non-Proliferation Treaty; calls upon all countries of the region that have not done so, pending the establishment of the zone, to place all their nuclear activities under IAEA safeguards; to declare their support for establishing such a zone in the region, and to deposit those declarations with the Security Council; and not to develop, produce, test or otherwise acquire nuclear weapons or permit the stationing on their territories, or territories under their control, of nuclear weapons or nuclear explosive devices. Invites the nuclear weapon states and all other states to render their assistance to the establishment of the zone and at the same time to refrain from any action that runs counter to both the letter and spirit of the present resolution.

Adopted without vote

37/76 9 December 1982

Reaffirms its endorsement, in principle, of the concept of a nuclear weapon-free zone in South Asia; urges once again the states of South Asia and such other neighbouring non-nuclear weapon states as may be interested to continue to make all possible efforts to establish such a zone in South Asia and to refrain, in the meantime, from any action contrary to this objective; and calls upon those nuclear-weapon states which have not done so to respond positively to this proposal and to extend the necessary co-operation in the efforts to establish the zone.

In favour 99[e]
Against 2: Bhutan, India
Abstaining 45: Afghanistan, Algeria, Angola, Argentina, Australia, Austria, Bahamas, Belize, Benin, Bolivia, Brazil, Bulgaria, Burma, Byelorussia, Congo, Cuba, Cyprus, Czechoslovakia, Denmark, Ethiopia, Fiji, France, GDR, Grenada, Hungary, Indonesia, Israel, Italy, Ivory Coast, Lao Republic, Libya, Madagascar, Mongolia, Mozambique, Nicaragua, Norway, Poland, Sao Tome and Principe, Sweden, UK, Ukraine, USSR, Vanuatu, Viet Nam, Yugoslavia
Absent: Dominica, Equatorial Guinea, Lesotho, Mauritius, St Vincent, Samoa, Seychelles, Suriname, Zimbabwe

Albania announced that it was not participating in the vote.

37/99 F 13 December 1982

Recalling its resolution 3472(XXX) of 11 December 1975 on the comprehensive study of the question of nuclear weapon-free zones in all its aspects, decides that a study should be undertaken to review and supplement the comprehensive study in the light of information and experience accumulated since 1975 and requests the Secretary-General, with the assistance of an *ad hoc* group of qualified governmental experts, to carry it out and to submit it to the General Assembly at its thirty-ninth session.

In favour 141
Against 1: India
Abstaining 2: Guyana, USA
Absent: Albania, Antigua and Barbuda, Belize, Bhutan, Cape Verde, Dominica, Gambia, Ivory Coast, St Vincent, Samoa,[a] Seychelles, Zimbabwe

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Indian Ocean as a zone of peace

37/96 13 December 1982

Emphasizes its decision to convene the Conference at Colombo as a necessary step for the implementation of the Declaration of the Indian Ocean as a zone of peace, adopted in 1971, and requests the *Ad Hoc* Committee on the Indian Ocean to accomplish the necessary preparatory work for the Conference, including consideration of its convening not later than the first half of 1984.

Adopted without vote

Non-proliferation of nuclear weapons

37/74 B 9 December 1982

Deplores the massive build-up of South Africa's military machine, including its acquisition of a nuclear weapon capability for repressive and aggressive purposes and as an instrument of blackmail; reaffirms that the racist regime's acquisition of nuclear capability constitutes a very grave danger to international peace and security and, in particular, jeopardizes the security of African states and increases the danger of the proliferation of nuclear weapons; and demands that South Africa respect international concern for peace and stability in Africa by terminating forthwith its development of the capability to produce nuclear weapons.

In favour 132
Against 4: France, Israel, UK, USA
Abstaining 11: Australia, Belgium, Canada, FRG, Italy, Japan, Luxembourg, Malawi, Netherlands, New Zealand, Portugal
Absent: Dominica, Equatorial Guinea, Guatemala, Lesotho, Paraguay, St Vincent, Samoa,[a] Seychelles, Zimbabwe

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37/82 9 December 1982

Taking note of the report of the Secretary-General on Israeli nuclear armament, reaffirms the demand that Israel renounce, without delay, any possession of nuclear weapons and place all its nuclear activities under international safeguards; calls upon all states and other parties and institutions to terminate forthwith all nuclear collaboration with Israel; requests the Security Council to investigate Israel's nuclear activities and the collaboration of other states, parties and institutions in these activities; condemns Israel's officially declared intention to repeat its armed attack against nuclear facilities; and requests the Secretary-General, in co-operation with the Organization of African Unity and the League of Arab States, to follow closely the nuclear and military collaboration between Israel and South Africa and the dangers it constitutes to peace and security and to efforts aimed at the establishment of nuclear weapon-free zones in Africa and the Middle East.

In favour 106
Against 2: Israel, USA
Abstaining 34: Australia, Austria, Belgium, Burma, Canada, Chile, Colombia, Denmark, Dominican Republic, Fiji, Finland, France, FRG, Guatemala, Haiti, Iceland, Ireland, Italy, Ivory Coast, Jamaica, Japan, Luxembourg, Malawi, Nepal, Netherlands, New Zealand, Norway, Papua New Guinea, Paraguay, Portugal, St Lucia, Sweden, UK, Uruguay
Absent: Antigua and Barbuda, Costa Rica, Dominica, Equatorial Guinea, Gabon, Honduras, Lesotho, St Vincent, Samoa,[a] Seychelles, Singapore, Swaziland, Zaire, Zimbabwe

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37/19 19 November 1982

Urges all states to strive for effective international co-operation in carrying out the work of the IAEA and to implement strictly the mandate of its statute, in promoting the use of nuclear energy and the application of nuclear science and technology for peaceful purposes; in strengthening technical assistance and co-operation for developing countries; and in ensuring the effectiveness of the IAEA safeguards system; considers that Israel's threat to repeat its armed attack against nuclear facilities, as well as any other armed attack against such facilities, constitutes a serious threat to the role and activities of the IAEA in the development and further promotion of nuclear energy for peaceful purposes; and affirms its confidence in the role of the IAEA in the application of nuclear energy for peaceful purposes.

In favour 105
Against 2: Israel, USA
Abstaining 25: Australia, Austria, Belgium,

Canada, Denmark, Finland, France, FRG, Greece, Iceland, Ireland, Italy, Japan, Liberia, Luxembourg, Malawi, Netherlands, New Zealand, Norway, Paraguay, Portugal, Spain, Sweden, Turkey, UK
Absent: Antigua and Barbuda, Bahamas, Belize, Bolivia, Botswana, Burma, China, Comoros, Costa Rica, Djibouti, Dominica, El Salvador, Grenada, Haiti, Iran, Kampuchea, Lesotho, Rwanda, St Vincent, Seychelles, Swaziland, Upper Volta, Zaire, Zimbabwe

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Chemical and biological weapons

37/98 B 13 December 1982

Reaffirming the necessity of strict observance by all states of the principles and objectives of the Geneva Protocol for the prohibition of the use in war of asphyxiating, poisonous or other gases, and of bacteriological methods of warfare, of 17 June 1925, and of the adherence by all states to the 1972 Convention on the prohibition of the development, production and stockpiling of bacteriological (biological) and toxin weapons and on their destruction, expresses its regret that an agreement on the complete and effective prohibition of the development, production and stockpiling of all chemical weapons and on their destruction has not yet been elaborated; and urges the Committee on Disarmament, as a matter of high priority, to intensify elaboration of such a convention during its session in 1983.

Adopted without vote

37/98 A 13 December 1982

Taking into consideration the decision by the Committee on Disarmament on the new mandate for the *Ad Hoc* Working Group on chemical weapons as well as the work of the Group during the 1982 session of the CD, and taking note of the proposals on the creation of chemical weapon-free zones aimed at facilitating the complete prohibition of chemical weapons, urges the CD to intensify the negotiations to achieve accord on a chemical weapons convention at the earliest possible date; calls upon the USSR and the USA to resume, at the earliest possible date, their bilateral negotiations on the prohibition of chemical weapons and to submit their joint proposal to the CD; and reaffirms its call to all states to refrain from any action that could impede negotiations on the prohibition of chemical weapons and specifically to refrain from the production and deployment of binary and other new types of chemical weapons, as well as from stationing chemical weapons on the territory of other states.

In favour 95[f]
Against 1: USA
Abstaining 46: Australia, Austria, Belgium, Bhutan, Brazil, Burma, Canada, Chile, China, Colombia, Comoros, Denmark, Djibouti, El Salvador, Finland, France, FRG, Greece, Guatemala, Honduras, Iceland, Ireland, Israel, Italy, Japan, Kampuchea, Lebanon, Luxembourg, Malawi, Morocco, Netherlands, New Zealand, Nigeria, Norway, Paraguay, Philippines, Portugal, Saudi Arabia, Somalia, Spain, Sri Lanka, Sudan, Sweden, Turkey, UK, Uruguay
Absent: Albania, Antigua and Barbuda, Belize, Cape Verde, Dominica, Equatorial Guinea, Gambia, Ivory Coast, Mauritius,[a] Rwanda, St Vincent, Samoa, Seychelles, Vanuatu

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37/98 E 13 December 1982

Having examined the report of the Group of Experts to investigate reports on the alleged use of chemical weapons, which was appointed by the Secretary-General pursuant to General Assembly resolutions 35/144 C of 12 December 1980 and 36/96 C of 9 December 1981, and noting the final conclusion of the Group that, while it could not state that the allegations had been proven, it nevertheless could not disregard the circumstantial evidence suggestive of the possible use of some sort of toxic chemical substance in some instances, takes note of the report and calls anew for strict observance by all states of the principles and objectives of the 1925 Geneva Protocol and condemns all actions that are contrary to these objectives.

In favour 83
Against 22: Afghanistan, Angola, Bulgaria, Byelorussia, Congo, Cuba, Czechoslovakia, Ethiopia, GDR, Grenada, Hungary, Lao Republic, Libya, Mongolia, Mozambique, Poland, Romania, Syria, Ukraine, USSR, Viet Nam, Dem. Yemen
Abstaining 33: Algeria, Argentina, Bahrain, Bangladesh, Bhutan, Brazil, Burma, Burundi, Cameroon, Cyprus, Finland, Ghana, Guinea, Guinea-Bissau, India, Indonesia, Iraq, Jamaica, Kuwait, Mali, Mexico, Nepal, Nicaragua, Panama, Peru, Qatar, Sri Lanka, Tanzania, Uganda, United Arab Emirates, Venezuela, Yemen, Yugoslavia
Absent: Albania, Antigua and Barbuda, Belize, Benin, Cape Verde, Dominica,

Equatorial Guinea, Gambia, Iran, Ivory Coast, Jordan, Madagascar, Maldives, St Vincent, Samoa,[a] Sao Tome and Principe, Seychelles, Vanuatu

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37/98 D 13 December 1982

Requests the Secretary-General to investigate, with the assistance of qualified experts, information that may be brought to his attention by any member state concerning activities that may constitute a violation of the 1925 Geneva Protocol for the prohibition of the use in war of asphyxiating, poisonous or other gases, and of bacteriological methods of warfare, or of the relevant rules of customary international law, in order to ascertain thereby the facts of the matter, and promptly to report the results of any such investigation to all member states and to the General Assembly; requests the Secretary-General, with the co-operation of member states, to compile, as a matter of priority, and maintain lists of qualified experts whose services could be made available at short notice to undertake such investigations, and of laboratories which could undertake testing for the presence of agents the use of which is prohibited.

Requests the Secretary-General, in meeting the above objectives: to appoint, as necessary, groups of experts selected from the list to undertake urgent investigation of possible violations; to make the necessary arrangements for the experts to collect and examine evidence, including on-site, with the co-operation of the countries concerned, to the extent relevant to the investigation, and for such testing as may be required; and to seek, in any such investigation, appropriate assistance and relevant information from all governments and international organizations as well as other appropriate sources. Further requests the Secretary-General, with the assistance of qualified consultant experts, to devise procedures for the timely and efficient investigation of information concerning activities that may constitute a violation of the Geneva Protocol or the relevant rules of customary international law and to assemble and organize systematically documentation relating to the identification of signs and symptoms associated with the use of agents as a means of facilitating such investigation and medical treatment that may be required; requests governments, national and international organizations, as well as scientific and research institutions, to co-operate fully with the Secretary-General in this work.

In favour 86[g]
Against 19: Afghanistan, Bulgaria, Byelorussia, Congo, Cuba, Czechoslovakia, Ethiopia, GDR, Grenada, Hungary, Lao Republic, Libya, Mongolia, Poland, Syria, Ukraine, USSR, Viet Nam, Dem. Yemen
Abstaining 33: Algeria, Argentina, Bahrain, Bhutan, Bolivia, Brazil, Burma, Burundi, Cyprus, Finland, Ghana, Guinea, Guinea-Bissau, Guyana, Iraq, Jordan, Kuwait, Madagascar, Mali, Mexico, Mozambique, Nicaragua, Panama, Peru, Qatar, Sierra Leone, Sri Lanka, Tanzania, Uganda, United Arab Emirates, Venezuela, Yemen, Yugoslavia
Absent: Albania, Angola, Antigua and Barbuda, Belize, Benin, Cape Verde, Dominica, Equatorial Guinea, Gabon, Gambia, Iran, Ivory Coast, Mauritius,[a] St Vincent, Samoa,[a] Sao Tome and Principe, Seychelles, Vanuatu

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37/98 C 13 December 1982

Convinced that the effective implementation and functioning of the Convention on the prohibition of the development, production and stockpiling of bacteriological (biological) and toxin weapons through the application of an adequate complaint and verification procedure will enhance international peace and security, recommends that the states parties should hold a special conference as soon as possible to establish a flexible, objective and non-discriminating procedure to deal with issues concerning compliance with the Convention. Requests the Secretary-General to render the necessary assistance and to provide such services as may be required for the conference.

In favour 124
Against 15: Afghanistan, Bulgaria, Byelorussia, Cuba, Czechoslovakia, GDR, Grenada, Hungary, Lao Republic, Mongolia, Mozambique, Poland, Ukraine, USSR, Viet Nam
Abstaining 1: Guinea
Absent: Albania, Antigua and Barbuda, Belize, Cape Verde, China, Dominica, Equatorial Guinea, Ethiopia, Gambia, Ivory Coast, Mauritius,[a] St Vincent, Samoa,[a] Seychelles, Vanuatu, Dem. Yemen

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Radiological weapons

37/99 C 13 December 1982

Requests the Committee on Disarmament to continue negotiations with a view to an early conclusion of the elaboration of a treaty prohibiting the development, production, stockpiling and use of radiological weapons,

in order that it may be submitted to the General Assembly at its thirty-eighth session, and requests the Committee to continue its search for a solution to the question of prohibition of military attacks on nuclear facilities.

Adopted without vote

New weapons of mass destruction

37/77 A 9 December 1982

Requests the Committee on Disarmament, in the light of its existing priorities, to intensify negotiations, with the assistance of qualified governmental experts, with a view to preparing a draft comprehensive agreement on the prohibition of the development and manufacture of new types of weapons of mass destruction and new systems of such weapons, and to draft possible agreements on particular types of such weapons; urges all states to refrain from any action which could adversely affect the talks aimed at working out an agreement or agreements to prevent the emergence of new types of weapons of mass destruction; and calls upon the permanent members of the Security Council as well as upon other militarily significant states to make declarations, identical in substance, concerning the refusal to create new types of weapons of mass destruction and new systems of such weapons, as a first step towards the conclusion of a comprehensive agreement on this subject.

In favour 119
Against 0
Abstaining 26: Australia, Austria, Belgium, Canada, Denmark, France, FRG, Greece, Guatemala, Iceland, Ireland, Israel, Italy, Ivory Coast, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Saudi Arabia, Spain, Sweden, Turkey, UK, USA
Absent: China, Colombia,[a] Dominica, Equatorial Guinea, Kampuchea, Lesotho, St Vincent, Samoa,[a] Seychelles, Zimbabwe

Albania announced that it was not participating in the vote.

Conventional weapons

37/79 9 December 1982

Recalling the adoption, on 10 October 1980, of the Convention on prohibitions or restrictions on the use of certain conventional weapons which may be deemed to be excessively injurious or to have indiscriminate effects, together with the Protocol (I) on non-detectable fragments, the Protocol (II) on prohibitions or restrictions on the use of mines, booby traps and other devices, and the Protocol (III) on prohibitions or restrictions on the use of incendiary weapons, urges those states that have not yet done so to exert the best of their endeavours to become parties to the Convention and the Protocols as early as possible, so as to obtain their entry into force and, ultimately, their universal adherence.

Adopted without vote

Regional disarmament

37/100 F 13 December 1982

Expresses the hope that governments, where circumstances of the region permit, will consult with each other on appropriate regional disarmament measures, which could be taken at the initiative and with the participation of all the states concerned; and encourages governments to consider the possible establishment or strengthening at the regional level, where appropriate, of institutional arrangements capable of promoting the implementation of such measures.

Adopted without vote

Military expenditures

37/95 B 13 December 1982

Recalling that an international system for standardized reporting of military expenditures has been introduced in pursuance of General Assembly resolution 35/142 B of 12 December 1980 and that annual reports on military expenditures are now being received from a number of member states, stresses the need for increasing the number of reporting states with a view to the broadest possible participation from different geographic regions and representing different budgeting systems; reiterates its recommendation that all member states should report annually by 30 April to the Secretary-General, by using the reporting instrument, their military expenditures of the latest fiscal year for which data are available; and requests the Secretary-General to make the collecting and assembling of data on military expenditures, reported by states on the basis of the reporting instrument, an integral part of his normal statistical

services and to arrange and publish these data according to statistical practice. Requests the Secretary-General, with the assistance of a group of qualified experts and with the voluntary co-operation of states, to undertake the task of constructing price indices and purchasing power parities for the military expenditures of participating states and to submit progress reports to the General Assembly at its thirty-eighth and thirty-ninth sessions, and a final report to the Assembly at its fortieth session.

In favour 96
Against 13: Afghanistan, Bulgaria, Byelorussia, Cuba, GDR, Grenada, Hungary, Lao Republic, Mongolia, Poland, Ukraine, USSR, Viet Nam
Abstaining 9: Angola, Argentina, Brazil, China, Congo, Ghana, India, Mozambique, Zambia
Absent: Albania, Algeria, Antigua and Barbuda, Belize, Botswana, Burma, Cape Verde, Central African Republic, Chad,[a] Costa Rica, Czechoslovakia,[h] Dominica, Egypt,[a] Equatorial Guinea, Ethiopia, Gambia, Guatemala, Guinea-Bissau, Iran, Ivory Coast, Kenya, Libya, Maldives, Mauritius,[a] Nicaragua, Niger, Philippines, St Lucia, St Vincent, Samoa,[a] Sao Tome and Principe, Seychelles, Solomon Islands, Swaziland, Uganda, Vanuatu, Dem. Yemen, Zimbabwe

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37/95 A 13 December 1982

Declares its conviction that it is possible to achieve international agreements on reduction of military budgets without prejudice to the right of all states to undiminished security, self-defence and sovereignty; reaffirms that human and material resources released through the reduction of military expenditures could be reallocated for economic and social development, particularly for the benefit of the developing countries; urges all states, in particular the most heavily armed states, pending the conclusion of agreements on the reduction of military expenditures, to exercise self-restraint in their military expenditures with a view to reallocating the funds thus saved to economic and social development, particularly for the benefit of developing countries; and requests the Disarmament Commission to continue the consideration of the item entitled "Reduction of military budgets" with a view to identifying and elaborating the principles that should govern further actions of states in freezing and reducing military expenditures, keeping in mind the possibility of embodying such principles in a suitable document at an appropriate stage.

Adopted without vote

Research and development

37/99 J 13 December 1982

Noting the impact of military research and development on the arms race, in particular in relation to major weapon systems such as nuclear weapons and other weapons of mass destruction, requests the Secretary-General, with the assistance of qualified governmental experts, to carry out a comprehensive study on the scope, role and direction of the military use of research and development, the mechanisms involved, its role in the overall arms race, in particular the nuclear arms race, and its impact on arms limitation and disarmament, particularly in relation to major weapon systems, such as nuclear weapons and other weapons of mass destruction, with a view to preventing a qualitative arms race and to ensuring that scientific and technological achievements may ultimately be used solely for peaceful purposes. Invites all states to submit to the Secretary-General not later than 15 April 1983 their views on the subject of the study, and to co-operate with the Secretary-General so that the objectives of the study may be achieved. Requests the Secretary-General to report on this subject to the General Assembly at its thirty-ninth session.

In favour 137
Against 0
Abstaining 8: FRG, Italy, Japan, Luxembourg, Netherlands, Turkey, UK, USA
Absent: Albania, Antigua and Barbuda, Belize, Cape Verde, Dominica, Gambia, Ivory Coast, St Vincent, Samoa,[a] Seychelles, Zimbabwe

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37/77 B 9 December 1982

Calls upon all states to undertake efforts to ensure that ultimately scientific and technological achievements may be used solely for peaceful purposes.

In favour 114
Against 10: Belgium, France, FRG, Italy, Luxembourg, Netherlands, Portugal, Turkey, UK, USA
Abstaining 17: Australia, Canada, Colombia, Denmark, Greece, Guatemala, Iceland, Israel, Japan, Lebanon, Liberia, Malawi,

New Zealand, Norway, Paraguay, Saudi Arabia, Spain
Absent: China, Comoros, Costa Rica, Djibouti, Dominica, Equatorial Guinea, Honduras, Kampuchea, Lesotho, St Vincent, Samoa,[a] Senegal, Seychelles, Zimbabwe

Albania announced that it was not participating in the vote.

Outer space

37/99 D 13 December 1982

Noting the grave concern expressed by the Second UN Conference on the exploration and peaceful uses of outer space over the possible extension of an arms race into outer space, requests the Committee on Disarmament to continue consideration of the question of negotiating effective and verifiable agreements aimed at preventing an arms race in outer space, taking into account all existing and future proposals designed to meet this objective and, as a matter of priority, the question of negotiating an effective and verifiable agreement to prohibit anti-satellite systems.

In favour 112[1]
Against 0
Abstaining 29: Afghanistan, Angola, Argentina, Benin, Bulgaria, Byelorussia, Colombia, Cuba, Czechoslovakia, Ecuador, Egypt, GDR, Guinea-Bissau, Hungary, Lao Republic, Lebanon, Madagascar, Mexico, Mongolia, Mozambique, Panama, Peru, Poland, Saudi Arabia, Sri Lanka, Tanzania, Ukraine, USSR, Viet Nam
Absent: Albania, Antigua and Barbuda, Belize, Cape Verde, China, Dominica, Gambia, Ivory Coast, Nicaragua, St Vincent, Samoa,[a] Sao Tome and Principe, Seychelles, Syria, Zimbabwe

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37/83 9 December 1982

Reaffirms the will of all states that outer space shall be used exclusively for peaceful purposes and that it shall not become an arena for an arms race; declares that any use other than for exclusively peaceful purposes of outer space runs counter to the agreed objective of general and complete disarmament under effective international control; emphasizes that further effective measures to prevent an arms race in outer space should be adopted by the international community; calls upon all states, in particular those with major space capabilities, to contribute actively to the objective of peaceful uses of outer space and to take immediate measures to prevent an arms race in outer space; requests the Committee on Disarmament to consider as a matter of priority the question of preventing an arms race in outer space; and further requests the CD to establish an *ad hoc* working group on the subject at the beginning of its session in 1983 with a view to undertaking negotiations for the conclusion of an agreement or agreements, as appropriate, to prevent an arms race in outer space in all its aspects.

In favour 138
Against 1: USA
Abstaining 7: Australia, Belgium, Canada, Israel, Luxembourg, Netherlands, UK
Absent: Antigua and Barbuda, China[a], Dominica, Equatorial Guinea, Lesotho, St Vincent, Samoa,[a] Seychelles, Zimbabwe

Albania announced that it was not participating in the vote.

37/78 K 9 December 1982

Convinced that consideration of the proposal for the establishment of an international satellite monitoring agency should be pursued in all its aspects, takes note of the report and the study on the implications of establishing an international satellite monitoring agency; takes note also of the conclusions of the study regarding the possibilities of establishing such an agency; and requests the Secretary-General to report to the General Assembly at its thirty-eighth session on the practical modalities for implementing these conclusions with respect to the institutional aspects of the draft examined in part V, chapter II, of the study.

In favour 126
Against 9: Bulgaria, Byelorussia, Czechoslovakia, GDR, Hungary, Mongolia, Poland, Ukraine, USSR
Abstaining 11: Afghanistan, Angola, Cuba, Cyprus,[a] Grenada, Lao Republic, Lebanon, Mozambique, USA, Viet Nam, Dem. Yemen
Absent: Dominica, Equatorial Guinea, Ethiopia, Lesotho, St Vincent, Samoa,[a] Sao Tome and Principe, Seychelles, Zimbabwe

Albania announced that it was not participating in the vote.

Disarmament and international security

37/100 E 13 December 1982

Calls upon all states to co-operate towards making more effective the system of security as provided for in the UN Charter, thus

effectively facilitating substantial disarmament; and requests the Security Council—and more significantly its permanent members—to proceed with a sense of urgency to the necessary measures for the effective implementation of the decisions of the Council in accordance with the Charter for the maintenance of international peace and security.

In favour 115
Against 0
Abstaining 28: Afghanistan, Belgium, Brazil,[a] Bulgaria, Byelorussia, Canada, Cuba, Czechoslovakia, France, GDR, FRG, Grenada, Hungary, Italy, Lao Republic, Luxembourg, Malawi, Mongolia, Mozambique, Netherlands, New Zealand, Poland, Portugal, UK, Ukraine, USA, USSR, Viet Nam
Absent: Albania, Antigua and Barbuda, Bahamas,[a] Belize, Cape Verde, Dominica, Gambia, Ivory Coast, St Vincent, Samoa,[a] Seychelles, Turkey, Zimbabwe

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Disarmament and development

37/84 9 December 1982

Requests the Secretary-General to take appropriate administrative action in accordance with the recommendations of the Group of Governmental Experts on the relationship between disarmament and development, as specified in chapter VII of the study prepared by the Group; urges member states to consider appropriate measures in accordance with all relevant recommendations of the Group; determines that the question of reallocation and conversion of resources, through disarmament measures, from military to civilian purposes should be included in the provisional agenda of the General Assembly at intervals to be decided upon, starting with its fortieth regular session in 1985; and recommends that an investigation—with due regard to the capabilities of existing agencies and institutions currently responsible for the international transfer of resources—of the modalities of an international disarmament fund for development should be undertaken by the UN Institute for Disarmament Research, in consultation with other relevant international institutions.

In favour 136
Against 0
Abstaining 10: Bulgaria, Byelorussia, Czechoslovakia, GDR, Hungary, Lao Republic, Mongolia, Poland, Ukraine, USSR
Absent: Antigua and Barbuda, Dominica, Equatorial Guinea, Lesotho, St Vincent, Samoa,[a] Seychelles, Viet Nam, Zimbabwe

Albania announced that it was not participating in the vote.

Confidence building

37/100 D 13 December 1982

Invites all states to consider the possible introduction of confidence-building measures in their particular regions and, where possible, to negotiate them in keeping with the conditions and requirements prevailing in the respective regions; and requests the Disarmament Commission to consider the elaboration of guidelines for appropriate types of confidence-building measures and for the implementation of such measures on a global or regional level.

Adopted without vote

37/78 B 9 December 1982

Calls upon all states to make use of the principles and ideas contained in the 1979 Declaration on international co-operation for disarmament by actively participating in disarmament negotiations, with a view to achieving concrete results, and by conducting them on the basis of equality and undiminished security and the non-use of force in international relations, refraining at the same time from developing new directions and channels of the arms race; declares that the elaboration and dissemination of doctrines and concepts justifying the unleashing of nuclear war endanger world peace, lead to deterioration of the international situation and further intensification of the arms race and are detrimental to the generally recognized necessity of international co-operation for disarmament; and appeals to states which are members of military or political groupings to promote, in the spirit of international co-operation for disarmament, the gradual mutual limitation of military activities of these groupings, thus creating conditions for their dissolution.

In favour 116
Against 12: Belgium, France, FRG, Italy, Japan, Luxembourg, Netherlands, New Zealand, Portugal, Turkey, UK, USA
Abstaining 16: Australia,[b] Austria, Canada,[b] Denmark, Finland, Greece, Iceland,

Ireland, Israel, Norway, Paraguay, Philippines, Saudi Arabia, Spain, Sweden, Uruguay
Absent: Burma, China, Dominica, Equatorial Guinea, Lesotho, St Vincent, Samoa,[a] Seychelles, Singapore, Zimbabwe

Albania and Kampuchea announced that they were not participating in the vote.

Humanitarian laws of war

37/116 16 December 1982

Reiterates its call, contained in General Assembly resolution 34/51, that all states should consider without delay the matter of ratifying or acceding to the two Protocols Additional to the Geneva Conventions of 1949 and relating to the protection of victims of armed conflicts.

Adopted without vote

Disarmament machinery

37/78 G 9 December 1982

Urges the Committee on Disarmament to continue or undertake, during its session to be held in 1983, substantive negotiations on the priority questions of disarmament on its agenda and to provide the existing *ad hoc* working groups with appropriate negotiating mandates and to establish, as a matter of urgency, an *ad hoc* working group on the cessation of the nuclear arms race and nuclear disarmament; further requests the CD to continue, as from the beginning of its session in 1983, its work on the elaboration of a comprehensive programme of disarmament and to submit the revised draft of such a programme to the General Assembly at its thirty-eighth session; and invites the members of the Committee involved in separate negotiations on specific questions of disarmament to intensify their efforts in order to achieve a positive conclusion of those negotiations and to submit a full report.

In favour 131
Against 0
Abstaining 17: Australia, Belgium, Canada, Denmark, France, FRG, Iceland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Turkey, UK, USA
Absent: Dominica, Equatorial Guinea, Lesotho, St Vincent, Samoa,[a] Seychelles, Zimbabwe

Albania announced that it was not participating in the vote.

37/99 K 13 December 1982

I

Requests the Committee on Disarmament to report to the General Assembly at its thirty-eighth session on the review of the membership of the Committee.

II

Bearing in mind the suggestion that the single multilateral disarmament negotiating forum should have the designation of a conference, commends to the Committee on Disarmament that it consider designating itself as a conference.

III

Requests the Secretary-General to revive the Advisory Board on Disarmament Studies.

IV

Decides that the UN Institute for Disarmament Research shall function as an autonomous institution in close relationship with the Department for Disarmament Affairs; be organized in a manner to ensure participation on an equitable political and geographical basis; continue to undertake independent research on disarmament and related security issues; and take into account the recommendations of the General Assembly.

The Secretary-General's Advisory Board on Disarmament Studies shall function as the Board of Trustees of the Institute; the headquarters of the Institute shall be at Geneva and its activities shall be funded by voluntary contributions from states and public and private organizations.

V

Requests the Secretary-General to transform the Centre for Disarmament, appropriately strengthened with the existing overall resources of the United Nations, into a Department for Disarmament Affairs, headed by an Under-Secretary-General and which will be so organized as to reflect fully the principle of equitable geographical distribution.

Adopted without vote

37/78 H 9 December 1982

Notes that the Disarmament Commission was not able to conclude the consideration of several items on its agenda; and requests the Commission to continue its work and to

direct its attention at each substantive session to specific subjects from among those which have been and will be under its consideration, taking into account the relevant resolutions of the General Assembly, and to make concrete recommendations on such subjects to the subsequent session of the Assembly.

Adopted without vote

37/99 B 13 December 1982

Having noted the report of the Independent Commission on Disarmament and Security Issues entitled 'Common Security', submitted to the General Assembly at its Second Special Session on Disarmament, requests the Secretary-General to transmit the report to the Disarmament Commission and requests the Commission to consider those recommendations and proposals in the report that relate to disarmament and arms limitation and to suggest to the General Assembly how best to ensure an effective follow-up thereto within the UN system or otherwise.

Adopted without vote

37/97 13 December 1982

Renews the mandate of the *Ad Hoc* Committee on the World Disarmament Conference; requests the Committee to maintain close contact with the representatives of the states possessing nuclear weapons, in order to remain currently informed of their attitudes, as well as with all other states, and to consider any possible relevant proposals and observations which might be made to the Committee, and to report to the General Assembly at its thirty-eighth session.

Adopted without vote

37/99 H 13 December 1982

Notes that, following appropriate consultations, a preparatory committee for the second review conference of the parties to the Treaty on the prohibition of the emplacement of nuclear weapons and other weapons of mass destruction on the sea-bed and the ocean floor and in the subsoil thereof is to be established prior to holding a review conference in 1983, and requests the Secretary-General to render the necessary assistance and to provide such services as may be required for the conference and its preparation.

Adopted without vote

37/99 I 13 December 1982

Notes that the Secretary-General, as Depositary, intends to convene the review conference of the parties to the Convention on the prohibition of military or any other hostile use of environmental modification techniques called for in the Convention, at the earliest practicable time after 5 October 1983 and that, to that end, he will hold consultations with the parties with regard to questions relating to the conference and its preparation, including the establishment of a preparatory committee for the conference.

In favour 135
Against 0
Abstaining 7: Argentina, Colombia, Ecuador, Jamaica, Mexico, Peru, Venezuela
Absent: Albania, Algeria, Antigua and Barbuda, Belize, Cape Verde, China, Dominica, France, Gambia, Ivory Coast, St Vincent, Samoa,[a] Seychelles, Zimbabwe

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Information and training

37/100 I 13 December 1982

Approves the programme of activities for the World Disarmament Campaign for 1983 proposed in the report of the Secretary-General; reiterates its invitation to all member states that have not yet done so to supplement available UN resources with voluntary contributions; decides that at the thirty-eighth session of the General Assembly there should be a pledging conference of contributions of member states for the World Disarmament Campaign; and declares again that voluntary contributions made by non-governmental organizations, foundations and trusts and other private sources would also be welcome.

Adopted without vote

37/100 H 13 December 1982

Invites member states, in the implementation of the activities within the framework of the World Disarmament Campaign, to take into account various views and opinions expressed at the Second Special Session on Disarmament, including the proposal on launching worldwide action for collecting signatures in support of measures to prevent nuclear war, to curb the arms race and for disarmament; also invites member states to co-operate with the United Nations to ensure a better flow of information with regard to the various aspects

of disarmament and to avoid dissemination of false and tendentious information; and takes note of the programme of activities for 1983 in the framework of the World Disarmament Campaign suggested in the report of the Secretary-General.

In favour 108
Against 0
Abstaining 33: Argentina, Australia, Austria, Belgium, Brazil, Canada, Colombia, Denmark, El Salvador, Finland, France, FRG, Greece, Guatemala, Iceland, Ireland, Israel, Italy, Luxembourg, Netherlands, New Zealand, Norway, Paraguay, Portugal, Saudi Arabia, Spain, Sri Lanka, Sweden, Turkey, UK, Uruguay, USA, Venezuela
Absent: Albania, Antigua and Barbuda, Belize, Burma, China, Dominica, Gambia, Ivory Coast, Kampuchea, St Vincent, Samoa,[a] Seychelles, Singapore, Suriname, Zimbabwe

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37/99 G 13 December 1982

Noting that misperceptions of the military capabilities and the intentions of potential adversaries, which could be caused, *inter alia*, by the lack of objective information, could induce states to undertake armaments programmes leading to the acceleration of the arms race, in particular the nuclear arms race, and to heightened international tensions, and aware that objective information on military capabilities could contribute to the building of confidence among states and to the conclusion of concrete disarmament agreements and, thereby, help to halt and reverse the arms race, calls upon all states, in particular nuclear weapon states and other militarily significant states, to consider additional measures to facilitate objective information on, as well as objective assessments of, military capabilities; and invites all states to communicate to the Secretary-General their views and proposals concerning such measures.

In favour 120
Against 0
Abstaining 17: Afghanistan, Bulgaria, Byelorussia, Cuba, Czechoslovakia, GDR, Guyana, Hungary, India, Lao Republic, Mongolia, Mozambique, Poland, Ukraine, USSR, Viet Nam, Zambia
Absent: Albania, Antigua and Barbuda, Belize, Cape Verde, China, Dominica, Dominican Republic, Ethiopia, Gambia, Ivory Coast, Libya, Nicaragua, St Vincent, Samoa,[a] Sao Tome and Principe, Seychelles, Syria, Dem. Yemen, Zimbabwe

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37/100 J 13 December 1982

Calls upon member states to facilitate the flow of a broad range of accurate information on disarmament matters, both governmental and non-governmental, to and among their citizens, with a view to the furtherance of the objectives of the World Disarmament Campaign and in order to advance the final objective of general and complete disarmament under effective international control; and calls upon states to encourage their citizens freely and publicly to express their own views on disarmament questions and to organize and meet publicly for that purpose.

Adopted without vote

37/70 9 December 1982

Welcomes the updated report of the Secretary-General on the economic and social consequences of the arms race and of military expenditures; recommends that the conclusions of the report should be brought to the attention of public opinion and be taken into account in future actions by the United Nations in the field of disarmament; reaffirms its decision to keep the item on the consequences of the armaments race under constant review and decides to include it in the provisional agenda of its fortieth session.

Adopted without vote

37/100 G 13 December 1982

Recalling the Concluding Document of the Second Special Session on Disarmament, in which it decided to increase the number of fellowships on disarmament from 20 to 25 as from 1983, requests the Secretary-General to make the necessary arrangements for the implementation of the fellowship programme.

Adopted without vote

37/78 D 9 December 1982

Noting the support for the decision taken by the General Assembly at its tenth special session regarding the proclamation of the week starting 24 October, the day of the foundation of the United Nations, as a week devoted to fostering the objectives of disarmament, invites all states, in carrying out appropriate measures at the local level

on the occasion of the Disarmament Week, to take into account the elements of the model programme prepared by the Secretary-General; invites the relevant specialized agencies and the IAEA to intensify activities, within their areas of competence, to disseminate information on the consequences of the arms race; and invites international non-governmental organizations to take an active part in the Disarmament Week.	Adopted without vote

[a] Later advised the Secretariat it had intended to vote in favour.
[b] Kuwait and Oman later advised the Secretariat they had intended to abstain.
[c] Cuba later advised the Secretariat it had intended to abstain.
[d] Later advised the Secretariat it had intended to abstain.
[e] Syria later advised the Secretariat it had intended not to participate in the vote.
[f] India later advised the Secretariat it had intended to abstain.
[g] India later advised the Secretariat it had intended to vote against.
[h] Later advised the Secretariat it had intended to vote against.
[i] Indonesia later advised the Secretariat it had intended to abstain.

19. Negotiations for conventional force reductions and security in Europe[1]

Square-bracketed numbers, thus [1], *refer to the list of references on page 608.*

I. Mutual force reduction talks

In 1982 the Warsaw Treaty Organization (WTO) and the North Atlantic Treaty Organization (NATO) presented separate draft treaties at the Mutual Force Reduction (MFR) talks in Vienna.[2] This was the first time in the 10-year history of these talks that treaties had been placed on the negotiating table. It is important to examine the treaties closely to determine if they indicate significant new movement toward bridging differences or whether, on the contrary, they symbolize more final static postures. In 10 years of negotiations on conventional force reductions in Europe the MFR talks have produced no results and a signed treaty has so far seemed unlikely. There has been progress, however, in identifying some common ground and in highlighting the issues which seem continually to escape negotiated solutions, such as the problem of reaching agreement on data on the size of military forces, confidence-building and verification procedures, and commitments by all participants in the talks to reduce forces together.

From the start of the preliminary talks in January 1973 and the formal talks in October 1973 there has been a basic difference of approach between the 12 NATO and the 7 WTO countries.[3] The West sought asymmetrical reductions to reach parity, based on the view that the East's

[1] The section of this chapter on the MFR negotiations was written by David Barton, and by Sigrid Pöllinger, Director of the Austrian Institute for Peace Research, Vienna, Austria. The section on the CSCE was written by Ulf Reinius.

[2] The talks at Vienna started in 1973 with a controversy over a name for the negotiations. The West suggested "Mutual Balanced Force Reduction Talks", or MBFR, but the East objected to the word "balanced". Agreement was eventually reached on the rather cumbersome title "Mutual Reduction of Forces and Armaments and Associated Measures in Central Europe", or MURFAAMCE. The controversy over the word "balanced" was not incidental. The important question was whether or not a balance of forces already existed. The WTO countries maintain that it does, while the NATO countries maintain that it does not. SIPRI will continue the practice of referring to the talks as the Mutual Force Reduction (MFR) talks. The talks are still commonly referred to as the MBFR talks, particularly in the NATO countries. For further background on this initial controversy at Vienna see references [1–3].

[3] There are two categories of participants at the Vienna talks. The first group is the eleven direct participants—countries which have forces in Central Europe (the United States, Canada, the United Kingdom, FR Germany, the Benelux countries, the Soviet Union, the German DR, Poland, and Czechoslovakia). The second group is the eight special participants which do not have forces in Central Europe (Bulgaria, Hungary, Roumania, Norway, Denmark, Italy, Greece, and Turkey). Although France has troops stationed in FR Germany, it does not participate in the negotiations.

military establishment enjoys significant advantages in manpower, tanks, and a geographic setting which facilitates rapid reinforcements. The East sought reductions which were equal in numbers and timing because the WTO assumed a starting-point of parity in forces established in Europe after World War II.

While this basic difference in approach remains, some of the solutions recommended over the years might in time facilitate an agreement.

The history of the talks and chronology of the proposals made show how these two approaches have hindered attempts to resolve the basic issues of shared military force data, verification procedures, and mutual military reductions by all participants. (See also *SIPRI Yearbooks 1974* and *1978*.)

Background to the negotiations

Before the MFR negotiations began in Vienna on 30 October 1973, there was a period of some 25 years during which formal and informal talks took place on how to reduce the East–West military confrontation in Central Europe.[4] Then, in the early 1970s, circumstances and initiatives combined to set the Vienna talks in motion. East–West detente and West German *Ostpolitik* provided a fertile political setting. There was domestic pressure in several NATO countries for unilateral force reductions while the WTO pressed for a European Security Conference [5]. One of the reasons the WTO was anxious to have such a conference was to secure recognition of the post-World War II boundaries in East and West Europe. Then, a four-power agreement was concluded which satisfied Western demands for the security of West Berlin, General Secretary Brezhnev agreed to arms control discussions outside the Security Conference context, and the first Strategic Arms Limitation Treaty was signed.[5] A compromise was slowly worked out during the years 1970 to 1972 which called for a separate East–West conference on the reduction of military forces in Central Europe to be opened in 1973 at the same time as the preparatory rounds of the CSCE (see section II).

At the outset of the talks, it was agreed that the general objective of the negotiations should be to contribute to a more stable relationship and to the strengthening of peace and security in Europe without diminishing the security of any party to the negotiations. It was further agreed that the negotiations would deal with the mutual reduction of armed forces and armaments and associated measures in Central Europe. It was decided that the area of reductions would consist of the territory of seven countries: the Benelux countries, the Federal Republic of Germany, the German Democratic Republic, Poland and Czechoslovakia.

[4] For more information on this period see reference [4].
[5] For further detailed accounts of this period see references [6a, 7, 8].

A chronology of proposals[6]

8 November 1973

The WTO made the first proposal, which suggested that all forces in the reduction area be cut by approximately 17 per cent in three annual stages. In the first stage, each side would reduce its forces by a total of 20 000 troops; in the second stage, each direct participant would reduce its forces by 5 per cent; and in the third stage, each direct participant would reduce its forces by 10 per cent. All direct participants would commit themselves from the very beginning to reduce their forces in each of the three stages. The East also proposed that all forces and armaments—ground, air and nuclear—be included in the reductions and that their residual level be limited.

22 November 1973

The first NATO proposal called for a reduction of the ground force manpower of both sides to parity in the form of a common collective ceiling. The reductions would occur in two phases, with the USA and the USSR reducing first and the other direct participants second. There would be specific limits on US and Soviet manpower in the reduction area during both phases. NATO also called for the reduction by the WTO of 68 000 men and 1 700 tanks in the first phase.

16 December 1975

NATO added to its proposal of 1973 an offer, *inter alia*, to reduce certain US nuclear armaments in the first phase. The level of the common collective ceiling on ground force manpower was set at 700 000 and on combined ground and air force manpower at 900 000.

19 February 1976

The WTO revised its proposals, in reaction to the December 1975 NATO move, to provide for phased reductions which only the USA and the USSR would make in the first phase. The WTO also proposed that this phase include equal US and Soviet reductions of several designated types of armament—tanks, aircraft, missiles and air defence systems.[7]

19 April 1978

NATO offered to specify, in the first phase agreement, the size and timing of total Western manpower reductions to be made in the second phase if

[6] The proposals are summarized in order to suggest the main elements. The negotiations have been held behind closed doors. A variety of sources were used to make this summarized chronology including past SIPRI Yearbooks, studies written about the talks, and statements issued by NATO and WTO delegations at Vienna.

[7] For more specific information on the types of weapon included see reference [9].

the WTO did likewise. NATO also modified its proposal for Soviet withdrawal in the first phase by proposing that Soviet force reductions be in the form of five divisions rather than an integral tank army. This meant that NATO was suggesting that the USA withdraw 1 000 tactical nuclear warheads, 54 F-4 aircraft with nuclear capacity, 36 Pershing medium-range missiles and 29 000 troops from Europe in return for Soviet withdrawal of 68 000 men and 1 700 tanks from the GDR, Czechoslovakia and Poland. The NATO proposal also included measures for reducing the possibility of surprise attack, for ensuring against attempts to circumvent the agreement and for verification of compliance with the agreement.

8 June 1978

The WTO accepted in principle the NATO proposal for an outcome of parity in military manpower in the form of a common collective ceiling. The WTO also expressed willingness to carry out a selective reduction and limitation of armaments and equal proportional cuts in the Soviet and US forces stationed in that area, as specified in the December 1975 NATO proposal. However, these proposals were made contingent upon Western acceptance of Eastern data on WTO forces in the area of reduction.

13 December 1978

NATO submitted new proposals for the treatment in the first phase of reductions of military manpower to be carried out in the second phase. This move was designed to meet Soviet wishes to know the size of final reductions by individual direct participants, not just total reductions.

20 December 1979

NATO proposed an interim agreement which would focus only on a first phase of US and Soviet troop reductions, almost identical in size to the reductions offered by the WTO in June 1978. Consideration of the controversial questions of specific armament reductions and troop limitations on other direct participants which could be addressed in a second phase would be deferred. The new NATO plan proposed: (*a*) withdrawal of 30 000 Soviet ground personnel in three divisions; (*b*) withdrawal of 13 000 US ground personnel, two-thirds in units, one-third by thin-out; (*c*) withdrawals preceded by achievement of an agreed data base on the strengths of US and Soviet ground force personnel in the reduction area; (*d*) agreement to implement a comprehensive package of confidence-building measures to monitor residual manpower levels and military movements, with the aim of reducing the capability to conduct a surprise attack; and (*e*) reaffirmation of the declaration that West European direct participants are to commit themselves to make adequate reductions, in

accordance with the size of their armed forces, in a second phase but not prior to agreement between the two sides on the strengths of the involved nations' forces [6b].[8]

10 July 1980

The WTO proposed lowering Soviet ground force manpower reductions from 30 000 to 20 000, arguing that this was justified by the unilateral withdrawal of 20 000 Soviet soldiers and 1 000 Soviet tanks from the GDR. US reductions in the first phase would be 13 000 troops. The WTO also proposed that no direct participant be allowed more than 50 per cent of the 900 000-man ceiling on each side's combined total of ground and air force manpower in the reductions area, an implicit limitation on FR Germany's forces.

13 November 1980

The WTO proposed that the duration of the first phase of a reductions and limitations agreement could be three years, instead of one year, as previously proposed. The WTO also proposed that a freeze in forces between the first and second phases could be collective and not on the basis of national limits.

10 December 1981

The WTO proposed that both sides establish a joint working group to write the text of a draft agreement or working document. NATO agreed to study this proposal. NATO was hesitant and cautious concerning the 1980 and 1981 WTO proposals because NATO claimed that these proposals did not address the vital problems of data and verification.

The two treaties of 1982

The presentation of the NATO and WTO proposals in 1982 was basically different from previous initiatives because they were submitted not in

[8] It is interesting to note from reference [6] that several factors probably led NATO to modify its 1979 proposal. The most important of these factors was perhaps the NATO decision to proceed with modernization of its theatre nuclear forces. Part of the modernization package was the conversion of US Pershing IAs to Pershing IIs, and the decision to withdraw unilaterally 1 000 US nuclear warheads. The latter decision seems to have been taken to demonstrate that the new weapons being introduced were part of a modernization process, and not a build-up of nuclear systems. The Eastern response to the 1979 NATO proposal was not encouraging since there was a fear that reductions by the other NATO countries might be postponed after the first phase. A principal objective of the Soviet Union was apparently to obtain constraints on West German military personnel. The quote that Keliher cites is by the WTO delegation and it is revealing: "The socialist countries wanted to be sure that the process did not end with Soviet withdrawals but that those West European participants to the talks whose armed forces account for 75 per cent of the NATO potential in Central Europe would also reduce their strength. . . . The Western proposal, however, drew apart the two stages of the talks and from the point of view of our security did not provide sufficient guarantees."

the form of suggestions but in the form of draft treaties, ready for signature.

On 18 February 1982 the WTO submitted a draft treaty which: (*a*) endorsed the principle of parity and collectivity by specifying the final goal of equal collective levels of 900 000 troops (700 000 ground, 200 000 air); (*b*) placed US and Soviet withdrawals in the first phase at 13 000 and 20 000 respectively while the other participants would simultaneously freeze their force strengths, but on a collective basis; (*c*) specified that troops would be withdrawn to their home countries and not redeployed in any way which might damage the security of any participatory states; (*d*) prescribed reductions in a second phase to be carried out on a roughly proportionate basis; (*e*) reiterated that after reductions were completed no direct participant would be allowed to have more than 50 per cent of the 900 000-troop ceiling as their forces in the reductions area; and (*f*) assured verification by notifications at the beginning and end of reductions, temporary monitoring posts, national technical means, and an appropriate consulting mechanism.[9]

On 8 July 1982 NATO tabled a draft treaty which included these major features. (*a*) It provided for one comprehensive agreement in which all direct participants would undertake a legally binding commitment to reach a combined common collective ceiling of approximately 900 000 ground and air force manpower, including a common collective ceiling of approximately 700 000 ground force manpower in four stages within a seven-year period. (*b*) It provided for staged implementation of the reductions to these common collective ceilings with collective limits being observed on the ground forces of each side after each intermediate stage. Each stage must be fully verified and carried out on the basis of agreed data. The NATO set of confidence-building and verification measures, together with provisions relating to flank security, which was tabled in 1979, remain an integral part of the draft treaty. (*c*) It would specify starting manpower totals for both sides. Thus, the overall size of WTO and NATO reductions needed to reach the common collective ceilings would be established and specified in the treaty at the time of signature. This, of course, confirms the need for agreement on data from the outset. (*d*) Vérification procedures would include pre-notification of out-of-garrison activity by one or more division formations; observers at out-of-garrison activities; pre-notification of major movements of ground forces into the area of reductions; an annual quota of inspections to be conducted from the ground, or air, or both; permanent exit/entry points, with observers, through which forces would move into or out of the area of reductions; exchange of information on forces to be withdrawn and continuing

[9] Mention of the WTO treaty is made in several articles: see references [10, 11].

periodic exchanges of information on personnel strengths and organization of forces remaining in the area; and non-interference with national technical means of verification.[10]

Common ground

A side-by-side comparison of the two 1982 treaties and an assessment of other progress made in the MFR talks to reach common ground reveal some important areas of agreement between NATO and the WTO:

1. The ultimate objective is equal common collective ceilings on WTO and NATO ground and air forces. This would allow each alliance to determine the mix of its national force components. This means that no specific national sub-ceilings would be required.

2. Reductions can be phased and unequal in size in order to achieve parity.

3. Numerical data on military forces can be exchanged periodically after an agreement is signed and implementation begins.

4. Monitoring posts can be established on East and West European territory as an additional verification method to national technical means, mainly satellite verification. There will be no interference with satellite verification.

5. Reductions will occur in the FRG, Benelux, the GDR, Poland and Czechoslovakia. All countries with forces in this reduction area which sign the treaty will make force reductions.

6. Implementation of the agreement would be accomplished by a consultative committee.

7. Withdrawn forces cannot be redeployed in any way which threatens the security of the states in either alliance in the northern or southern flank areas [10].

Hardened positions and stumbling-blocks

There is some evidence that a hardening of position has occurred on both sides. For example, while NATO's new treaty purports to make a breakthrough concession to the WTO on the 'linkage' issue of whether all participant states are irreversibly committed to reductions in forces, the WTO has already responded that there is no concession by NATO, and that no real solution to the linkage issue has been offered. This disagreement has arisen even though it was assumed that there was East–West

[10] Mention of the NATO treaty is made in several articles: see references [12, 13].

agreement that US and Soviet reductions could occur first if all participants were committed in a treaty to eventual reductions.

The side-by-side comparison of the two treaties reveals that the NATO side may be maintaining a static position or hardening it on the crucial issues of data and verification.

The NATO position on data demands that starting manpower totals be specified in the treaty rather than any general statement of a methodology which would solve the data discrepancy by unequal reductions during the treaty period. Traditionally NATO has said that it counts 150 000 more WTO troops in the reduction area than the WTO has admitted. Recent US statements have even increased the discrepancy figure from 150 000 to 160 000 and then 170 000.[11] At the beginning of 1980 the discrepancy was only 145 000 since the WTO cited its total as 815 000 ground force personnel whereas the NATO sources put WTO ground forces at a level of 960 000 and its own forces at 790 000 [10].

The NATO position on data, as interpreted by the US ambassador to the Vienna talks Richard Staar, also asserts that there must be some special compensation for the distance of the withdrawals since the USA would withdraw 5 000 kilometres while the USSR would only have to withdraw 500 kilometres. It seems, therefore, that the USA wants either to expand the geographical reduction area covered into the Soviet Union, knowing that the Soviet opposition to such proposals has traditionally been fierce, or to increase the numbers of troops reduced on the Soviet side. Ambassador Staar's interpretation also dismisses as irrelevant any suggestion by the Soviet Union that its unilateral withdrawal of 20 000 troops and 1 000 tanks from the GDR in 1979–80 should be counted as a reduction in force levels because the withdrawals could not be verified and were made outside the MFR framework. And, at the same time, the NATO position will not count the French forces in any way since France will not sign the treaty [14, 15].

Ambassador Staar accused the WTO of never seeking a compromise and never changing its position on the verification issue. He also specified that satellite verification was inadequate and that NATO wanted 'permanent' observation posts during not only the reduction period of seven years but also for eight years after that. The WTO side has accepted 'temporary' observation posts during the seven-year reduction period. Also, NATO wants inspections 'on call' by low-flying aircraft, helicopter and ground teams [15].

The WTO treaty breaks no new ground either and the WTO response to NATO's new concession on linkage, as mentioned above, was to reject it

[11] The 160 000 discrepancy figure is cited in reference [12]. The 170 000 discrepancy figure is cited by Ambassador Richard Staar in an interview with USIA security affairs correspondent William H. Durham [14].

by stating that it does not solve their concern that reductions start by all parties to any treaty from the beginning [16]. This is a hardened stance since in previous MFR proposals the WTO had accepted phased reductions with a first phase accomplished only by the USA and the USSR.

Some of these stumbling-blocks seem normal for negotiations but others indicate some hardening of the Western and Eastern positions which, after 10 years of negotiations, might make one wonder about the seriousness of intent and chances of success of these draft treaties.

The advantage to both sides of tabling treaties in 1982 was that their international political image was enhanced by an action which would normally prove a serious intent to achieve arms control results. However, the danger of tabling treaties in negotiations like the MFR talks, which have gone on so long and have covered so many of the differences and tried to resolve them in so many ways, is that if the treaties do exhibit hardened positions it may be difficult for the two sides to negotiate flexibly and arrive at compromises which differ substantively from the tabled treaties. This might be interpreted, particularly on the NATO side, as negotiating away some of the vital security concerns embodied in the tabled treaty. This might, in turn, add a final static character to the negotiations. The new tabled treaties might not be taken seriously, thereby threatening the future of the negotiations themselves. The WTO treaty could be seen as part of General Secretary Brezhnev's 'peace offensive' and an effort to win favour in Western Europe. The NATO treaty could be seen as part of an effort by President Reagan to take the initiative in launching proposals and treaties at all three arms control negotiations (START, INF and MFR; see also chapters 1 and 2) in order to defuse the US and West European peace movements' pressure for arms restraint at a time when the US Administration wants large defence spending increases and wants the NATO allies to follow suit.

Prospects for trade-offs

There should still be room left in the negotiations for bargaining on the most difficult issues. On the data issue a working group might be established, as proposed by both sides at various times during the negotiations. The working group would attempt to arrive at a formula which might resolve that issue for both sides. After all, common collective ceilings have been agreed to and the total numbers suggested by NATO have been tacitly, if not explicitly, accepted by the WTO, and unequal reductions in various phases have been proposed by both sides.

Ambassador Jonathan Dean, US ambassador to the MFR talks between 1978 and 1981, has pointed out that some progress on narrowing the data

discrepancies has already been made when the data were examined on a case-by-case basis. Ambassador Dean states:

> Even in the refractory data dispute, there has been some progress. East–West discussion in Vienna has identified a number of types of Eastern European forces which were not included in the figures on [WTO] military personnel provided by Eastern participants. This clarifies the reasons for a large part of the difference between the figures of the two sides on [WTO] forces. A logical further step would be to discuss these individual cases and to try to reach some tentative agreement on whether they should be included in the count. [10a]

If the WTO was ready to provide additional details on their data and resolve further major discrepancies it does not seem unreasonable also for the West to allow some compensation for the fact that NATO does not include the 51 200 French troops in FR Germany [17]. This would mean that both sides would have to recognize that their data are not totally accurate and comprehensive. This could be done by agreeing in a treaty to an approach to the data question which would secure the objective of equal common collective ceilings on WTO and NATO ground and air forces in the reduction area. This would be easier than trying to agree from the outset of any treaty on specific manpower totals for both sides since that has proved to be impossible during the 10 years of continuous negotiations.

The verification issue should also not pose insurmountable problems to an eventual solution for a treaty agreement if both sides are willing to compromise a little on their current treaty positions. For some time the WTO insisted that only national technical means of verification be used, mainly satellite surveillance. But now the WTO has agreed to monitoring posts on East European territory. The difference is that the WTO wants the posts to be temporary, for the reduction period only, and NATO wants the posts to be permanent, for the reduction period and thereafter. Ambassador Staar more specifically defined the timing as monitoring posts on the ground, overflights by plane or helicopter, and special on-the-ground inspections 'on call' for the reduction period of seven years and for eight years after the reductions have been completed [15]. A compromise could be struck by perhaps specifying aerial reconnaissance on call for a certain period after the reductions are completed. Satellite surveillance would, of course, be in continual use by both sides for verification purposes. After the experience of monitoring seven years of reductions and assuming ever-increasing capabilities of surveillance and monitoring systems it would seem impossible that the WTO or NATO could re-introduce large military units undetected back into the reduction area. Seven years of reductions might also prove so attractive to both sides in terms of reducing the military confrontation in Central Europe that there might be agreements coupled into the treaty by that time which would

simply continue the reduction process down to common collective ceilings of, say, 500 000 troops and the monitoring would continue since the reductions would also be continuing.

The so-called linkage issue should also not be viewed as a permanent stumbling-block. Both sides have agreed to phased reductions, and, if a primary concern of the WTO is potential increases in West German forces, then a way could be found to add some symbolic reductions by other NATO forces in the first phase where the major reductions would still fall to the USA and the USSR. The first phase could also be shortened in time so that the signed treaty commitments by the other NATO countries would become an on-the-ground reality to the opposing WTO forces in a shorter period of time. An additional solution might also be reverting back to a percentage formula, 50 per cent previously, for limiting any one NATO or WTO force in the reduction zone; in other words, no one NATO or WTO country could maintain over 50 per cent of the total forces in the reduction zone.

What seemed true at the beginning of the MFR talks 10 years ago seems to be true at the end of 1982. If new East–West stability in the conventional military sphere can be achieved through an agreement at Vienna, then that might have a positive impact on the willingness of both sides to reduce their reliance on large numbers of nuclear weapons and even to negotiate lower levels at the START and INF talks in Geneva. Because this alliance-to-alliance negotiation on arms control is so unique in character and potentially so vital to resolving the basic military confrontation in Europe it would be important that the two tabled treaties signal more rather than less willingness to negotiate a successful agreement. More creativity and political will are needed by both sides to do this. The alternative is pressure on both NATO and the WTO to boost the quality and quantity of their conventional forces in Europe.

II. Talks on security and co-operation in Europe

The meeting of the Conference on Security and Co-operation in Europe (CSCE) to review the implementation of the Helsinki Final Act continued at Madrid in several sessions during 1981 and 1982. The meeting resumed on 8 February 1983, after a New Year recess. The 35 participating nations, after more than two years of discussion, still had not, by the end of February 1983, been able to agree on a concluding document.[12]

The CSCE Final Act was signed at Helsinki in 1975. It is a compromise document, covering a wide range of issues in interstate relations. The East European states, in the absence of a peace treaty at the end of World War

[12] See also *SIPRI Yearbooks 1981* (chapter 17) and *1982* (chapter 2).

II, wanted recognition of Europe's post-war boundaries. The West, while recognizing these boundaries, wanted to achieve significant progress particularly in the fields of human rights and dissemination of information. The Final Act therefore contains a declaration on the principles which should guide relations between the participating states. These principles include the sovereign equality of states, the inviolability of frontiers, the territorial integrity of states, non-intervention in internal affairs, and respect for human rights and fundamental freedoms. The Final Act also outlines co-operative steps which states can take to improve human contacts, family reunifications, exchange of information, working conditions for journalists, and exchanges in the fields of culture and education. It contains provisions for a first generation of military confidence-building measures. The participants agreed to a process of review of the implementation of the Act.

The Helsinki Final Act thus embodies 'linkage', in which such questions as military confidence-building measures are linked in the same document with issues of human right. The text is in many places formulated in cryptic language and is therefore interpreted and implemented by states in different ways.

The Madrid meetings in 1982

Because the Helsinki document is so broad in scope, it has allowed attention to be devoted to assessments of the behaviour of individual states, and international events have often become the most heated subjects of the debates. Progress in negotiations has been affected by statements and accusations concerning such topics as developments in Afghanistan and Poland, sanctions against East European states, the current and planned nuclear and conventional arms build-ups, the treatment of dissidents, the right to work and rising unemployment in the West.

The meeting, originally scheduled to end in February 1981, dragged on to the 1981/82 New Year recess, when the neutral and non-aligned states tabled a draft final document. Approval of the document was, however, made impossible by the December 1981 events in Poland. Instead, during the 1982 spring session, Western delegations sharpened their demands for the inclusion of a stronger text on human rights in the final document. This short session again produced no results and, after a long recess, the meeting reconvened in November.

At this session the neutral and non-aligned draft of the final document served as the framework of discussion. However, it soon became clear that there was no break in the deadlock. A number of amendments were proposed by some Western states, and both sides declared that much of the draft document was unacceptable to them.

The mandate for a European Disarmament Conference (EDC) is still the central item on the agenda (see appendix 19A for the non-aligned draft proposal). Already in 1981 delegations had reached consensus on several important terms of reference for such a conference and there seems to be a general understanding that a conference should take place. The conference is planned to proceed in two stages. The first stage would consider proposals for confidence- and security-building measures (CSBMs). It is agreed that these measures should be militarily significant, politically binding and verifiable. A follow-up meeting of the CSCE would assess the progress achieved during the first stage and decide on whether to continue with a second stage of arms control and disarmament negotiations.

The priority of CSBMs before disarmament is based on the Western approach; the East European states originally had in mind a step-by-step conference on "military détente and disarmament", "beginning with simpler measures and proceeding gradually towards more complex and far-reaching ones."

The most controversial issue at Madrid is still officially the zone of application for these confidence-building measures. The problem is how the West should compensate "accordingly" for the Soviet concession of February 1981 to include in the zone the whole European part of the Soviet Union, up to the Urals. (In the Helsinki Final Act, the area included was only a 250-km wide belt along the Western borders.) This issue is important because such a zone, with geographical and/or functional delimitations in sea (ocean) areas and the air space adjoining Europe, would probably serve as a basis not only for the CSBMs to be discussed at the first stage of the EDC, but also for arms control and disarmament measures to be discussed at a later stage of the conference or already under discussion in other fora. There is, for example, the question of whether the Azores or Svalbard would be considered as belonging to Europe in this context.

Prospects

By the time this Yearbook is published, there should be some outcome at Madrid. The meetings are now well into their third year, and many participants are pressing for a conclusion. The position is much as it was a year ago: no state wants to take the blame for the dissolution of the CSCE without a final document; and it is difficult to envisage a final document which does not refer in some way to the convening of a European Disarmament Conference.

A new effort to bring the conference to an end was made by the neutral and non-aligned states on 15 March, when they tabled a revised version [18] of their draft concluding document. This document, amongst other things, now calls for the first stage of a European Disarmament Conference to

start in Stockholm on 15 November 1983. This group of states is pressing for an early decision by the conference on this document.

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Appendix 19A

Proposal submitted by the delegations of Austria, Cyprus, Finland, Liechtenstein, San Marino, Sweden, Switzerland and Yugoslavia in 1981

Excerpt

Conference on Confidence- and Security-building Measures and Disarmament in Europe.

. . .

Have agreed to convene a Conference on Confidence- and Security-building Measures and Disarmament in Europe, commencing in 1982/83.

1. The aim of the Conference is, as a substantial and integral part of the multilateral process initiated by the Conference on Security and Co-operation in Europe, with the participation of all the States signatories of the Final Act, to undertake, in stages, new, effective and concrete actions designed to make progress in strengthening confidence and security and in achieving disarmament.

2. Thus the Conference will begin a process of which the first stage will be devoted to the negotiation and adoption of a set of mutually complementary confidence- and security-building measures designed to reduce the risk of military confrontation in Europe. . . .

4. . . . these confidence- and security-building measures will cover the whole of Europe as well as the adjoining sea area and air space. They will be of military significance and politically binding and will be provided with adequate forms of verification which correspond to their content.

As far as the adjoining sea area and air space is concerned, these measures will be applicable to the military activities of forces of all the participating States operating there in so far as these activities constitute a part of activities in Europe which the participating States will agree to notify. Necessary specifications will be made through the negotiations on the confidence- and security-building measures at the Conference. . . .

5. Taking into account the above-mentioned aim of the Conference, the next follow-up meeting of the participating States of the CSCE, to be held in . . ., commencing on . . ., will assess the progress achieved during the first stage of the Conference.

6. Taking into account the relevant provisions of the Final Act, and having reviewed the results achieved by the first stage of the Conference, and also in the light of other relevant negotiations on security and disarmament affecting Europe, a future CSCE follow-up meeting will consider ways and appropriate means for the participating States to continue their efforts for security and disarmament in Europe, including the question of supplementing the present mandate for the next stage of the Conference on Confidence- and Security-building Measures and Disarmament in Europe.

7. A preparatory meeting, charged with establishing the agenda, time-table and other modalities for the first stage of the Conference, will be held in . . ., commencing on . . . Its duration shall not exceed three weeks.

Source: Madrid Conference document CSCE/RM/39, 16 December 1981.

Appendix 19B

*Notifications of military manoeuvres in 1982, in compliance with the Final Act of the CSCE**

State giving notification	Date of notification	Duration of manoeuvre	Designation of manoeuvre	Number of troops involved**	Area of manoeuvre
Czechoslovakia	4 Jan	25–30 Jan	*Druzba 82*[1]	25 000	Litomerice–Liberec–Prague–Plzen–Karlovy
Sweden	28 Jan	1–10 Mar	*Norrsken*[2]	23 000	Upper Norrland's military district: Luleå–Boden–Edefors–Överkalix–Kalix
Norway	12 Feb	12–17 Mar	*Alloy Express*[3]	14 200	Nordland and Troms
FR Germany	19 Aug	13–23 Sep	*Carbine Fortress*[4]	73 000	Aschaffenburg–Fulda–Bamberg–Schwäbisch Hall–Mannheim
Canada	20 Aug	13–23 Sep	*Carbine Fortress*[4]	73 000	FR Germany (see above)
FR Germany	20 Aug	13–17 Sep	*Starke Wehr*[5]	45 000	Cuxhaven–Osnabrück–Braunschweig–Gratow
Sweden	20 Aug	23–29 Sep	*Sydfront*[6]	24 000	Military Command South with adjoining sea areas: Eastern Skåne–Blekinge, Hanö Bay and sea areas south of Öland
USA	23 Aug	13–23 Sep	*Carbine Fortress*[4]	73 000	FR Germany (see above)
FR Germany	24 Aug	20–24 Sep	*Bold Guard 1982*[7]	47 200	Jutland, Danish Isles, Schleswig-Holstein
Denmark	27 Aug	20–24 Sep	*Bold Guard 1982*[7]	47 200	Denmark/FR Germany (see above)
Austria	30 Aug	15–22 Oct	*Raumverteidigungsübung 1982*[8]	14 000	Unterinntal–Wörgl–Kufstein–Kössen–St Johann
Bulgaria	4 Sep	25 Sep–1 Oct	*Chtit 82*[9] *[Shield 82]*	60 000	Bulgaria and Black Sea
France	16 Sep	19–24 Sep	*Langres 82*[10]	17 000	Districts of Aube, Cote d'Or, Meuse, Meurthe and Moselle, Vosges
Switzerland	8 Oct	15–19 Nov	*Panzerjagd*[11]	30 000	Eastern Switzerland

* This appendix was prepared by Ragnhild Ferm.

** It is not advisable to add together the number of troops in different manoeuvres taking place during the same period of time, as some troops may participate in more than one manoeuvre.

[1] '*Druzba 82*'—an operational and tactical (bilateral) manoeuvre.
Purpose of the manoeuvre: to train co-ordinated activities between commanders and units of the armies in winter conditions.
Participating units: ground force and air force units of Czechoslovakia, Soviet Union and Hungary.

[2] Purpose of the '*Norrsken*' manoeuvre: to train army, naval and air forces in transfer and concentration into operating area and in solving co-operative defence tasks under winter conditions. Command level: Commanding General, Upper Norrland's military district.
Participating units: two Norrland brigades (reduced), motorized and light infantry battalions, tank and self-propelled artillery battalions, support units; coastal defence and commando units, interceptor, attack, reconnaissance and transport air force units. Basic training as well as refresher training units take part.
Absence from garrisons: 28 February–11 March.
Foreign observers invited to attend.

[3] Part of the NATO exercise '*Alloy Express*' taking place 24 February–24 March, a multinational routine exercise in the 'Express' series.
Purpose of the manoeuvre: to train NATO procedures for reception and deployment of allied reinforcement to national forces under winter conditions. The combined forces supported by naval and air force units. Command level: Commander, North Norway.
Participating units: 6th Division, Brigade North and minor national army units; ACE (Allied Command Europe) Mobile Force (AMF); 42nd Commando Royal Marines including units from Royal Netherlands Marine Commando, 36th Marine Amphibious Unit from Marine Corps; in addition to Norwegian and minor allied naval and air force units.
Absence from garrisons: 3 March until immediately after end of manoeuvre.

[4] '*Carbine Fortress*'—a corps-level training manoeuvre in the context of the 'Autumn Forge' field training and command post exercises being conducted by members of NATO.
Purpose of the manoeuvre: to provide training in joint operations of major NATO formations. Command level: COMCENTAG (Commander Central Army Group) Central Europe.
Participating forces: units from 7th Corps, parts of 5th Corps (USA); units from 12th armoured division (FRG); parts of territorial defence Command South including Home Defence Brigade 56; Belgian, British, Danish, Canadian, Luxembourg and Dutch units.
Absence from garrisons: 13–23 September. The Canadian troops depart for the exercise on 10 September and return to garrison by 25 September.
Foreign observers invited to attend.

[5] '*Starke Wehr*'—a combat exercise with two parties and with air support.
Purpose of the manoeuvre: training of combined arms combat and joint operations of major allied units. Command level: GOC—1st German Corps.
Participating units: parts of Territorial Defence Command North including Home Defence Brigade 52; one US and one Dutch brigade. Air support provided by parts of the air forces of the participating countries.
Absence from garrisons: 10–17 September.
Foreign observers invited to attend.

[6] Purpose of the '*Sydfront*' manoeuvre: to train staffs and field units from all services in defence operations against a coastal invasion. Command level: Commanding General, Military Command South.
Participating forces: one infrantry brigade (reduced), six armoured and regional defence battalions, commando, anti-aircraft, supply and service, and other units; surface attack and submarine flotillas, coastal artillery and other units; interceptor, attack, reconnaissance and light attack squadrons, air transport and other units. Basic training as well as refresher training units take part.
Absence from garrisons: 22–30 September.

[7] '*Bold Guard 1982*'—a combat exercise with two parties and air support.
Purpose of the manoeuvre: to provide training in the joint operations of major units of NATO. Command level: COMBALTAP (Commander Allied Forces Baltic Approaches).

Participating forces: units of 6th FRG Armoured Infantry Division; of Territorial Defence Command Schleswig-Holstein; of Danish Jutland Division, Danish Eastern Land Command; and of US, British and Dutch units. Air support provided by parts of air forces of participating countries.

Absence from garrisons: 20–24 September.

Foreign observers invited to attend.

[8] '*Raumverteidigungsübung 1982*'—a field exercise with two parties.

Purpose of the manoeuvre: to train commanders, staffs and troops in combat operations in a security zone including an independent key area, as well as in applicable methods of warfare. Command level: Military Commander Tyrol.

Participating forces: staffs, reinforced mechanized brigade, reinforced light infantry brigade, regional army units.

[9] '*Chtit 82*'—an exercise with staffs, army and naval units of the forces of the member states of the WTO.

Purpose of the manoeuvre: to train staffs and allied armies in combat co-ordination and joint activities.

[10] '*Langres 82*'—an army corps field manoeuvre with the participation of 1st Army Corps and two infantry divisions. A reconnaissance phase to be followed by offensive, contact mobile defensive and, finally, counter-attack.

[11] Purpose of the '*Panzerjagd*' manoeuvre: to train staffs and troops in mobile combat and in co-operation with civil defence organizations. Command level: Commander Army corps.

Participating forces: Army corps units, 7th Infantry Division, 11th Mechanized Division, logistic units, air force units.

Foreign observers invited to attend.

20. Multilateral arms control agreements[1]

The term 'arms control' is used here in a broad sense to denote measures intended to freeze, limit or abolish specific categories of weapons; to prevent certain military activities; to proscribe transfers of militarily important items; to reduce the risk of war; to constrain or prohibit the use of certain arms in war; or to build up confidence among states through greater openness in the military field. It thus includes measures of both arms limitation and disarmament as well as rules of conduct in war.

I. Summaries of the agreements

This section contains annotated summaries of the multilateral agreements and information on the status of their implementation, as of 31 December 1982. The status of implementation of the major multilateral agreements is given in section II. The agreements are listed below in chronological order, by the date on which they were opened for signature. (For the full texts of both the bilateral and multilateral arms control agreements, see Goldblat, J., *Agreements for Arms Control, A Critical Survey*, SIPRI (Taylor & Francis, London, 1982.)

Protocol for the prohibition of the use in war of asphyxiating, poisonous or other gases, and of bacteriological methods of warfare (Geneva Protocol)

Signed at Geneva on 17 June 1925; entered into force on 8 February 1928

Declares that the parties agree to be bound as between themselves by the above prohibition, which should be universally accepted as part of international law, binding alike the conscience and the practice of nations. (**Parties:** see section II.)

Convention on the prevention and punishment of the crime of genocide (Genocide Convention)

Adopted at Paris by the UN General Assembly on 9 December 1948; entered into force on 12 January 1951

Declares genocide, defined as the commission of acts intended to destroy, in whole or in part, a national, ethnic, racial or religious group, as such, to be a punishable crime.

Parties: Afghanistan, Albania, Algeria, Argentina, Australia, Austria, Bahamas, Barbados, Belgium, Brazil, Bulgaria, Burma, Byelorussia, Canada, Chile, Colombia, Costa Rica, Cuba, Cyprus, Czechoslovakia, Denmark, Ecuador, Egypt, El Salvador, Ethiopia, Fiji, Finland,

[1] This chapter was prepared by Jozef Goldblat and Ragnhild Ferm.

France, Gambia, GDR, FRG, Ghana, Greece, Guatemala, Haiti, Honduras, Hungary, Iceland, India, Iran, Iraq, Ireland, Israel, Italy, Jamaica, Jordan, Kampuchea, Republic of Korea, Lao Republic, Lebanon, Lesotho, Liberia, Luxembourg, Mali, Mexico, Monaco, Mongolia, Morocco, Nepal, Netherlands, New Zealand, Nicaragua, Norway, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Poland, Romania, Rwanda, Saudi Arabia, Spain, Sri Lanka, Sweden, Syria, Taiwan, Tonga, Tunisia, Turkey, UK, Ukraine, USSR, Upper Volta, Uruguay, Venezuela, Viet Nam, Yugoslavia, Zaire

Conventions for the protection of war victims (Geneva Conventions)

Signed at Geneva on 12 August 1949; entered into force on 21 October 1950

Convention I provides for the amelioration of the condition of the wounded and sick in armed forces in the field.

Convention II provides for the amelioration of the condition of the wounded, sick and shipwrecked members of armed forces at sea.

Convention III relates to the treatment of prisoners of war.

Convention IV relates to the protection of civilian persons in time of war.

Parties: Afghanistan, Albania, Algeria, Argentina, Australia, Austria, Bahamas, Bahrain, Bangladesh, Barbados, Belgium, Benin, Bolivia, Botswana, Brazil, Bulgaria, Burundi, Byelorussia, Cameroon, Canada, Central African Republic, Chad, Chile, China, Colombia, Congo, Costa Rica, Cuba, Cyprus, Czechoslovakia, Denmark, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Fiji, Finland, France, Gabon, Gambia, GDR, FRG, Ghana, Greece, Grenada, Guatemala, Guinea-Bissau, Guyana, Haiti, Holy See, Honduras, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Italy, Ivory Coast, Jamaica, Japan, Jordan, Kampuchea, Kenya, Democratic People's Republic of Korea, Republic of Korea, Kuwait, Lao Republic, Lebanon, Lesotho, Liberia, Libya, Liechtenstein, Luxembourg, Madagascar, Malawi, Malaysia, Mali, Malta, Mauritania, Mauritius, Mexico, Monaco, Mongolia, Morocco, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Rwanda, St Lucia, St Vincent, San Marino, Sao Tomé and Principe, Saudi Arabia, Senegal, Sierra Leone, Singapore, Solomon Islands, Somalia, South Africa, Spain, Sri Lanka, Sudan, Suriname, Swaziland, Sweden, Switzerland, Syria, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Tunisia, Turkey, Tuvalu, Uganda, UK, Ukraine, United Arab Emirates, Upper Volta, Uruguay, USA, USSR, Vanuatu, Venezuela, Viet Nam, Yemen Arab Republic, Dem. Yemen, Yugoslavia, Zaire, Zambia

See also Protocols of 1977.

Antarctic Treaty

Signed at Washington on 1 December 1959; entered into force on 23 June 1961

Declares the Antarctic an area to be used exclusively for peaceful purposes. Prohibits any measure of a military nature in the Antarctic, such as the establishment of military bases and fortifications, and the carrying out of military manoeuvres or the testing of any type of weapon. Bans any nuclear explosion as well as the disposal of radioactive waste material in Antarctica, subject to possible future international agreements on these subjects.

Representatives of the contracting parties meet at regular intervals to exchange information and consult each other on matters of common interest pertaining to Antarctica, as well as to recommend to their governments measures in furtherance of the principles and objectives of the Treaty. (**Parties:** see section II.)

Treaty banning nuclear weapon tests in the atmosphere, in outer space and under water (Partial Test Ban Treaty—PTBT)

Signed at Moscow on 5 August 1963; entered into force on 10 October 1963

Prohibits the carrying out of any nuclear weapon test explosion or any other nuclear explosion: (*a*) in the atmosphere, beyond its limits, including outer space, or under water, including territorial waters or high seas; or (*b*) in any other environment if such explosion causes radioactive debris to be present outside the territorial limits of the state under whose jurisdiction or control the explosion is conducted.

Only three nuclear weapon powers—the UK, the USA and the USSR—are parties to the PTBT. China and France have refused to adhere to it, but France stopped atmospheric tests in 1975. (The 1974 US–Soviet Threshold Test Ban Treaty (TTBT) prohibits underground nuclear weapon tests having a yield which exceeds 150 kt. The 1976 US–Soviet Peaceful Nuclear Explosions Treaty (PNET) regulates nuclear explosions carried out outside the weapon test sites. The trilateral UK–US–Soviet talks for the achievement of a comprehensive test ban (CTB) were adjourned in 1980 *sine die*. The subject is pursued in the Committee on Disarmament.) (**Parties:** see section II.)

Treaty on principles governing the activities of states in the exploration and use of outer space, including the Moon and other celestial bodies (Outer Space Treaty)

Signed at London, Moscow and Washington on 27 January 1967; entered into force on 10 October 1967

Prohibits the placing in orbit around the Earth of any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, the installation of such weapons on celestial bodies, or the stationing of them in outer space in any other manner. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies are also forbidden. (**Parties:** see section II.)

Treaty for the prohibition of nuclear weapons in Latin America (Treaty of Tlatelolco)

Signed at Mexico City on 14 February 1967; entered into force on 22 April 1968

Prohibits the testing, use, manufacture, production or acquisition by any means, as well as the receipt, storage, installation, deployment and any form of possession of any nuclear weapons by Latin American countries.

The parties should conclude agreements with the IAEA for the application of safeguards to their nuclear activities.

Under *Additional Protocol I*, annexed to the Treaty, the extra-continental or continental states which, *de jure* or *de facto*, are internationally responsible for territories lying within the limits of the geographical zone established by the Treaty (France, the Netherlands, the UK and the USA), undertake to apply the statute of military denuclearization, as defined in the Treaty, to such territories.

Under *Additional Protocol II*, annexed to the Treaty, the nuclear weapon states undertake to respect the statute of military denuclearization of Latin America, as defined and delimited in the Treaty, and not to contribute to acts involving a violation of the Treaty, nor to use or threaten to use nuclear weapons against the parties to the Treaty. (**Parties:** see section II.)

Treaty on the non-proliferation of nuclear weapons (NPT)

Signed at London, Moscow and Washington on 1 July 1968; entered into force on 5 March 1970

Prohibits the transfer by nuclear weapon states, to any recipient whatsoever, of nuclear weapons or other nuclear explosive devices or of control over them, as well as the assistance, encouragement or inducement of any non-nuclear weapon state to manufacture or otherwise acquire such weapons or devices. Prohibits the receipt by non-nuclear weapon states from any transferor whatsoever, as well as the manufacture or other acquisition by those states, of nuclear weapons or other nuclear explosive devices.

Non-nuclear weapon states undertake to conclude safeguards agreements with the International Atomic Energy Agency (IAEA) with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices.

The parties undertake to facilitate the exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy and to ensure that potential benefits from peaceful applications of nuclear explosions will be made available to non-nuclear weapon parties to the Treaty. They also undertake to pursue negotiations on effective measures relating to cessation of the nuclear arms race and to nuclear disarmament, and on a treaty on general and complete disarmament.

The structure and content of agreements between the IAEA and states required in connection with the NPT were agreed to in 1971.

Of the five nuclear weapon powers, France and China have not adhered to the NPT. However, France stated that it would behave as a state adhering to the Treaty and that it would follow a policy of strengthening the safeguards relating to nuclear equipment, material and technology. Of the non-nuclear weapon states, India (not a signatory of the NPT) exploded in 1974 a nuclear device which it claimed to be for peaceful purposes.

In 1977 a group of major nuclear suppliers (the so-called London Club), comprising 15 countries, agreed on a set of guidelines for nuclear transfers.

Conferences of the parties to the NPT reviewing the implementation of the Treaty were held in 1975 and 1980. (**Parties:** see section II.)

Treaty on the prohibition of the emplacement of nuclear weapons and other weapons of mass destruction on the sea-bed and the ocean floor and in the subsoil thereof (Sea-Bed Treaty)

Signed at London, Moscow and Washington on 11 February 1971; entered into force on 18 May 1972

Prohibits emplanting or emplacing on the sea-bed and the ocean floor and in the subsoil thereof beyond the outer limit of a sea-bed zone (coterminous with the 12-mile outer limit of the zone referred to in the 1958 Geneva Convention on the Territorial Sea and the Contiguous Zone) any nuclear weapons or any other types of weapons of mass destruction as well as structures, launching installations or any other facilities specifically designed for storing, testing or using such weapons.

The 1979 SALT II Treaty extended, for the USA and the USSR, the ban on military activities in the sea-bed environment. It prohibits the development, testing or deployment of fixed ballistic or cruise missile launchers for emplacement on the ocean floor, on the sea-bed, or on the beds of internal waters and inland waters, or in the subsoil thereof, or mobile launchers of such missiles, which move only in contact with the ocean floor, the sea-bed, or the beds of internal waters and inland waters, or missiles for such launchers. The SALT II Treaty was not in force by 31 December 1982. (**Parties:** see section II.)

Convention on the prohibition of the development, production and stockpiling of bacteriological (biological) and toxin weapons and on their destruction (BW Convention)

Signed at London, Moscow and Washington on 10 April 1972; entered into force on 26 March 1975

Prohibits the development, production, stockpiling or acquisition by other means or retention of microbial or other biological agents, or toxins whatever their origin or method of production, of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes, as well as weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict. The destruction of the agents, toxins, weapons, equipment and means of delivery in the possession of the parties, or their diversion to peaceful purposes, should be effected not later than nine months after the entry into force of the Convention.

The 1980 Conference reviewing the operation of the BW Convention reaffirmed the comprehensive nature of the prohibitions under the BW Convention by stating that the language of the Convention fully covered all agents which could result from the application of such new techniques as the techniques for manipulation of molecules which form the genetic material of organisms.

The parties to the BW Convention recognized that the Convention was only a step towards an agreement effectively prohibiting also chemical weapons and providing for their destruction. Consequently, the prohibition of chemical means of warfare has been the subject of discussions in the Committee on Disarmament. (**Parties:** see section II.)

Document on confidence-building measures and certain aspects of security and disarmament, included in the Final Act of the Conference on Security and Co-operation in Europe (CSCE)

Signed at Helsinki on 1 August 1975

Provides for notification of major military manoeuvres in Europe to be given at least 21 days in advance or, in the case of a manoeuvre arranged at shorter notice, at the earliest possible opportunity prior to its starting date. The term "major" means that at least 25 000 troops are involved. States may invite observers to attend the manoeuvres.

At the follow-up meetings of the CSCE, proposals were made for mandatory notification of military manoeuvres and movements with fewer than 25 000 men, for setting an earlier date for notification, and for providing observers with substantive information.

The Final Act was signed by Austria, Belgium, Bulgaria, Canada, Cyprus, Czechoslovakia, Denmark, Finland, France, GDR, FRG, Greece, Holy See, Hungary, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Malta, Monaco, Netherlands, Norway, Poland, Portugal, Romania, San Marino, Spain, Sweden, Switzerland, Turkey, UK, USA, USSR, Yugoslavia.

Convention on the prohibition of military or any other hostile use of environmental modification techniques (ENMOD Convention)

Signed at Geneva on 18 May 1977; entered into force on 5 October 1978

Prohibits military or any other hostile use of environmental modification techniques having widespread, long-lasting or severe effects as the means of destruction, damage

or injury to states party to the Convention. The term "environmental modification techniques" refers to any technique for changing—through the deliberate manipulation of natural processes—the dynamics, composition or structure of the Earth, including its biota, lithosphere, hydrosphere and atmosphere, or of outer space.

The understandings reached during the negotiations, but not written into the Convention, define the terms "widespread", "long-lasting" and "severe". (**Parties:** see section II.)

Protocols Additional to the 1949 Geneva Conventions

Signed at Bern on 12 December 1977; entered into force on 7 December 1978

Protocol I

Relates to the protection of victims of international armed conflicts.

Reiterates the rule of international law that the right of the parties to an armed conflict to choose methods or means of warfare is not unlimited, and that it is prohibited to use weapons and methods of war that cause superfluous injury or unnecessary suffering. Expands the existing prohibition against indiscriminate attacks to cover attacks by bombardment of cities or other areas containing a similar concentration of civilians or civilian objects. Dams, dykes and nuclear electric power generating stations are placed under special protection. There is also a prohibition to attack, by any means, localities declared as non-defended, or to extend military operations to zones on which the parties conferred by agreement the status of demilitarized zone. Reprisals against the civilian population are forbidden. Guerrilla fighters are accorded the right to prisoner-of-war status if they belong to organized units subject to an internal disciplinary system and under a command responsible to the party concerned.

Protocol II

Relates to the protection of victims of non-international conflicts.

Prescribes humane treatment of all the persons involved in such conflicts, care for the wounded, sick and shipwrecked, as well as protection of civilians against the dangers arising from military operations.

Parties: Austria, Bangladesh, Bahamas, Botswana, Cuba (only Prot. I), Cyprus (only Prot. I), Denmark, Ecuador, El Salvador, Finland, Gabon, Ghana, Jordan, Republic of Korea, Libya, Lao Republic, Mauritania, Mauritius, Niger, Norway, St Lucia, Sweden, Switzerland, Tunisia, Viet Nam (only Prot. I), Yugoslavia, Zaire (only Prot. I)

Agreement governing the activities of states on the Moon and other celestial bodies

Opened for signature at New York on 18 December 1979; not in force by 31 December 1982

Prohibits any threat or use of force or any other hostile act or threat of hostile act on the Moon. Also prohibits use of the Moon in order to commit any such act or to engage in any such threat in relation to the Earth, the Moon, spacecraft or the personnel of spacecraft. States are under the obligation not to place in orbit around the Moon objects carrying nuclear weapons or any other kinds of weapons of mass destruction or place or use such weapons on the Moon.

Ratified by: Chile, Philippines, Uruguay

Convention on the physical protection of nuclear material

Signed at Vienna and New York on 3 March 1980; not in force by 31 December 1982

Obliges the parties to ensure that, during international transport across their territory or on ships or planes under their jurisdiction, nuclear material for peaceful purposes as categorized in a special annex is protected at the agreed level. Storage of such material, incidental to international transport, must be within an area under constant surveillance. Robbery and embezzlement or extortion in relation to nuclear material, and acts without lawful authority involving nuclear material, are to be treated as punishable offences. "International nuclear transport" is defined as the carriage of a consignment of nuclear material by any means of transport intended to go beyond the territory of the state where the shipment originates.

Ratified by: Czechoslovakia, GDR, Republic of Korea, Philippines, Sweden

Convention on the prohibitions or restrictions on the use of certain conventional weapons which may be deemed to be excessively injurious or to have indiscriminate effects ('Inhumane Weapons' Convention)

Signed at New York on 10 April 1981; not in force by 31 December 1982

The Convention is an 'umbrella treaty', under which specific agreements can be concluded in the form of protocols.

Protocol I prohibits the use of weapons intended to injure by fragments which are not detectable in the human body by X-rays.

Protocol II prohibits or restricts the use of mines, booby-traps and similar devices.

Protocol III prohibits or restricts the use of incendiary weapons.

(For signatures and ratifications see section II.)

II. Status of the implementation of the major multilateral arms control agreements as of 31 December 1982

Number of parties

1925 Geneva Protocol	103
Antarctic Treaty	25
Partial Test Ban Treaty	112
Outer Space Treaty	84
Treaty of Tlatelolco	22
Additional Protocol I	3
Additional Protocol II	5
Non-Proliferation Treaty	120
NPT safeguards agreements	74
Sea-Bed Treaty	73
BW Convention	96
ENMOD Convention	38
'Inhumane Weapons' Convention (not yet in force)	16 ratifications

Note

1. The list of parties records ratifications, accessions and successions.

2. The Partial Test Ban Treaty, the Outer Space Treaty, the Non-Proliferation Treaty, the Sea-Bed Treaty and the Biological Weapons Convention provide for three depositaries—the governments of the UK, the USA and the USSR. The dates given in the table are the earliest dates on which countries deposited their instruments of ratification, accession or succession—whether in London, Washington or Moscow.

Under the 1925 Geneva Protocol, the only depositary is the French government; under the Antarctic Treaty, the US government; under the Treaty of Tlatelolco, the Mexican government; and under the ENMOD Convention and the 'Inhumane Weapons' Convention, the UN Secretary-General. The dates given for these agreements are the dates of the deposit of the instruments of ratification, accession or succession with the respective depositaries.

3. Key to abbreviations used in the table:
   S: signature without further action
   PI: Additional Protocol I to the Treaty of Tlatelolco
   PII: Additional Protocol II to the Treaty of Tlatelolco
   SA: Safeguards agreement in force with the International Atomic Energy Agency under the Non-Proliferation Treaty or the Treaty of Tlatelolco

4. The footnotes are listed at the end of the table and are grouped separately under the heading for each agreement. The texts of the statements contained in the footnotes have been abridged, but the wording is close to the original version.

State	Geneva Protocol	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention	ENMOD Convention	'Inhumane Weapons' Convention
Afghanistan			1964	S		1970 SA	1971	1975		S
Algeria			S							
Argentina	1969	1961	S	1969	S[1]		S[1]	1979		S
Australia	1930[1]	1961	1963	1967		1973[1] SA	1973	1977	S	S
Austria	1928		1964	1968		1969 SA	1972	1973[1]		S
Bahamas			1976[1]	1976[1]	1977[2]	1976[2]				
Bangladesh						1979 SA			1979	
Barbados	1976[2]			1968	1969[2]	1980		1973		
Belgium	1928[1]	1960	1966	1973		1975 SA	1972	1979	1982	S
Benin			1964			1972	S	1975	S	
Bhutan	1978		1978					1978		

State	Geneva Protocol	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention	ENMOD Convention	'Inhumane Weapons' Convention
Bolivia			1965	S	1969[2]	1970	S	1975	S	
Botswana			1968[1]	S		1969	1972	S		
Brazil	1970	1975	1964	1969[2]	1968[3]		S[2]	1973	S	
Bulgaria	1934[1]		1963	1967		1969 SA	1971	1972	1978	1982
Burma			1963	1970			S	S		
Burundi			S	S		1971	S	S		
Byelorussia	1970[3]		1963[3]	1967[3]			1971	1975	1978	1982
Cameroon			S[2]	S		1969	S			
Canada	1930[1]		1964	1967		1969 SA	1972[3]	1972	1981	S
Cape Verde			1979			1979	1979	1977	1979	
Central African Republic	1970		1964	S		1970	1981	S		

Chad			1965			1971				
Chile	1935[1]	1961	1965	1981	1974[4]			1980		
China	1929[4]				PII: 1974[5]					1982[1]
Colombia			S	S	1972[2] SA	S	S	S		
Congo						1978	1978	1978		
Costa Rica			1967		1969[2] SA[16]	1970 SA	S	1973		
Cuba	1966			1977[4]			1977[4]	1976	1978	S
Cyprus	1966[2]		1965	1972		1970 SA	1971	1973	1978	
Czechoslovakia	1938[5]	1962	1963	1967		1969 SA	1972	1973	1978	1982
Denmark	1930	1965	1964	1967		1969 SA	1971	1973	1978	1982
Dominican Republic	1970		1964	1968	1968[2] SA[16]	1971 SA	1972	1973		
Ecuador	1970		1964	1969	1969[2] SA[16]	1969 SA		1975		1982

State	Geneva Protocol	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention	ENMOD Convention	'Inhumane Weapons' Convention
Egypt	1928		1964	1967		1981[3] SA		S	1982	S
El Salvador	S		1964	1969	1968[2] SA[16]	1972 SA		S		
Equatorial Guinea							S			
Ethiopia	1935		S	S		1970 SA	1977	1975	S	
Fiji	1973[1,2]		1972[1]	1972[1]		1972[2] SA		1973		
Finland	1929		1964	1967		1969 SA	1971	1974	1978	1982
France	1926[1]	1960		1970	PI: S[6] PII: 1974[7]	[4]				S[2]
Gabon			1964			1974		S		
Gambia	1966[2]		1965[1]	S		1975 SA	S	S		
German Dem. Republic	1929	1974[1]	1963	1967		1969 SA	1971	1972	1978	1982

FR Germany	1929	1979[2]	1964[4]	1971[5]		1975[5] SA	1975[5]	S	S	S
Ghana	1967		1963	S		1970 SA	1972	1975	1978	
Greece	1931		1963	1971		1970 SA	S	1975		S
Grenada					1975[2]	1975[2]				
Guatemala			1964[2]		1970[2] SA[16]	1970 SA	S	1973		
Guinea							S			
Guinea-Bissau			1976	1976		1976	1976	1976		
Guyana				S				S		
Haiti			S	S	1969[2]	1970		S		
Holy See (Vatican City)	1966			S		1971[6] SA			S	
Honduras			1964	S	1968[2] SA[16]	1973 SA	S	1979		
Hungary	1952		1963	1967		1969 SA	1971	1972	1978	1982

State	Geneva Protocol	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention	ENMOD Convention	'Inhumane Weapons' Convention
Iceland	1967		1964	1968		1969 SA	1972	1973	S	S
India	1930[1]		1963	1982			1973[6]	1974[2]	1978	S
Indonesia	1971[2]		1964	S		1979[7] SA		S		
Iran	1929		1964	S		1970 SA	1971	1973	S	
Iraq	1931[1]		1964	1968		1969 SA	1972[4]	S	S	
Ireland	1930[6]		1963	1968		1968 SA	1971	1972[3]	1982	S
Israel	1969[7]		1964	1977						
Italy	1928	1981	1964	1972		1975[8] SA	1974[7]	1975	1981	S[3]
Ivory Coast	1970		1965			1973	1972	S		
Jamaica	1970[2]		S	1970	1969[2] SA[16]	1970 SA	S	1975		

Japan	1970	1960	1964	1967		1976[9] SA	1971	1982	1982	1982
Jordan	1977[8]		1964	S		1970 SA	1971	1975		
Kampuchea						1972	S	S		
Kenya	1970		1965			1970		1976		
Korea, Republic of (South)			1964[2]	1967[4]		1975[11] SA	S[4]	S[4]		
Kuwait	1971[9]		1965[5]	1972[6]		S		1972[5]	1980[1]	
Lao People's Dem. Republic			1965	1972		1970	1971	1973	1978	[4]
Lebanon	1969		1965	1969		1970 SA	S	1975	S	
Lesotho	1972[2]			S		1970 SA	1973	1977		
Liberia	1927		1964			1970	S	S	S	
Libya	1971[10]		1968	1968		1975 SA		1982		
Liechtenstein						1978[12] SA				S

State	Geneva Protocol	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention	ENMOD Convention	'Inhumane Weapons' Convention
Luxembourg	1936		1965	S		1975 SA	1982	1976	S	S
Madagascar	1967		1965	1968[7]		1970 SA	S	S		
Malawi	1970		1964[1]					S	1978	
Malaysia	1970		1964	S		1970 SA	1972	S		
Maldives	1966[2]					1970 SA				
Mali			S	1968		1970	S	S		
Malta	1970[2]		1964[1]			1970	1971	1975		
Mauritania			1964							
Mauritius	1970[2]		1969[1]	1969[1]		1969 SA	1971	1972		
Mexico	1932		1963	1968	1967[2,8] SA	1969[13] SA		1974[6]		1982
Monaco	1967									

Mongolia	1968[11]		1963	1967		1969 SA	1971	1972	1978	1982
Morocco	1970		1966	1967		1970 SA	1971	S	S	S
Nauru						1982				
Nepal	1969		1964	1967		1970 SA	1971	S		
Netherlands	1930[12]	1967	1964	1969	PI: 1971[9]	1975 SA	1976	1981	S	S
New Zealand	1930[1]	1960	1963	1968		1969 SA	1972	1972		S
Nicaragua	S		1965	S	1968[2,10] SA[16]	1973 SA	1973	1975	S	S
Niger	1967[2]		1964	1967			1971	1972		
Nigeria	1968[1]		1967	1967		1968		1973		S
Norway	1932	1960	1963	1969		1969 SA	1971	1973	1979	S
Pakistan	1960[2]		S	1968				1974		S
Panama	1970		1966	S	1971[2]	1977	1974	1974		

State	Geneva Protocol	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention	ENMOD Convention	'Inhumane Weapons' Convention
Papua New Guinea	1981[1]	1981	1980[1]	1980[1]		1982		1980	1980	
Paraguay	1933[13]		S		1969[2] SA[16]	1970 SA	S	1976		
Peru		1981	1964	1979	1969[2] SA	1970 SA		S		
Philippines	1973		1965[2]	S		1972 SA		1973		S
Poland	1929	1961	1963	1968		1969 SA	1971	1973	1978	S
Portugal	1930[1]		S			1977 SA	1975	1975	S	S
Qatar	1976						1974	1975		
Romania	1929[1]	1971[3]	1963	1968		1970 SA	1972	1979	S	S[5]
Rwanda	1964[2]		1963	S			1975	1975		
Saint Lucia						1979[2]				
Samoa			1965			1975 SA				

San Marino			1964	1968		1970		1975		
Sao Tome and Principe							1979	1979	1979	
Saudia Arabia	1971			1976			1972	1972		
Senegal	1977		1964			1970 SA	S	1975		
Seychelles				1978			1976	1979		
Sierra Leone	1967		1964	1967		1975	S	1976	S	S
Singapore			1968[1]	1976		1976 SA	1976	1975		
Solomon Islands						1981[2]	1981	1981[10]	1981[3]	
Somalia			S	S		1970		S		
South Africa	1930[1]	1960	1963	1968			1973	1975		
Spain	1929[14]	1982	1964	1968				1979	1978	S
Sri Lanka	1954		1964	S		1979		S	1978	
Sudan	1980		1966			1973 SA	S			S

State	Geneva Protocol	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention	ENMOD Convention	'Inhumane Weapons' Convention
Suriname					1977[2] SA[16]	1976[2] SA				
Swaziland			1969			1969 SA	1971			
Sweden	1930		1963	1967		1970 SA	1972	1976		1982
Switzerland	1932		1964	1969		1977[12] SA	1976	1976[7]		1982
Syria	1968[15]		1964	1968[8]		1969[10]		S	S	
Taiwan			1964	1970		1970	1972[8]	1973[8]		
Tanzania	1963		1964				S	S		
Thailand	1931		1963	1968		1972 SA		1975		
Togo	1971		1964	S		1970	1971	1976		S
Tonga	1971		1971[1]	1971[1]		1971[2]		1976		
Trinidad and Tobago	1970[2]		1964	S	1970[2]	S				

Tunisia	1967		1965	1968		1970	1971	1973	1978	
Turkey	1929		1965	1968		1980[14] SA	1972	1974	S[2]	S
Tuvalu						1979[2]				
Uganda	1965		1964	1968		1982			S	
UK	1930[1]	1960	1963[6]	1967	PI: 1969[12] PII: 1969[12]	1968[15] SA[16]	1972[9]	1975[9]	1978	S
Ukraine			1963[3]	1967[3]			1971	1975	1978	1982
United Arab Emirates								S		
Upper Volta	1971		S	1968		1970				
Uruguay	1977	1980[4]	1969	1970	1968[2] SA[16]	1970 SA	S	1981		
USA	1975[16]	1960	1963	1967	PI: 1981[13] PII: 1971[14]	1970 SA[17]	1972	1975	1980	S[6]
USSR	1928[17]	1960	1963	1967	PII: 1979[11]	1970	1972	1975	1978	1982
Venezuela	1928		1965	1970	1970[2,15] SA[16]	1975 SA		1978		

State	Geneva Protocol	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention	ENMOD Convention	'Inhumane Weapons' Convention
Viet Nam	1980[1]			1980		1982	1980[10]	1980	1980	S
Yemen Arab Republic	1971		S			S	S	S	1977	
Yemen, People's Dem. Republic of			1979	1979		1979	1979	1979	1979	
Yugoslavia	1929[18]		1964	S		1970[18] SA	1973[11]	1973		S
Zaire			1965	S		1970 SA		1977	S	
Zambia			1965[1]	1973			1972			

The 1925 Geneva Protocol

[1] The Protocol is binding on this state only as regards states which have signed and ratified or acceded to it. The Protocol will cease to be binding on this state in regard to any enemy state whose armed forces or whose allies fail to respect the prohibitions laid down in the Protocol.
[2] Notification of succession. (In notifying its succession to the obligations contracted in 1930 by the United Kingdom, Barbados stated that as far as it was concerned the reservation made by the UK was to be considered as withdrawn.)
[3] In a note of 2 March 1970, submitted at the United Nations, Byelorussia stated that "it recognizes itself to be a party" to the Protocol.
[4] On 13 July 1952 the People's Republic of China issued a statement recognizing as binding upon it the accession to the Protocol in the name of China. China considers itself bound by the Protocol on condition of reciprocity on the part of all the other contracting and acceding powers.
[5] Czechoslovakia shall cease to be bound by this Protocol towards any state whose armed forces, or the armed forces of whose allies, fail to respect the prohibitions laid down in the Protocol.
[6] The government of Ireland does not intend to assume, by this accession, any obligation except towards the states having signed and ratified this Protocol or which shall have finally acceded thereto, and should the armed forces or the allies of an enemy state fail to respect the Protocol, the government of Ireland would cease to be bound by the said Protocol in regard to such state. In February 1972, Ireland declared that it had decided to withdraw the above reservations made at the time of accession to the Protocol.
[7] The Protocol is binding on Israel only as regards states which have signed and ratified or acceded to it. The Protocol shall cease to be binding on Israel as regards any enemy state whose armed forces, or the armed forces of whose allies, or the regular or irregular forces, or groups or individuals operating from its territory, fail to respect the prohibitions which are the object of the Protocol.
[8] The accession by Jordan to the Protocol does not in any way imply recognition of Israel. Jordan undertakes to respect the obligations contained in the Protocol with regard to states which have undertaken similar commitments. It is not bound by the Protocol as regards states whose armed forces, regular or irregular, do not respect the provisions of the Protocol.
[9] The accession of Kuwait to the Protocol does not in any way imply recognition of Israel or the establishment of relations with the latter on the basis of the present Protocol. In case of breach of the prohibition laid down in this Protocol by any of the parties, Kuwait will not be bound, with regard to the party committing the breach, to apply the provisions of this Protocol.
[10] The accession to the Protocol does not imply recognition of Israel. The Protocol is binding on Libya only as regards states which are effectively bound by it, and will cease to be binding on Libya as regards states whose armed forces, or the armed forces of whose allies, fail to respect the prohibitions which are the object of this Protocol.
[11] In the case of violation of this prohibition by any state in relation to Mongolia or its allies, the government of Mongolia shall not consider itself bound by the obligations of the Protocol towards that state.
[12] As regards the use in war of asphyxiating, poisonous or other gases and of all analogous liquids, materials or devices, this Protocol shall cease to be binding on the Netherlands with regard to any enemy state whose armed forces or whose allies fail to respect the prohibitions laid down in the Protocol.
[13] This is the date of receipt of Paraguay's instrument of accession. The date of the notification by the depositary government "for the purpose of regularization" is 1969.
[14] Spain declared the Protocol as binding *ipso facto*, without special agreement with respect to any other member or state accepting and observing the same obligation, that is, on condition of reciprocity.
[15] The accession by Syria to the Protocol does not in any case imply recognition of Israel or lead to the establishment of relations with the latter concerning the provisions laid down in the Protocol.
[16] The Protocol shall cease to be binding on the USA with respect to the use in war of asphyxiating, poisonous or other gases, and of all analogous liquids, materials, or devices, in regard to an enemy state if such state or any of its allies fails to respect the prohibitions laid down in the Protocol.
[17] The Protocol only binds the USSR in relation to the states which have signed and ratified or which have definitely acceded to the Protocol. The Protocol shall cease to be binding on the USSR in regard to any enemy state whose armed forces or whose allies *de jure* or in fact do not respect the prohibitions which are the object of this Protocol.
[18] The Protocol shall cease to be binding on Yugoslavia in regard to any enemy state whose armed forces or whose allies fail to respect the prohibitions which are the object of the Protocol.

The Antarctic Treaty

[1] The German Democratic Republic stated that in its view Article XIII, paragraph 1 of the Treaty was inconsistent with the principle that all states whose policies are guided by the purposes and principles of the United Nations Charter have a right to become parties to treaties which affect the interests of all states.
[2] The Federal Republic of Germany stated that the Treaty applies also to Berlin (West).
[3] Romania stated that the provisions of Article XIII, paragraph 1 of the Treaty were not in accordance with the principle according to which multilateral treaties whose object and purposes concern the international community, as a whole, should be open for universal participation.
[4] In acceding to the Treaty, Uruguay proposed the establishment of a general and definitive statute on Antarctica in which the interests of all states involved and of the international community as a whole would be considered equitably. It also declared that it reserved its rights in Antarctica in accordance with international law.

The Partial Test Ban Treaty

[1] Notification of succession.
[2] With a statement that this does not imply the recognition of any territory or regime not recognized by this state.

[3] The United States considers that Byelorussia and Ukraine are already covered by the signature and ratification by the Soviet Union.
[4] The Federal Republic of Germany stated that the Treaty applies also to Berlin (West).
[5] Kuwait stated that its signature and ratification of the Treaty do not in any way imply its recognition of Israel nor oblige it to apply the provisions of the Treaty in respect of the said country.
[6] The United Kingdom stated its view that if a regime is not recognized as the government of a state, neither signature nor the deposit of any instrument by it, nor notification of any of those acts, will bring about recognition of that regime by any other state.

The Outer Space Treaty

[1] Notification of succession.
[2] The Brazilian government interprets Article X of the Treaty as a specific recognition that the granting of tracking facilities by the parties to the Treaty shall be subject to agreement between the states concerned.
[3] The United States considers that Byelorussia and Ukraine are already covered by the signature and ratification by the Soviet Union.
[4] With a statement that this does not imply the recognition of any territory or regime not recognized by this state.
[5] The Federal Republic of Germany stated that the Treaty applies also to Berlin (West).
[6] Kuwait acceded to the Treaty with the understanding that this does not in any way imply its recognition of Israel and does not oblige it to apply the provisions of the Treaty in respect of the said country.
[7] Madagascar acceded to the Treaty with the understanding that under Article X of the Treaty the state shall retain its freedom of decision with respect to the possible installation of foreign observation bases in its territory and shall continue to possess the right to fix, in each case, the conditions for such installation.
[8] Syria acceded to the Treaty with the understanding that this should not mean in any way the recognition of Israel, nor should it lead to any relationship with Israel that could arise from the Treaty.

The Treaty of Tlatelolco

[1] Argentina stated that it understands Article 18 as recognizing the right of parties to carry out, by their own means or in association with third parties, explosions of nuclear devices for peaceful purposes, including explosions which involve devices similar to those used in nuclear weapons.
[2] The Treaty is in force for this country due to a declaration, annexed to the instrument of ratification in accordance with Article 28, paragraph 2, which waived the requirements for the entry into force of the Treaty, specified in paragraph 1 of that Article: namely, that all states in the region deposit the instruments of ratification; that Protocol I and Protocol II be signed and ratified by those states to which they apply; and that agreements on safeguards be concluded with the IAEA. Colombia made this declaration subsequent to the deposit of ratification, namely, on 6 September 1972, as did Nicaragua, on 24 October 1968, and Trinidad and Tobago, on 27 June 1975.
[3] On signing the Treaty, Brazil stated that, according to its interpretation, Article 18 of the Treaty gives the signatories the right to carry out, by their own means or in association with third parties, nuclear explosions for peaceful purposes, including explosions which involve devices similar to those used in nuclear weapons. This statement was reiterated at the ratification. Brazil also stated that it did not waive the requirements for the entry into force of the Treaty laid down in Article 28. The Treaty is therefore not yet in force for Brazil.
[4] Chile has not waived the requirements for the entry into force of the Treaty laid down in Article 28. The Treaty is therefore not yet in force for Chile.
[5] On signing Protocol II, China stated, *inter alia*: China will never use or threaten to use nuclear weapons against non-nuclear Latin American countries and the Latin American nuclear weapon-free zone; nor will China test, manufacture, produce, stockpile, install or deploy nuclear weapons in these countries or in this zone, or send its means of transportation and delivery carrying nuclear weapons to cross the territory, territorial sea or airspace of Latin American countries. The signing of the Protocol does not imply any change whatsoever in China's stand on the disarmament and nuclear weapons issue and, in particular, does not affect the Chinese government's stand against the Non-Proliferation Treaty and the Partial Test Ban Treaty.

The Chinese government holds that, in order that Latin America may truly become a nuclear weapon-free zone, all nuclear countries, and particularly the superpowers, must undertake not to use or threaten to use nuclear weapons against the Latin American countries and the Latin American nuclear weapon-free zone, and implement the following undertakings: (1) dismantle all foreign military bases in Latin America and refrain from establishing new bases there, and (2) prohibit the passage of any means of transportation and delivery carrying nuclear weapons through Latin American territory, territorial sea or airspace.
[6] On signing Protocol I, France made the following reservations and interpretative statements: the Protocol, as well as the provisions of the Treaty to which it refers, will not affect the right of self-defence under Article 51 of the UN Charter; the application of the legislation referred to in Article 3 of the Treaty relates to legislation which is consistent with international law; the obligations under the Protocol shall not apply to transit across the territories of the French Republic situated in the zone of the Treaty, and destined to other territories of the French Republic; the Protocol shall not limit, in any way, the participation of the populations of the French territories in the activities mentioned in Article 1 of the Treaty, and in efforts connected with the national defence of France; the provisions of Articles 1 and 2 of the Protocol apply to the text of the Treaty as it stands at the time when the Protocol is signed by France, and consequently no amendment to the Treaty that might come into force under Article 29 thereof would be binding on the government of France without the latter's express consent.
[7] On signing Protocol II, France stated that it interprets the undertaking contained in Article 3 of the Protocol to mean that it presents no obstacle to the full exercise of the right of self-defence enshrined in Article 51 of the United Nations Charter; it takes note of the interpretation of the Treaty given by the Preparatory Commission for the

Denuclearization of Latin America and reproduced in the Final Act, according to which the Treaty does not apply to transit, the granting or denying of which lies within the exclusive competence of each state party in accordance with the pertinent principles and rules of international law; it considers that the application of the legislation referred to in Article 3 of the Treaty relates to legislation which is consistent with international law. The provisions of Articles 1 and 2 of the Protocol apply to the text of the Treaty as it stands at the time when the Protocol is signed by France. Consequently, no amendment to the Treaty that might come into force under the provision of Article 29 would be binding on the government of France without the latter's express consent. If this declaration of interpretation is contested in part or in whole by one or more contracting parties to the Treaty or to Protocol II, these instruments would be null and void as far as relations between the French Republic and the contesting state or states are concerned. On depositing its instrument of ratification of Protocol II, France stated that it did so subject to the statement made on signing the Protocol. On 15 April 1974, France made a supplementary statement to the effect that it was prepared to consider its obligations under Protocol II as applying not only to the signatories of the Treaty, but also to the territories for which the statute of denuclearization was in force in conformity with Article 1 of Protocol I.

[8] On signing the Treaty, Mexico said that if technological progress makes it possible to differentiate between nuclear weapons and nuclear devices for peaceful purposes, it will be necessary to amend the relevant provisions of the Treaty, according to the procedures established therein.

[9] The Netherlands stated that Protocol I shall not be interpreted as prejudicing the position of the Netherlands as regards its recognition or non-recognition of the rights of or claims to sovereignty of the parties to the Treaty, or of the grounds on which such claims are made.

[10] Nicaragua stated that it reserved the right to use nuclear energy for peaceful purposes such as the removal of earth for the construction of canals, irrigation works, power plants, and so on, as well as to allow the transit of atomic material through its territory.

[11] The Soviet Union signed and ratified Protocol II with the following statement:

The Soviet Union proceeds from the assumption that the effect of Article 1 of the Treaty extends, as specified in Article 5 of the Treaty, to any nuclear explosive device and that, accordingly, the carrying out by any party to the Treaty of explosions of nuclear devices for peaceful purposes would be a violation of its obligations under Article 1 and would be incompatible with its non-nuclear status. For states parties to the Treaty, a solution to the problem of peaceful nuclear explosions can be found in accordance with the provisions of Article V of the Non-Proliferation Treaty and within the framework of the international procedures of the IAEA. The signing of the Protocol by the Soviet Union does not in any way signify recognition of the possibility of the force of the Treaty being extended beyond the territories of the states parties to the Treaty, including airspace and territorial waters as defined in accordance with international law. With regard to the reference in Article 3 of the Treaty to "its own legislation" in connection with the territorial waters, airspace and any other space over which the states parties to the Treaty exercise sovereignty, the signing of the Protocol by the Soviet Union does not signify recognition of their claims to the exercise of sovereignty which are contrary to generally accepted standards of international law. The Soviet Union takes note of the interpretation of the Treaty given in the Final Act of the Preparatory Commission for the Denuclearization of Latin America to the effect that the transport of nuclear weapons by the parties to the Treaty is covered by the prohibitions in Article 1 of the Treaty. The Soviet Union reaffirms its position that authorizing the transit of nuclear weapons in any form would be contrary to the objectives of the Treaty, according to which, as specially mentioned in the preamble, Latin America must be completely free from nuclear weapons, and that it would be incompatible with the non-nuclear status of the states parties to the Treaty and with their obligations as laid down in Article 1 thereof.

Any actions undertaken by a state or states parties to the Treaty which are not compatible with their non-nuclear status, and also the commission by one or more states parties to the Treaty of an act of aggression with the support of a state which is in possession of nuclear weapons or together with such a state, will be regarded by the Soviet Union as incompatible with the obligations of those countries under the Treaty. In such cases the Soviet Union reserves the right to reconsider its obligations under Protocol II. It further reserves the right to reconsider its attitude to this Protocol in the event of any actions on the part of other states possessing nuclear weapons which are incompatible with their obligations under the said Protocol. The provisions of the articles of Protocol II are applicable to the text of the Treaty for the Prohibition of Nuclear Weapons in Latin America in the wording of the Treaty at the time of the signing of the Protocol by the Soviet Union, due account being taken of the position of the Soviet Union as set out in the present statement. Any amendment to the Treaty entering into force in accordance with the provisions of Articles 29 and 6 of the Treaty without the clearly expressed approval of the Soviet Union shall have no force as far as the Soviet Union is concerned.

In addition, the Soviet Union proceeds from the assumption that the obligations under Protocol II also apply to the territories for which the status of the denuclearized zone is in force in conformity with Protocol I of the Treaty.

[12] When signing and ratifying Protocol I and Protocol II, the United Kingdom made the following declarations of understanding:

In connection with Article 3 of the Treaty, defining the term "territory" as including the territorial sea, airspace and any other space over which the state exercises sovereignty in accordance with "its own legislation", the UK does not regard its signing or ratification of the Protocols as implying recognition of any legislation which does not, in its view, comply with the relevant rules of international law.

The Treaty does not permit the parties to carry out explosions of nuclear devices for peaceful purposes unless and until advances in technology have made possible the development of devices for such explosions which are not capable of being used for weapon purposes.

The signing and ratification by the UK could not be regarded as affecting in any way the legal status of any territory for the international relations of which the UK is responsible, lying within the limits of the geographical zone established by the Treaty.

Should a party to the Treaty carry out any act of aggression with the support of a nuclear weapon state, the UK would be free to reconsider the extent to which it could be regarded as committed by the provisions of Protocol II.

In addition, the UK declared that its undertaking under Article 3 of Protocol II not to use or threaten to use nuclear weapons against the parties to the Treaty extends also to territories in respect of which the undertaking under Article 1 of Protocol I becomes effective.

[13] The United States ratified Protocol I with the following understandings: The provisions of the Treaty made applicable by this Protocol do not affect the exclusive power and legal competence under international law of a state adhering to this Protocol to grant or deny transit and transport privileges to its own or any other vessels or aircraft irrespective of cargo or armaments; the provisions of the Treaty made applicable by this Protocol do not affect rights under international law of a state adhering to this Protocol regarding the exercise of the freedom of the seas, or regarding passage through or over waters subject to the sovereignty of a state, and the declarations attached by the United States to its ratification of Protocol II apply also to its ratification of Protocol I.

[14] The United States signed and ratified Protocol II with the following declarations of understanding:

In connection with Article 3 of the Treaty, defining the term "territory" as including the territorial sea, airspace and any other space over which the state exercises sovereignty in accordance with "its own legislation", the US ratification of the Protocol could not be regarded as implying recognition of any legislation which did not, in its view, comply with the relevant rules of international law.

Each of the parties retains exclusive power and legal competence, unaffected by the terms of the Treaty, to grant or deny non-parties transit and transport privileges.

As regards the undertaking not to use or threaten to use nuclear weapons against the parties, the United States would consider that an armed attack by a party, in which it was assisted by a nuclear weapon state, would be incompatible with the party's obligations under Article 1 of the Treaty.

The definition contained in Article 5 of the Treaty is understood as encompassing all nuclear explosive devices; Articles 1 and 5 of the Treaty restrict accordingly the activities of the parties under paragraph 1 of Article 18.

Article 18, paragraph 4 permits, and US adherence to Protocol II will not prevent, collaboration by the USA with the parties to the Treaty for the purpose of carrying out explosions of nuclear devices for peaceful purposes in a manner consistent with a policy of not contributing to the proliferation of nuclear weapon capabilities.

The United States will act with respect to such territories of Protocol I adherents, as are within the geographical area defined in Article 4, paragraph 2 of the Treaty, in the same manner as Protocol II requires it to act with respect to the territories of the parties.

[15] Venezuela stated that in view of the existing controversy between Venezuela on the one hand and the United Kingdom and Guyana on the other, Article 25, paragraph 2 of the Treaty should apply to Guyana. This paragraph provides that no political entity should be admitted, part or all of whose territory is the subject of a dispute or claim between an extra-continental country and one or more Latin American states, so long as the dispute has not been settled by peaceful means.

[16] Safeguards under the Non-Proliferation Treaty cover the Treaty of Tlatelolco.

The Non-Proliferation Treaty

[1] On signing the Treaty, Australia stated, *inter alia*, that it regarded it as essential that the Treaty should not affect security commitments under existing treaties of mutual security.

[2] Notification of succession.

[3] On the occasion of the deposit of the instrument of ratification, Egypt stated that since it was embarking on the construction of nuclear power reactors, it expected assistance and support from industrialized nations with a developed nuclear industry. It called upon nuclear weapon states to promote research and development of peaceful applications of nuclear explosions in order to overcome all the difficulties presently involved therein. Egypt also appealed to these states to exert their efforts to conclude an agreement prohibiting the use or threat of use of nuclear weapons against any state, and expressed the view that the Middle East should remain completely free of nuclear weapons.

[4] France, not party to the Treaty, declared that it would behave like a state adhering to the Treaty and that it would follow a policy of strengthening appropriate safeguards relating to nuclear equipment, material and technology. On 12 September 1981 an agreement between France, the European Atomic Energy Community (Euratom) and the IAEA for the application of safeguards in France entered into force. The agreement covers nuclear material and facilities notified to the IAEA by France, and is similar to the agreements concluded with the IAEA by the United Kingdom and the United States.

[5] On depositing the instrument of ratification, the Federal Republic of Germany reiterated the declaration made at the time of signing: it reaffirmed its expectation that the nuclear weapon states would intensify their efforts in accordance with the undertakings under Article VI of the Treaty, as well as its understanding that the security of FR Germany continued to be ensured by NATO; it stated that no provision of the Treaty may be interpreted in such a way as to hamper further development of European unification; that research, development and use of nuclear energy for peaceful purposes, as well as international and multinational co-operation in this field, must not be prejudiced by the Treaty; that the application of the Treaty, including the implementation of safeguards, must not lead to discrimination of the nuclear industry of FR Germany in international competition; and that it attached vital importance to the undertaking given by the United States and the United Kingdom concerning the application of safeguards to their peaceful nuclear facilities, hoping that other nuclear weapon states would assume similar obligations.

In a separate note, FR Germany declared that the Treaty will also apply to Berlin (West) without affecting Allied rights and responsibilities, including those relating to demilitarization. In notes of 24 July, 19 August, and 25 November 1975, respectively, addressed to the US Department of State, Czechoslovakia, the Soviet Union and the German Democratic Republic stated that this declaration by FR Germany had no legal effect.

[6] On acceding to the Treaty, the Holy See stated, *inter alia*, that the Treaty will attain in full the objectives of security and peace and justify the limitations to which the states party to the Treaty submit, only if it is fully executed in

every clause and with all its implications. This concerns not only the obligations to be applied immediately but also those which envisage a process of ulterior commitments. Among the latter, the Holy See considers it suitable to point out the following:
(*a*) The adoption of appropriate measures to ensure, on a basis of equality, that all non-nuclear weapon states party to the Treaty will have available to them the benefits deriving from peaceful applications of nuclear technology.
(*b*) The pursuit of negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective control.

[7] On signing the Treaty, Indonesia stated, *inter alia*, that the government of Indonesia attaches great importance to the declarations of the United States, the United Kingdom and the Soviet Union affirming their intention to provide immediate assistance to any non-nuclear weapon state party to the Treaty that is a victim of an act of aggression in which nuclear weapons are used. Of utmost importance, however, is not the action *after* a nuclear attack has been committed but the guarantees to prevent such an attack. The Indonesian government trusts that the nuclear weapon states will study further this question of effective measures to ensure the security of the non-nuclear weapon states. On depositing the instrument of ratification, Indonesia expressed the hope that the nuclear countries would be prepared to co-operate with non-nuclear countries in the use of nuclear energy for peaceful purposes and implement the provisions of Article IV of the Treaty without discrimination. It also stated the view that the nuclear weapon states should observe the provisions of Article VI of the Treaty relating to the cessation of the nuclear arms race.

[8] Italy stated that in its belief nothing in the Treaty was an obstacle to the unification of the countries of Western Europe; it noted full compatibility of the Treaty with the existing security agreements; it noted further than when technological progress would allow the development of peaceful explosive devices different from nuclear weapons, the prohibition relating to their manufacture and use shall no longer apply; it interpreted the provisions of Article IX, paragraph 3 of the Treaty, concerning the definition of a military nuclear state, in the sense that it referred exclusively to the five countries which had manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1 January 1967, and stressed that under no circumstance would a claim of pertaining to such category be recognized by the Italian government to any other state.

[9] On depositing the instrument of ratification, Japan expressed the hope that France and China would accede to the Treaty; it urged a reduction of nuclear armaments and a comprehensive ban on nuclear testing; appealed to all states to refrain from the threat or use of force involving either nuclear or non-nuclear weapons; expressed the view that peaceful nuclear activities in non-nuclear weapon states party to the Treaty should not be hampered and that Japan should not be discriminated against in favour of other parties in any aspect of such activities. It also urged all nuclear weapon states to accept IAEA safeguards on their peaceful nuclear activities.

[10] A statement was made containing a disclaimer regarding the recognition of states party to the Treaty.

[11] On depositing the instrument of ratification, the Republic of Korea took note of the fact that the depositary governments of the three nuclear weapon states had made declarations in June 1968 to take immediate and effective measures to safeguard any non-nuclear weapon state which is a victim of an act or an object of a threat of aggression in which nuclear weapons are used. It recalled that the UN Security Council adopted a resolution to the same effect on 19 June 1968.

[12] On depositing the instruments of accession and ratification, Liechtenstein and Switzerland stated that activities not prohibited under Articles I and II of the Treaty include, in particular, the whole field of energy production and related operations, research and technology concerning future generations of nuclear reactors based on fission or fusion, as well as production of isotopes. Liechtenstein and Switzerland define the term "source or special fissionable material" in Article III of the Treaty as being in accordance with Article XX of the IAEA Statute, and a modification of this interpretation requires their formal consent; they will accept only such interpretations and definitions of the terms "equipment or material especially designed or prepared for the processing, use or production of special fissionable material", as mentioned in Article III of the Treaty, that they will expressly approve; and they understand that the application of the Treaty, especially of the control measures, will not lead to discrimination of their industry in international competition.

[13] On signing the Treaty, Mexico stated, *inter alia*, that none of the provisions of the Treaty shall be interpreted as affecting in any way whatsoever the rights and obligations of Mexico as a state party to the Treaty of Tlatelolco.

It is the understanding of Mexico that at the present time any nuclear explosive device is capable of being used as a nuclear weapon and that there is no indication that in the near future it will be possible to manufacture nuclear explosive devices that are not potentially nuclear weapons. However, if technological advances modify this situation, it will be necessary to amend the relevant provisions of the Treaty in accordance with the procedure established therein.

[14] The ratification was accompanied by a statement in which Turkey underlined the non-proliferation obligations of the nuclear weapon states, adding that measures must be taken to meet adequately the security requirements of non-nuclear weapon states. Turkey also stated that measures developed or to be developed at national and international levels to ensure the non-proliferation of nuclear weapons should in no case restrict the non-nuclear weapon states in their option for the application of nuclear energy for peaceful purposes.

[15] The United Kingdom recalled its view that if a regime is not recognized as the government of a state, neither signature nor the deposit of any instrument by it, nor notification of any of those acts, will bring about recognition of that regime by any other state.

[16] This agreement, signed between the United Kingdom, Euratom and the IAEA, provides for the submission of British non-military nuclear installations to safeguards under IAEA supervision.

[17] Together with the notification that the statutory and constitutional requirements for the entry into force of the agreement for the application of safeguards to US civilian nuclear installations had been met, the IAEA received a list of facilities in the United States eligible to be safeguarded.

[18] In connection with the ratification of the Treaty, Yugoslavia stated, *inter alia*, that it considered a ban on the development, manufacture and use of nuclear weapons and the destruction of all stockpiles of these weapons to be

indispensable for the maintenance of a stable peace and international security; it held the view that the chief responsibility for progress in this direction rested with the nuclear weapon powers, and expected these powers to undertake not to use nuclear weapons against the countries which have renounced them as well as against non-nuclear weapon states in general, and to refrain from the threat to use them. It also emphasized the significance it attached to the universality of the efforts relating to the realization of the Non-Proliferation Treaty.

The Sea-Bed Treaty

[1] On signing the Treaty, Argentina stated that it interprets the references to the freedom of the high seas as in no way implying a pronouncement of judgement on the different positions relating to questions connected with international maritime law. It understands that the reference to the rights of exploration and exploitation by coastal states over their continental shelves was included solely because those could be the rights most frequently affected by verification procedures. Argentina precludes any possibility of strengthening, through this Treaty, certain positions concerning continental shelves to the detriment of others based on different criteria.

[2] On signing the Treaty, Brazil stated that nothing in the Treaty shall be interpreted as prejudicing in any way the sovereign rights of Brazil in the area of the sea, the sea-bed and the subsoil thereof adjacent to its coasts. It is the understanding of the Brazilian government that the word "observation", as it appears in paragraph 1 of Article III of the Treaty, refers only to observation that is incidental to the normal course of navigation in accordance with international law.

[3] In depositing the instrument of ratification, Canada declared: Article I, paragraph 1, cannot be interpreted as indicating that any state has a right to implant or emplace any weapons not prohibited under Article I, paragraph 1, on the sea-bed and ocean floor, and in the subsoil thereof, beyond the limits of national jurisdiction, or as constituting any limitation on the principle that this area of the sea-bed and ocean floor and the subsoil thereof shall be reserved for exclusively peaceful purposes. Articles I, II and III cannot be interpreted as indicating that any state but the coastal state has any right to implant or emplace any weapon not prohibited under Article I, paragraph 1 on the continental shelf, or the subsoil thereof, appertaining to that coastal state, beyond the outer limit of the sea-bed zone referred to in Article I and defined in Article II. Article III cannot be interpreted as indicating any restrictions or limitation upon the rights of the coastal state, consistent with its exclusive sovereign rights with respect to the continental shelf, to verify, inspect or effect the removal of any weapon, structure, installation, facility or device implanted or emplaced on the continental shelf, or the subsoil thereof, appertaining to that coastal state, beyond the outer limit of the sea-bed zone referred to in Article I and defined in Article II. On 12 April 1976, the Federal Republic of Germany stated that the declaration by Canada is not of a nature to confer on the government of this country more far-reaching rights than those to which it is entitled under current international law, and that all rights existing under current international law which are not covered by the prohibitions are left intact by the Treaty.

[4] A statement was made containing a disclaimer regarding recognition of states party to the Treaty.

[5] On ratifying the Treaty, the Federal Republic of Germany declared that the Treaty will apply to Berlin (West).

[6] On the occasion of its accession to the Treaty, the government of India stated that as a coastal state, India has, and always has had, full and exclusive rights over the continental shelf adjoining its territory and beyond its territorial waters and the subsoil thereof. It is the considered view of India that other countries cannot use its continental shelf for military purposes. There cannot, therefore, be any restriction on, or limitation of, the sovereign right of India as a coastal state to verify, inspect, remove or destroy any weapon, device, structure, installation or facility, which might be implanted or emplaced on or beneath its continental shelf by any other country, or to take such other steps as may be considered necessary to safeguard its security. The accession by the government of India to the Treaty is based on this position. In response to the Indian statement, the US government expressed the view that, under existing international law, the rights of coastal states over their continental shelves are exclusive only for the purposes of exploration and exploitation of natural resources, and are otherwise limited by the 1958 Convention on the Continental Shelf and other principles of international law. On 12 April 1976, the Federal Republic of Germany stated that the declaration by India is not of a nature to confer on the government of this country more far-reaching rights than those to which it is entitled under current international law, and that all rights existing under current law which are not covered by the prohibitions are left intact by the Treaty.

[7] On signing the Treaty, Italy stated, *inter alia*, that in the case of agreements on further measures in the field of disarmament to prevent an arms race on the sea-bed and ocean floor and in their subsoil, the question of the delimitation of the area within which these measures would find application shall have to be examined and solved in each instance in accordance with the nature of the measures to be adopted. The statement was repeated at the time of ratification.

[8] Ratification of the Treaty by Taiwan is considered by Romania as null and void.

[9] The United Kingdom recalled its view that if a regime is not recognized as the government of a state, neither signature nor the deposit of any instrument by it, nor notification of any of those acts, will bring about recognition of that regime by any other state.

[10] Viet Nam stated that no provision of the Treaty should be interpreted in a way that would contradict the rights of the coastal states with regard to their continental shelf, including the right to take measures to ensure their security.

[11] On 25 February 1974, the Ambassador of Yugoslavia transmitted to the US Secretary of State a note stating that in the view of the Yugoslav government, Article III, paragraph 1, of the Treaty should be interpreted in such a way that a state exercising its right under this Article shall be obliged to notify in advance the coastal state, in so far as its observations are to be carried out "within the stretch of the sea extending above the continental shelf of the said state". On 16 January 1975, the US Secretary of State presented the view of the United States concerning the Yugoslav note, as follows: In so far as the note is intended to be interpretative of the Treaty, the United States cannot accept it as a valid interpretation. In addition, the United States does not consider that it can have any effect on the existing law of the sea. In so far as the note was intended to be a reservation to the Treaty, the United States placed

on record its formal objection to it on the grounds that it was incompatible with the object and purpose of the Treaty. The United States also drew attention to the fact that the note was submitted too late to be legally effective as a reservation. A similar exchange of notes took place between Yugoslavia and the United Kingdom. On 12 April 1976, the Federal Republic of Germany stated that the declaration by Yugoslavia is not of a nature to confer on the government of this country more far-reaching rights than those to which it is entitled under current international law, and that all rights existing under current international law which are not covered by the prohibitions are left intact by the Treaty.

The BW Convention

[1] Considering the obligations resulting from its status as a permanently neutral state, Austria declares a reservation to the effect that its co-operation within the framework of this Convention cannot exceed the limits determined by the status of permanent neutrality and membership with the United Nations.

[2] In a statement made on the occasion of the signature of the Convention, India reiterated its understanding that the objective of the Convention is to eliminate biological and toxin weapons, thereby excluding completely the possibility of their use, and that the exemption with regard to biological agents or toxins, which would be permitted for prophylactic, protective or other peaceful purposes, would not in any way create a loophole in regard to the production or retention of biological and toxin weapons. Also any assistance which might be furnished under the terms of the Convention would be of a medical or humanitarian nature and in conformity with the Charter of the United Nations. The statement was repeated at the time of the deposit of the instrument of ratification.

[3] Ireland considers that the Convention could be undermined if the reservations made by the parties to the 1925 Geneva Protocol were allowed to stand, as the prohibition of possession is incompatible with the right to retaliate, and that there should be an absolute and universal prohibition of the use of the weapons in question. Ireland notified the depositary government for the Geneva Protocol of the withdrawal of its reservations to the Protocol, made at the time of accession in 1930. The withdrawal applies to chemical as well as to bacteriological (biological) and toxin agents of warfare.

[4] The Republic of Korea stated that the signing of the Convention does not in any way mean or imply the recognition of any territory or regime which has not been recognized by the Republic of Korea as a state or government.

[5] In the understanding of Kuwait, its ratification of the Convention does not in any way imply its recognition of Israel, nor does it oblige it to apply the provisions of the Convention in respect of the said country.

[6] Mexico considers that the Convention is only a first step towards an agreement prohibiting also the development, production and stockpiling of all chemical weapons, and notes the fact that the Convention contains an express commitment to continue negotiations in good faith with the aim of arriving at such an agreement.

[7] The ratification by Switzerland contains the following reservations:

1. Owing to the fact that the Convention also applies to weapons, equipment or means of delivery designed to use biological agents or toxins, the delimitation of its scope of application can cause difficulties since there are scarcely any weapons, equipment or means of delivery peculiar to such use; therefore, Switzerland reserves the right to decide for itself what auxiliary means fall within that definition.

2. By reason of the obligations resulting from its status as a perpetually neutral state, Switzerland is bound to make the general reservation that its collaboration within the framework of this Convention cannot go beyond the terms prescribed by that status. This reservation refers especially to Article VII of the Convention as well as to any similar clause that could replace or supplement that provision of the Convention.

In a note of 18 August 1976, addressed to the Swiss Ambassador, the US Secretary of State stated the following view of the US government with regard to the first reservation: The prohibition would apply only to (*a*) weapons, equipment and means of delivery, the design of which indicated that they could have no other use than that specified, and (*b*) weapons, equipment and means of delivery, the design of which indicated that they were specifically intended to be capable of the use specified. The government of the United States shares the view of the government of Switzerland that there are few weapons, equipment or means of delivery peculiar to the uses referred to. It does not, however, believe that it would be appropriate, on this ground alone, for states to reserve unilaterally the right to decide which weapons, equipment or means of delivery fell within the definition. Therefore, while acknowledging the entry into force of the Convention between itself and the government of Switzerland, the US government enters its objection to this reservation.

[8] The deposit of the instrument of ratification by Taiwan is considered by the Soviet Union as an illegal act because the government of the People's Republic of China is regarded by the Soviet Union as the sole representative of China.

[9] The United Kingdom recalled its view that if a regime is not recognized as the government of a state, neither signature nor the deposit of any instrument by it nor notification of any of those acts will bring about recognition of that regime by any other state.

[10] Notification of succession.

The ENMOD Convention

[1] Kuwait made the following reservation and understanding: This Convention binds Kuwait only towards states parties thereto; its obligatory character shall *ipso facto* terminate with respect to any hostile state which does not abide by the prohibition contained therein. It is understood that accession to this Convention does not mean in any way recognition of Israel by Kuwait; furthermore, no treaty relation will arise between Kuwait and Israel.

On 23 June 1980, the UN Secretary-General, the depositary of the Convention, received from the government of Israel a communication stating that Israel would adopt towards Kuwait an attitude of complete reciprocity.

[2] On signing the Convention, Turkey declared that the terms "widespread", "long-lasting" and "severe effects" contained in the Convention need to be more clearly defined, and that so long as this clarification was not made, Turkey

would be compelled to interpret for itself the terms in question and, consequently, reserved the right to do so as and when required. Turkey also stated its belief that the difference between "military or any other hostile purposes" and "peaceful purposes" should be more clearly defined so as to prevent subjective evaluations.
[3] Notification of succession.

The 'Inhumane Weapons' Convention

[1] Upon signature, China stated that the Convention fails to provide for supervision or verification of any violation of its clauses, thus weakening its binding force. The Protocol on mines, booby traps and other devices fails to lay down strict restrictions on the use of such weapons by the aggressor on the territory of the victim and to provide adequately for the right of a state victim of an aggression to defend itself by all necessary means. The Protocol on incendiary weapons does not stipulate restrictions on the use of such weapons against combat personnel.
[2] France stated that it regretted that it had not been possible to reach agreement on the provisions concerning the verification of facts which might be alleged and which might constitute violations of the undertakings subscribed to. It therefore reserved the right to submit, possibly in association with other states, proposals aimed at filling that gap at the first conference to be held pursuant to Article 8 of the Convention and to utilize, as appropriate, procedures that would make it possible to bring before the international community facts and information which, if verified, could constitute violations of the provisions of the Convention and the protocols annexed thereto.

Not being bound by the 1977 Additional Protocol I to the Geneva Conventions of 1949, France considers that the fourth paragraph of the preamble to the Convention on prohibitions or restrictions on the use of certain conventional weapons, which reproduces the provisions of Article 35, paragraph 3, of Additional Protocol I, applies only to states parties to that Protocol. France will apply the provisions of the Convention and its three Protocols to all the armed conflicts referred to in Articles 2 and 3 common to the Geneva Conventions of 1949.
[3] Italy stated its regret that no agreement had been reached on provisions that would ensure respect for the obligations under the Convention. Italy intends to undertake efforts to ensure that the problem of the establishment of a mechanism that would make it possible to fill this gap in the Convention is taken up again at the earliest opportunity in every competent forum.
[4] Lao People's Democratic Republic acceded to the Convention and its Protocols in 1983.
[5] Romania stated that the provisions of the Convention and its Protocols have a restricted character and do not ensure adequate protection either to the civilian population or to the combatants as the fundamental principles of international humanitarian law require.
[6] The United States stated that it had strongly supported proposals by other countries to include special procedures for dealing with compliance matters, and reserved the right to propose at a later date additional procedures and remedies, should this prove necessary, to deal with such problems.

21. Non-governmental organizations and disarmament at the United Nations[1]

Square-bracketed numbers, thus [1], *refer to the list of references on page 654.*

I. Introduction

The first UN Special Session on Disarmament (SSD I) in 1978 in many ways constituted a watershed in the activities of non-governmental organizations (NGOs) in the field of disarmament in the UN system. NGOs in other fields are also active at the United Nations, especially in matters of human rights, development, and anti-colonialism. NGOs which concern themselves with disarmament, however, have never been given the status that those in the economic and social field have been given through the UN Charter (see section IX).

Despite the prominent role played by NGOs at SSD I, their status at the UN did not improve in the following years. However, with preparations for SSD II, NGO activities took a quantum leap. This chapter considers the formal, if implicit, role (largely inside UN headquarters) and the informal role (outside and world-wide) of NGOs in disarmament from the conclusion of SSD I in 1978 until the conclusion of SSD II in 1982.[2]

II. Beyond SSD I

The Final Document of SSD I acknowledged the valuable contributions of 25 NGOs and 6 research institutes at the session and in paragraph 123 asked that "the [UN] Centre [for Disarmament] should also increase contacts with non-governmental organizations and research institutions in view of the valuable role they play in the field of disarmament. This role could be encouraged also in other ways that may be considered as appropriate" [2]. Despite the adoption by the 33rd regular session of the General Assembly in 1978 of a resolution in accordance with these aims [3], nothing substantial resulted from efforts to build on paragraph 123.

In 1980 the UN Centre for Disarmament placed an NGO liaison officer on its staff. It compiled a mailing list of organizations and institutions concerned with disarmament and sent them regular materials. The Centre,

[1] This chapter was written by Homer A. Jack, Secretary-General of the World Conference on Religion and Peace, New York.

[2] For an account of the NGO role before and during SSD I, see reference [1].

together with the Department of Public Information, increased the output of material on disarmament, notably a series of Fact Sheets (see, for example reference [4]).

In this post-SSD I period, NGOs had no designated role but continued to observe the work of the First Committee in successive regular sessions of the General Assembly and that of the reorganized Disarmament Commission. Their written statements, submitted in quantities for use by delegates, were circulated [5]. NGOs continued to observe the work of such subsidiary organs as the *Ad Hoc* Committees on the World Disarmament Conference and on the Indian Ocean.

A small number of NGOs were present at the Preparatory Committee for the UN Conference on the Prohibitions or Restrictions on the Use of Certain Conventional Weapons (1981). NGOs also observed the sessions of this UN Conference in Geneva.

Communications from NGOs were listed and circulated to delegations at the enlarged Committee on Disarmament in 1979. A small number of NGOs regularly attended the Second Review Conference of the Non-Proliferation Treaty, and *Disarmament Times* was published as a service to the Conference (see page 648). NGOs were only permitted to observe these meetings, however, and could not deliver oral statements.

In declaring the 1980s as the Second Disarmament Decade the General Assembly expressly stated that NGOs should "undertake further programs of information relating to the danger of the armaments race" and that "The UN, in particular the Centre for Disarmament, should intensify and coordinate its program of publications, audio-visual materials, co-operation with non-governmental organizations and relations with the media" [6]. The programme did not, however, give any additional role to NGOs, such as suggesting their substantive input on disarmament issues into the UN system.

A result of the post-SSD I meetings of the NGO committees on disarmament at Geneva and New York was the development of an *Ad Hoc* NGO Liaison Group, composed of the officers of both disarmament committees (whose organizations are indicated in appendix 21A). The Group discussed its limited mandate and presented a statement on the participation of NGOs in SSD II to the then UN Secretary-General Kurt Waldheim.

III. Preparations for SSD II

The NGO role in the preparations for SSD II was delineated at the very first meeting of its Preparatory Committee, on 4 December 1980, which decided that representatives of NGOs might attend meetings of the

Committee and that they might provide the Secretariat with lists of communications received from non-governmental organizations conducting research in the field of disarmament [7].

A small number of NGOs observed the sessions of the Preparatory Committee, and the statements, pamphlets and other communications which NGOs and institutions submitted to the Secretariat for use by the delegates to the Preparatory Committee were indexed [8] and often made directly available to members of delegations.

The *Ad Hoc* Liaison Group met before the Preparatory Committee and asked for three changes in the role previously accorded to NGOs: (*a*) to allow oral interventions by NGOs at various sessions of the Preparatory Committee and its subsidiary bodies, (*b*) to circulate written statements by NGOs relating specifically to the agenda (but not general disarmament statements) to delegations with a UN cover sheet and document number, and (*c*) to allow NGOs to attend subsidiary organs of the Preparatory Committee, including working groups.

As a result, the first substantive session of the Preparatory Committee in May 1981 invited NGOs to make oral statements to the October Preparatory Committee meeting, but to decide for themselves which should do so [9]. The other two proposals of the *Ad Hoc* Group were not acted upon.

Eight NGOs and three institutes were heard at a plenary meeting of the Preparatory Committee and their statements were printed in a verbatim report of the meeting [10]. NGOs held consultations with individual delegates, and groups of delegates, on SSD II at the three substantive sessions of the Preparatory Committee and informed delegates of the crescendo of NGO activity around the world for disarmament, especially related to SSD II. They issued special inventories of seminars, meetings and demonstrations and also projections of parallel NGO activities during SSD II itself [11–13].

IV. At SSD II

The Preparatory Committee recommended that NGOs and research institutions concerned with disarmament and peace should be accorded the same facilities at SSD II as those which they had received at SSD I [14]. More than 3 000 NGOs registered to observe SSD II. Of this number, almost one-half were from Japan. The second largest number was from the USA, but all continents were represented.

Visas [15]

Despite discussions in April/May 1982 between the NGO Committee on Disarmament and both UN and US authorities, hundreds of NGOs

coming to SSD II had their visas delayed and 318 had their visas denied. The latter included 268 Japanese nationals, and citizens from other countries in Asia, Europe and North America. Protests were immediately lodged by NGOs, some governments, the press, and through a suit in Federal Court against the US Secretary of State and the US Attorney-General. Both the suit and a subsequent appeal were lost. Letters from the US government to applicants denying visas usually ended with the sentence "It would not be in the public interest of the USA to waive excludability."

This denial of visas was not the finest hour during SSD II, and did not go unnoticed [16]. The UN issued no public protest on the matter. However, at the request of the NGO Committee on Disarmament (at UN Headquarters), the Committee on Relations with the Host Country of the General Assembly began to discuss the NGO visa question in November 1982.

Literature and briefings

NGO literature on disarmament was solicited by the UN Centre and made available to delegates in the General Assembly building. The Secretariat issued a list of "Communications Received Relating to Disarmament" [17]. Daily briefings for NGOs were held each morning at UN Headquarters.

Lobbying

Attempts to influence policy were undertaken by some NGOs, individually and in groups. Two persons worked for the National Weapons Freeze campaign of the USA for more than two months to acquaint delegates with the campaign and urge its echo in SSD II [18]. A small group of NGOs met regularly and tried to influence delegates on selected issues, especially the nuclear freeze and the World Disarmament Campaign. At the conclusion of SSD II this group issued a statement at a press conference expressing deep concern at the obvious failure of the session [19].

Attempts at lobbying were severely handicapped by alleged security problems at UN Headquarters during SSD II. NGOs were unable to talk to delegates on the floor of the General Assembly Hall or in the Delegates Lounge—as they had been able to do during SSD I.

Disarmament Times

First published in 1978 before SSD I, *Disarmament Times* appeared to be a valuable tool to unify the entire SSD II community: delegates, the Secretariat, NGOs, and the press. Twenty issues of *Disarmament Times*

were published during the five-week period. They were mailed to subscribers on every continent and several thousand copies were distributed free at UN Headquarters. It was published by the NGO Committee on Disarmament and financed by specially raised funds.

V. NGO days

The fact that representatives of 25 NGOs and 6 peace and disarmament institutions addressed the *Ad Hoc* Committee of SSD I in 1978 was a breakthrough for NGOs in disarmament affairs. It was therefore assumed early on that NGOs would again be invited to speak at SSD II.

At its second substantive session, the Preparatory Committee made arrangements for NGOs to give statements to SSD II, giving the *Ad Hoc* Liaison Group of the two NGO disarmament committees at Geneva and UN Headquarters the job of selecting appropriate speakers from representatives of NGOs and peace and disarmament research institutions.

More than 500 NGOs and institutions with an interest in disarmament were contacted and informed of this opportunity to deliver oral statements. Some 120 applied to speak, including 56 international or regional organizations, 47 national organizations, and 17 institutions. The Group selected 56 international and national NGOs, but found it impossible to screen the research institutions. Thus it recommended that all 17 which applied be allowed to speak. The final session of the Preparatory Committee added six institutions and recommended to SSD II that a total of 56 NGOs and 23 institutions be allowed to speak [20]. Of these, 75 addressed the *Ad Hoc* Committee (they are listed in appendix 21A).

The 'NGO days' were on 24–25 June and a wide range of speeches were given. The most popular topics raised by the 75 speakers were as follows [21]: nuclear arms limitation and disarmament, disarmament and international security, information on disarmament, dissemination of information on disarmament, disarmament and development, the role of NGOs, the nuclear freeze, the public outcry against preparation for war, nuclear-free zones, and a redefinition of security or alternatives to present security. Twenty-one speakers advocated unilateralism while 20 discussed the World Disarmament Campaign.

VI. Parallel activities

The *Ad Hoc* NGO Liaison Group had decided not to sponsor a parallel NGO conference but instead to encourage as many parallel activities by individual NGOs or groups of NGOs as possible—a practice also encouraged at SSD I.

Early demonstrations

A great number of disarmament demonstrations were held in the autumn of 1981 and early in 1982, especially in Western Europe. These had varied objectives, but increasingly SSD II became a focus. Suddenly these manifestations spilled over into North America and Japan and their leaders increasingly realized the utility of relating these efforts to SSD II.

National lobbying

In the period immediately preceding SSD II, NGOs in some world capitals tried to make an impact on evolving governmental policy for SSD II. In London, a range of NGOs met regularly and discussed SSD II with the Arms Control and Disarmament Research Unit of the Foreign and Commonwealth Office. In Washington, the US Arms Control and Disarmament Agency held a one-day meeting with selected NGOs on SSD II. In Japan, the UN Information Centre was the venue of a number of meetings of NGOs preparing for SSD II, with the Japanese government also involved.

An enormous number of meetings, seminars, conferences, teach-ins and rallies focusing on SSD II were held from the spring of 1981 throughout the world. These culminated in the 12 June demonstration, the largest peace and disarmament rally in North American history. Preparations were made for the rally a year in advance, first by Mobilization for Survival and then by a large group of primarily peace, labour and other organizations. Over 750 000 people participated, gathering in the UN community, marching past UN Headquarters, and then walking to Central Park for a five-hour rally.

VII. Initial follow-up

During the final days of SSD II, the NGOs present resolved to continue at least the NGO momentum surrounding SSD II and convene an early conference, especially related to the evolving World Disarmament Campaign. The *Ad Hoc* NGO Liaison Group, meeting in September in New York, voted to sponsor an NGO Consultation for the World Disarmament Campaign at UN Headquarters on 8–10 November 1982. In the meantime, the annual NGO conference of the UN Department of Public Information in September featured disarmament and included much discussion of SSD II.

In November 1982 an informal NGO seminar on disarmament was held. It discussed at length the World Disarmament Campaign and its

relation to NGOs. It recommended that NGO participation in the decision-making processes of the World Disarmament Campaign should be recognized officially by the UN. The Seminar also discussed the permanent NGO role in disarmament at the UN and made a recommendation that a comprehensive resolution on the subject be drafted by the General Assembly. Substantive disarmament issues were also discussed. Many of the organizations and institutions published their addresses to SSD II (see, for example, reference [23]).

Influence

The peace marches did not go unnoticed in UN Headquarters and the public voice of protest was commented upon by a number of heads of state or government or other speakers in the general debate of SSD II. "Hundreds of thousands of demonstrators in Western Europe, in Canada, and here in New York last week have taken pains to express the extent to which a renewed arms race is fundamentally repugnant to their values", said Canadian Prime Minister Pierre Trudeau [24], and his words were echoed by many other leaders.

Despite this recognition of the mass demonstrations, there was no reflection of these demands in the substantive work of SSD II, except perhaps in the memorandum adopted on the World Disarmament Campaign. UN Secretary-General Javier Perez de Cuellar best reflected opinion about the demonstrations when he wrote in his first annual report on the work of the UN:

> Our peoples, especially the young, take to the streets in the hundreds of thousands in many parts of the world to proclaim their peaceful protest against the existing situation and their deep fear of the consequences of the arms race and nuclear catastrophe. Who can say that these gentle protesters are wrong or misguided? ... The States Members of the Organization should not ignore the significance of what they are trying to say. [25]

VIII. NGOs and the World Disarmament Campaign

The World Disarmament Campaign was not conceived by NGOs, but it was recognized almost from the beginning that NGOs would have to play an integral part in the campaign if it were to succeed. Their essential and continuing role in providing sound information to the public was referred to at SSD I when the idea was first mentioned [26].

As a result of a General Assembly resolution [27], the Secretary-General was asked to have a small group of experts make a study of a World Disarmament Campaign. Its 1981 report contained a section on NGOs:

"Their work is vital to a campaign seeking to enlist the support of the general public because they comprise a wide range of categories and occupations . . . The Campaign should both involve these organizations as disseminators of information and help to make their work part of the global Campaign itself" [28].

The outline of a programme for the Campaign compiled by the Secretariat for SSD II stated that ". . . consultations and workshops on the development and implementation of the Campaign program will be held with the non-governmental organizations Committees on Disarmament and other national and international organizations at regular intervals in all regions" [29].

The World Disarmament Campaign was the one substantive issue about which the delegates at the SSD II were able to reach consensus. The Concluding Document [30] cited the role of NGOs in achieving the objectives of the Campaign and asked the UN Centre for Disarmament to maintain liaison with NGOs and research institutes. A further report from the Secretariat on the Campaign, published in November 1982, indicated that the Campaign will focus on NGOs as one of "five major constituencies" and that the UN Centre will maintain "liaison" with NGOs. It was also admitted that the "success of the Campaign will greatly depend on the extent of the active and material support of Member States and cooperation of non-governmental organizations". The memorandum also indicated that "consultations on the development and implementation of the Campaign program will be held with non-governmental organizations committees on disarmament and other national and international organizations at regular intervals" [31]. However, the draft resolution adopted by the 37th session of the General Assembly made no special provision for NGOs—except urging them to help finance it [32].

IX. Formalization of the NGO role

Article 71 of the UN Charter gives a role to NGOs in the economic and social field. Some NGOs in consultative relationship with the UN Economic and Social Council (ECOSOC) have carried their work into the disarmament field. Others, registered with the Department of Public Information or with UN specialized agencies, have also worked on disarmament issues. However, it soon became apparent that formalization of the role of NGOs within the UN system would be helpful.

A greatly expanded NGO role was proposed by various conferences in the late 1970s and their suggestions are well documented [33, 34]. Efforts were made during SSD II for a resolution to be submitted on formalizing the role of NGOs. None was submitted. However, NGOs began working

toward an explicit role for NGOs in disarmament in the 37th regular session of the General Assembly during September–December 1982. The obvious prerogatives for NGOs in disarmament include at least the following: access to meetings, including working groups; written statements and their reproduction, distribution and indexing; hearings and oral statements; access to documentation; and the process of accreditation. The definition of an NGO is pertinent here, although the tradition in the field of disarmament has increasingly been to include any local, national, regional or international non-governmental organization which expressed an interest in disarmament, whether or not it had a previous connection with the UN system. This now includes peace and disarmament research institutions and other academic institutions, including colleges and universities [35].

X. Conclusions and the future

Over the decades NGOs have gradually increased or broadened their role in disarmament in most parts of the UN system, but the prerogatives of NGOs in the economic and social fields have not yet been equalled.

The increase in the NGO role has been almost wholly due to united, persistent pressures by NGOs. Member states and members of the UN Secretariat have not been eager to help NGOs attain new prerogatives, being reluctant to create an 'uncomfortable' precedent, and some have held back for fear that somehow NGOs will take over.

A formalization of the role of NGOs in disarmament is overdue. The fear that the UN would be inundated by NGOs if the doors were slightly widened appears groundless. So far, with rare exceptions, more seats have been made available to NGOs than they have been able to fill. This reflects the inability of NGOs to seize the opportunities given to them. This situation might change, but not unless there is a sudden increase in the professionalization of NGOs in the field of disarmament. NGOs must also be shown that their presence at the UN will someday make a difference to UN policy formulation.

Local, national and regional NGOs make as much contribution to disarmament as international NGOs, unlike the ECOSOC system in which international NGOs tend to receive priority. The contribution of peace and disarmament research institutions, especially those of international character, is increasingly recognized as valuable by the UN.

Despite a kind of praise given to the actions of NGOs by member states and members of the UN Secretariat, the fact is that NGOs have made little impact on the disarmament policies of states as reflected in the UN, either at the two Special Sessions or in other UN bodies. This lack of results

must surely make NGOs want to re-evaluate their strategies and tactics. How have they gone wrong in their programmes of education, demonstrations, lobbying, electoral politics, or civil disobedience? NGOs have recognized that their pressure is felt more in national capitals than in the UN itself.

Perhaps the experience of NGOs at SSD II reflects more on the limitations of governments than those of NGOs. Perhaps US President Dwight D. Eisenhower was prophetic when he wrote: "I like to believe that people in the long run are going to do more to promote peace than are governments. Indeed, I think that people want peace so much that one of these days governments had better get out of their way and let them have it" [36].

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Appendix 21A

List of non-governmental organizations and research institutions which addressed the Ad Hoc *Committee of the Twelfth Special Session*[1]

A. Non-governmental organizations

1. Action Reconciliation/Service for Peace
2. Afro-Asian Peoples' Solidarity Organization[a]
3. Asian Buddhists Conference for Peace
4. Baha'i International Community
5. Campaign for Nuclear Disarmament
6. Christian Peace Conference
7. Commission of the Churches on International Affairs of the World Council of Churches[a]
8. Friends of the Earth
9. Friends World Committee for Consultation[b]
10. Hiroshima Peace Culture Foundation/Nagasaki Atomic Bomb Casualty Council
11. Inter-Church Peace Council
12. International Association for Religious Freedom[b]
13. International Association for the Work of Dr. Albert Schweitzer
14. International Association of Democratic Lawyers
15. International Committee for European Security and Co-operation
16. International Confederation of Free Trade Unions
17. International Co-operative Alliance
18. International Fellowship of Reconciliation[b]
19. International Organization of Journalists
20. International Peace Bureau[a]
21. International Physicians for the Prevention of Nuclear War, Inc.
22. International Union of Students
23. International Youth and Student Movement for the United Nations
24. National Nuclear Weapons Freeze Campaign
25. Pacific Concerns Resource Center
26. Parliamentarians for World Order
27. Pax Christi International
28. Project Ploughshares[b]
29. Pugwash Conferences on Science and World Affairs
30. Russian Orthodox Church
31. SSD II National Liaison Committee for Nuclear and General Disarmament
32. Soviet Peace Fund/Soviet Liaison Committee of Peace Forces
33. Swedish People's Parliament for Disarmament
34. Union of Arab Jurists
35. United Presbyterian Church in the United States of America

[1] Geneva-based members of the *Ad Hoc* Liaison Group are marked *a* and New York-based members are marked *b*. (The International Humanist and Ethical Union was also represented in the Group.)

36. War Resisters International[b]
37. Women for Peace
38. Women's International Democratic Federation[a]
39. Women's International League for Peace and Freedom[b]
40. World Association of World Federalists
41. World Confederation of Organizations of the Teaching Profession
42. World Conference on Religion and Peace[b]
43. World Federation of Democratic Youth[a]
44. World Federation of Scientific Workers
45. World Federation of Teachers' Unions
46. World Federation of Trade Unions
47. World Federation of United Nations Associations[b]
48. World Jewish Congress
49. World Muslim Congress
50. World Peace Council[a]
51. World Union of Catholic Women's Organizations[b]
52. World Veterans Federation[a]
53. Yugoslav League for Peace, Independence and Equality of Peoples

B. Research institutions

1. Centre for Conflict Studies
2. Center for Defense Information
3. Council for Arms Control
4. Foundation for the Study of National Defense/French Institute of Polemology
5. French Institute of International Relations
6. Gandhi Peace Foundation
7. Heritage Foundation
8. Hungarian Institute of International Relations
9. Institute for Peace Research
10. Institute for Peace Science—Hiroshima University
11. Institute of Defense Studies and Analyses
12. Institute for World Economy and International Relations
13. International Institute for Peace
14. International Peace Academy
15. International Peace Research Association
16. Israeli Institute for the Study of International Affairs
17. Nigerian Institute of International Affairs
18. Peace Research Institute—Dundas
19. Romanian National Committee of Scientists for Peace
20. Stanley Foundation
21. Stockholm International Peace Research Institute
22. Tampere Peace Research Institute

Source: UN document A/S-12/32.

22. Chronology of major events related to arms control issues[1]

January–December 1982

3 February President Brezhnev makes public a proposal for a two-thirds cut by 1990 in the US and Soviet arsenals of medium-range nuclear weapons deployed in Europe.

4 February The USA rejects the Soviet proposal of 3 February. President Reagan announces that the USA has submitted to the Soviet Union a draft treaty based on the "zero option" concept, that is, providing for the elimination of medium-range nuclear missiles in Europe and the cancellation of future deployments.

18 February At the Vienna Talks on the mutual reduction of forces in Europe, the WTO member states present a draft treaty which would establish the level of 900 000 troops for each side. In the first stage, the USSR would withdraw 20 000 ground troops from Central Europe, while the USA would withdraw 13 000.

16 March President Brezhnev announces a unilateral moratorium on the deployment of Soviet medium-range nuclear weapons in the European part of the USSR, and states the intention of the USSR on its own initiative to reduce in 1982 its medium-range missiles by a certain number (unless there is new aggravation of the international situation). He warns that if the West deploys its new missiles, capable of striking targets on the territory of the Soviet Union, the USSR will be compelled to take retaliatory steps that would put the USA in an "analogous position". The Soviet Union also proposes establishing a mutual limit on operations of naval fleets, in particular removing the missile-carrying submarines of the two sides from their present extensive combat patrol areas and restricting their movements by limits mutually agreed upon.

24 March In a communiqué of the NATO Nuclear Planning Group meeting at Colorado Springs, the participating ministers reiterate the importance they attach to the continuation of the preparations for the deployment of ground-launched cruise missiles and Pershing II missiles in Western Europe. They stress that the planned deployment is designed to reinforce the NATO strategy of flexible response by linking even more closely the US strategic deterrent to the defence of NATO Europe.

[1] This chapter was prepared by Jozef Goldblat and Ragnhild Ferm.

31 March President Reagan states that since on balance the Soviet Union has a "definite margin of superiority", a nuclear freeze would not only be disadvantageous, but even dangerous to the USA; it would also militate against any negotiations for reduction. The President invites the Soviet Union to join with the USA "now" to reduce substantially nuclear weapons.

5 April President Reagan proposes to meet President Brezhnev in June 1982 in New York during the UN Second Special Session on Disarmament.

6 April Secretary of State Haig rejects the proposal for a renunciation of the first use of nuclear weapons, which has been made by McGeorge Bundy, George F. Kennan, Robert S. McNamara and Gerard Smith in an article published in the spring issue of *Foreign Affairs*. He argues that a no-first-use policy would be the end of the credibility of the Western strategy of deterrence.

17 April President Brezhnev declines President Reagan's offer for a June meeting and proposes instead a well-prepared summit in a third country in October 1982.

7 May The NATO Defence Planning Committee in ministerial session expresses the view that NATO force goals for the period 1983–88 will pose a significant challenge which underlines the importance of adhering to the existing 3 per cent "guidance" for annual military spending increases, notwithstanding the financial and economic constraints.

9 May President Reagan says that, at the envisaged talks with the USSR, the USA will focus its efforts on reducing significantly ballistic missiles, the number of warheads they carry, and their overall destructive potential. At the end of the first phase of the reductions, the USA expects ballistic missile warheads to be reduced to equal ceilings at least a third below current levels; it would ask that no more than half of these warheads be land-based. In a second phase, the USA will seek to achieve an equal ceiling on other elements of the strategic nuclear forces, including limits on ballistic missile throw-weight at less than current US levels.

18 May President Brezhnev announces that the Soviet Union is already implementing its decision to reduce the number of its medium-range missiles. He also says that no such missiles will be deployed additionally where the FR Germany and other West European countries lie within their range. The Soviet Union proposes that the strategic weapons of the USSR and the USA should be frozen as soon as the talks on their reduction begin, both in terms of quantity and so that their modernization should be restricted as much as possible.

31 May In announcing that US–Soviet talks on strategic arms will begin on 29 June 1982, President Reagan states that the USA will refrain from actions which undercut existing strategic agreements as long as the Soviet Union shows equal restraint.

7 June–10 July The UN General Assembly holds its Second Special Session devoted exclusively to disarmament problems.

10 June The heads of state and government participating in the meeting of the North Atlantic Council declare that their purpose is to have a stable balance of forces at the "lowest possible level", thereby strengthening peace and international security.

10 June Nearly 400 000 people demonstrate in Bonn against the deployment of US missiles in Europe.

11 June In a statement at the UN Second Special Session on Disarmament, France declares its inability to participate in nuclear arms control negotiations, unless the arsenals of the USA and the USSR are reduced to such levels that one could consider the gap between capabilities "to have changed in its nature", unless the defensive strategic systems that might be able to neutralize nuclear deterrence are limited quantitatively and qualitatively, unless significant progress is made in the reduction of imbalances in conventional arms and unless the threat of chemical warfare in Europe is eliminated. At the same time France states that it will not use nuclear arms against a state that "does not have these weapons and has pledged not to seek them", except in the case of an act of aggression carried out in association or alliance with a nuclear weapon state against France or a state with which France has a security commitment.

12 June A rally of some three-quarters of a million people in favour of peace and disarmament takes place in New York City.

15 June In a statement at the UN Second Special Session on Disarmament, the Soviet Union announces that it has assumed an obligation not to be the first to use nuclear weapons and expects its action to be reciprocated by the other nuclear states. It also declares its readiness to place part of its peaceful nuclear installations under the control of the International Atomic Energy Agency (IAEA).

16 June The Soviet Union submits to the UN Second Special Session on Disarmament a proposal for basic provisions of a chemical weapons convention. In the part dealing with verification, it accepts the possibility of having "systematic" international on-site inspection of the destruction of stocks.

17 June In a statement at the UN Second Special Session on Disarmament, the USA proposes convening an international conference to develop a common system for accounting and reporting military spending.

21 June In a proposal submitted at the UN Second Special Session on Disarmament China says that if the USA and the USSR take the lead in halting the testing, improvement and manufacture of nuclear weapons and in reducing their nuclear arsenals by 50 per cent, it will be ready to join all the other nuclear states in stopping the development and production of nuclear weapons and in reducing these weapons and means of their delivery in reasonable proportion.

24–25 June Fifty-three representatives of non-governmental organizations and 22 representatives of research institutions address the Second UN Special Session on Disarmament.

29 June US–Soviet negotiations called the Strategic Arms Reduction Talks (START) open in Geneva.

8 July At the Vienna Talks on the mutual reduction of forces in Europe, NATO member states present a draft treaty proposing a reduction of NATO and WTO ground and air forces in the central area of Europe to 900 000 troops each, with a subceiling of 700 000 for ground forces, in four stages spread over seven years. The treaty would commit all countries with troops in Central Europe to reduce their forces to reach the common collective ceiling.

20 July An announcement is made in Washington that the US government has decided to set aside efforts to negotiate a comprehensive ban on nuclear testing and will, therefore, not resume the trilateral talks with the USSR and the UK.

16 August A US Senate–House conference committee, finishing work on a Defense Department budget authorization bill, announces that it has not accepted a White House request for money to begin production of binary nerve gas munitions.

19 August *Pravda* publishes an interview with the Soviet Defence Minister, who says that there exists an approximate parity of forces between NATO and the Warsaw Treaty Organization, both in the nuclear and conventional fields, and that a mutual freeze on nuclear arsenals would be an important first step in stopping the nuclear arms race. He reveals that the Soviet Union has tabled at the Geneva talks proposals providing for the creation of a vast European zone of reduction and limitation of nuclear arms from the Arctic Ocean to Africa, from the mid-Atlantic to the Ural Mountains. The nuclear weapons with a range of 1 000 km and more, but not intercontinental, existing in this zone, would be reduced so that five years after an agreement has been reached the USA and the USSR would have no more than 300 units each of weapons of this class. Both missiles and aircraft would be subject to reduction. Deployment of new

types of nuclear weapon, including US Pershing II and cruise missiles, would be prohibited. In the aggregate level of 300 units, account is taken of both the US missiles and aircraft and those of Britain and France, which are targeted against the USSR and its allies.

15 November US Roman Catholic bishops meet in Washington to discuss a proposed pastoral letter on war and peace. The authors of the letter state that they do not perceive any situation in which the deliberate initiation of nuclear warfare, on however restricted a scale, can be morally justified, and that non-nuclear attacks must be resisted by other than nuclear means.

22 November President Reagan announces that he has formally proposed in a letter to the Soviet leaders a series of first-step confidence-building measures. These measures include advance notification of all US and Soviet test launches of intercontinental, sea-launched and intermediate-range missiles and mutual notification of major military exercises to remove the element of surprise and uncertainty that could lead to an accidental war.

26 November A group of experts, which has investigated allegations of use of chemical weapons at the request of the UN General Assembly, submits its report to the Secretary-General. The group says that it cannot state that the allegations have been proven, but it cannot disregard the circumstantial evidence suggestive of the possible use of some sort of toxic chemical substance.

2 December NATO defence ministers meeting in Brussels decide to seek ways to improve conventional weapon capabilities.

8 December The Swedish government approaches, through diplomatic channels, the governments of states members of the two major military alliances and of the European neutral and non-aligned states to ascertain the possibilities of establishing a zone free of battlefield nuclear weapons in Central Europe.

10 December The Convention on the Law of the Sea is signed in Jamaica by 117 nations. (The United States and the United Kingdom do not sign.)

13 December The UN General Assembly adopts one resolution calling upon all nuclear weapon states to agree to a freeze on nuclear weapons, and another urging only the USA and the USSR to proclaim a nuclear arms freeze, either through unilateral declarations or through a joint declaration; requests the Secretary-General to investigate, with the assistance of experts, information that may be brought to his attention concerning a possible violation of the 1925 Geneva Protocol prohibiting the use of chemical and bacteriological methods of warfare; approves the programme of activities for the World Disarmament Campaign for 1983, proposed by the

Secretary-General; and decides to raise the status of the UN Centre for Disarmament by transforming it into a Department for Disarmament Affairs.

20 December The US Congress denies funds requested by the President to start an MX missile production line.

21 December Mr Andropov, who succeeded Mr Brezhnev as General Secretary of the Central Committee of the Soviet Communist Party, warns the West that the stationing of new US medium-range weapons in Europe would have grave consequences for all further efforts to limit nuclear armaments. He states that the USSR would agree to retain in Europe only as many medium-range missiles as Britain and France have there. Along with this an accord must be reached on reducing to equal levels on both sides the number of medium-range nuclear-delivery aircraft stationed in this region by the USSR and the NATO countries. The USSR is also prepared to reduce its strategic arms by more than 25 per cent, if US arms are reduced accordingly, so that the two states have the same number of strategic delivery vehicles. Also the number of nuclear warheads should be substantially lowered and the improvement of nuclear weapons maximally restricted.

The US State Department declares the Soviet proposal regarding the European theatre nuclear weapons to be unacceptable because it would leave the USSR with several hundred warheads on SS-20s while denying the USA deterrence of that threat.

Errata

World Armaments and Disarmament, SIPRI Yearbook 1982

Page 162, line 5 of text:	"weapon sophistication" should read "weapon standardization".
Pages 234 and 235:	Page 234 of the register is page 235; page 235 is page 234.
Page 367, line 5:	"3 000 of them razed" should read "300 of them razed".
Page 369, line 24:	"13.4" should read "11.4".
Page 386, reference 19, line 2:	"table 4" should read "table 2".

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WORLD ARMAMENTS AND DISARMAMENT

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This is the fourteenth SIPRI Yearbook. The aim of the Yearbooks is to bring together information on world armaments and the efforts made to limit or reduce them. Yearbooks attract world-wide attention and are used extensively in the United Nations, in international disarmament negotiations and in national parliamentary and government debates as an authoritative source of information.

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