World Armaments and Disarmament

SIPRI yearbook 1980

Stockholm International Peace Research Institute

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Stockholm International Peace Research Institute

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PREFACE

The eleventh issue of the *SIPRI Yearbook* continues our analysis of the world's arms races, and the attempts to stop them, up to 31 December 1979. As in all SIPRI publications, information has been obtained from open sources only.

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Introduction

I. World military spending

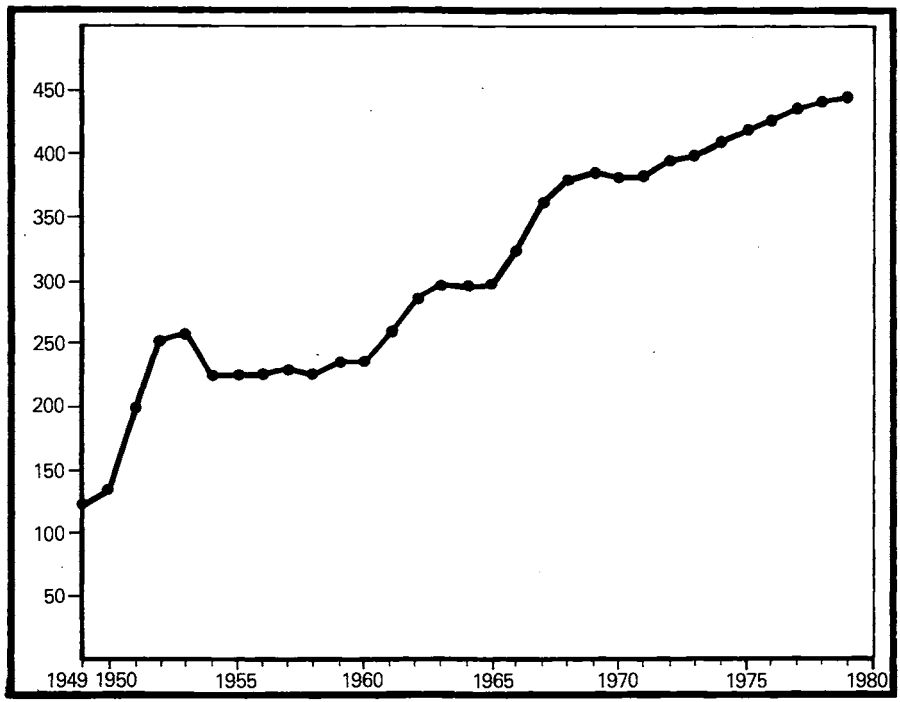
Military spending in real terms (that is, after taking inflation into account) has increased four-fold since the end of World War II. This large increase has not taken place steadily, but has occurred in a number of large jumps. Three times since 1945, military spending has shot up during a war or major crisis. In each case the subsequent fall in expenditure was modest.

World military expenditure in 1980 will, in current dollars, amount to over $500 000 million, or roughly 6 per cent of total world output. (In the years before World War I and between the world wars, the proportion was no more than about 3 per cent.)

Currently available military budget figures indicate that we are now faced with another big upward jump. The figures for the two great power

Figure 1. World military expenditure, 1949–79

US $ thousand million, in constant (1978) prices and exchange-rates



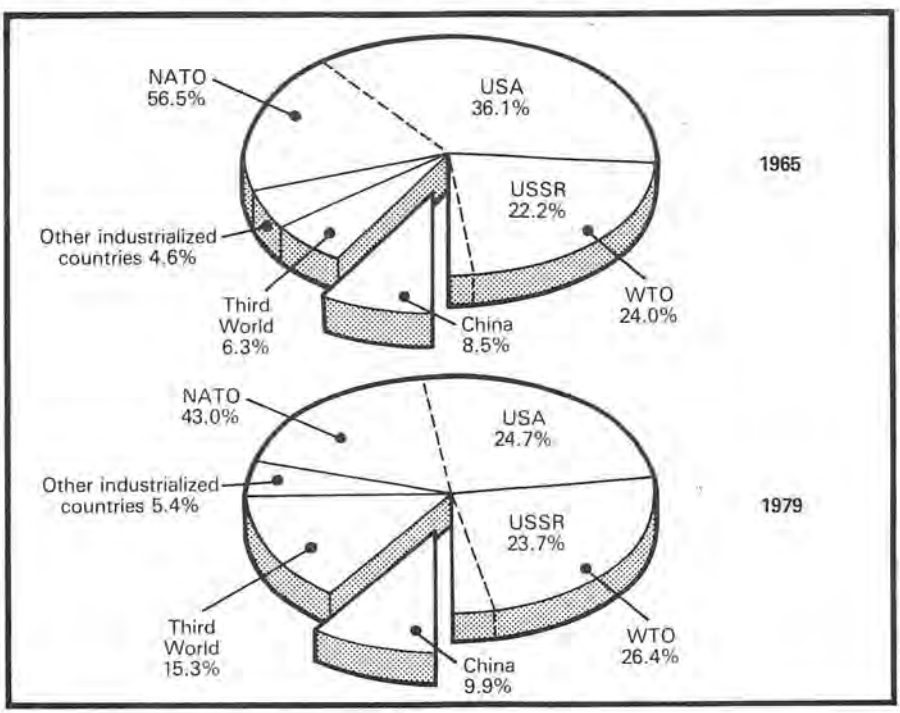
blocs are particularly disturbing. The level and trend of Soviet military spending are controversial because of the lack of official figures. We do know, however, that NATO has set itself a target of a 3 per cent annual rise, in real terms, in military spending, claiming that the USSR had been spending at least as much in recent years. But the United States has gone beyond this figure, and has begun a major upturn of its armaments programme. The US defence budget for the fiscal year 1981 presents a five-year forecast for military spending, envisaging a 4 per cent annual increase from fiscal years 1980 to 1985. Over those five years, the total additional spending, over and above the present level of military expenditure, is about $80 000 million (at 1980 prices). By fiscal year 1985, US military spending will reach, in current prices, about $225 000 million according to US forecasts.

In the Far East, Japan—although devoting less than 1 per cent of its gross domestic product (GDP) to military purposes—has moved up to seventh place in the world league of military spending.

Third World military spending is also increasing alarmingly. The general increase in the world outside NATO, the Warsaw Treaty Organization (WTO) and China, has been 7 or 8 per cent a year from 1970 to 1979.

For some groups of countries, the trend has been even more marked.

Figure 2. Distribution of world military expenditure 1965 and 1979



For example, OPEC (Organization of the Petroleum Exporting Countries) states have spent a significant part of their increased income on weapons. Their military spending has increased by almost 15 per cent a year in real terms. Another area of rapidly increasing military spending is Southern Africa, with an annual real increase in military spending of 16 per cent a year.

Third World military spending is increasing much faster than the gross national product (GNP). In the past 20 years, Third World GNP increased about 3 times, while military spending increased about 4.5 times.

World military expenditure levels and trends have made a mockery of the first UN 'Decade of Disarmament', the 1970s. A main objective was to achieve some reduction in the immense military burden carried by the world economy. Some of the savings would, it was hoped, be transferred to development aid for Third World countries. Instead, world military spending increased during the decade. Chapter 1 examines the main trends of military expenditure during this period.

II. Arms production and trade

The international arms trade has supplied most of the weapons used in the numerous wars which have mostly taken place in the Third World since World War II, wars which have killed some 25 million people.

The trade in arms has been increasing dramatically. In 1979, for example, SIPRI's estimate of the value of major arms exports was 500 per cent higher than in 1969 and 1 200 per cent higher than in 1959. Two-thirds of the total global arms trade involves the transfer of weapons from the industrialized world to the Third World.

The large increase in the value of the international trade in arms is mainly due to the fact that governments are buying increasingly more sophisticated and expensive weapons. The arms business is one of the fastest growing sectors of the world economy.

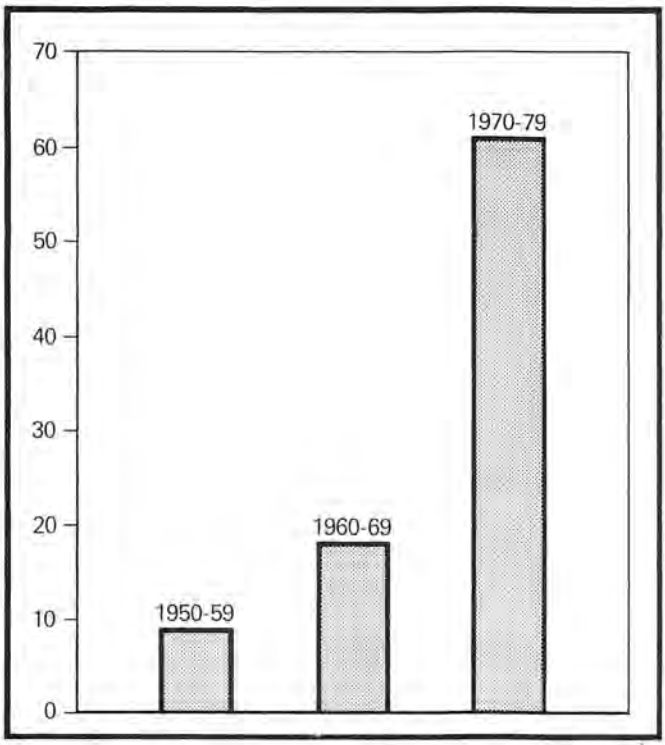
Annual global production of military equipment now amounts to $120 000 million. The arms export business makes up 17 per cent of the total market turnover.

The number of countries producing their own weapons is also increasing rapidly. Today, 56 countries produce major weapons—that is, aircraft, armoured vehicles, missiles or ships—and 24 of these are in the Third World. If small arms are included, then the number of weapon-producing countries is, of course, much larger. Of the major weapon projects entered in the SIPRI weapon production file, 2 242 projects are in the industrialized world while 94 are in the Third World.

Some Third World weapon producers—notably Israel, South Africa,

Figure 3. Value of world major weapon[a] exports, 1950–79

Values are in US $ thousand million, at constant 1975 prices



[a] The arms production and trade data cover the four categories of 'major weapons'—that is, aircraft, missiles, armoured vehicles and warships.

Brazil, Argentina and India—already compete in the arms export market. The growing number of suppliers will further complicate efforts to control the arms trade.

Controlling the arms trade is an urgent international task. But doing so will, to say the least, be extremely difficult. The United States and the Soviet Union—the biggest arms traders—have been discussing the issue, but without result.

Some governments use the arms trade to gain political or economic influence, or military bases, in Third World regions. Others believe that selling weapons helps their economies, especially in a recession. Some seek the economies of scale to be had from long production runs. And some want to recover some of the enormous research and development costs involved in modern weapon design. Finally, commercial firms use their considerable influence to persuade their governments to grant them export licences.

The world-wide production of and trade in major weapons are analysed in chapters 2 and 3.

III. Preventing the spread of nuclear weapons

The final Plenary Conference of the International Nuclear Fuel Cycle Evaluation (INFCE) took place in Vienna to consider the danger that the know-how, facilities or materials used in the nuclear power industry might be misused for the purpose of constructing nuclear weapons and how such misuse could be discouraged.

The INFCE operation, which began on 27 November 1978, was organized into eight working groups on fuel and heavy water availability; enrichment availability; assurances of long-term supply of technology, fuel and heavy water and services in the interest of national needs; reprocessing and plutonium handling and recycle; fast breeders; spent fuel management; waste management and disposal; and advanced fuel cycle and reactor concepts. Sixty-six countries and five international organizations took part in the discussions.

From the INFCE proceedings it could be implied that the technological capabilities of many countries are such that there is no technical solution to the problem of preventing the spread of nuclear weapons to countries which do not now have them. Thus it would appear that if a solution is to be found, it must be a political one.

An element in a political solution could be the internationalization of those elements of the nuclear fuel cycle, especially the reprocessing of spent reactor fuel elements and the enrichment of uranium, which could be used to produce fissile materials for the production of nuclear weapons.

Questions about the ownership, staffing and management of multinational and international facilities and the settlement of disputes remain to be answered. However, provided the countries involved in the enterprise are technically competent to control the nuclear material in the facility, which would of course be under International Atomic Energy Agency (IAEA) safeguards, and provided they do not have any common interest to acquire, singly or together, nuclear weapons, internationalization would be a political barrier, albeit by no means a complete one, to the proliferation of nuclear weapons. But the most important current political barrier is the Non-Proliferation Treaty (NPT).

Article VIII of the NPT, which came into force in 1970, provides for periodic conferences to review the operation of the treaty to assure that its purposes and provisions are being realized. The first review conference was held on 5–30 May 1975, and the second will be held in Geneva in August–September 1980. It is essential that the already fragile NPT is not further eroded. (See chapter 8.)

Table 1. Thermal reactors currently in operation, under construction, or planned (net output > 150 MW(e))

Country	Number of reactors	Total power output (MW(e))
Argentina	3	1 505
Austria	1	692
Belgium	8	6 483
Brazil	3	3 116
Bulgaria	4	1 677
Canada	24	15 217
Cuba	2	880
Czechoslovakia	11	4 541
Finland	5	3 160
France	34	29 495
FR Germany	34	35 916
German DR	12	4 896
Hungary	4	1 632
India	8	1 689
Iran	8	8 982
Israel	1	600
Italy	8	5 242
Japan	32	23 019
Korea	5	3 598
Mexico	2	1 308
Netherlands	1	447
Pakistan	1	600
Philippines	1	621
Poland	2	816
Romania	1	440
South Africa	2	1 843
Spain	19	15 991
Sweden	12	9 442
Switzerland	10	7 833
Taiwan	6	4 923
Thailand	1	600
Turkey	1	620
UK	32	12 408
USA	202	200 931
USSR	31	23 269
Yugoslavia	1	632
Total	**532**	**435 064**

By the end of 1979, the number of parties to the NPT had reached 111. This number, which includes three nuclear weapon powers—the UK, the USA and the USSR—shows that the non-proliferation idea is widely accepted. However, the non-proliferation régime will be threatened as long as any states with significant nuclear activities remain outside the treaty. There are now about a dozen such states. The second NPT review conference provides an opportunity to strengthen the non-proliferation régime.

To this end the nuclear weapon powers should commit themselves to halting and reversing the nuclear arms race, starting by a permanent ban

on all nuclear weapon tests and a limitation followed by a significant reduction in their nuclear arsenals; safeguards procedures should be improved, and the IAEA strengthened, to ensure both the rapid detection of diversion of fissionable material for weapon purposes and quick action if diversion is detected; participation in the treaty should be made more attractive by internationally agreed, legally binding security assurances to non-nuclear weapon parties; non-parties should be encouraged to join the treaty if parties stopped supplying them with nuclear materials and equipment; the obligation not to help others to manufacture nuclear weapons should apply to *all* states and, consequently, all exports of nuclear material and equipment to nuclear weapon powers should be subject to IAEA safeguards so as to avoid their use for weapon purposes; and parties to the NPT in a position to do so should take seriously their obligation to assist the development of the applications of nuclear technology for peaceful purposes.

A strong NPT is an essential political measure to prevent, or slow down, the spread of nuclear weapons to countries which do not now have these weapons. But a longer-term solution of the proliferation problem must include the resolution of regional security problems, so that states do not perceive the need to develop nuclear weapons for security reasons. Also, the belief that nuclear weapons bring prestige must be eliminated. So long as the present nuclear weapon powers imply, by continuously expanding and improving their nuclear arsenals, that nuclear weapons are prestigious and have high political and military utility, other countries will come to share this belief.

IV. Military use of outer space

Considerable qualitative advances are being made in almost all fields of military technology. An excellent example is the military use of space, the subject of chapter 5.

In 1979, 94 military satellites were launched—10 by the USA and 84 by the USSR. Of the 84 shorter-lived Soviet satellites, 35 were for photographic reconnaissance, 27 for military communications, 8 for weather forecasting, 6 for navigation, 2 probably for interceptor-destructor tests, and 6 for ocean surveillance, electronic reconnaissance and early warning of attack.

The USA launched, in 1979, two satellites for photographic reconnaissance, three for communications, two for weather forecasting, two for early warning of attack and one for electronic reconnaissance.

Military satellites play a useful role in verifying arms control agreements. But only two nations possess the technology for extensive data

gathering. Broad international participation in the verification of multilateral arms control agreements is clearly desirable. Several proposals for such participation have been made since 1973. France, for example, has recently suggested that international participation in verification could begin with the use of civilian Earth resources satellites.

V. New nuclear weapons

Events during 1979 in Iran, Mecca and Afghanistan brought home the political instabilities of the Persian Gulf region. The Soviet Union may become a net importer of oil in the mid-1980s and compete for Persian Gulf oil. Great power rivalry may then intensify and enhance the danger of a great power conflict in the region.

The escalation of a regional conflict to a general nuclear war may be more likely than a direct nuclear attack by the USA or the USSR, or *vice versa*. A future local conflict in a Third World region like the Middle East may begin as a conventional war and then escalate to a limited nuclear war. This may in turn escalate to a full-scale nuclear war involving the two great powers. Escalation may be most likely if these powers are the main suppliers of the conventional weapons used in the original conflict. This is why the international arms trade and nuclear weapon proliferation are so dangerous.

New types of nuclear weapons are emerging which by their very characteristics may increase the probability of a nuclear world war. In particular, very accurate and reliable ballistic missiles are being developed which are more suitable for fighting a nuclear war than deterring it.

Much has recently been heard about some of these weapons—Soviet SS-20 intermediate-range ballistic missiles, US cruise missiles, and US Pershing II missiles. These so-called tactical nuclear weapons are being deployed or are planned for deployment in Europe. But new strategic nuclear weapons are also being developed. (See appendices A and B.)

VI. Other strategic nuclear forces

The UK, France and China have also deployed strategic nuclear forces. The UK maintains four strategic nuclear-powered submarines, armed with a total of 64 Polaris A-3 missiles, and a fleet of 56 Vulcan bombers. The UK is considering replacing its strategic nuclear submarines and the missiles carried by these submarines, and will soon retire the Vulcans.

France also has five strategic nuclear submarines equipped with 64 M-2 or M-20 missiles, and plans to build another submarine. France will

modernize its submarine-launched ballistic missile forces with a new warhead which has a limited MIRV capability. France also deploys 18 land-based intermediate-range ballistic missiles, and 33 Mirage IVA aircraft are assigned a strategic nuclear role.

According to US sources, China currently deploys three types of liquid-fuel ballistic missiles: a medium-range missile with a range of about 1 000 km, an intermediate-range missile with a range of around 2 500 km, and an intercontinental missile with a maximum range of 7 000 km. China has, in addition, over 100 TU-16 (Badger) and TU-4 (Bull) medium-range bombers with an operational radius of about 3 000 km. China is said to be developing a liquid-fuel ICBM with a range estimated at over 10 000 km.

VII. Eurostrategic missiles

There are a wide variety and a large number of nuclear weapons deployed in Europe, and targeted on Europe (see chapter 4). Both sides are currently modernizing these weapons. The question of modernizing these forces is now being discussed with the missile component given prominence.

Any limited use of nuclear weapons in Europe will probably escalate to the use of the strategic nuclear arsenals. Escalation will be more probable when Pershings IIs and cruise missiles are deployed in Europe. The Pershing II, with a range of about 1 700 km, could, for example, reach Moscow from FR Germany; and the cruise missile, with a range of about 2 500 km, could reach even farther into the USSR. It is difficult to see why the reaction to the explosion on the territory of one or the other side of nuclear warheads carried by missiles of a shorter range would be different from that to the explosion of warheads carried by strategic missiles. These missiles, and the Soviet SS-20 intermediate-range ballistic missile, may be perceived to be more suitable for fighting than deterring a nuclear war.

VIII. Arms control

SALT II

On 3 January 1980, President Carter requested the US Senate to postpone the debate on the SALT II Treaty "in the light of the Soviet invasion of Afghanistan". Without the SALT II Treaty (the subject of chapters 6 and 7), it is extremely unlikely that there will be significant progress in the negotiation of any other arms control treaty—in particular, a comprehensive nuclear test ban.

Figure 4. Current US strategic nuclear delivery systems

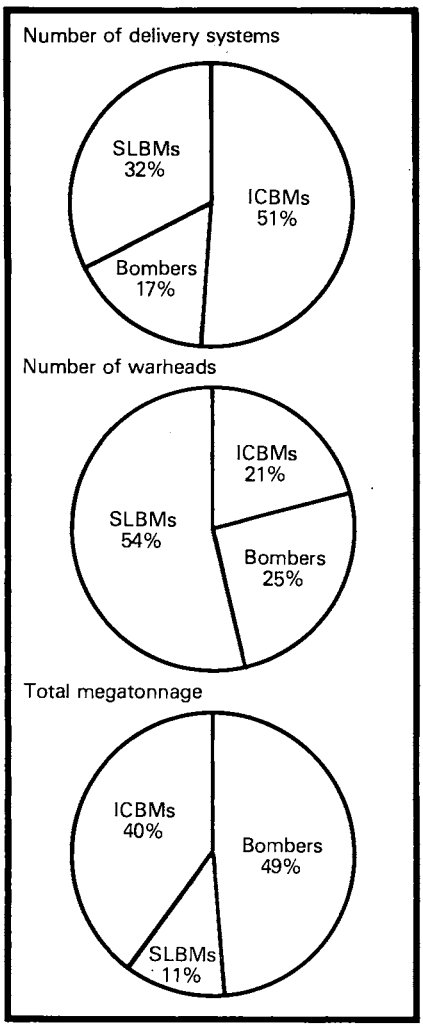
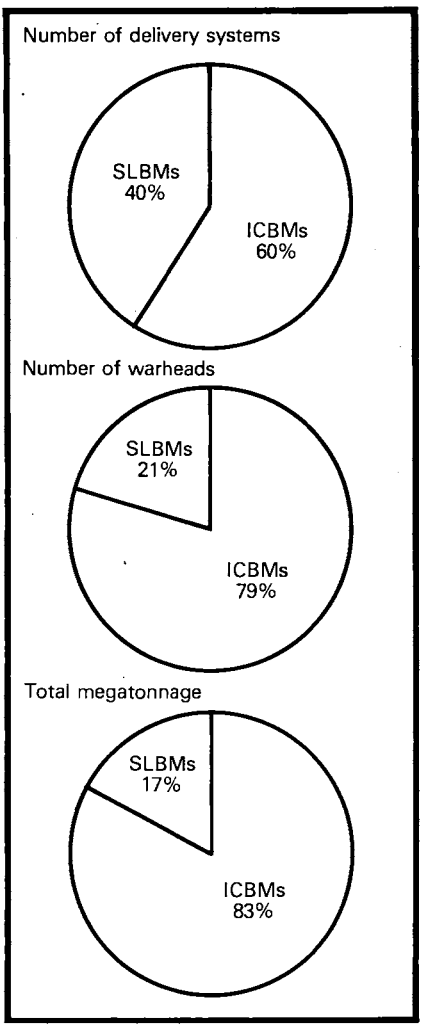


Figure 5. Current Soviet strategic nuclear delivery systems



The SALT II agreement, signed by President Carter and President Brezhnev on 18 June 1979 in Vienna, has three components: a treaty lasting until the end of 1985; a protocol that runs until the end of 1981; and a joint statement of principles and guidelines for subsequent SALT negotiations. Also included are a commitment by the USSR about the Soviet Backfire bomber and a memorandum listing the numbers of strategic weapons deployed by both sides in various categories as of 18 June 1979.

SALT II is hardly a significant disarmament measure, even though 300 or so obsolete strategic delivery systems will have to be dismantled. It

Table 2. Soviet strategic missile delivery capability, September 1980 (estimates)

Vehicle	Number of vehicles deployed	Number of warheads per delivery vehicle	Total delivery capability (number of warheads)	Total yield per delivery vehicle (Mt)	Total delivery capability (Mt)	Estimated CEP (m)
MIRVed vehicles						
SS-17	150	4	600	2	300	300–600
SS-18	240	8	1 920	4	960	300–600
SS-19	300	6	1 800	3	900	300–450
SS-N-18[a]	144	3	432	0.6	86	500–1 000
Sub-total	834		4 752		2 246	
Non-MIRVed vehicles						
SS-9	8	1	8	20	160	1 000–1 300
SS-11	580	1 or 3	1 160	1 or 0.6	464	1 000–1 800
SS-13	60	1	60	1	60	
SS-18	60	1	60	15	900	1 000–2 500
SS-N-6[a]	464	1 or 2	696	1 or 0.4	325	1 400
SS-NX-17[a]	16	1	16	1	16	500
SS-N-8[a]	326	1	326	1	326	1 000–1 500
Sub-total	1 514		2 326		2 251	
Total	**2 348**		**7 078**[b]		**4 497**	

[a] SLBM.
[b] Of these, 6 266 are independently targetable (5 028 on ICBMs and 1 238 on SLBMs). ICBMs carry 83 per cent of the total megatonnage, and SLBMs carry the remaining 17 per cent.

Table 3. Current US operational strategic delivery capability

Vehicle	Number of vehicles deployed	Number of warheads per delivery vehicle	Total delivery capability (number of warheads)	Total yield per delivery vehicle (Mt)	Total delivery capability (Mt)	CEP (m)
MIRVed vehicles						
Minuteman III	550	3	1 650	0.51	280	300
Poseidon C-3[a]	496	10[b]	4 960	0.4	198	500
Sub-total	1 046		6 610		478	
Non-MIRVed vehicles						
B-52 (SRAMS and bombs)	150[c]	12[d]	1 800	5.6	840	180
B-52 (bombs)	190[c]	4[d]	760	4	760	180
Titan II	54	1	54	9	486	1 300
Minuteman II	450	1	450	1.2	540	400
Polaris A-3[a]	160	3	480	0.66	106	900
Sub-total	1 004		3 544		2 732	
Total	**2 050**		**10 154**[e]		**3 210**	

[a] SLBM.
[b] Average figure.
[c] Including heavy bombers in storage, etc., there are 573 strategic bombers.
[d] Operational loading. Maximum loading per aircraft may be eleven bombs, each of about one megaton.
[e] Of these, 7 274 are independently targetable warheads on ballistic missiles (2 154 on ICBMs and 5 120 on SLBMs). Ballistic missiles carry 51 per cent of the megatonnage, 40 per cent on ICBMs and 11 per cent on SLBMs.

Table 4. Probable US strategic delivery capability in 1985, with or without SALT II

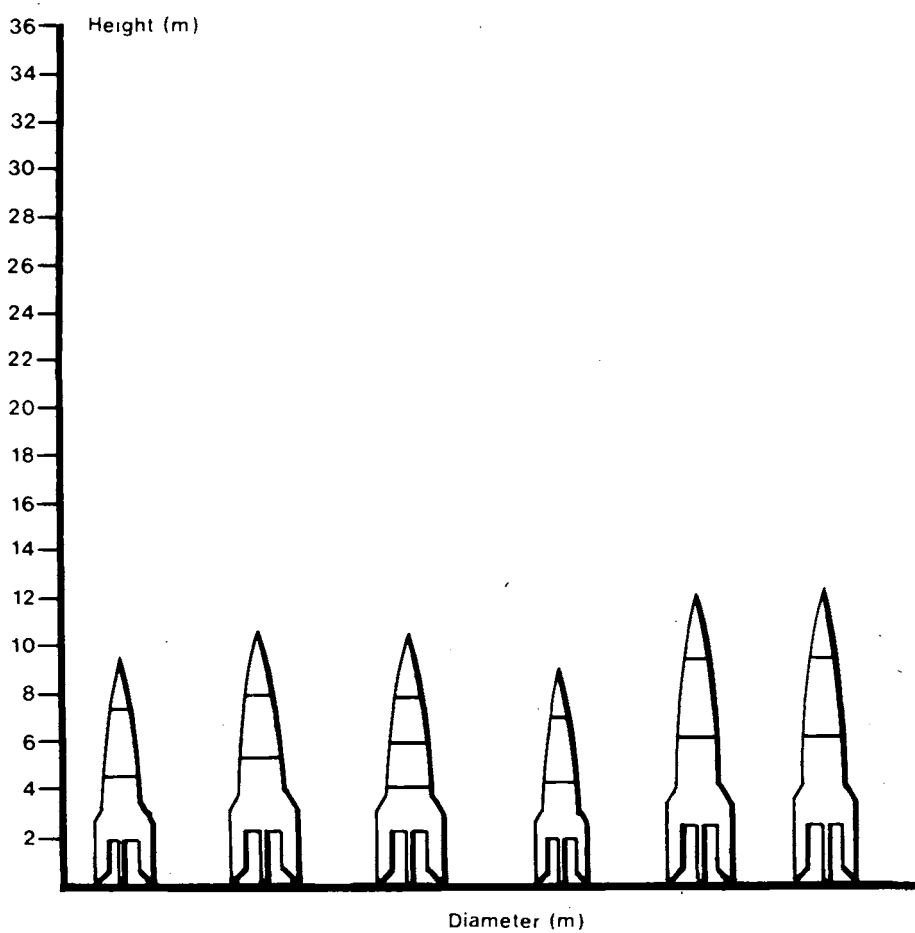
Vehicle	Number of vehicles deployed	Number of warheads per delivery vehicle	Total delivery capability (number of warheads)	Total yield per delivery vehicle (Mt)	Total delivery capability (Mt)	CEP (m)
MIRVed vehicles						
Minuteman III (Mk 12)	236	3	708	0.51	120	200
Minuteman III (Mk 12A)	300	3	900	1	300	200
Poseidon C-3[a]	304	10[b]	3 040	0.4	122	500
Trident I[a]	360	8	2 880	0.8	288	500
B-52 with ALCM	120	12	1 440	2.4	288	50
Sub-total	1 320		8 968		1 118	
Non-MIRVed vehicles						
B-52 (SRAM, bombs)	150	12[c]	1 800	5.6	840	180
B-52 (bombs)	76	4[c]	304	4	304	180
Titan II	54	1	54	9	486	1 300
Minuteman II	450	1	450	1.2	540	400
Sub-total	730		2 608		2 170	
Total	**2 050**		**11 576**[d]		**3 288**	

[a] SLBM.
[b] Average.
[c] Operational. Maximum loading per aircraft may be eleven bombs, each of about one megaton.
[d] Of these, 8 032 are independently targetable warheads on ballistic missiles (2 112 on ICBMs, and 5 920 on SLBMs). Ballistic missiles carry 56 per cent of the total megatonnage, 44 per cent on ICBMs and 12 per cent on SLBMs.

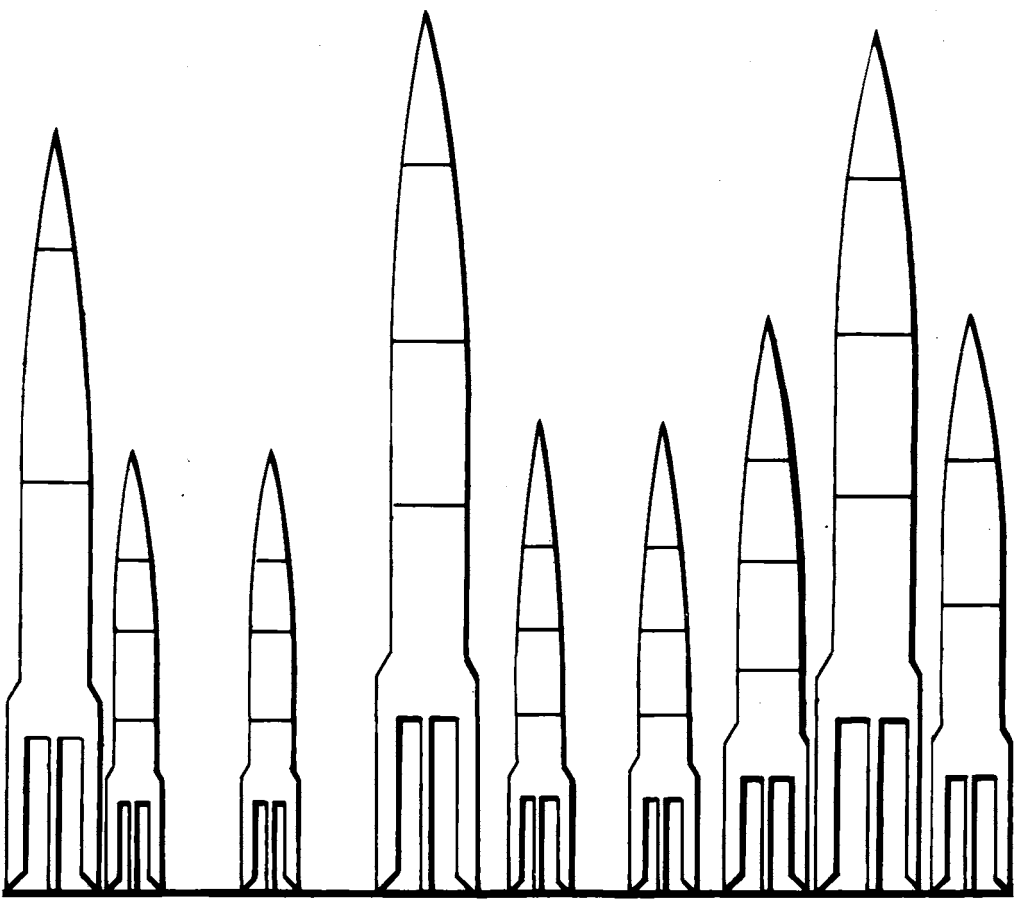
Figure 6. US and Soviet strategic ballistic missiles

	US SLBMs			Soviet SLBMs		
	Polaris A-3	**Poseidon C-3**	**Poseidon C-4**	**SS-N-6**	**SS-N-8**	**SS-N-18**
Date introduced	1964	1970	–	1968	1973	–
Number deployed (estimates for Sep 1980)	80	432	88	464	326	144
Number of MIRVs	3 (MRV)	10	8	1 (or 2 MRV)	1	3
Range (nautical miles)	2 500	2 500	4 000	1 300–1 600	4 300	4 050
Propellant	s	s	s	l-st	l-st	l-st
Throw-weight (kg)	500	1 000		700	700	
CEP (m)	900	500	500	1 000–2 500	1 000–1 500	550–1 000

Key: *Propellant fuel*: l = liquid, l-st = liquid-storable, s = solid, st = storable.



US ICBMs			Soviet ICBMs					
Titan II	**Minuteman II**	**Minuteman III**	**SS-9**	**SS-11**	**SS-13**	**SS-17**	**SS-18**	**SS-19**
1963	1966	1970	1966	1966	1969	1977	1976	1976
54	450	550	8	580	60	150	300	300
1	1	3	1	1 (or 3 MRV)	1	4	1 or 8	6
6 300	7 000	7 000	6 500	5 700	4 400	5 000	5 500	5 000
l	s	s	l	st	s	l-st	l-st	l-st
4 000	1 000	1 000	7 300	1 000	500	3 200	7 300	3 200
1 300	400	300	1 000–1 300	1 000–1 800	1 300	300–600	300–600	300–450



Diameter (m)

places some qualitative restrictions on the development and deployment of new types of nuclear weapons. But these are relatively minor. These restrictions have no effect whatsoever on current plans for the development or deployment of ballistic or cruise missiles.

From an international political point of view, the importance of SALT II cannot be overestimated and the treaty must, therefore, be ratified as soon as possible. In the meantime, it is to be hoped that both sides will continue to comply with SALT I and SALT II.

A comprehensive test ban

Another urgent arms control measure is a comprehensive ban on nuclear weapon tests (a CTB).

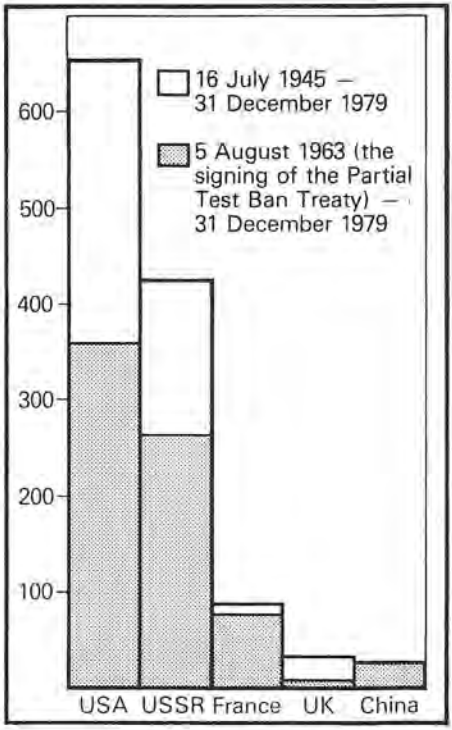
In 1979, the traditional nuclear weapon powers are known to have made 53 nuclear explosions—the USSR made 28, the USA 15, France 9, and the UK 1. It has been reported that a nuclear test explosion (perhaps South African) was set off in the atmosphere over a very remote area of the Indian Ocean, south-east of South Africa, in the early hours of 22 September 1979.

There have been 1 221 known nuclear explosions since 1945, an average rate of about one a week—about 653 by the USA, 426 by the USSR, 86 by France, 30 by the UK, 25 by China, and 1 by India. Some 60 per cent of these explosions have taken place since the 1963 Partial Test Ban Treaty, banning nuclear explosions in the atmosphere and under water. The UK, the USA, and the USSR are parties to the treaty; France and China are not. Nevertheless, since 1974, France has conducted all its nuclear tests underground. China, however, continues to make nuclear explosions in the atmosphere, at an average rate of about one every 18 months, but made no tests in 1979.

The only country persevering with nuclear explosions for so-called peaceful purposes is the Soviet Union. In the past five years, at least 21 presumed peaceful explosions were made in Siberia, West Kazakhstan and Ural. The frequency of presumed Soviet peaceful explosions has, in fact, recently been increasing—there were two in 1975, one in 1976, three in 1977, seven in 1978, and eight in 1979. The USA last made such an explosion in 1973. (See chapter 10.)

Most nuclear test explosions are related to the development of new nuclear weapons or the modernization of existing ones. Many developments created demands for further sophistication, more stringent weapon-safety regulations, refinements to delivery vehicles, and so on. These in turn give rise to more weapon tests in a never-ending series. A comprehensive nuclear test ban treaty could put a stop to most qualitative developments in nuclear warhead design.

Figure 7. Nuclear explosions during 1945–79 (known and presumed)



□ 16 July 1945–31 December 1979
⁞⁞ 5 August 1963 (the signing of the Partial Test Ban Treaty)–31 December 1979

To be worth having, a comprehensive test ban must be permanent and multilateral, with all the parties actively participating in its verification. Lack of reliable verification, the old stumbling-block in CTB negotiations, can no longer reasonably be said to be an obstacle to such a treaty.

A treaty of three years' duration, as is now being negotiated by the USA, the USSR and the UK, would be an unsatisfactory treaty. It may delay, perhaps indefinitely, the negotiation of a multilateral and permanent ban.

Chemical disarmament

Hopes of further progress towards a ban on all chemical weapons rose in early 1979. (Progress towards chemical disarmament is discussed in chapter 11.) In a Soviet–US report to the Committee on Disarmament in August 1979, the two powers recorded a convergence of views on some key issues and identified areas needing further study.

However, US military officials, including Defense Secretary Harold Brown, asked Congress for an increase in the chemical warfare programme, to include facilities for manufacturing new chemical weapons and improving defences against these weapons. At the same time, allegations were made of the use of chemical weapons in Indo-China and Afghanistan.

IX. Conclusions

The immediate prospect facing us is a new escalation of the arms race. Increased resources will be used for military activity at a time when few countries, rich or poor, can afford even the present levels of military spending.

The global arms trade, already out of control, will continue to increase. And so will the number of countries producing their own weapons. The militarization of the Earth's land mass will, therefore, continue, as will the militarization of space and the oceans.

Even if the SALT II Treaty is ratified—and for international political reasons it is very desirable that it should be—it will merely result in a mutually regulated arms race. The development and deployment of even more lethal tactical and strategic nuclear weapons will continue.

Nuclear proliferation is a serious current concern. Hopefully, the NPT review conference to be held in Geneva from 11 August to 5 September 1980 will prevent further erosion of the non-proliferation régime.

Given the current state of Soviet–US relations, it is doubtful whether there can be much early progress in arms control or disarmament negotiations. The developing situation in Europe is particularly disturbing, which makes the need for consultations and negotiations all the more urgent. Against the background of the impending acceleration of the arms race in Europe, in particular the Eurostrategic nuclear arms build-up, negotiations are urgently needed.

The follow-up meeting of the Conference on Security and Co-operation in Europe, commencing in November 1980, presents an opportunity which must not be lost to take further steps in the field of confidence-building measures (see chapter 15) and also to initiate a European arms control and disarmament negotiating process.

Appendix A

Modernization of the US strategic triad

In October 1979, the replacement of the current Mark-12 re-entry vehicle and the W62 170-kiloton nuclear warhead with the Mark-12A re-entry vehicle and the W78 350-kiloton nuclear warhead began. The plan is to put the new warheads on 300 of the existing 550 Minuteman III missiles. The Mark-12A will have roughly the same weight, size, radar cross-section and aerodynamic characteristics as the Mark-12.

Improvements are also being made in the computer of the missile's NS-20 guidance system, involving better mathematical descriptions of the in-flight performance of the inertial platform and accelerometers, and better pre-launch calibration of the gyroscopes and accelerometers. With these guidance improvements, the circular error probability (CEP) of the Minuteman III will probably decrease from about 350 to about 200 metres.

Mark 12A warheads with the higher accuracy will be able to destroy Soviet ICBMs in silos hardened to about 1 500 psi (pounds per square inch) with a probability of over 50 per cent for one shot and over 90 per cent for two shots. Superior arming and fuzing devices will provide more control over the height at which the warhead is exploded and, hence, the damage done.

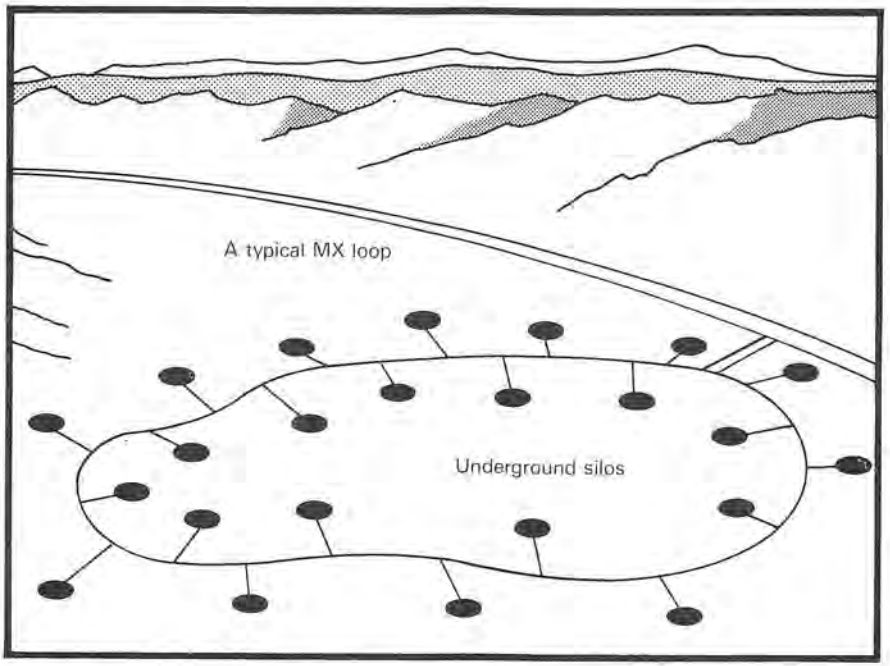
The upgraded land-based intercontinental ballistic missile (ICBM) force will significantly increase US counterforce capabilities. These will be further increased by the MX missile system.

The MX system includes both a new ICBM and a related basing scheme. The guidance for the MX missile will probably be based on the advanced inertial reference sphere (AIRS), an 'all-attitude' system which can correct for movements of the missile along the ground before it is launched. A CEP of about 100 m should be achieved with this system. If the MX warhead is provided with terminal guidance, using a laser or radar system to guide the warhead on to its target, CEPs of a few ten of metres may be possible.

No decision has yet been made about the yield and other characteristics of the MX warhead. Presumably, each missile would carry ten warheads, the maximum number allowed by SALT II.

The launch-weight of the MX will probably be about 86 000 kg, about 2.4 times more than that of Minuteman III, and the throw-weight about 3 500 kg. The planned length of the MX is 21.6 m, compared with 18.3 m

Figure A.1. Loop road for one missile with 23 shelters



for the Minuteman. The three MX booster stages, each 233 cm in diameter, will use advanced solid propellants, very light motor cases, and advanced nozzles to produce nearly twice the propulsion efficiency of the Minuteman.

The MX missile, by design, could fit into the existing Minuteman silos. But, if deployed, a mobile basing system will almost certainly be used.

Currently, the most favoured basing concept is the horizontal shelter basing scheme in which the missiles would be moved between hardened shelters on a transporter–erector–launcher. Each MX would be moved around a loop of roadway about 20 km long and 10 km wide. If the transporter, possibly a 450 000-kg vehicle, travelled along the road at an appropriate speed, the missile could be moved to any one of 23 shelters in the 30 minutes or so that would be available between the time the launch of Soviet ICBMs was detected by US satellites and the time the warheads detonated in the USA. The MX missiles could, therefore, be moved after the Soviet ICBMs were launched. The USSR would have to attack all the shelters to be sure of hitting the missiles.

The number of MX missiles deployed and the number of shelters per missile will depend on perceptions of the potential Soviet threat to the US ICBM force. The most often cited numbers are 200 MXs and about 4 600 shelter points. The cost of the system will be at least $30 000 million

and may top $50 000 million. The MX will probably be flight-tested in 1983, and, if deployed, the first missiles could be operational in 1986.

The most formidable Soviet ICBM is the SS-18, or the RS-20 in Soviet terminology. This is thought currently to have a CEP of about 500 m. This accuracy will probably improve to about 250 m within a few years. Each SS-18 warhead probably has an explosive power equivalent to about 500 kilotons. With the higher accuracy, this would give the warhead about a 60 per cent chance of destroying a US Minuteman ICBM in its silo. Two warheads fired in succession give about a 90 per cent success.

The USSR also has the SS-19 ICBM (the RS-18). This is thought to be more accurate than the SS-18 and to be equipped with a similar warhead. Some of both the SS-18 and -19s are MIRVed. So far, a total of more than 500 SS-18s and -19s have been deployed. If these are MIRVed to the extent allowed by the SALT II Treaty, they are equipped with a total of about 4 000 warheads. The other Soviet MIRVed ICBM, the SS-17 (or RS-16), has been tested with four warheads, but so far only about 100 SS-17s have been deployed.

The Soviet MIRVed strategic missile force is clearly an increasing threat to the 1 000-strong US Minuteman ICBM force as the accuracy and reliability of the Soviet warheads are improved. The USSR could, under SALT II, double the number of warheads on its ICBMs to about 8 000.

The quality of strategic nuclear submarines and the ballistic missiles they carry is also being continuously improved. In the USA, for example, the present Polaris and Poseidon strategic nuclear submarine force is being augmented, and may eventually be replaced, by Trident submarines. The 10 Polaris submarines now operating are approaching the end of their projected 20-year life-span and will be phased out by the end of 1982. The 31 Poseidon submarines now operating were converted (from Polaris submarines) between 1970 and 1978 and should last into the 1990s.

Trident submarines will be equipped with a new SLBM, the Trident I, the successor of the Poseidon C-3 submarine-launched ballistic missile (SLBM). Yet another SLBM, the Trident II, is currently being developed for eventual deployment on Trident submarines.

In the meantime, Trident I missiles will also be deployed on Poseidon submarines. The first of 12 Poseidons to be modified to carry Trident I missiles went to sea in October 1979; the others should be ready by 1984.

The first Trident submarine, the *USS Ohio*, was launched in May 1979 at the General Dynamics pier in Groton, Connecticut, and will become operational in 1982.

Two more Tridents are being built at Groton. According to current plans, 11 Trident submarines will become operational during the 1980s, at a rate of two every three years. But the ultimate size of the Trident fleet has yet to be decided.

Trident submarines are extremely expensive—each costs nearly $2 000 million. The complete Trident programme, as currently conceived, is likely to cost well over $30 000 million.

The Trident is by far the world's biggest submarine. It is 171 m long, has a maximum hull diameter of 12.8 m, and displaces 18 700 tons when submerged. The enormous size of the Trident can be judged from the facts that it is twice as large as a Polaris/Poseidon submarine, which has a submerged displacement of about 8 300 tons, and is as large as the new British through-deck cruiser (displacement 19 500 tons). These submarines can therefore carry more weapons than Polaris/Poseidon submarines.

It should be possible to keep about two-thirds of the Trident fleet at sea at any one time, whereas only about one-half of the Poseidon and Polaris submarines are at sea at any one time. But perhaps most importantly, Trident emits less noise and is, therefore much more difficult for enemy anti-submarine warfare (ASW) systems to detect. Moreover, the Trident fleet will be able to operate independently of foreign bases, a desirable attribute at a time when it is becoming increasingly difficult to hold on to bases abroad.

The Trident submarine will carry a crew of 164. Two crews will be provided for every submarine, and each crew will do a 70-day patrol. The patrol period is limited by the stamina of the crew rather than by the endurance of the submarine.

Each Trident will carry 24 SLBMs. The Trident I SLBM is designed to have a maximum range of 4 000 nautical miles (7 400 km) when equipped with eight 100-kiloton MIRVed warheads. Even longer ranges can be achieved if the missile has a smaller payload. The Poseidon SLBM, which it replaces, can carry up to fourteen 40-kiloton MIRVed warheads, but has a maximum range of only 2 500 nautical miles (4 600 km). With the longer-range missile, Trident submarines will be able to operate in many times more ocean area and still remain within range of its targets. The long-range missiles will also allow Trident submarines to operate closer to US shores and still reach their targets, giving the submarines greater protection against Soviet ASW activities.

Trident I is the same physical size as the Poseidon SLBM—10.4 m long and 1.9 m in diameter—and has the same launch-weight—30 000 kg. The missile, a two-stage propellant rocket, is provided with a stellar-aided inertial guidance system to provide mid-course corrections. It carries a MK-4 re-entry vehicle and W76 nuclear warheads.

The CEP of the Trident I SLBM is probably about 500 m at a maximum range, whereas that of the Poseidon SLBM is about 550 m, and that of the Polaris I SLBM is about 900 m. The development and deployment of mid-course guidance techniques for SLBMs and the more accurate navigation of missiles submarines will steadily increase the accuracy of the missiles.

SLBM warheads may eventually be fitted with terminal guidance, using radar, laser or some other device to guide them on to their targets after re-entry into the Earth's atmosphere. This could give CEPs of a few tens of metres. SLBMs will then be so accurate as to cease to be only counter-city weapons and become counterforce weapons. If deployed, the Trident II SLBM will add to the counterforce potentialities of the present modern US SLBMs.

Only six Tridents, with 144 MIRVed SLBMs, can be deployed before the SALT ceiling of 1 200 MIRVs is reached. If a seventh Trident becomes operational, some older MIRVed launchers will, according to the SALT II Treaty, have to be scrapped.

Current US ballistic missiles carry 7 274 independently targetable warheads. Of these missile warheads, 5 120 are sea-based—4 960 on Poseidon SLBMs and 160 on Polaris SLBMs. US ballistic missiles have a total explosive yield of about 1 650 megatons (Mt), of which about 290 Mt are carried by SLBMs. US sea-based strategic nuclear forces account, therefore, for about 70 per cent of the missile warheads. If all US strategic warheads, on bombers and missiles, are included, the sea-based forces account for about 56 per cent of the number.

Almost all Soviet strategic nuclear warheads are deployed on ballistic missiles; the USSR operates no more than 150 strategic bombers and there is no evidence that they are assigned an intercontinental role. There are said to be about 5 000 independently targetable Soviet missile warheads. Of these, about 1 200, or 24 per cent, are probably carried by SLBMs, while the rest are on ICBMs. The SLBM warheads probably have a total explosive yield of about 900 Mt. According to US sources, the Soviet Union normally has only about one-seventh of its strategic submarines (about ten boats) at sea at any one time. The land-based ICBM force is, at present, therefore, by far the most important component of the Soviet strategic nuclear arsenal.

The most modern Soviet SLBM is the 4 000 nautical mile (7 400 km) range SS-N-18, equipped with three 200-kt MIRVs. So far, 144 SS-N-18s have been put to sea, 16 on each of 9 Delta-class submarines, the most modern Soviet strategic nuclear submarines. The other main Soviet SLBM is the SS-N-8, with a range of 4 300 nautical miles (7 950 km) and a single 1-Mt warhead. Two hundred and sixty-eight SS-N-8s are deployed on 21 Delta-class submarines.

The USSR also operates about 30 Yankee-class strategic nuclear submarines, each carrying 16 SS-N-6 SLBMs, a 1 600 nautical mile (3 000 km) range missile carrying either a 1-Mt warhead or two 200-kt warheads. In all, according to the numbers given in the SALT II Treaty, the USSR has 950 SLBMs, 144 of them MIRVed.

Soviet strategic nuclear submarines are, generally speaking, techno-

logically inferior to their US counterparts, mainly because they are much noisier and, therefore, easier to detect by ASW systems. Moreover, Soviet SLBMs are much less accurate than are US ones.

The SS-N-6 is thought to have a CEP of about 2 000 m, the SS-N-8 a CEP of about 1 300 m, and the SS-N-18 a CEP of about 1 000 m. But one can expect that the accuracy of Soviet SLBMs will be steadily improved and that more Soviet MIRVed SLBMs will be deployed.

The US strategic bomber force, the third component of the strategic triad, will be modernized by equipping B-52 strategic bombers with air-launched cruise missiles (ALCMs). The ALCMis a small, long-range, very accurate, nuclear-armed, winged vehicle. ALCMs can be launched against Soviet targets by bombers penetrating Soviet defences or from outside Soviet territory.

Two types of cruise missile—the Boeing MGM-86 and the General Dynamics AGM-109—are competing for selection as the US strategic ALCM.

According to current plans, ALCMs should become operational in December 1982, when the first B-52G squadron is loaded with cruise missiles under the aircraft's wings. Full operational capability is planned for 1990, when all 151 B-52G aircraft will be loaded, each with 12 ALCMs under the wings and 8 in the bomb bays. ALCMs will about double the number of nuclear weapons these aircraft carry.

Appendix B

US and Soviet strategic nuclear forces, 1971–80

Figures for 1971–76 are as of 30 June; figures for 1977–80 are as of 30 September.

		First in service	Range (nm)	Payload	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Delivery vehicles														
Strategic bombers														
USA	B-52 C/D/E/F	1956	10 000	27 000 kg	198	149	149	116	99	83	83	83	83	83
	B-52 G/H	1959	10 900	34 000 kg	281	281	281	274	270	265	265	265	265	265
	(FB-111	1970	3 300	17 000 kg	66	66	66	66	66	66	66	66	66	65)
USSR	Mya-4 'Bison'	1955	5 300	9 000 kg	56	56	56	56	56	56	56	56	56	56
	Tu-95 'Bear'	1956	6 800	18 000 kg	100	100	100	100	100	100	100	100	100	100
	(Tu-22M 'Backfire'	1975	4 000	9 000 kg	–	–	–	–	12	24	36	48	60	72)
				Long-range bomber total: USA	**479**	**430**	**430**	**390**	**369**	**348**	**348**	**348**	**348**	**348**
				USSR	**156**	**156**	**156**	**156**	**156**	**156**	**156**	**156**	**156**	**156**
Submarines, ballistic missile-equipped, nuclear-powered (SSBNs)														
USA	With Polaris A-2	1962	n.a.	16 × A-2	8	8	8	6	3	–	–	–	–	–
	With Polaris A-3	1964	n.a.	16 × A-3	26	21	13	13	13	13	11	10	10	5
	With Poseidon C-3 conv.	1970	n.a.	16 × C-3	7	12	20	22	25	28	30	31	31	27
	With Trident C-4 conv.	1979	n.a.	16 × C-4	–	–	–	–	–	–	–	–	–	4
	With Trident C-4	1980	n.a.	24 × C-4	–	–	–	–	–	–	–	–	–	1
USSR	'Hotel II'-conv. class	1963	n.a.	3 × 'SS-N-5'	8	7	7	7	7	7	7	7	7	–
	'Yankee'-class	1968	n.a.	16 × 'SS-N-6'	21	27	33	33	33	33	33	33	32	29
	'Hotel III'-conv. class	1972	n.a.	6 × 'SS-N-8'	–	1	1	1	1	1	1	1	1	1
	'Delta I'-class	1973	n.a.	12 × 'SS-N-8'	–	–	1	7	12	12	12	12	12	12
	'Yankee II'-class	1974	n.a.	16 × 'SS-NX-17'	–	–	–	1	1	1	1	1	1	1
	'Delta II'-class	1976	n.a.	16 × 'SS-N-8'	–	–	–	–	–	6	11	11	11	11
	'Delta III'-class	1978	n.a.	16 × 'SS-N-18'	–	–	–	–	–	–	–	2	4	9
				Submarine total: USA	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**41**	**37**
				USSR	**29**	**35**	**42**	**49**	**54**	**60**	**65**	**67**	**68**	**63**
				Modern subs: USSR	**21**	**27**	**34**	**41**	**46**	**52**	**57**	**59**	**60**	**62**
SLBM (Submarine-launched ballistic missile) launchers on SSBNs														
USA	Polaris A-2	1962	1 500	1 × 1 Mt	128	128	128	96	48	–	–	–	–	–
	Polaris A-3	1964	2 500	3 × 200 kt (MRV)	416	336	208	208	208	208	176	160	160	80
	Poseidon C-3	1970	2 500	10 × 40 kt (MIRV)	112	192	320	352	400	448	480	496	496	432
	Trident C-4	1979	4 000	8 × 100 kt (MIRV)	–	–	–	–	–	–	–	–	–	88

USSR 'SS-N-5'	1963	700	1 × 1 Mt	24	21	21	21	21	21	21	21	21	–
'SS-N-6 mod. 1'	1968	1 300	1 × 1 Mt	336	432	528							
'SS-N-6 mod. 2' conv.	1973	1 600	1 × 1 Mt	–	–	–	528	528	528	528	528	512	464
'SS-N-6 mod. 3' conv.	1973	1 600	2 × 200 kt (MRV)	–	–	–							
'SS-N-8'	1973	4 300	1 × 1 Mt	–	6	18	90	150	246	326	326	326	326
'SS-NX-17'	n.a.	..	1 × 1 Mt (MIRV-cap.)	–	–	–	16	16	16	16	16	16	16
'SS-N-18'	n.a.	4 050	3 × 200 kt (MIRV)	–	–	–	–	–	–	–	32	64	144
			SLBM launcher total: USA	**656**	**656**	**656**	**656**	**656**	**656**	**656**	**656**	**656**	**600**
			USSR	**360**	**459**	**567**	**655**	**715**	**811**	**891**	**923**	**939**	**950**
ICBMs (Intercontinental ballistic missiles)													
USA Titan II	1963	6 300	1 × 10 Mt	54	54	54	54	54	54	54	54	54	54
Minuteman I	1963	6 500	1 × 1 Mt	390	290	190	100	–	–	–	–	–	–
Minuteman II	1966	7 000	1 × 1.5 Mt	500	500	500	500	450	450	450	450	450	450
Minuteman III conv.	1970	7 000	3 × 170 kt (MIRV)	110	210	310	400	550	550	550	550	550	550
Minuteman III impr.	1979	7 000	3 × 350 kt (MIRV)	–	–	–	–	–	–	–	–	–	
USSR 'SS-7 Saddler'	1962	6 000	1 × 5 Mt	190	190	190	190	190	130	30	2	–	–
'SS-8 Sasin'	1963	6 000	1 × 5 Mt	19	19	19	19	19	19	19	–	–	–
'SS-9 Scarp'	1966	6 500	1 × 10–20 Mt	288	288	288	288	288	248	188	128	68	8
'SS-11 mod. 1'	1966	5 700	1 × 1 Mt	970	970								
'SS-11 mod. 2' conv.	1973	..	1 × 1 Mt	–	–	970	970	970	890	800	690	580	520
'SS-11 mod. 3' conv.	1973	..	3 × 200 kt (MRV)	–	–								
'SS-13 Savage'	1969	4 400	1 × 1 Mt	60	60	60	60	60	60	60	60	60	60
'SS-11 mod. 3'	1973	..	3 × 200 kt (MRV)	–	–	20	40	60	60	60	60	60	60
'SS-18 mod. 1/mod. 3'	1976	5 500	1 × 10–20 Mt	–	–	–	–	–	60	120	180	240	300
'SS-18 mod. 2' conv.	1977	..	8 × 500 kt (MIRV)	–	–	–	–	–	–				
'SS-19' conv.	1976	5 000	6 × 500 kt (MIRV)	–	–	–	–	–	80	120	180	240	300
'SS-17' conv.	1977	..	4 × 500 kt (MIRV)	–	–	–	–	–	–	50	100	150	150
			ICBM total: USA	**1 054**	**1 054**	**1 054**	**1 054**	**1 054**	**1 054**	**1 054**	**1 054**	**1 054**	**1 054**
			USSR	**1 527**	**1 527**	**1 547**	**1 567**	**1 587**	**1 547**	**1 447**	**1 400**	**1 398**	**1 398**
			Total, long-range bombers and missiles: USA	**2 189**	**2 140**	**2 140**	**2 100**	**2 079**	**2 058**	**2 058**	**2 058**	**2 058**	**2 002**
			USSR	**2 043**	**2 142**	**2 270**	**2 378**	**2 458**	**2 514**	**2 494**	**2 479**	**2 493**	**2 504**
Nuclear warheads													
Independently targetable warheads on missiles: USA				2 938	3 858	5 210	5 678	6 410	6 842	7 130	7 274	7 274	7 258
USSR				1 887	1 986	2 114	2 222	2 302	2 758	3 508	4 427	5 375	6 266
Total warheads on bombers and missiles, official US estimates: USA				4 600	5 700	6 784	7 650	8 500	8 400	8 500	9 000	9 200*	9 200*
USSR				2 100	2 500	2 200	2 500	2 500	3 300	4 000	4 500	5 000*	6 000*

* 1 January.

For sources and notes, see page XLIV.

Sources and notes for appendix B (pages XLII–XLIII)

Sources: The main sources and methodology of this appendix are described in the *SIPRI Yearbook 1974*, pp. 108–109, where a comparable table for the decade 1965–74 appears.

The earlier table has been updated on the basis of material published in the *Annual Report* of the US Secretary of Defense for the fiscal years 1976 through 1981 (US Government Printing Office, Washington, D.C., 1975–1980) and the statements on *US Military Posture* by the Chairman of the Joint Chiefs of Staff for the same six years.

The version of this table for 1967–76 which appeared in the *SIPRI Yearbook 1976*, pp. 24–27, included revised estimates of the numbers of US strategic submarines and SLBMs of various types, based on the dates of overhaul and conversion of each submarine given in *Jane's Fighting Ships* (Macdonald & Co., London, annual), *Ships and Aircraft of the US Fleet* (Naval Institute Press, Annapolis, Maryland, recent editions), and US Senate Committee on Appropriations annual *Hearings* on naval appropriations. The revised series has been continued, based on the same sources.

The estimates of the numbers of US strategic bombers were revised in the table for 1968–77 which appeared in the *SIPRI Yearbook 1977*, pp. 24–28. The revised series, continued here, is based on a narrow definition of 'active aircraft'—the only definition which permits a consistent time series to be constructed from public data—taking the authorized 'unit equipment' (number of planes per squadron) of the authorized numbers of squadrons of each type of plane and adding a 10 per cent attrition and pipeline allowance (or lower when it is known that adequate numbers of spare aircraft are lacking).

A version of the table covering the period 1967–78 appeared in the brochure containing the SIPRI Statement on World Armaments and Disarmament, presented at the UN General Assembly Special Session devoted to Disarmament on 13 June 1978. That table listed three configurations of Soviet submarine, also shown here ('Hotel III', 'Yankee II' and 'Delta III'), which had not been previously reported. Reference to these configurations, as well as some indication that a 'Golf'-class submarine was deployed in a test configuration with modern SS-N-6 launch tubes, are given in the US fiscal year defence statements.

Notes:

Dates of deployment

The estimates for the year 1980 are planned or expected deployments.

In the case of the official US estimates of total warheads on bombers and missiles (the last two rows of the table), the estimates for 1979 and 1980 refer to 1 January. All other estimates in the table follow the more usual practice of official US accounts—which are the main source of the data—by referring to the closing date of the US government fiscal year.

US SLBMs and submarines

The number of US submarines and the corresponding SLBMs are derived by treating all submarines under conversion as though they carry their former load until the conversion is completed (shipyard work finished), and they take on their new load from the date of completion. This method, the only exact procedure feasible with public data, differs from the practice in some official US accounts of excluding from the estimates of *total force loadings* (warheads on bombers and missiles) the loads that would be carried by submarines undergoing conversion and treating the submarines as under conversion until the date of their first subsequent operational deployment at sea.

The first of 12 Poseidon-equipped submarines which are to be backfitted with the Trident I (C-4) missile began conversion in the autumn of 1978 and became operational in October 1979. The first Trident submarine, with 24 launch tubes for the Trident I or Trident II missile (the latter now under development), is scheduled to begin sea trials in July 1980 and is therefore considered to be operational by 30 September 1980, even though the US government's estimate for the submarine's initial operational capability (IOC) is August 1981 (*Fiscal Year 1981 Annual Report*, US Department of Defense, p. 131).

The maximum payload of the Poseidon missile is 14 warheads, rather than the 10 shown in the table. It is estimated that these missiles actually carry only 10 warheads each, an offloading undertaken to compensate for poorer-than-expected performance by the missile propulsion system, so that the design range of 2 500 nautical miles can be reached. (In *Combat Fleets of the World 1978/79* (US Naval Institute Press, Annapolis, Maryland, 1978) Jean

Labayle Couhat suggests that a range of 2 500 nautical miles can be reached with a 14-warhead payload and that reduction of the payload to 10 warheads increases the range to 3 200 nautical miles.)

US ICBMs

Starting in 1979 or 1980, 300 of the 550 Minuteman III missiles are to be backfitted with the Mark 12A re-entry vehicle, each of which will carry a 350-kt warhead. Moreover, NS-20 improvements in Minuteman III guidance have brought the expected accuracy (circular error probability) of this missile to about 600 ft. This gives the current 170-kt Minuteman III warhead a better than 50 : 50 chance of destroying a Soviet missile silo hardened to 1 000–1 500 psi, and two such warheads in succession (barring 'fratricide' effects) about an 80 per cent probability of kill. The hard-silo kill probability of the new 350-kt warhead, given 600-ft accuracy, will be about 57 per cent for one shot and close to 95 per cent for two shots.

MIRVed warheads on Soviet ICBMs

Firm estimates are available of the numbers of Soviet SS-9 and SS-11 ICBM silos that have been hardened and made capable of launching the SS-18 and the SS-19 or -17, respectively. SS-17 deployments in modified SS-11 silos are proceeding at a slow pace and are reported to involve MIRVed missiles only.

For the SS-18 and SS-19, the rate of silo conversion is faster. However, the numbers of MIRVed missiles placed in the upgraded silos are uncertain. In the case of the SS-18, US Defense Department officials have indicated that both MIRVed (eight-warhead) and unMIRVed (single-warhead) versions have been deployed, with the greater proportion MIRVed. In the case of the SS-19, the US fiscal year 1980 and 1981 documents report that some of the nearly 300 SS-11 silos converted to SS-19 launch configuration continue to have SS-11s installed in them. Thus, the numbers of MIRVed SS-18s and SS-19s remain obscure and possibly unknown.

The SIPRI estimates of the numbers of MIRVed SS-18s and SS-19s rely on assumptions implicit in the US official estimates of total Soviet independently targetable warheads and total numbers of modified silos. These estimates may be revised as more detailed information becomes available.

Soviet and US bomber aircraft

The long-standing estimate of 140 Soviet long-range bombers has been revised upwards to 156 to conform with Soviet official data made public at the time of the signing of the SALT II Treaty. In past years, the designation 'Tu-20' has been given for the 'Bear' bomber in *SIPRI Yearbooks*. The SALT II Treaty states that the 'Bear' bomber is designated 'Tu-95' in the Soviet Union. Similarly, the Soviet designation for the medium-range bomber known in the West as 'Backfire' is referred to in the table as 'Tu-22M' (as opposed to 'Tu-26' in previous *SIPRI Yearbooks*) to conform with the designation used in the Soviet Backfire statement given to the USA before the signing of the SALT II Treaty.

US medium-range FB-111 strategic bombers are shown in parentheses, and long-range bombers only are included in the bomber totals, to clarify the number of delivery vehicles counted against SALT II limitations.

'Backfire' is included in the table only because much attention is given to this aircraft in the United States as a potential strategic delivery vehicle. It is the only weapon system in the table which is not officially recognized—indeed, disavowed—by the deploying government as a strategic weapon system. Moreover, it has been publicly recognized in US intelligence estimates as having less than intercontinental range in normal combat flight profile and as having been deployed at bases with peripherally oriented medium-range bombers and with naval aviation forces. As in the case of the Tu-95 'Bear', the naval aviation-assigned 'Backfires' are not included in the table at all. The medium-range bomber-assigned units, about half of production to date, shown in the table because of their prominence in the debate, are not included in the Soviet bomber totals.

For the past several years, the *Annual Report* of the US Secretary of Defense has included estimates of the total inventory of US bomber aircraft, including a large number of B-52s (about 220) in inactive storage. These aircraft will be counted against the SALT II delivery vehicle totals, even though many of them, perhaps most, are not in operating condition, and some may have been cannibalized or allowed to rust. (Almost all are older B-52 C/E/F models.)

Nuclear warheads

The estimates of independently targetable missile warheads can generally be reconciled with the official US estimates of total bomber and missile warheads if the following steps are taken: (*a*) bomber warhead loads are based on one bomb per 8 000–10 000 kg payload, using Unit Equipment (UE) aircraft for the USA and adding SRAMs (1 140 operational missiles deployed on the bombers during 1972–75) to the internal payload; (*b*) in the case of US SLBMs, load on submarines under conversion and in overhaul are excluded altogether; and (*c*) for some early years, individual MRVs and not just MIRVs are counted separately in the force load total.

1. World military expenditure

Square-bracketed numbers, thus [1], *refer to the list of references on page 16.*

I. Introduction

The figures for world military expenditure are beginning to take an uneasy turn. The UN 'Decade of Disarmament' of the 1970s is ending in virtually total failure. One main objective had been to bring about some reduction in the immense military burden carried by the world economy; some of the resources, it was hoped, might be transferred to aid to Third World countries. This was an objective which had been endorsed in principle by virtually every world political leader.

The gap between words and deeds could hardly be wider. Throughout the 1970s world military spending continued to increase slowly in real terms. By 1979, the SIPRI estimate of world military expenditure had reached the figure of some $480 thousand million, at current prices—and the 1980 figure will certainly go above $500 thousand million. For current budget figures give a strong indication that the rise in world military expenditure is accelerating. At the same time there have been widespread cuts in the real value of development aid.

It is not simply the waste of resources which makes this outcome bitter. It is also ominous. There were upswings in world military expenditure before both World War I and World War II; and in the post-war period, the big upswings were at the time of the Korean War and the Viet Nam War. It is true that the rate of increase envisaged in the next few years is well below that of 1934–38.[1] However, at the beginning of the 1930s, world military spending (as a proportion of world output) was very much lower than it is now: the acceleration in the late 1930s started from a much lower base.

This chapter discusses first the NATO and the Warsaw Treaty Organization (WTO) figures—including an extended discussion of the factors leading to the US decision to accelerate its military spending. Trends in the rest of the world are then briefly surveyed. The fourth section discusses the reliability of the figures for military expenditure given in various sources; this section is followed by comments on the validity of some of the statistical exercises which have been conducted, using these figures.

[1] Reference [1] suggests that between fiscal year 1934 (ending 31 March 1935) and fiscal year 1938 (ending 31 March 1939), German military expenditure rose nine-fold in real terms.

II. NATO and the WTO

It is the impending figures for the two great power blocs which are the most disturbing. As usual, the information is one-sided: one can document what is happening in NATO, and can only give a blurred impression of what is happening in the Soviet Union. The official Soviet figures show no signs of an acceleration in military expenditure—indeed, the 1980 budget shows a small fall. However, for reasons discussed below, one can neither accept these figures as representing the resources devoted to military purposes in the Soviet Union, nor the alternative very high US Central Intelligence Agency (CIA) estimates.

There are, however, some signs in the figures that military spending is being increased in other WTO countries. The 1979 figures are up in the German Democratic Republic (by 5 per cent) and in Bulgaria (by 6.7 per cent), and it seems probable that there has also been a rise in Czechoslovakia. The other WTO countries do not as yet show any change in trend. The Romanian government indicated that, in its judgement, the international situation did not warrant an increase, and the serious economic situation precluded an increase in Poland.

The upswing in NATO military spending is in the budgets that have been announced for the future: it does not show up significantly in the figures for the calendar year 1979. In discussing trends in NATO, it is important to separate out what has been happening in the United States, and what has been happening in European NATO. In the United States, military spending rose enormously at the time of Viet-Nam—it went up 40 per cent, in real terms, between 1965 and 1968. It then drifted down to a low point in 1976, and since then—in the past three years—it has been on an upward trend of around 2 per cent a year.

The profile of military spending in NATO Europe has been quite different. It has trended up fairly steadily through the 1970s—at 3.5 per cent a year in real terms in the first half of the decade, and at 2 per cent a year since 1975. (All these figures are SIPRI estimates, using consumer price indices, for the reason given in the final section. Other sources which use different price series may obtain slightly different figures.)

The 1979 NATO estimates of military spending do not show changes in the NATO trend as yet: the rise in the United States is 1.7 per cent (in real terms), and 2 per cent in European NATO. Among the European NATO estimates for 1979, the most notable figure is that for the UK. The UK, like other NATO countries, has undertaken to increase military spending by 3 per cent a year, in real terms. However, the NATO estimate of its spending in 1979 shows a real increase over the previous year of no less than 6 per cent.

The information from budget figures suggests that NATO Europe will probably meet its 3 per cent target for 1980. The change from a 2 per cent trend to a 3 per cent trend should not be dismissed as insignificant. Over five years, it would imply additional military expenditure of some $15 thousand million in NATO Europe (at 1980 prices).

However, the more radical change in trend is in the United States. (The factors accounting for this change are discussed in the next section.) The US defence budget for the fiscal year 1981, announced by the Secretary of Defense on 28 January 1980, gives figures in constant prices for five years ahead; the average rate of increase in military outlays from fiscal year 1980 to fiscal year 1985 goes up to 4 per cent a year in real terms. This change in trend from 2 per cent to 4 per cent means *additional* spending over the five years of some $45 thousand million dollars (at 1980 prices). This is simply a measure of the effect of the change in trend. The *total* increase in the five-year period over the level of spending in fiscal year 1980 is $80 thousand million (at 1980 prices).

In the event, spending may increase even faster. At the moment, the US Administration is assuming that—in spite of the fact that the SALT II Treaty has not been ratified in the United States—both sides will conform to its provisions. If this unwritten agreement breaks down, then, according to the Defense Secretary's testimony before the Senate Foreign Relations Committee, the spending on strategic weapons might be increased by a further $3 thousand million a year [2a], shifting up the five-year growth rate from 4 to 4.5 per cent a year.

Economic consequences

There is an important economic consequence from this change in trend. Over the next few years, it seems very likely that the military sector will be becoming increasingly important in the economies of NATO countries. There is general agreement, among forecasters, that 1980 will be a year of relative depression in Western industrialized countries; the Organization for Economic Co-operation and Development (OECD) forecast is for a rise in the real gross domestic product of this group of only 1 per cent [3]. Medium-term forecasts for the period up to 1985 also suggest slower growth rates than in the past. As a consequence, the military sectors will be one of the few prosperous sectors in the Western economies. Firms making both civil and military goods are likely to find plants devoted to military purposes fully employed, and plants producing goods for the civil economy working short-time. It will become increasingly attractive to firms to obtain some share of the increases in expenditure on military procurement; whereas over the past decade, firms heavily engaged in military production have been attempting to diversify into civil production, now

we may begin to see the opposite tendency. These developments will serve to strengthen the position of the military sector in the economy.

It is also a significant—and an unfortunate—change that the arms race between NATO and the WTO is now proceeding with target rates of increase in real military expenditure. There was a time when it was necessary for the military to specify the nature of the increased military threat which they observed, and the nature of their response to it. It was then possible for commentators to discuss whether or not the threat had been increased, whether a response was needed, and whether the proposed response was a cost-effective one. A response may be available (for example, in anti-tank weapons) which costs much less than the increase in the threat (for example, an increase in a potential enemy's tank force). Now it increasingly appears that the decision to raise military expenditure comes first, and the decision on what military hardware to buy comes second. This is partly the consequence of the way in which the arguments to increase military expenditure have been presented: great stress has been laid on the proposition that Soviet military expenditure has been rising in real terms for a long time, and that therefore NATO military expenditure should do the same. This type of argument relieves the military of the necessity of specifying the exact nature of the increased threat, and the appropriateness of their suggested response. This particular way of justifying increases in military expenditure seems very likely to lead to a rising trend into the indefinite future.

Military expenditure comparisons are increasingly used in the arguments of those who are pressing for spending increases, because the single number —for example, that the Soviet Union has spent $100 thousand million more than the United States—sounds highly compelling. However, expenditure comparisons between countries with radically different price structures make very little sense, and the figures which have been popularly used do not bear critical scrutiny.

The US case

Four years ago, when President Carter assumed office, he took the view that significant reductions in military expenditure were possible. He has now put forward a five-year defence budget which embodies a faster growth in military spending, in real terms, than at any time since World War II, except for the Korean War and Viet Nam War years. This is a case study of a major change in direction which will produce a very large increase indeed in the sum total of world resources devoted to the military sector. It is therefore important to try to establish some of the factors which led to this change.

The intention to begin an increase in US military spending in real terms

was signalled well before the Soviet action in Afghanistan. First of all, within the terms of the SALT II Treaty, the United States was proposing to increase its expenditure on *strategic* weapons substantially, from $10 thousand million a year (at 1980 prices) to $12.5 thousand million. To quote Representative Les Aspin: "It appears that President Carter has had to commit himself on full-scale development of the MX missile in order to make the Treaty acceptable to the Joint Chiefs and several key Senators" [4]. The MX missile is not the only proposed addition to the armoury of strategic weapons (see chapter 6). There are also the Trident I submarine-launched missiles in Trident submarines, and about 3 000 air-launched cruise missiles for B-52G bombers, and eventually new types of carriers. Secondly, an undertaking to increase *non-strategic* military spending was also a part of the Administration's attempt to get SALT II ratified. The Administration had to ensure that the Joint Chiefs of Staff would testify in support of SALT II before the Senate Foreign Relations Committee. In their testimony, the Joint Chiefs made clear their view that a general increase in military expenditure was necessary. For example, General Meyer testified: "From a green suit, Army point of view, perhaps a bit parochial, I think it is important that we put a cap on strategic offensive systems so that we can get on with some of the other things we have to do to respond to our broader strategic needs throughout the world" [2b]. The Administration also had to consider the influential evidence of Dr Henry Kissinger, who argued that the Senate should withhold its ratification until the Administration had submitted and had approved a supplementary defence budget and a revised five-year defence programme.

Indeed, the issue between the Administration and the Senate in the autumn of 1979 was not on the question of whether there should be an increase in the volume of total military spending, but on the size of the increase. The Secretary of Defense argued that the 3 per cent volume increase which had already been agreed by NATO was adequate. A number of senators—whose spokesmen were Senators Henry Jackson and Sam Nunn—argued for a 5 per cent volume increase, and in September they carried the Senate in a vote to permit 5 per cent annual increases in the 1981 and 1982 defence budgets.

The proponents of a faster increase in military spending made extensive use of the CIA estimates of Soviet military spending measured in dollars. These figures were presented without qualification, as bald statements of fact. Thus General Jones, in his testimony to the Foreign Relations Committee, said: "They [the Soviet Union] have spent approximately $100 billion more in investments in systems across the board since the early 1970's than the United States" [2c]. Using the same figures, Senator Nunn states: "According to CIA data, in the last ten years, . . . in research and development the Soviets have spent 50% more. Soviet investment in

weapons and military facilities was $100 billion more than the US" [5]. When these figures were quoted to the Secretary of Defense, he made a rather halfhearted attempt to draw attention to the qualifications: "I think you have to treat these [figures] with some caution, because they are calculated in terms of what it would cost us to do in dollars what the Soviets do . . . it also excludes allied expenditures which are much bigger on the US-allied side than on the Soviet-allied side" [6]. It cannot be too often repeated that these figures, of a huge gap in military spending, which have been so influential in leading to a sharp increase in US military spending, are virtually meaningless as they stand.

There was a further factor in the Administration's change of stance on military expenditure. A number of influential US commentators took the view that since 1975 the Soviet Union had indulged in what Dr Kissinger called 'geopolitical adventurism', and that this was linked to the relative growth of Soviet military power. Dr Kissinger stated this case as follows:

> Whatever the cause, the fact is that since 1975 there has been an unprecedented Soviet assault on the international equilibrium. 1975 saw the introduction of Cuban combat forces into Angola, eventually reaching 40 000, backed by Soviet financing, aircraft, and policy support. By 1977 Soviet planes and pilots were flying air defense missions out of Cuba so that the Cuban air-force could operate in Africa. 1977 witnessed the spread of Cuban forces to Ethiopia. East German military and intelligence advisers have now joined the Cubans all over Africa and the Middle East. There have been two invasions of Zaire—and there may yet be a third; there have been Communist coups in Afghanistan and South Yemen; and the occupation of Cambodia by Vietnam, preceded by a Soviet Friendship Treaty designed to secure Hanoi's rear during its aggression. Soviet arms depots in Libya and Ethiopia fuel insurgencies all over Africa. While the collapse of the Shah of Iran had many causes, one contributing factor surely was the demoralization of a pro-Western leadership group by the gradual and unopposed growth of Soviet power in nearby areas. [2d]

The link between these events and US military expenditure was not made clear. If the United States, in the late 1970s, had proceeded more rapidly with the development of the MX missile, and had also developed the B1 bomber, it is not clear how this would have altered developments in Angola or in Ethiopia, still less in Iran.

There is no doubt that—however irrational the connection—these events, and more particularly the taking of US hostages in Iran, had changed the attitude of the electorate towards proposals for increased military expenditure; events in Afghanistan merely served to intensify a change in the climate of opinion which the politicians had already observed. Thus in July 1979 Representative Les Aspin noted: "The domestic climate no longer jeopardizes new weapons programs. Quite the contrary. The political momentum lies more with the hawkish groups . . . Congressional and public support for new weapons is fairly strong. Five years ago, popular backlash against the Viet Nam war shaped the public's view of the entire

military establishment; this perspective has now all but vanished from the scene" [4]. Senator Biden, also in July 1979, had also come to the same conclusion: "You will get much more wild applause from the public today saying, let's get tough with the Russians, than to make the argument of let's really limit arms, let's not have a buildup" [2e]. Particularly in a Presidential election year, politicians took careful note of this change of climate. This has no doubt been a factor in the decision taken early in 1980 to move up the target for the increase in the volume of military expenditure.

There is little doubt, therefore, that 1979/80 marks an acceleration in the arms race between the two great powers. President Carter has declared his intention of ensuring that the United States remains the strongest power on Earth. There will presumably be a Soviet reaction: a sharp acceleration in the trend of US military expenditure is unlikely to be met with a nil response. World military expenditure is now on an ominous course.

The Soviet Union

On Soviet military expenditure, there is little to add to the discussion in the *SIPRI Yearbook 1979* [7a]. On the one hand, the official Soviet figure shows a *level* of military expenditure in 1979 which, converted into dollars at the official exchange-rate, is only about one-fifth of that of the United States. Further, the trend in military expenditure is shown, on the official figures, as falling slightly over the decade, by about 0.5 per cent a year, with a further small 0.5 per cent fall scheduled for 1980. Given what is known about developments in Soviet weaponry in the past decade, these figures cannot provide a reasonable representation of the resources which the Soviet Union devotes to the military sector.

On the other hand, the CIA continues to put forward its estimate of Soviet military expenditure valued "at what it would cost, in dollars, to produce in the United States". This gives a 1979 estimate which is 50 per cent higher than the US figure. It is now widely accepted that this is an extremely biased comparison [8]. However, as we have seen, the numbers which it produces have been extensively used, without qualifications, in the arguments about US military expenditure. Further, the CIA does not make a genuine attempt to value, in roubles, what it would cost the Soviet Union to replicate the US pattern of military expenditure. This is because they say that, while the military expenditure which the USSR produces is all within US technology and can be given a real dollar price, a large part of US equipment is beyond Soviet technology and cannot be given an actual rouble price. If a proper high rouble price-tag could be put on US high technology, the US defence package would certainly cost the Soviet Union more to produce than its own. These comparisons of military spending, therefore, which have done so much to fuel the arms race, are so con-

structed that "the very dimension of the arms race in which America has the greatest advantage—advanced technology—and which makes most of the difference between military superiority and inferiority, is enormously undervalued" [9].

Secondly, turning to Western estimates of the *trend*, in real terms, in the Soviet Union, official Western statements are entirely casual about the figures they use. The CIA, using their dollar estimates, now talk about a 3 per cent real trend during the 1970s [10]. The NATO Final Communique of the Defence Planning Committee, which met on 11–12 December 1979, refers to "real increases in military spending over a long period of 4 to 5% annually by the Soviet Union" [11]. Over ten years, a 5 per cent growth rate produces a level of expenditure which is very much higher than a 3 per cent growth rate: the casual use of these figures, in so serious a matter, is wholly improper.

The method used by the CIA to calculate the real trend in Soviet military spending is different from the method used to calculate the real trends in Western countries, and here again there is a strong likelihood of bias [7b].

The figures in the *SIPRI Yearbooks* can be said to be the consequence of 'equal disbelief' of the low, flat official Soviet series and the high CIA dollar estimates.

III. World trends outside NATO and the WTO

The focus of attention this year is necessarily on the impending acceleration in the rise in military expenditure in the NATO–WTO area. The short section which follows looks back over the past decade at the experience in the rest of the world (see table 1.1). The main conclusion is clear: in general, military expenditure has been growing fast: the figures are high. A growth rate of 7 per cent implies a doubling every ten years, and a growth rate of

Table 1.1. Trends in world military expenditure outside the power blocs (excluding NATO and the WTO), 1970–79[a]

Annual average per cent changes in real terms.

Main regions		Other groupings	
Middle East	13.5	Southern Africa	15.5
Africa	7.5	OPEC	15
Far East (excl. China)	7	Non-oil developing countries:	
Latin America	5	High-income	7.5
South Asia	4	Medium-income	6.5
Other Europe	3.5	Low-income	3.5
Oceania	0.5	Total	6

[a] China is excluded because the figures are very unreliable.

Source: Appendix 1A. For definitions of areas, see notes on page 33.

12 per cent implies a trebling. (All the figures in this section—except where otherwise indicated—are for average annual growth rates in military expenditure in real terms over the period 1970–79.)

1. Southern Africa—comprising South Africa, Zimbabwe, Mozambique, Zambia and Tanzania—heads the list: an obvious area of great tension. However, there are other parts of Africa where the trend has been very rapid—in Ethiopia, for example (a 15 per cent trend). Ethiopia has been engaged in wars with Somalia and also with Eritrean independence movements. The fighting near its borders has also led Kenya to build up its armed forces from a low figure.

2. The Organization of the Petroleum Exporting Countries (OPEC) states have spent a considerable part of their vastly increased income on expanding their military sector—with a growth rate of 15 per cent a year. However, the rate of growth has slowed in the past few years; and in Iran military spending has fallen very sharply in 1979, as the big arms procurement programmes of the previous régime were cancelled (see figure 1.1).

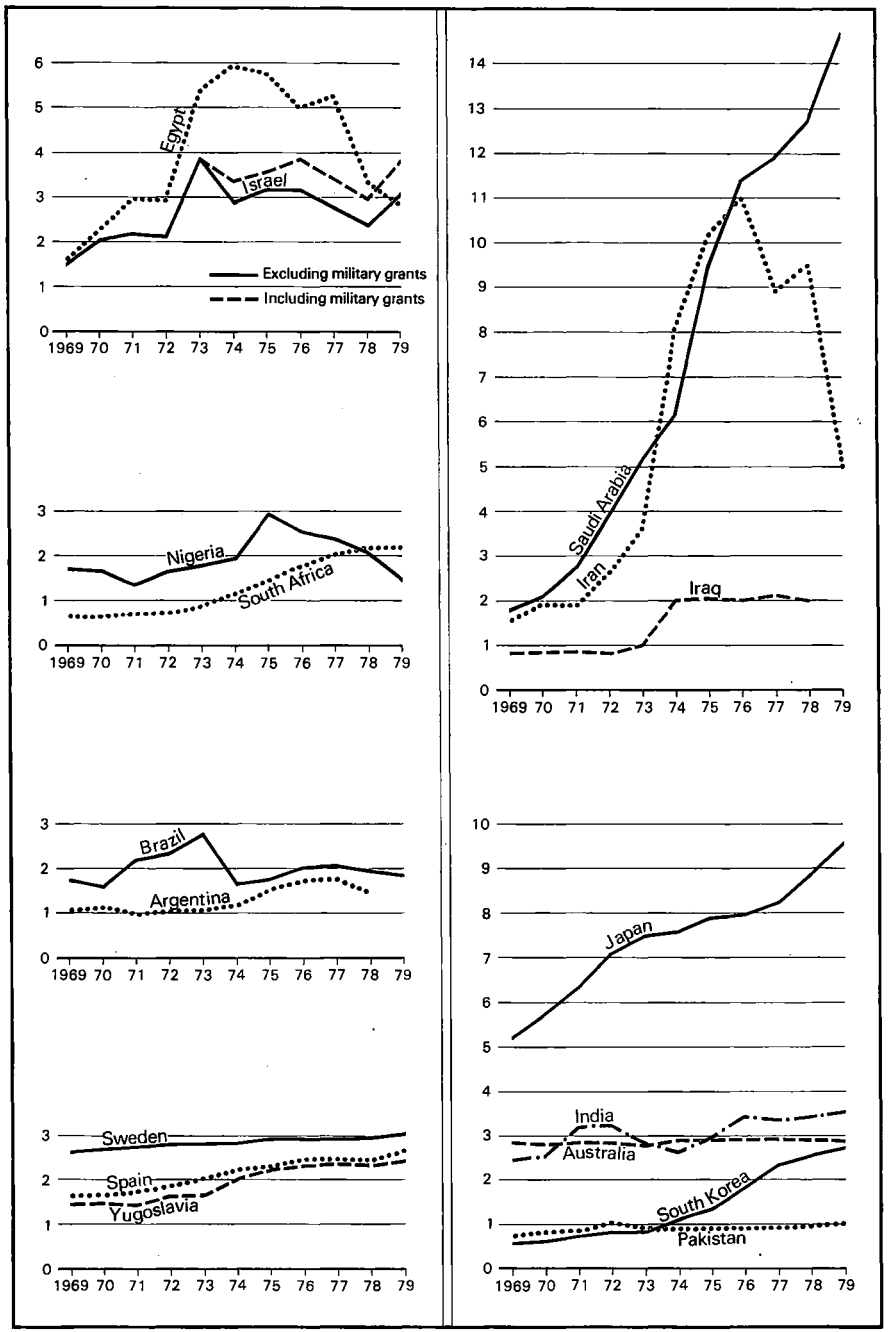
3. Elsewhere in the Middle East, military spending has come down from its war-time peak in both Egypt and Israel—but much more in Egypt than in Israel (figure 1.1)—no doubt because Israel considers itself still threatened by other Arab states. Syria has recently increased its military spending very sharply.

4. In the Far East, Japan—with a trend rise of 6 per cent a year—now has the seventh largest military budget in the world. (This is in spite of the fact that Japan spends less than 1 per cent of its gross domestic product on the military sector.) It is under pressure from the United States to increase its military budget much further; however, there are at present constraints on public expenditure, and the 1980/81 budget shows only a 1.5 per cent rise in real terms. For the medium term, the Defence Agency has suggested that military spending be raised from 0.9 per cent to 1.0 per cent of the gross domestic product. This innocuous-sounding proposal could imply a rapid increase in military spending. If, over four years, gross domestic product rises 6 per cent a year, and military spending raises its share from 0.9 to 1.0 per cent, then the annual percentage rise in military spending (in real terms) would be 9 per cent. The 1979 Defence White Paper for the first time pointed to the Soviet Union as the most likely threat to the peace and stability of the region.

5. Elsewhere in the Far East, there are a number of countries where the upward trend has been very rapid—South Korea (18 per cent a year), the Philippines (16 per cent), and Singapore, Thailand and Indonesia (all at 9 per cent). It is a pattern of behaviour which seems likely to continue in this area: South Korea's 1980 military budget shows an increase of over 30 per cent, and in Malaysia, there is a report of a tripling of the development funds for the military in 1980.

Figure 1.1. Military expenditure trends in certain countries outside NATO and the WTO

The values are US $ thousand million, at constant (1978) prices and 1978 exchange-rates.



Source: SIPRI tables, appendix 1A.

6. Figures for China are not included in table 1.1 because they are too uncertain. However, for the first time since 1960, China has announced some military expenditure figures—16.8 thousand million yuan in 1978 (a 12.6 per cent increase over 1977), and 20.2 thousand million yuan in 1979 (a 20 per cent increase over 1978).

7. In Latin America in general, the rise in military expenditure has been less marked than in Africa or the Far East—although a 5 per cent annual increase is rapid enough. The trend has probably been very high in Cuba—though, as we have no price series for that country, we cannot make a good volume estimate. In Chile, military spending went up some 16 per cent a year in real terms from 1970 to 1979.

8. The military expenditure trends for three income categories of developing countries (excluding the OPEC countries) are calculated in table 1.1. It is interesting that the higher the income, the more rapid the upward trend in military spending.

9. 'Other Europe' is one of the few areas—outside NATO and the WTO —where the upward trend has been relatively, but only relatively, modest. These countries act to some extent as bellwethers of the state of international tension. After the Helsinki agreement of 1975, military expenditure stayed flat in these countries, in aggregate, between 1976 and 1978. Last year it began to rise again.

10. The one main region, outside NATO and the WTO, which has seen no reason to increase its military spending is Oceania—Australia and New Zealand. The 1979 figures are, in real terms, virtually the same as those of 1970. However, here too a change in the trend appears to be imminent. The Australian government has announced its intention of raising the share of military spending in the gross national product from its present figure of 2.7 per cent to a figure of 3 per cent by 1985. This probably means that military expenditure in Australia will, from now on, start to rise at about 4 per cent a year in real terms.

IV. Reliability of the figures

A number of sources now give figures for the military expenditure of different countries. The purpose of this section is to provide a guide to the various series which are given, to explain some of the differences in them, and also to make some comparison between the series given. The main object of this comparison is to provide some guide to the reliability of the series. It is obviously important that those who use the statistics have some knowledge of the degree of reliability; and if different sources give widely differing estimates of military expenditure for a particular country, that is an indication that the series has a wide margin of error. It is in no way an ideal indicator of reliability, but it is the best that is available. It

may be that some of the institutions publishing figures do not have the resources to examine critically the figures which they present; if that is so, then including their estimates in the assessment may exaggerate the degree of unreliability. On the other hand, although widely differing estimates do suggest unreliability, the converse does not necessarily apply. If all sources give the same figure, it may simply mean that they agree on using the same original source—which may or may not be itself reliable. In the first example—of differing estimates—we can reasonably assume that the figures are unreliable. In the second example—of similar estimates—it is possible that the figures are reliable.

Why do figures for military expenditure differ? The basic source is normally an expenditure estimate provided by the national government concerned—which in some countries is published in a Defence White Paper with other supporting material. However, in other countries it may simply be a single figure embedded in the budget statement; in many countries there are also supplementary budget estimates submitted in the course of the year; there are often 'emergency budgets' which may include military expenditure together with other 'emergency' expenditure—and the total is not split; and there is always the problem that actual expenditure may differ substantially from the sum initially allocated in the budget. For a number of countries it is extremely difficult to obtain expenditure estimates from sources published in the country itself. However, countries do submit expenditure figures to UN agencies—both to the United Nations itself and to the International Monetary Fund (IMF). These figures tend not to be very up-to-date, and they often have to be supplemented from a variety of sources, including press cuttings and enquiries to embassies or to ministries in the country concerned. Further, the coverage of the figures submitted to UN agencies varies considerably. Sometimes military expenditure is combined with other categories of expenditure, such as justice and the police. It is clear that some countries report to the United Nations figures for military expenditure which exclude their arms purchases from abroad. Para-military figures are treated differently in different countries.

The SIPRI approach is to construct a worksheet for each country, on which all available figures from any source are entered. For countries outside NATO and the WTO, the series given in the IMF source, *Government Finance Statistics Yearbook*, is usually the preferred source, when available; however, it is not a long series, and it can be two to three years out-of-date. Estimates have then to be made from other sources, using also any circumstantial evidence, such as estimates of arms imports.

The figures obviously become more useful if they are corrected for inflation, and converted into a common currency. Here again, there are problems. If the purpose of the estimates is to give some indication of the 'resources forgone'—the 'opportunity cost' of military expenditure—(and

that is the purpose of the SIPRI estimates), then the appropriate price index to use is either a consumer price index or a GDP or GNP deflator—that is, an estimate of the price movements for all goods and services produced in the country. Consumer price indices vary considerably in quality, and are often not available for the latest year. Further, in some advanced countries it is possible to get significantly different answers, according to whether a base-weighted or current-weighted consumer price index is used.[2] Thus, at the time of writing, the US base-weighted consumer price index shows an 11 per cent rise in 1979; the current-weighted index shows a 9 per cent rise. One implies a real rise in US military spending of 1.7 per cent; the other, of 3.5 per cent.

The exchange-rate is also a problem. Most sources use the official exchange-rate (except for WTO countries). However, there is a case for using purchasing-power-parity exchange-rates, for which there are now more estimates than there used to be [12].

The main sources provide figures as follows:

1. Both the UN *Statistical Yearbook* and the IMF *Government Finance Statistics Yearbook* give local currency, current price figures for the financial year of the country concerned [13, 14].

2. SIPRI gives local currency, current price figures, adjusted to the calendar year. It also gives constant price, constant dollar estimates, using the consumer price index of the country concerned for the 'constant price' calculation, and using (except for WTO countries) the average exchange-rate for the base year to convert the figure into dollars [15].

3. The US Arms Control and Disarmament Agency (ACDA) also gives 'constant price, constant dollar' series. However, not all figures are adjusted to a calendar year, and the price index used to deflate the series to constant prices is the GNP price index, not the consumer price index. The exchange-rate used for the base year conversion is the same as SIPRI's. ACDA does not give a 'local currency, current price' series. It does give a current dollar series. However, this is not constructed by using the exchange rate for each year—as ACDA correctly points out, because exchange rates fluctuate so much this can produce a very bumpy series. It is constructed by using the constant dollar series, and adjusting it by the movement of the United States GNP price index [16].

4. The International Institute for Strategic Studies (IISS) gives a local currency, current price series for one year only in the country-by-country

[2] A consumer price index has to combine into a single figure a large number of different price changes, and for this purpose each price change has to be given a 'weight' according to its importance in consumers' budgets. The weights can either be those of some base year—1975 is commonly used at the moment; or they can be those of the current year—say, 1979. A base-weighted index will normally show a bigger price rise than a currently weighted index—because, for example, between 1975 and 1979 people will have shifted their consumption patterns away from products whose prices have risen rapidly towards products whose prices have risen slowly.

text. It has a table giving 'current price, current dollar' figures. For this, in the most recent volume, it uses the exchange-rate at the end of the first quarter [17].

5. *World Military and Social Expenditures* gives a single dollar figure for one year, using the average exchange-rate for that year [18].

For conducting the reliability exercise, the figures were collected for all countries for six years—1970 to 1975, inclusive. In order to include in the exercise the effect of revisions, five successive issues were taken of *The Military Balance*, and four successive issues of the *SIPRI Yearbooks*, of *World Military Expenditures and Arms Transfers*, of *World Military and Social Expenditures*, of the UN *Statistical Yearbook*, and one issue of *Government Finance Statistics Yearbook*. Thus, for any individual year in any individual country, there were a maximum of 17 estimates; the average number of estimates for each year was 12.

The 'standard error' of the estimates was calculated; this is a measure of the extent of divergence of the estimates. Table 1.2 gives the full ranking of standard errors.[3]

The implication is clear. For most NATO countries, the standard error of the estimates which use the NATO definition is fairly low; it is also low for a number of other European countries. Outside this area, the figures are generally high. For many countries, it is unwise to put much reliance on year-to-year movements in the figures. There is some more certainty about broad trends over a period of years, particularly in regional totals.

Valid and invalid exercises

Given the wideness of the range of estimates for different countries, it is not proper to conduct statistical exercises which depend for their validity on the accuracy of year-to-year movements in the figures for most individual countries outside the Western industrial world. It is, of course, tempting to try to trace the course of an arms race in military expenditure figures—showing for example interactions between Soviet and US figures, or between Egypt and Israel, or India and Pakistan. The uncertainty about the year-to-year movements in the figures is too great for any such exercise to be meaningful.

Limited exercises are possible, however, with the military expenditure figures of those countries where the estimates (judging from the standard error calculations) seem reasonably reliable. This is in general true for the member countries of the OECD.

One such exercise has recently examined the 'underconsumption' thesis

[3] If one assumes that each estimate has an equal chance of being right, then a standard error of 10 suggests that—if the average of the estimates is 100—the correct figure probably lies somewhere in the range 90–110.

Table 1.2. Classification of countries according to the divergence of various estimates of military expenditure (standard errors in brackets)

Standard error 0–7.0			Standard error 7.1–15.0			Standard error greater than 15.0	
Austria	(2.6)		India	(7.4)		Mongolia[b]	(15.3)
Netherlands[c]	(3.0)	(3.2)	Ecuador[a]	(7.5)		German DR[b]	(16.1)
Norway[c]	(3.3)	(3.2)	Lebanon	(7.6)		Brazil	(16.2)
USA[c]	(3.3)	(1.9)	Mexico	(7.6)		Israel[a]	(16.2)
Somalia	(3.4)		Australia	(7.8)		United Arab Emirates[a]	(16.8)
Sweden	(3.5)		Indonesia[a]	(7.9)		Singapore	(18.0)
Venezuela[a]	(3.6)		Jordan	(8.0)		Uganda	(18.1)
UK[c]	(3.7)	(3.1)	Portugal[c]	(8.0)	(6.3)	Korea, North[b]	(18.9)
Guatemala	(3.8)		Colombia	(8.2)		Philippines	(19.0)
Switzerland	(4.0)		Nepal	(8.3)		Oman[a]	(21.4)
Senegal	(4.7)		Tunisia	(8.3)		Congo	(20.9)
Thailand	(4.7)		Kenya	(8.6)		Nigeria[a]	(22.3)
New Zealand	(4.9)		Burma	(8.8)		Argentina	(22.2)
Luxembourg[c]	(5.0)	(4.0)	Chad	(8.8)		USSR[b]	(22.7)
France[c]	(5.1)	(3.9)	Zambia	(9.2)		Czechoslovakia[b]	(22.8)
Yugoslavia	(5.1)		Albania[b]	(9.7)		Saudi Arabia[a]	(22.6)
Finland	(5.2)		El Salvador	(9.7)		Afghanistan	(24.4)
Nicaragua	(5.4)		Ireland	(9.8)		Algeria[a]	(24.6)
Cuba	(5.5)		Ghana	(10.0)		Iran[a]	(26.1)
Madagascar	(5.5)		Honduras	(10.1)		Laos[b]	(26.1)
Belgium[c]	(5.8)	(2.6)	Zaire	(10.1)		Kampuchea[b]	(26.8)
Canada[c]	(5.9)	(2.3)	Cameroon	(10.2)		Bangladesh	(27.3)
Denmark[c]	(5.9)	(3.5)	Malaysia	(10.6)		Zimbabwe	(28.8)
Korea, South	(6.2)		Turkey[c]	(10.6)	(7.6)	Tanzania	(29.0)
Dominican Republic	(6.6)		Pakistan	(10.7)		Poland[b]	(29.6)
Taiwan	(6.6)		Yemen PDR[a]	(11.2)		Spain	(30.3)
FR Germany[c]	(6.9)	(3.6)	Bolivia	(11.3)		Viet Nam, North[b]	(33.1)
Greece[c]	(6.9)	(4.4)	Paraguay	(11.4)		Egypt	(34.7)
Japan	(7.0)		Sudan	(11.6)		Chile	(35.3)
			Morocco	(12.2)		Iraq[a]	(37.3)
			Italy[c]	(12.3)	(3.9)	Kuwait[a]	(39.4)
			Syria	(12.4)		China[b]	(40.9)
			Ivory Coast	(12.6)		Hungary[b]	(42.1)
			South Africa	(12.8)		Romania[b]	(43.3)
			Peru	(13.3)		Bulgaria[b]	(66.9)
			Yemen AR	(13.8)		Libya[a]	(84.3)
			Sri Lanka	(13.9)			
			Uruguay	(14.0)			
			Ethiopia	(14.9)			

[a] Excluding ACDA figures, for which local currency figures could not be calculated.
[b] Based on dollar, not local currency figures.
[c] For NATO countries, the first figure includes all the estimates. The second figure includes only those that use the NATO definition.

Source: See the description of method, page 14.

—the thesis that capitalist countries undertake military expenditure because otherwise they are faced with overproduction, falling profits, and high unemployment [19]. This hypothesis can be tested both by making comparisons between countries—asking the question: 'Do countries with relatively high military expenditure have relatively low unemployment figures, and vice versa?' It can also be tested—though this is more difficult because of time lags—by examining time series for individual countries, asking whether increases in military expenditure appear to lead to lower unemployment or not. There appears to be no support, in Western industrial countries, for the underconsumption thesis. There is no tendency for countries with high military expenditure to have relatively low unemployment; nor is it possible to trace, in the figures of individual countries, any significant effects on unemployment from increases or decreases in military spending.

The 'underconsumption' thesis, as an explanation of military spending in Western countries, can be laid to rest.

A second exercise asks the question 'Which particular sector of non-military expenditure tends to be reduced when military expenditure is raised?' Here again, it is possible to use evidence both from inter-country comparisons and from analysis of time series. There appears to be reasonable support for the proposition that military spending tends to be at the expense of fixed investment—either public or private [20]. This seems *a priori* plausible. First of all, it is the same industries which produce investment goods and military hardware—so, certainly in the short term, there is a direct conflict for limited resources. Secondly, it is not at all easy for governments to hold back the rise in real personal income, or to reduce health and educational expenditure, in order to make room for military spending: that leaves investment as the sector most likely to be affected. This does suggest that any acceleration of the rise in military expenditure is likely to be accompanied—through its effect on productive investment —by slower long-term economic growth.

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Appendix 1A

World military expenditure, 1979

For the sources and methods for the world military expenditure data, see appendix 1B. For the conventions used in the tables and for footnotes, see pages 32 and 33.

Table 1A.1. World military expenditure summary, in constant price figures

Figures are in US $ mn, at 1978 prices and 1978 exchange-rates.

	1950	1955	1960	1965	1970	1975	1976	1977	1978	1979
USA	39 475	98 252	100 001	107 192	130 872	110 229	104 261	108 540	108 357	110 145
Other NATO	27 885	44 328	50 386	60 891	63 094	74 699	76 669	78 183	80 438	81 728
Total NATO	67 360	142 580	150 387	168 083	193 966	184 928	180 930	186 723	188 795	191 873
USSR	[37 700]	[51 200]	[48 000]	[65 900]	[92 500]	[99 800]	[101 300]	[102 700]	[104 200]	[105 700]
Other WTO	..	..	3 388	5 423	8 263	10 530	11 138	11 756	12 006	12 256
Total WTO	[40 700]	[54 200]	[51 388]	[71 323]	[100 763]	[110 330]	[112 438]	[114 456]	[116 206]	[117 956]
Other Europe	(2 800)	(5 140)	(5 867)	7 552	8 595	10 579	11 111	11 052	11 139	11 544
Middle East	[800]	[1 400]	[2 400]	[4 500]	(10 505)	33 879	36 271	35 366	(34 636)	[33 103]
South Asia	[1 240]	[1 415]	(1 555)	3 376	3 424	4 037	4 558	4 541	(4 648)	[4 747]
Far East (excl. China)	[4 400]	[5 200]	[6 100]	8 000	11 990	15 771	[16 880]	[18 780]	[20 275]	[21 580]
China	[12 900]	[11 800]	[13 100]	[25 300]	[37 900]	[40 300]	[40 400]	[41 700]	[42 900]	[44 200]
Oceania	987	1 583	1 485	2 279	3 068	3 232	3 194	3 206	3 204	3 175
Africa (excl. Egypt)	[125]	[400]	[900]	2 898	5 330	9 134	(9 720)	(9 950)	[10 130]	[10 250]
Central America	[400]	[420]	[575]	742	987	1 266	[1 500]	[1 825]	[2 070]	[2 275]
South America	[2 000]	[2 250]	(2 485)	(3 212)	3 981	5 489	5 858	(6 120)	[5 950]	[5 455]
World total	**133 710**	**226 390**	**236 245**	**297 265**	**380 510**	**418 945**	**422 860**	**433 719**	**439 953**	**446 158**
Developed market economies[a]				181 321	212 407	208 835	205 631	211 371	214 031	218 734
Centrally planned economies[a]				97 412	140 074	152 244	154 719	158 239	161 634	164 800
OPEC countries[a]				(3 800)	8 739	29 821	32 816	32 392	(33 621)	[30 646]
Non-oil developing countries:[a]										
with (1977) GNP *per capita* US $80–300				4 795	5 181	5 812	6 233	6 340	[6 660]	[6 915]
with (1977) GNP *per capita* US $320–800				(2 500)	4 536	9 195	8 848	9 484	7 678	[7 914]
with (1977) GNP *per capita* > US $800				[6 090]	(8 190)	12 057	13 564	14 725	15 071	15 811
Total non-oil developing countries				13 385	17 907	27 064	28 645	30 549	29 409	30 640
Southern Africa[a]				688	884	2 152	2 502	2 816	3 191	3 292

Table 1A.2. World military expenditure, in constant price figures

Figures are in US $ mn, at 1978 prices and 1978 exchange-rates.

	1950	1955	1960	1965	1970	1975	1976	1977	1978	1979
NATO										
North America:										
Canada	1 271	4 134	3 422	3 167	3 256	3 468	3 702	3 939	4 087	3 877
USA	39 475	98 252	100 001	107 192	130 872	110 229	104 261	108 540	108 357	110 145
Europe:										
Belgium	783	1 459	1 582	1 839	2 174	2 758	2 902	2 978	3 175	3 327
Denmark	329	691	741	1 026	1 038	1 277	1 260	1 266	1 315	1 322
France	6 320	9 520	12 603	13 867	14 458	16 169	16 934	17 687	18 623	18 993
FR Germany	4 959	7 799	11 685	16 760	16 872	20 847	20 657	20 522	21 417	21 636
Greece[b]	297	353	437	495	990	1 714	(1 814)	(2 044)	(2 117)	[2 281]
Italy	2 154	2 749	3 231	4 344	4 831	5 607	5 580	5 990	6 246	6 283
Luxembourg	14.1	46.0	18.5	30.1	22.7	32.2	34.4	33.8	36.7	37.6
Netherlands	1 535	2 433	2 168	2 896	3 349	4 036	4 002	4 454	4 307	4 434
Norway	316	622	603	885	1 018	1 171	1 200	1 223	1 307	1 346
Portugal	204	299	367	712	983	774	605	570	623	687
Turkey[b]	609	775	892	1 318	1 448	(2 351)	(3 208)	(3 320)	(2 557)	(1 968)
UK	9 094	13 448	12 636	13 552	12 654	14 495	14 771	14 156	14 627	15 536
Total NATO Europe	26 614	40 194	46 964	57 724	59 838	71 231	72 967	74 244	76 351	77 851
Total NATO	67 360	142 580	150 387	168 083	193 966	184 928	180 930	186 723	188 795	191 873
WTO										
Bulgaria	..	..	208	267	365	611	664	(597)	(624)	(666)
Czechoslovakia	1 116	1 217	1 025	1 181	1 645	2 008	2 115	(2 148)	(2 105)	[2 160]
German DR	..	..	456	1 414	2 605	3 364	3 580	(3 968)	(4 170)	(4 380)
Hungary	..	..	235	437	703	766	721	750	819	791
Poland	283[c]	963	1 140	1 672	2 290	2 907	3 107	(3 316)	(3 218)	(3 195)
Romania	..	..	324	452	655	874	951	977	1 070	(1 064)
USSR	[37 700]	[51 200]	[48 000]	[65 900]	[92 500]	[99 800]	[101 300]	[102 700]	[104 200]	[105 700]
Total WTO	[40 700]	[54 200]	[51 388]	[71 323]	[100 763]	[110 330]	[112 438]	[114 456]	[116 206]	[117 956]
Total WTO (excl. USSR)	..	..	3 388	5 423	8 263	10 530	11 138	11 756	12 006	12 256
Other Europe										
Albania[f]	..	..	..	70	116	155	191	196	201	204
Austria	104	34	309	399	490	642	657	679	741	762
Finland	151	214	254	329	350	490	499	461	463	473
Ireland	58.2	75.8	75.6	93.4	110	186	197	178	196	(170)

Spain	339	851	966	1 189	1 662	2 308	2 472	2 478	2 461	2 662
Sweden	1 169	1 763	1 888	2 530	2 696	2 924	2 919	2 933	2 980	3 066
Switzerland	681	931	1 080	1 584	1 697	1 638	1 856	1 758	1 762	1 791
Yugoslavia	274	1 224	1 240	1 358	1 474	2 236	2 320	(2 369)	(2 335)	(2 416)
Total Other Europe	(2 800)	(5 140)	(5 867)	7 552	8 595	10 579	11 111	11 052	11 139	11 544
Middle East										
Bahrain	..	..	..	..	..	21.4	29.9	41.1	[44.7]	[47.8]
Cyprus	..	..	..	16.8	13.9	23.2	22.7	30.1	[23.2]	[17.4]
Egypt[b]	206	489	513	974	2 271	5 756	5 004	5 239	[3 325]	[2 840]
Iran[b]	212	291	577	862	1 906	10 168	11 031	8 902	9 506	(4 943)
Iraq[k]	58	140	313	563	841	2 049	2 010	2 100	1 988	..
Israel[b, t]	57	49	189	385	2 016	3 160	3 158	2 726	2 377	(3 063)
Jordan[k]	56	109	181	191	279	246	232	275	307	387
Kuwait[b, k]	..	..	53[e]	97	393	860	1 073	1 189	1 091	..
Lebanon[g, t]	13	27	38	68	94	165	137	85	..	..
Oman[f]	..	..	..	..	36	698	785	686	767	[695]
Saudi Arabia[b]	..	..	..	1 035	2 094	(9 430)	[11 375]	[11 900]	(12 700)	(14 640)
Syria	58	68	170	242	429	1 088	1 086	1 097	1 151	(1 937)
United Arab Emirates[f]	..	..	..	..	..	74	(153)	(904)	(1 066)	(1 195)
Yemen, Arab Republic[h]	..	..	..	12	58	(102)	(122)	(134)	(132)	..
Yemen, Peoples' Democratic[h]	..	..	..	..	45.8	38.2	52.1	57.9	74.6	..
Total Middle East	[800]	[1 400]	[2 400]	[4 500]	(10 506)	33 879	36 271	35 366	(34 636)	[33 103]
South Asia										
Afghanistan	..	..	..	63	43.0	47.1	56.9	58.8	..	..
Bangladesh	..	..	..	..	..	68.3	109	133	125	121
India	858	995	1 112	2 595	2 538	2 980	3 447	3 383	3 444	3 523
Nepal[k]	..	..	[5]	[5.2]	8.1	13.5	15.1	15.9	(16.0)	
Pakistan[b]	333	358	369	705	823	914	917	934	989	1 001
Sri Lanka	0.8	4.0	10.1	8.0	11.9	14.1	13.0	16.1	14.0	24.0
Total South Asia	[1 240]	[1 415]	(1 555)	3 376	3 424	4 037	4 558	4 541	(4 648)	[4 747]
Far East										
Brunei[f]	..	..	..	12.8	22.3	48.1	73.1	133	130	163
Burma	57	180	213	228	220	148	149	(169)	..	..
Hong Kong	..	..	..	19.3	26.8	(31)	(70)	(73)	(83)	..
Indonesia	634[e]	486	898	338	811	1 324	1 178	1 411	1 545	1 705
Japan	2 656[e]	2 856	2 860	3 927	5 725	7 899	7 983	8 232	8 875	(9 516)

	1950	1955	1960	1965	1970	1975	1976	1977	1978	1979
Kampuchea, Democratic	..	..	[80]	80	210	[105]	..	..	..	..
Korea, North[f]	..	..	[276][e]	[429]	(878)	922	1 004	1 022	1 194	..
Korea, South	..	207	313	311	617	1 359	1 855	2 362	2 560	2 723
Laos	..	..	..	40	37	[26]	[38]	..	..	..
Malaysia	7.5	124	99	224	353	(451)	370	440	506	[465]
Mongolia[f]	..	..	[20][e]	[20]	[50]	124	136	135	141	160
Philippines	71	102	112	110	174	443	583	744	651	[667]
Singapore[k]	..	..	..	..	239	347	444	520	500	(513)
Taiwan	..	371	511	833	1 073	1 199	1 390	1 655	(1 810)	(1 882)
Thailand	53	109	159	206	419	496	596	716	839	..
Viet Nam, North[l, n]	..	..	..	[620]	[585]	[605]	..	..	..	..
Viet Nam, South[m, n]	..	..	226	602	550	[244]	..	..	..	..
Viet Nam, Socialist Republic of[n]	..	..	..	..	..	..	..	..	..	..
Total Far East, excl. Kampuchea, Laos and Viet Nam	[4 000]	[4 700]	(5 487)	6 658	10 608	14 791	15 831	17 612	(19 016)	[20 240]
Total Far East	[4 400]	[5 200]	[6 100]	8 000	11 990	15 771	[16 880]	[18 780]	[20 275]	[21 580]
Oceania										
Australia	873	1 380	1 280	2 025	2 804	2 939	2 912	2 921	2 902	2 893
Fiji	..	..	..	..	1.0	1.6	2.5	2.9	..	..
New Zealand	114	203	205	254	263	291	279	282	299	(278)
Total Oceania	987	1 583	1 485	2 279	3 068	3 232	3 194	3 206	3 204	3 175
Africa										
Algeria	..	..	..	252	226	373	426	473	465	[500]
Benin[f]	..	..	(2.1)[e]	4.4	5.3	5.7	7.8	(11.9)	..	..
Burundi[h]	..	..	..	4.0	5.3	12.1	11.2	13.3	(19.9)	..
Cameroon	..	..	31.5	44.5	55.7	63.0	66.2	63.6	60.7	61.3
Central African Empire	..	..	3.5[e]	5.9	12.8	10.8	10.5	9.3	..	..
Chad	..	..	0.1[e]	9.7	36.5	26.0	37.4	(34.7)	(41.3)	..
Congo	..	..	6.0[e]	12.2	(28.1)	44.8	46.2	44.1	38.1	..
Equatorial Guinea[f]	..	..	..	..	3	4	..	..	..	..
Ethiopia	..	..	53	117	87	216	173	[146]	[159]	[308]
Gabon	..	..	3.7[e]	9.4	14.2	24.3	26.9	34.9	(53.9)	(60.1)
Ghana[i]	..	78	268	267	375	350	253	135	..	..
Guinea[f]	..	..	5.1[e]	14.0	[22.7]	(22.4)	..	..	..	..
Ivory Coast	..	..	13.4[e]	42.2	50.3	70.3	66.7	(33.1)	87.8	78.6

Kenya	..	14.9[d]	7.1	25.0	39.8	77.0	111	230	251	..
Liberia	..	..	..	7.0	7.7	5.4	6.1	7.2	..	..
Libya[b]	..	..	13	60	(331)	(1 048)	(1 602)	(1 579)	..	..
Madagascar	..	..	4.7	23.7	26.9	33.1	41.4	50.7	52.2	..
Malawi	..	..	..	1.7	2.6	10.3	10.9	15.7	19.4	..
Mali[f]	..	..	[17.1[e]]	17.9	24.6	(32.5)	38.6	37.6	(30.9)	..
Mauritania	..	..	[6.9[e]]	5.9	6.2	35	(51)	(66)	..	..
Mauritius	..	..	0.7	0.7	7.0	11.5	..	..	..	..
Morocco	..	74[d]	119	149	201	539	755	867	825	1 086
Mozambique[f]	..	..	..	..	..	14	(41)	44	(85)	87
Niger	..	..	4.5[e]	19.1	11.0	9.1	10.0	..	..	..
Nigeria	..	28.2	101	203	1 643	2 925	2 545	2 367	(2 040)	[1 471]
Rwanda	..	..	..	7.0	9.0	12.4	14.2	(18.7)	..	..
Senegal	..	..	8.9[e]	38.2	38.6	39.6	44.4	50.5	49.4	60.8
Sierra Leone	..	..	4.5	4.4	6.3	7.9	7.2	[7.9]	..	..
Somalia	..	..	10.4[e]	12.9	26.0	32.5	32.4	35.5	(67)	(86)
South Africa	96	151	141	523	628	1 430	1 769	2 000	2 180	2 187
Sudan	27	32	67	136	255	152	194	220	(213)	[290]
Tanzania[k]	..	..	..	82	101	182	186	195	(301)	(283)
Togo	..	..	(0.7)[e]	7.2	8.0	11.9	17.2	18.3	21.2	..
Tunisia	..	7.6[d]	36.0	31.5	43.6	65.4	73.5	80.1	84.3	91.2
Uganda[h]	..	20	11.0	83	168	(217)	170	136	..	..
Upper Volta	..	..	4.2	9.1	11.2	(23.6)	(33.1)	(31.2)	..	..
Zaire[i]	..	..	..	585	658	(471)	(297)	(267)	..	..
Zambia[b]	..	..	21	47	67	[353]	[291]	[259]	[240]	[248]
Zimbabwe	..	..	..	36	[88]	173	215	(318)	(385)	(487)
Total Africa	[125]	[400]	[900]	2 898	5 330	9 134	(9 720)	(9 950)	[10 130]	[10 250]
Central America										
Costa Rica[k]	..	(9.8)[d]	10.5	10.7	7.6	13.7	17.7	19.5	22.1	..
Cuba[f, k]	..	..	222[e]	270	367	(413)	..	..	992	1 065
Dominican Republic	..	..	85.6	78.7	66.1	72.0	78.7	78.6	[87]	[151]
El Salvador[k]	11.6	14.6	13.4	20.4	20.4	37.8	48.0	56.8	59.0	(62)
Guatemala	12.2	17.4	20.6	31.1	58.0	57.7	60.3	84.0	[59]	[64]
Haiti	..	13.5	18.1	16.6	14.8	11.3	11.6	11.9	13.5	..
Honduras	6.5	6.3	8.4	10.7	14.1	25.8	27.2	(26.8)	(31.4)	..
Jamaica	..	..	..	10.1	10.5	(21.2)	27.3	[28.2]	..	..
Mexico	125	125	180	266	385	557	610	(719)	(699)	[740]
Nicaragua	..	..	15.2[e]	17.0	22.4	32.5	43.5	[43.1]	..	..
Panama	..	..	..	[5.6]	12.7	16.7	(16.7)	..	..	..
Trinidad and Tobago	..	..	..	5.5	7.9	7.4	8.2	8.9	..	..
Total Central America	[400]	[420]	[575]	742	987	1 266	[1 500]	[1 825]	[2070]	[2 275]

	1950	1955	1960	1965	1970	1975	1976	1977	1978	1979
South America										
Argentina[t]	1 012	824	1 004	974	1 122	1 515	1 721	[1 771]	[1 492]	..
Bolivia	..	10.6	13.3	37.7	31.3	72.1	79.0	78.0	91	[81]
Brazil[t]	673	823	820	1 268	1 596	1 756	2 023	[2 069]	[1 951]	[1 842]
Chile[t]	62	100	83	86	177	420	431	[484]	[714]	[665]
Colombia	49.1	133	99	213	204	193	198	182	167	[188]
Ecuador	15.3[c]	46.8	54.0	56.7	80.6	141	129	215	[170]	..
Guyana[k]	..	..	..	..	13.9	42.0	55.3	..	..	..
Paraguay	..	..	[15.1][e]	[18.0]	26.3	31.9	29.3	34.1	28.6	..
Peru[t]	69.2	75.7	110	176	297	(488)	(615)	(498)	[592]	[401]
Uruguay[t]	..	..	45.3[e]	72.9	92.7	123	95	100	..	..
Venezuela	92	160	227	307	340	707	482	631	590	587
Total South America	[2 000]	[2 250]	(2 485)	(3 212)	3 981	5 489	5 858	(6 120)	[5 950]	[5 455]

Table 1A.3. World military expenditure, in current price figures

Figures are in local currency, current prices.

	Currency	1950	1955	1960	1965	1970	1975	1976	1977	1978	1979
NATO											
North America:											
Canada	*mn dollars*	495	1 819	1 654	1 659	2 061	3 127	3 589	4 124	4 662	4 799
USA	*mn dollars*	14 559	40 371	45 380	51 827	77 854	90 948	91 013	100 928	108 357	122 261
Europe:											
Belgium	*mn francs*	8 256	17 067	20 209	26 606	37 388	70 899	81 444	89 480	99 726	109 467
Denmark	*mn kroner*	359	920	1 113	1 974	2 757	5 281	5 680	6 343	7 250	8 000
France	*mn francs*	5 591	11 020	19 162	25 300	32 672	55 872	63 899	73 097	84 042	94 926
FR Germany	*mn marks*	4 265	7 383	12 115	19 915	22 573	37 589	38 922	40 184	43 019	45 414
Greece[b]	*mn drachmas*	1 971	3 688	5 110	6 290	14 208	43 917	(52 670)	(66 580)	(77 600)	[98 860]
Italy	*thous mn lire*	353	551	710	1 212	1 562	3 104	3 608	4 533	5 301	6 119
Luxembourg	*mn francs*	170	614	263	477	416	836	983	1 029	1 154	1 229
Netherlands	*mn guilders*	901	1 699	1 728	2 714	3 968	7 246	7 817	9 260	9 317	10 001
Norway	*mn kroner*	357	953	1 058	1 897	2 774	4 771	5 333	5 934	6 854	7 394
Portugal	*mn escudos*	1 516	2 224	3 023	6 680	12 538	19 898	18 845	22 082	27 354	37 733
Turkey[b]	*mn lira*	599	1 077	2 410	3 821	6 237	(23 830)	(38 170)	(49 790)	(62 090)	(72 150)
UK	*mn pounds*	849	1 567	1 657	2 091	2 444	5 165	6 132	6 810	7 620	9 085
WTO											
Bulgaria	*mn leva*	..	..	179	230	324	548	596	(541)	(565)	(603)
Czechoslovakia	*mn korunas*	9 086	9 908	8 343	9 618	14 719	18 133	19 228	(19 795)	(19 700)	[20 550]
German DR	*mn marks*	..	..	1 050	3 255	5 998	7 512	7 994	(8 770)	(9 215)	(9 680)
Hungary	*mn forints*	..	..	3 100	5 757	9 448	11 811	11 671	12 607	14 410	14 943
Poland	*mn zlotys*	3 750[c]	12 760	15 110	23 552	34 534	49 672	55 432	(61 865)	(63 045)	(65 725)
Romania	*mn lei*	..	..	3 392	4 735	7 067	9 713	10 570	10 960	12 000	(12 000)
USSR	*mn roubles*	[17 100]	[23 300]	[21 800]	[30 000]	[42 000]	[45 400]	[46 000]	[46 700]	[47 400]	[48 000]
Other Europe											
Albania	*mn leks*	..	..	..	288	475	635	783	805	824	835
Austria	*mn schillings*	383	188	1 893	2 957	4 265	7 946	8 728	9 515	10 767	11 541
Finland	*mn markkaa*	99	163	267	446	597	1 455	1 695	1 767	1 908	2 093
Ireland	*mn pounds*	4.9	8.1	9.2	14.0	21.3	67.1	84.0	86.4	102.2	(100.0)
Spain	*mn pesetas*	2 834	8 167	13 375	23 471	42 067	103 064	127 028	158 568	188 666	235 700
Sweden	*mn kronor*	1 138	2 264	2 898	4 646	6 150	9 781	10 768	12 054	13 466	14 860
Switzerland	*mn francs*	505	750	924	1 586	2 014	2 813	3 242	3 110	3 151	3 314
Yugoslavia	*mn new dinars*	395	1 593	2 077	4 305	7 864	28 815	33 234	(38 890)	(43 530)	(53 510)

	Currency	1950	1955	1960	1965	1970	1975	1976	1977	1978	1979
Middle East											
Bahrain	*mn dinars*	..	..	..	..	..	5.8	9.3	14.3	[17.3]	[19.5]
Cyprus	*mn pounds*	..	..	..	3.3	3.0	7.2	7.3	10.4	[8.6]	[7.0]
Egypt	*mn pounds*	31	71	[80]	178	482	1 631	1 564	1 845	[1 300]	[1 200]
Iran	*thous mn rials*	2.5	5.0	13.8	22.8	54.1	453	547	562	670	(388)
Iraq[k]	*mn dinars*	7.0	17.1	42.4	80.6	143	470	520	593	587	..
Israel	*mn pounds*	22	50	243	700	4 481	20 723	27 218	31 625	41 535	(85 380)
Jordan[k]	*mn dinars*	5.0	10.5	19.1	21.5	37.4	55.2	60.0	78.8	94.2	132.7
Kuwait[k]	*mn dinars*	..	..	6.1[e]	10.9	48.7	190	250	300	300	..
Lebanon	*mn pounds*	14.6	26.7	47.8	90.1	138	315	327	255	491	738
Oman	*mn riyals*	..	..	..	..	12.4	241	271	237	265	[240]
Saudi Arabia	*mn riyals*	..	..	293	1 076	2 379	(22 235)	[35 300]	[41 065]	(43 200)	(50 835)
Syria	*mn pounds*	68	82	251	365	763	3 280	3 634	4 136	4 545	(8 000)
United Arab Emirates	*mn dirhams*	..	..	..	..	..	285	(595)	(3 500)	(4 125)	(4 625)
Yemen, Arab Republic	*mn rials*	..	..	..	11.7	74	(320)	(445)	(610)	(755)	..
Yemen, Peoples' Democratic	*mn dinars*	..	..	..	..	8.1	12.1	17.1	20.0	27.1	36.3
South Asia											
Afghanistan	*mn afghanis*	..	..	[628]	1 023	1 361	1 805	2 190	2 480	..	..
Bangladesh	*mn taka*	..	..	..	..	..	909	1 313	1 760	1 882	1 990
India	*mn rupees*	1 748	1 932	2 774	8 651	11 747	23 823	25 400	27 043	28 216	29 988
Nepal[k]	*mn rupees*	..	..	[16.2]	[28.3]	58	125	160	182	(193)	
Pakistan	*mn rupees*	662	787	978	2 059	2 975	7 212	7 751	8 697	9 820	10 890
Sri Lanka	*mn rupees*	5.4	27.5	71.3	62.0	113	192	179	224	219	411
Far East											
Brunei	*mn dollars*	..	..	..	29.3	51.0	110	167	303	297	373
Burma	*mn kyats*	122	338	426	511	585	891	1 099	(1 233)	..	..
Hong Kong	*mn dollars*	..	..	..	57	100	(123)	(290)	(320)	(385)	..
Indonesia	*thous mn new rupiahs*	..[o]	..[o]	..[o]	..[o]	102.2	407	434	577	683	865
Japan	*thous mn yen*	119[c]	151	163	300	570	1 356	1 498	1 669	1 868	(2 068)
Kampuchea	*mn riels*	..	..	[1 495]	1 846	5 966	..	..	..	..	..
Korea, North	*mn won*	..	..	[565][e]	[880]	(1 800)	1 890	2 058	2 096	2 447	..
Korea, South	*thous mn won*	..	5.9	14.8	29.9	101.6	452	712	1 000	1 239	1 559
Laos	*mn kips*	..	..	..	7 391	9 131	..	..	..	..	..
Malaysia	*mn ringgits*	8.6	161	131	303	510	(927)	779	972	1 172	[1 116]
Mongolia	*mn tugriks*	..	..	[60][e]	[60]	[150]	373	407	405	424	480
Philippines	*mn pesos*	114	157	193	237	500	2 655	3 700	5 100	4 800	[5 640]

Singapore[k]	*mn dollars*	..	..	..	..	311	744	934	1 128	1 137	(1 196)
Taiwan	*thous mn dollars*	..	2.8	6.6	12.1	19.3	38.3	45.5	58.0	(67)	(76)
Thailand	*mn baht*	298	855	1 378	1 921	4 420	8 339	10 438	13 488	17 054	..
Viet Nam, South[n]	*thous mn piastres*	..	..	[7.6]	28.5	128.3	[293]	..	..	..	..
Oceania											
Australia	*mn dollars*	152	362	392	678	1 094	1 867	2 100	2 364	2 535	2 742
Fiji	*mn dollars*	..	..	..	..	0.4	1.1	1.9	2.3	..	..
New Zealand	*mn dollars*	20	48	56	79	104	187	210	243	288	(304)
Africa											
Algeria	*mn dinars*	..	..	..	490	488	1 030	1 288	1 600	1 843	2 318
Benin	*mn francs*	..	..	(480)[e]	995	1 200	1 285	1 759	(2 680)	..	..
Burundi	*mn francs*	..	..	..	182	273	951	946	1 195	(1 915)	..
Cameroon	*mn francs*	..	..	2 185	3 975	5 622	10 025	11 580	12 770	13 700	14 875
Central African Empire	*mn francs*	..	..	250[e]	547	1 351	1 774	1 915	1 880	..	..
Chad	*mn francs*	..	..	7[e]	820	3 850	4 052	5 977	(7 370)	(9 330)	..
Congo	*mn francs*	..	..	500[e]	1 235	(3 200)	7 500	8 125	9 000	8 600	11 200
Equatorial Guinea	*mn ekueles*	..	..	..	..	243	290	..	..	..	..
Ethiopia	*mn birr*	..	..	41	107	88	261	269	[265]	[330]	[722]
Gabon	*mn francs*	..	..	245[e]	740	1 285	3 612	4 807	7 107	(12 160)	(14 600)
Ghana	*mn cedis*	..	4.0	14.9	25.4	43.1	90.6	102.3	118.5	..	..
Guinea	*mn syli*	..	..	100[e]	275	[445]	440	..	..	..	..
Ivory Coast	*mn francs*	..	..	990[e]	3 162	4 900	9 834	10 458	(6 600)	19 800	20 900
Kenya	*mn pounds*	..	1.8[d]	0.9	3.5	6.1	19.9	31.8	76	97	..
Liberia	*mn dollars*	..	..	..	2.8	3.8	4.5	5.4	6.7	..	..
Libya	*mn dinars*	..	..	1.4	7.3	(55)	(214)	(345)	(361)	..	..
Madagascar	*mn francs*	..	..	396	2 644	3 370	6 470	8 504	10 732	11 775	..
Malawi	*mn kwachas*	..	..	..	0.8	1.2	7.4	8.1	12.2	16.4	..
Mali	*mn francs*	..	..	[2 020][e]	2 260	3 400	(8 150)	10 456	12 751	(13 966)	(15 341)
Mauritania	*mn ouguiyas*	..	..	[100][e]	104	135	1 200	(1 975)	(2 830)	..	..
Mauritius	*mn rupees*	..	..	1.6	1.5	18.1	52.6	..	..	..	..
Morocco	*mn dirhams*	..	116[d]	210	320	444	1 675	2 551	3 294	3 438	4 937
Mozambique	*mn escudos*	..	..	..	..	..	600	(1 760)	1 900	(3 650)	3 733
Niger	*mn francs*	..	..	315[e]	1 480	1 025	1 225	1 667	..	..	..
Nigeria	*mn nairas*	1.6	2.8	12.2	28.1	299	1 008	1 070	1 209	(1 296)	(1 168)
Rwanda	*mn francs*	..	..	..	220	315	838	1 020	(1 541)	..	..
Senegal	*mn francs*	..	..	740[e]	3 900	4 461	7 645	8 822	11 004	11 143	13 964
Sierra Leone	*mn leones*	..	..	1.5	1.8	3.1	5.9	6.3	[7.7]	..	..
Somalia	*mn shillings*	..	..	23[e]	37	80	145	165	200	(420)	(600)
South Africa	*mn rands*	21.0	42.4	44	182	257	913	1 257	1 578	1 896	2 136

	Currency	1950	1955	1960	1965	1970	1975	1976	1977	1978	1979
Sudan	*mn pounds*	1.6	2.8	6.1	14.6	32.5	40.2	52.0	68.9	(80)	[130]
Tanzania[k]	*mn shillings*	..	..	..	148	312	1 054	1 148	1 341	(2 315)	(2 450)
Togo	*mn francs*	..	..	66[e]	678	830	1 960	3 153	4 118	4 789	(4 800)
Tunisia	*mn dinars*	..	1.4[d]	7.4	7.4	11.8	22.8	27.0	31.4	35.1	40.3
Uganda	*mn shillings*	..	12.9	8	77	190	(690)	835	1 123	1 200	..
Upper Volta	*mn francs*	..	..	311	860	1 160	(3 350)	(4 300)	(5 400)	..	..
Zaire	*mn zaires*	..	..	..	15.3	48	(81)	(96)	(141)	..	..
Zambia	*mn kwachas*	..	..	4.8	12.0	23	[173]	[170]	[181]	[195]	[235]
Zimbabwe	*mn dollars*	..	..	..	12.6	[34]	86	119	(197)	(262)	(375)
Central America											
Costa Rica[k]	*mn colones*	..	(28.9)[d]	32.9	37.2	30.1	102.5	137.7	157.4	189.2	..
Cuba[k]	*mn pesos*	..	..	175[e]	213	290	(326)	..	..	784	841
Dominican Republic	*mn pesos*	..	..	33.4	35.0	31.3	57.2	67.4	76.0	[87]	[158]
El Salvador[k]	*mn colones*	9.9	16.4	15.3	23.6	24.9	69.7	94.8	125.4	147.4	(170)
Guatemala	*mn quetzales*	5.1	8.0	9.4	14.3	28.7	42.9	49.6	77.8	[59]	[71]
Haiti	*mn gourdes*	17.7	25.9	33.3	36.6	35.8	50.9	55.8	60.9	67.7	..
Honduras	*mn lempiras*	5.7	6.4	8.2	12.0	17.2	42.8	47.4	(50.5)	(62.8)	..
Jamaica	*mn dollars*	..	..	..	3.4	4.6	(17.7)	25.0	[28.7]	..	..
Mexico	*mn pesos*	346	533	1 021	1 651	2 825	7 262	9 159	(13 935)	(15 915)	[19 850]
Nicaragua	*mn córdobas*	..	..	49.2[e]	57.2	85.8	190.9	262.4	[290]	..	..
Panama	*mn balboas*	..	..	..	[3.2]	7.9	14.7	(15.3)	..	..	..
Trinidad and Tobago	*mn dollars*	..	..	..	4.3	7.5	13.0	16.0	19.4	..	..
South America											
Argentina	*thous mn new pesos*	..[o]	..[o]	..[o]	..[o]	1.8	29.2	180	512	[1 187]	..
Bolivia	*mn pesos*	..	4.7	[49]	178	197	1 157	1 325	1 414	1 820	[1 900]
Brazil	*mn cruzeiros*	6.3	17.8	55	924	3 926	11 220	18 335	(28 140)	[36 200]	[49 775]
Chile	*mn pesos*	..[o]	..[o]	..[o]	..[o]	2.4	1 587	5 076	[10 930]	[22 600]	[27 620]
Colombia	*mn pesos*	81	272	317	1 218	1 885	4 023	4 975	6 066	6 583	[9 010]
Ecuador	*mn sucres*	88[c]	295	336	428	767	2 522	2 563	4 813	[4 245]	..
Guyana[k]	*mn dollars*	..	..	..	..	18.1	78.9	113.1	..	..	..
Paraguay	*mn guaranies*	..	..	[750][e]	975	1 514	3 173	3 048	3 876	3 605	[4 189]
Peru	*mn soles*	398	618	1 340	3 286	8 800	(26 250)	(44 100)	(49 310)	[92 514]	[107 458]
Uruguay	*mn new pesos*	..	..	..[o]	..[o]	11.9	218	254	425	..	..
Venezuela	*mn bolivares*	182	338	540	742	891	2 440	1 792	2 526	2 532	2 740

Table 1A.4. World military expenditure as a percentage of gross domestic product

	1950	1955	1960	1965	1970	1975	1976	1977	1978	1979
NATO										
North America:										
Canada	2.6	6.3	4.2	2.9	2.4	1.9	1.8	1.9	2.0	1.8
USA	5.1	10.2	9.0	7.6	8.0	6.0	5.4	5.4	5.1	5.2
Europe:										
Belgium	..	3.8	3.6	3.2	2.9	3.1	3.1	3.2	3.3	3.3
Denmark	1.7	3.2	2.7	2.8	2.4	2.4	2.3	2.3	2.4	2.4
France	5.5	6.4	6.5	5.2	4.2	3.8	3.8	3.9	3.9	4.0
FR Germany	4.4	4.1	4.0	4.3	3.3	3.6	3.5	3.4	3.4	3.3
Greece	6.0	5.1	4.9	3.5	4.8	6.5	(6.4)	(6.9)	(6.7)	..
Italy	4.3[c]	3.7	3.3	3.3	2.7	2.5	2.3	2.4	2.4	2.3
Luxembourg	1.3	3.2	1.0	1.4	0.8	1.0	1.1	1.0	1.1	1.0
Netherlands	4.8	5.7	4.1	4.0	3.5	3.4	3.3	3.5	3.3	3.3
Norway	2.4	3.9	2.9	3.4	3.5	3.2	3.1	3.1	3.3	3.2
Portugal	3.8	4.2	4.2	6.2	7.1	5.3	4.0	3.5	3.5	3.8
Turkey	6.2	5.6	5.1	5.0	4.3	(4.6)	(5.8)	(5.8)	(5.1)	..
UK	6.6	8.2	6.5	5.9	4.8	5.0	5.0	4.8	4.7	4.9
WTO[p]										
Bulgaria	..	..	3.0	2.6	2.4	3.0	(2.7)	..	..	
Czechoslovakia	..	5.8	4.0	4.4	3.9	3.5	3.8	(3.9)	..	
German DR	..	..	1.2	3.2	4.5	4.3	4.4	(4.6)	..	
Hungary	..	..	1.7	2.7	2.8	2.4	2.3	2.3	..	
Poland	..	4.8	3.5	3.8	4.0	2.9	3.0	(3.1)	..	
Romania	..	..	2.3	2.1	2.1	1.7	1.7	1.6	..	
USSR	..	..	[12.4]	[12.8]	[12.0]	[10.3]	[9.9]	[9.6]	..	
Other Europe										
Austria	0.7	0.2	1.2	1.2	1.1	1.2	1.2	1.2	1.3	
Finland	1.8	1.6	1.7	1.7	1.4	1.4	1.5	1.4	1.4	
Ireland	1.3	1.6	1.6	1.4	1.3	1.8	1.9	1.6	..	
Spain	..	2.2	2.2	1.8	1.6	1.7	1.8	1.7	1.7	
Sweden	3.5	4.5	4.0	4.1	3.6	3.4	3.3	3.4	3.4	
Switzerland	2.6	2.8	2.5	2.7	2.2	2.0	2.3	2.1	2.1	
Yugoslavia[q]	..	10.3	7.2	5.4	5.0	5.9	5.6	(5.3)	..	

	1950	1955	1960	1965	1970	1975	1976	1977	1978
Middle East									
Cyprus	..	..	..	2.4	1.3	2.8	2.2	2.4	[1.7]
Egypt	..	..	[5.8]	8.0	16.2	33.4	24.9	25.1	..
Iran	..	..	4.3	4.9	6.6	13.1	12.5	10.8	..
Iraq	..	4.2	7.1	8.8	11.2	11.7	11.2	10.4	..
Israel	4.7	2.3	5.5	6.8	23.8	26.5	27.1	22.0	18.0
Jordan	..	..	19.4	12.8	17.8	19.8	15.5	16.7	17.1
Kuwait	..	..	..	1.3	3.9	5.3	..	..	..
Lebanon	..	..	1.8	2.6	2.8	4.2	..	3.1	..
Oman	..	..	..	..	11.6	33.3	32.8	26.9	..
Saudi Arabia	..	..	..	9.6	11.8	(14.6)	[19.1]	[19.2]	..
Syria	..	..	..	7.9	11.9	16.8	15.5	16.0	14.8
United Arab Emirates	..	..	..	..	..	0.9	(1.4)	(6.4)	(7.7)
Yemen, Arab Republic	..	..	..	..	4.7	(6.6)	(7.0)	..	..
South Asia									
Bangladesh	..	..	..	..	..	0.8	1.2	1.6	..
India	..	[1.7]	1.9	3.6	3.0	3.3	3.3	3.2	..
Nepal	..	..	..	[0.4]	0.7	0.7	0.9	..	..
Pakistan	..	[3.4]	2.8	4.0	6.1	5.9	5.5	5.4	5.3
Sri Lanka	0.1	0.5	1.1	0.8	0.9	0.8	0.7	0.7	0.6
Far East									
Burma	3.1	5.9	6.0	6.6	5.7	4.0	4.2	(4.3)	..
Indonesia	..	..	5.4	2.2	3.1	3.2	2.8	3.1	3.1
Japan	..	1.8	1.1	0.9	0.8	0.9	0.9	0.9	..
Korea, South	..	5.1	6.1	3.7	3.8	4.5	5.3	5.8	5.4
Malaysia	..	3.2	2.2	3.3	4.1	(4.2)	2.8	3.0	3.3
Philippines	1.6	1.6	1.4	1.0	1.2	2.3	2.8	3.3	2.8
Singapore	..	..	..	..	5.4	5.6	6.4	7.1	6.5
Taiwan	..	9.3	10.5	10.6	8.5	6.8	6.9	(7.7)	(7.5)
Thailand	1.6[c]	2.2	2.6	2.3	3.2	2.8	3.1	3.5	3.8
Vietnam, South[n]	..	..	9.2	19.9	16.5	..	..	..	..
Oceania									
Australia	3.0	3.8	2.7	3.4	3.5	2.8	2.7	2.7	2.6
Fiji	..	..	..	..	0.2	0.2	0.3	0.3	..
New Zealand	1.5	2.5	2.1	2.1	1.9	1.7	1.6	1.6	..

Africa									
Algeria	..	..	..	3.2	2.1	1.8	1.9	2.0	..
Benin	..	..	(1.3)[e]	2.4	2.3	1.2	1.4	(1.9)	..
Cameroon	..	..	..	2.3	1.9	1.8	1.6	..	..
Chad	..	..	..	1.4	4.3	2.7	3.8	..	..
Ethiopia	..	..	1.7	3.2	1.9	4.5	..	..	..
Gabon	..	..	0.7[e]	1.5	1.4	0.8	0.7	1.1	..
Ghana	..	0.6	1.6	1.6	1.9	1.5	..	..	..
Ivory Coast	..	..	0.6[e]	1.3	1.2	1.2	0.9	(0.4)	..
Kenya	..	0.9[d]	0.4	1.0	1.1	1.7	2.2	4.1	4.6
Liberia	..	..	..	1.0	0.9	0.7	0.9	1.0	..
Libya	..	..	..	1.4	(4.1)	(5.7)	(7.0)	(6.3)	..
Madagascar	..	..	3.0	1.6	1.3	1.6	2.0	2.4	..
Malawi	..	..	..	0.4	0.4	1.3	1.2	1.6	1.8
Mauritania	..	..	..	1.4	1.2	6.3	(8.7)	(11.6)	..
Mauritius	..	..	0.2	0.2	1.7	1.5	..	..	..
Morocco	..	1.7[d]	2.3	2.4	2.6	4.6	6.2	7.0	6.6
Niger	..	..	0.6[e]	2.0	0.9	..	..	..	..
Nigeria	..	0.2[e]	0.5	0.9	5.8	6.6	6.2	6.0	..
Rwanda	..	..	..	3.0	1.4	1.6	1.6	..	..
Senegal	..	..	0.4[e]	1.9	1.9	1.9	1.9	2.3	2.3
Sierra Leone	..	..	..	0.7	0.9	1.0	0.9	..	..
South Africa	0.8	1.0	0.8	2.3	2.0	3.3	4.1	4.5	4.8
Sudan	..	..	1.7	3.0	5.2	2.4	..	..	..
Tanzania	..	..	..	2.4	3.4	5.5	4.9	4.6	(6.9)
Togo	..	..	0.2[e]	1.6	1.1	1.6	2.4	..	..
Tunisia	..	..	2.2	1.4	1.6	1.3	1.4	1.5	1.4
Uganda	..	0.5	0.3	1.7	2.0	(3.6)	3.4	..	..
Upper Volta	..	..	(0.7)	1.5	1.3	(2.9)	..	..	..
Zaire	..	..	..	5.6	5.0	(4.3)	(3.3)	(3.7)	..
Zambia	..	..	1.1	1.7	1.8	[11.0]	[8.8]	[9.0]	[8.5]
Zimbabwe	..	..	..	1.7	[3.2]	4.3	5.5	(8.9)	(11.2)
Central America									
Costa Rica	..	(1.3)[d]	1.1	0.9	0.5	0.6	0.7	0.6	0.6
Cuba[g]	..	..	..	5.1	6.9	..	..	..	..
Dominican Republic	..	..	4.6	3.7	2.1	1.6	1.7	1.7	..
El Salvador	1.1[e]	1.3	1.1	1.2	1.0	1.6	1:7	1.8	1.9
Guatemala	0.8	1.0	0.9	1.1	1.5	1.2	1.1	1.4	..
Haiti	..	1.8	2.4	2.0	1.7	1.1	1.0	..	..
Honduras	1.3	1.2	1.2	1.2	1.2	2.0	1.9	(1.7)	(1.8)
Jamaica	..	..	..	0.5	0.4	(0.7)	0.9	[1.0]	..

	1950	1955	1960	1965	1970	1975	1976	1977	1978
Mexico	0.8	0.6	0.7	0.7	0.7	0.7	0.8	(0.9)	..
Nicaragua	..	..	1.9[e]	1.4	1.6	1.7	2.0	[1.8]	..
Panama	..	..	..	[0.5]	0.8	0.8	(0.8)	..	..
Trinidad and Tobago	..	..	..	0.3	0.4	0.2	0.2	0.2	..
South America									
Argentina	2.8	1.5	2.3	1.8	1.9	2.2	2.5	2.5	[2.2]
Bolivia	..	0.3	[1.1]	2.5	1.6	2.3	2.3	2.1	..
Brazil	2.1	2.2	2.0	2.1	1.9	1.1	1.2	1.1	[1.0]
Chile	..	3.4	2.7	1.9	2.5	3.8	3.5	[3.4]	..
Colombia	1.0	2.1	1.2	2.0	1.4	1.0	0.9	0.8	..
Ecuador	1.1[e]	2.7	2.4	2.1	2.2	2.3	2.0	3.1	[2.4]
Guyana	..	..	..	..	3.4	6.6	10.1	..	..
Paraguay	..	..	[1.9][e]	[1.7]	2.0	1.7	1.4	1.5	..
Peru	2.5	2.1	2.4	2.9	3.7	(4.7)	(5.7)	(4.7)	[5.5]
Uruguay	..	..	1.1[e]	1.7	1.9	2.6	1.9	2.1	..
Venezuela	1.5	1.9	2.1	2.0	1.7	1.9	1.4	1.7	..

Conventions

.. Information not available or not applicable.
( ) Uncertain data or SIPRI estimates of military expenditure.
[ ] Rough estimate.

Notes

[a] *Developed market economies* include all NATO countries, Other Europe except Albania and Yugoslavia, 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, Oman, Saudi Arabia, United Arab Emirates, Indonesia, Algeria, Gabon, Libya, Nigeria, Ecuador and Venezuela. (Qatar, although a member of OPEC, is not included.)
Non-oil developing countries include the rest of the world, excluding Kampuchea, Laos and Viet Nam
Southern Africa includes Mozambique, Tanzania, South Africa, Zambia and Zimbabwe.
[b] See appendix 1B, section V.
[c] 1951.
[d] 1956.
[e] 1961.
[f] At current prices and 1978 exchange-rates.
[g] Wholesale price index used as deflator.
[h] At 1977 prices and 1977 exchange-rates.
[i] See the sub-section on inflation in appendix 1B, section V.
[k] Include internal security, etc.
[l] At current prices and 1973 exchange-rates.
[m] At 1973 prices and 1973 exchange-rates.
[n] From 2 July 1976, North and South Viet Nam constitute a single state, the Socialist Republic of Viet Nam, for which no military expenditure figures are available.
[o] Because of high rates of inflation, these figures are not meaningful.
[p] Per cent of gross national product.
[q] Per cent of gross material product.

Appendix 1B

Sources and methods for the world military expenditure data

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

This appendix describes the sources and methods used in the preparation of the tables on military expenditure (appendix 1A). Only the main points are noted here. The tables are updated and revised versions of those which appeared in the *SIPRI Yearbook 1979*

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 of 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.

For many small countries receiving large amounts of military aid, the military expenditure figures considerably understate the volume of military activity. This is naturally also the case for countries with a foreign military presence. Data on military aid in the form of major weapons are given in the arms trade registers (see appendices 3A and 3B).

The purpose of publishing the ratio between military expenditure and national product is to give an indication of the burden of military activities on the economies of individual countries and to provide a rough yardstick of comparison in this respect between different countries.

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 para-military 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 series chosen for the Warsaw Treaty Organization (WTO) countries other than the Soviet Union include for Czechoslovakia, the German Democratic Republic and Poland some estimates for research and development expenditure, which may not be included in their official budgets. They also exclude an estimated 'civilian' portion of internal security for the countries that publish 'defence and internal security' expenditures taken together only.

For all other countries, the NATO definition is used as a guideline, especially when choosing between alternative series. However, for most other countries, it was not possible to obtain specific definitions of their military expenditure, and consequently no adjustments were made. In the cases where major divergencies were known to exist, and information was insufficient to make a reliable alternative estimate, this has been indicated in footnotes to the tables.

For calculating the ratio of military expenditure to national product, gross domestic product (GDP) at purchasers' values has been used. It 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" [1]. 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

Appendix 1A covers 132 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 every fifth year since 1950 and every year since 1975. Series for each year since 1950 are available in previous volumes of the *SIPRI Yearbook* and will also be 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 [2a] for the years 1965–76. For the years after 1976 and before 1965, 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 CIA estimates; the reasons are explained in the *SIPRI Yearbook 1979* (page 28).

Official figures for China for 1977, 1978 and 1979 have now been released, for the first time since 1960. Their coverage is not clear; the figures used here have been derived as a compromise between the estimates given in a number of Western sources.

For the remaining countries, the prime source is the United Nations' *Statistical Yearbook* (UNSY). A relatively new and valuable source is the *Government Finance Statistics Yearbook* (GFS) published by the International Monetary Fund for the past three years, the latest issue of which contains five-year series of 'defence expenditure' for 100 countries. The data given are based upon a detailed definition, which reads as follows:

> This category covers all expenditure, whether by defence or other departments, for the maintenance of military forces, including the purchase of military supplies and equipment (including the stockpiling of finished items but not the industrial raw materials required for their production), military construction, recruiting, training, equipping, moving, feeding, clothing and housing members of the armed forces, and providing remuneration, medical care, and other services for them. Also included are capital expenditures for the provision of quarters to families of military personnel, outlays on military schools, and research and development serving clearly and foremost the purpose of defense. Military forces also include paramilitary organizations such as gendarmerie, constabulary, security forces, border and customs guards, and others trained, equipped, and available for use as military personnel. Also falling under this category are expenditures for purposes of strengthening the public services to meet wartime emergencies, training civil defense personnel, and acquiring materials and equipment for these purposes. Included also are expenditures for foreign military aid and contributions to international military organizations and alliances.
>
> This category excludes expenditure for nonmilitary purposes, though incurred by a ministry or department of defense, and any payments or services provided to war veterans and retired military personnel.

The GFS is considered superior to the UNSY, since it presents the figures in this uniform manner, while the latter gives the figures unadjusted in the form they are notified to the United Nations by governments.

For a limited 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 usually not very useful, since they have a tendency to quote each other when giving military expenditure figures. An

exception is the *Europa Year Book* (London) which mainly for small nations is quite useful.

The countries for which figures have been impossible to find in any of the mentioned sources have presented difficulties. The estimates of their military spending have been derived from other sources and are highly approximate.

The figures for the latest years in the series have mainly been obtained from journals and newspaper articles giving the most recent budget estimates.

The regionally orientated journals most used are, for

the Middle East:	*Arab Report and Record* (London) (out of print) *Middle East Economic Digest* (London)
South Asia:	*Asian Recorder* (New Delhi) *IDSA News Review on South Asia* (New Delhi)
Far East:	*Far Eastern Economic Review* (Hong Kong)
Africa:	*Africa Research Bulletin* (Exeter, UK) *Afrique Défense* (Paris) *Facts and Reports* (Amsterdam)
Latin America:	*Latin America Economic Report* (London).

The data on GDP, consumer price index and exchange-rates are taken from *International Financial Statistics*, published by IMF.

The GNP estimates for the USSR were obtained by converting the GNP dollar-estimate for 1975 given in reference [3a] 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 1965–76, and for the other years were calculated using the NMP series.

Other periodical publications, newspapers and annual reference works used are listed in the *SIPRI Yearbook 1979*, pp. 62–63.

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, two operations must be performed. First, all national expenditures must be converted into a common currency. The most widely used for such a purpose is the US dollar, which practice SIPRI has also adopted. Second, it is necessary to adjust for the effect of price changes. The figures in this *Yearbook* are presented at 1978 price levels and 1978 exchange-rates.

For most countries, the 1978 average is used for the official exchange-rate.

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 [3b], updated by the change in the US consumer price index from 1975 to 1978, which brings it to 2.2 dollars per rouble.

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 on the ratio of military expenditure to GDP/GNP were all made in domestic currencies and for calendar years.

V. Notes on individual countries

Inflation

The figures for 'constant price' military expenditure become more unreliable when inflation is very rapid. In the following countries, prices more than doubled between 1975 and 1978.

(*Price index numbers, 1975 = 100*)

Israel	266	Argentina	4 131
Lebanon	..	Brazil	283
Ghana	585	Chile	838
Mali	327	Peru	291
Zaire	486	Uruguay	345

NATO

Figures according to the NATO definition are not available for Greece after 1975 or for Turkey after 1974. We have used national figures for later years, linking to the previous NATO series.

The Middle East

Egypt. A number of sources (such as GFS) give much lower figures for military expenditure. They seem to exclude the Emergency Fund expenditure.

Iran. The status of arms purchases in 1979 is uncertain.

Israel. The figure in this *Yearbook* is revised to exclude military grants (but not military loans) from the United States. This affects the figures from 1974 onwards.

Kuwait. The figure has been revised downwards. It now represents the official figures in GFS with an addition for arms imports.

Saudi Arabia. The figure has been revised upwards to include expenditure on the National Guard and the military expenditure of the Ministry of Interior.

South Asia

Pakistan. The defence budget figure which is used here excludes border guards; we do not have an estimate for this category of expenditure.

Africa

Libya. The estimate has been revised upwards. It now includes what is described as 'administrative expenditure of the armed forces', plus an estimate for arms imports.

Zambia. The estimate is derived by taking 'Constitutional and statutory expenditure' (which includes defence expenditure), and subtracting from it interest on public debt and social security and welfare payments.

Latin America

Peru. The category 'other expenditure' in the budget is assumed by most commentators to refer to military expenditure.

References

1. *Statistical Yearbook* (United Nations, New York, 1974), p. XVII.
2. Alton, T. P., Lazarcik, G., Bass, E. M. and Znayenko, W., 'Defense expenditures in Eastern Europe, 1965–76', in *East European Economies Post-Helsinki*, A compendium of papers submitted to the Joint Economic Committee, US Congress (US Government Printing Office, Washington, D.C., 1975).
   (a) —, pp. 267–88.
   (b) —, p. 270.
3. Sivard, Ruth L., *World Military and Social Expenditures* (WMSE Publications, Leesburg, Virginia, March 1978).
   (a) —, p. 21.
   (b) —, p. 30.

2. World production of conventional armaments

Square-bracketed numbers, thus [1], *refer to the list of references on page 56.*

A weapon system designed so that it is unusable in war has little chance of passing beyond the blueprint stage. Many conventional weapons—though far from all of those currently in production—are also ultimately used in war, and in the post-World War II era they have more often than not been used in areas remote from the country of origin of the weapon.

Many factors underlie the concept of power in inter-state relations, but *military* power builds to a large extent on the possession of armaments. Politically, armaments are needed to pursue a variety of goals, be it defence, offence, demonstrations of strength or national prestige.

The 'arsenal of democracy'[1] is practically identical to the arsenal of socialism. The arsenal of the Third World—that is, of the new post-World War II arms-producing nations outside North America, Europe and the Soviet Union—is becoming a copy of those of democracy and socialism.

In the arsenal build-ups, one 'side' may claim that the other is far ahead in conventional weapon technology. When looking at individual projects over time, this claim is hardly ever possible to substantiate. One side may be ahead of the other at a given point in time with one single type of weapon—for example, a new type of armour designed to protect tank crews against the latest type of high-velocity ammunition, such as the British Chobham armour. But normally, within less than one year of such developments, the other side has acquired the same type of equipment—in this case, it is now claimed that the latest Soviet tank design, the T-80, is equipped with Chobham-type armour.

Some of the new Third World arms producers claim exclusive possession of special types of weapon that are more useful in developing nations than are weapons designed by traditional arms producers in the industrialized world. India, for example, claims to be able to produce warships specifically suited to the needs of developing nations in the Pacific—in this case, for Malaysia. In reality, the sole reason why Malaysia might find Indian ships more suitable may well lie in the fact that, due to the extremely low costs of labour in India compared to those in the industrialized countries, Malaysia can better afford Indian ships than, for example, Swedish Spica-class ships.

[1] This expression is borrowed from reference [1].

The motivating force behind the development of new weapons was originally analysed as resulting from an external action–reaction pattern: when the United States developed a new type of tank, the Soviet Union would follow suit within a certain time span, or *vice versa*. To this has been added the notion that new technology creates its own internal action–reaction pattern: once the weapon constructor or the national military buyer has received a new weapon system, he insists on the development of a counter-measure system to that new weapon, regardless of what the other side may possess.

Traditional producers have during the past two decades in effect designed weapon systems specially intended for underdeveloped countries containing less advanced technology than weapon systems used in their own armed forces. One of the first export successes in the Third World was Northrop's F-5A Freedom Fighter, used extensively in combat in Third World conflict regions. Another success was achieved by the French company Dassault with its Mirage-5, a less sophisticated version of the Mirage-3, also intended for wars in poor countries. The French armoured car ERC-90S Sagaie is also specially developed for Third World use.

Even Sweden is producing an aircraft designed for export to and use in the Third World—the Saab Supporter, which has been sold to Zambia and Pakistan. The Supporter is the military version of an older plane known as the Safari.

For approximately a decade after 1945, the leading producers of conventional armaments remained identical to the Allied Powers, with the United States far ahead in the field of advanced weapon technology. European countries and the Soviet Union, devastated by the war, needed some time to build up their industries again. In Western Europe this was achieved through the US Marshall aid programme, which included the rearming of Western Europe. British and French industries were rebuilt first, whereas it took a longer time for FR Germany and Italy.

The leading West European aerospace industries of today are those of France, the UK, Italy and Sweden. The industries in these countries possess an indigenous design capacity, and most of the projects are local designs with the exception of Italian projects. Increasing costs and the need to compete with the United States have led to a growing number of co-production projects in Western Europe. Other West European nations concentrate on licensed production, mostly of US-designed weapons, but there are also sales of licences among the European nations, as illustrated in the register of industrialized world licensed production (see appendix 3B, section I).

The spread of production know-how to the Third World is constantly increasing, as more and more nations strive to achieve a greater degree of 'independence' from the industrialized countries. The number of indi-

genously designed weapon projects in the Third World is, however, much smaller than the number of licensed projects.

The sale of production know-how is an irreversible decision, just as in the case of any other type of knowledge which has spread, such as know-how in nuclear technology. Know-how transfer was first strictly limited to the industrialized countries. One of the first exporters was France, entering the South African arms market with the sale of production licences for the Panhard armoured car despite the 1963 UN embargo. The Soviet Union was the first major power to sell know-how for modern arms such as the MiG-21 and Atoll air-to-air missiles, in production since 1965 in India. Since then, Italy and FR Germany in particular have sold production licences to many Third World countries, for COIN fighters and warships, respectively. The United States has been more hesitant to part with technology know-how—present US policy permits co-assembly of, for example, US fixed-wing aircraft only with the NATO countries, Australia, New Zealand and Japan. Taiwan has for some years been a special exemption, with its licensed production of the F-5E Tiger-2 fighter.

The proportion of major arms production in the industrialized world and the Third World is illustrated in tables 2.1–2.4.

The following abbreviations are used in the tables:

AAM	Air-to-air missile
AC	Armoured car
AEW	Airborne early warning aircraft
APC	Armoured personnel carrier
AShM	Air-to-ship missile
ASM	Air-to-surface missile
ATM	Antitank missile
COIN	Counterinsurgency
ECM	Electronic countermeasures
FPB	Fast patrol boat
LT	Light tank
Mar patrol	Maritime patrol aircraft
MBT	Main battle tank
MICV	Mechanized infantry combat vehicle
Recce	Reconnaissance (aircraft or vehicle)
SAM	Surface-to-air missile
ShAM	Ship-to-air missile
ShShM	Ship-to-ship missile
SSM	Surface-to-surface missile

Table 2.1. Types of military aircraft in production or under development in 1979

Producing country \ Type	AEW/ECM	Bomber	COIN	Fighter	Helicopter	Lightplane	Mar patrol/ recce	Trainer	Transport
Industrialized world									
Australia							N-22L Nomad N-24A Nomad		N-22B Nomad
Belgium				F-16A/B (lic)				Alpha Jet (lic)	
Canada									CL-215 DHC-5D Buffalo DHC-6 Twin Otter DHC-7 Ranger
China		B-5[e]		F-6[b] F-9[c] Fantan F-12[d] (design) Harrier (lic; planned)	(Planned)			BT-6[a]	(Planned)
Czechoslovakia						Zlin-43		L-39 Albatross L-39Z Albatross	
Finland								Valmet-L-70 Hawk (lic)	
France		Mystère-Falcon 20FH	Cessna-F337 Milirole (lic)	Mirage F-1A/B/C Mirage-3D/E/S Mirage-5 Mirage-2000 (design) Mirage-4000 (design) Super Etendard	Alouette-3 AS-350B/M Ecureuil SA-315B Lama Super Puma (1980) Dauphin-2 (1978) Super Frelon	MS-880 Rallye Cessna-182 (lic)	Atlantic-4 (1980) Falcon-20G (1979) Mirage-F-1R Mirage-3R/RD Mirage-5R	Fouga-90[f] Cessna-172 Hawk XP (lic)	Frégate-262A-2 Frégate-262A-2M
FR Germany					Bo-105CB/L/M/P				Do-24A/72 Do-28D-5

Italy	MB-326K/L SF-260 Warrior		A-109 Hirundo AM-3C A-129 Mangusta AB-205 (lic) AB-206 (lic) AB-212 (lic) AB-212AS (lic) AB-214A (lic) CH-47C (lic) Hughes-300/ 500 (lic) S-61R (lic) SH-3D Sea King (lic)		MB-326GB MB-339A	G-222[g] G-222L
Japan		C-I F-I F-15A Eagle (lic)	Bell-205 (lic) Hughes-500 (lic) Bell-47 (lic) KV-107/2-A (lic) OH-6 (lic) S-61/HSS-2 (lic)	P-2Y Neptune (lic) P-3C Orion (lic)	KM-2B Mu-2N Marquise Mu-2P Solitaire T-2A US-1	
Netherlands		F-16A (lic)		F-27 Maritime		F-27 Friendship F-28 Fellowship F-29 (design) Super F-28 (planned)
Poland			Taurus-2[h]		TS-11 Iskra- 200	An-28 (lic)
Romania			Alouette-3 (lic)			BAC-111 (lic) BN-2A Islander (lic)
Spain			Bo-105 (lic)		C-101 Aviojet	C-212C Aviocar
Sweden		Viggen			Safari TS Supporter	
Switzerland		F-5E Tiger-2 (lic)			AS-202 Bravo Flamingo (1979) PC-7	

Producing country \ Type	AEW/ECM	Bomber	COIN	Fighter	Helicopter	Lightplane	Mar patrol/ recce	Trainer	Transport
UK				AST-403 (planned) Harrier Sea Harrier	WG-30 (design) Commando-2 (lic) SH-3D Sea King (lic)		HS-743 Coastguarder Nimrod (1980)	Hawk	BAC-111 BN-2A Defender[i] BN-2A Islander[i] HS-125/146 Jetstream-31 (1981) Skyvan-3M Trislander-M
USA	Boeing AWACS E-4B EA-6B Prowler Lockheed TR-1 (1980)		A-37B Dragonfly OV-10 Bronco T-34C-1	AV-8B Harrier (lic; design) A-10A Thunderbolt A-6E Intruder A-7K Corsair-2 F-111 F-14A Tomcat F-15 Eagle F-16 F-18A Hornet F-18L Cobra[i] F-5E Tiger-2	CH-47C Chinook CH-47D Chinook (design) CH-53E Jetranger-3 King Air C90 Bell-206L Bell-209AH-IS Bell-209 Sea Cobra Bell-212 UH-IN Bell-214 Hughes-500MD S-67 Blackhawk S-69 S-72 S-76 Spirit SH-2 Seasprite Super King Air 200 UH-60A LAMPS-3 YAH-64 (1980) YUH-61A LAMPS	Citation[j] Piper Aztec[j] Merlin-3/4[j] Metro-2[j] Cessna-402[j] Cessna-421[j] Cessna A-150[j]	CP-140 Aurora[k] P-3C Orion E-2C Hawkeye Maritime-200T RF-4 Phantom F-4G Wild Weasel RF-5E Tiger-2	Cessna-172 Skyhawk	B-707 B-737 B-747 C-130 Hercules Gulfstream-2 Jetstar-2
USSR		Tu-22 Blinder-D Tu-26 Backfire		MiG-21Bis MiG-23 Flogger-E MiG-25 Foxbat	Ka-25 Hormone Ka-26 Hodlum Mi-10 Harke Mi-14 Haze		MiG-25R Foxbat-B MiG-25RE Foxbat-D	Yak-36 Forger	An-26 Curl An-32 Cline An-40 An-72 Coaler

		MiG-27 Flogger-D[m] MiG-29 Su-15 Flagon-F Su-17 Fitter-2 Su-19 Fencer Su-20/22 Fitter-C Su-25 (1979)	Mi-24 Hind Mi-6 Hook Mi-8 Hip				Il-18 Il-38 May Il-76 Candid Il-86 Camber Yak-40 Codling
Yugoslavia			SA-342 Gazelle (lic)			G-2AE Galeb J-1E Jastreb	
Third World							
Argentina	IA-58A Pucará IA-58B Pucará (1980)		Cicaré CK-1 Hughes Model-500 (lic)	Piper Arrow-3 (lic)			
Brazil	EMB-326 Xavante (lic)		AS-350M Esquilo (lic) SA-315B Lama (lic)	EMB-810 (lic)	EMB-111	T-25 Universal-2 (1979) Uirapuru-132 EMB-312	EMB-110 Bandeirante EMB-121 Xingu EMB-121 Xingu-2 (1981)
Egypt		Mirage-2000 (lic; planned)	Lynx (lic; 1980)			Alpha Jet (lic; planned)	
India		HF-25 (1985) HF-73 (planned) Jaguar (lic; 1979) MiG-21Bis (lic; 1979)	SA-315B Cheetah (lic) SA-316B Cheetah (lic) New (design)			HJT-16 Kiran-2 (1979) HPT-32 Gnat T-2 Ajeet (lic; 1980)	
Indonesia			SA-330 Puma (lic) Bo-105 (lic)			LT-200	C-212A Avidar (lic)
Israel		Arye (planned) Kfir-C2	Hughes-500 (lic)		Arava Maritime Westwind-1		Arava Westwind-1124/1125
Korea, North		MiG-21MF (lic)					

Producing country \ Type	AEW/ECM	Bomber	COIN	Fighter	Helicopter	Lightplane	Mar patrol/ recce	Trainer	Transport
Korea, South				F-5E Tiger-2 (lic)					
Mexico			EMB-326 Xavante (lic; planned)					Arava (lic; planned)	EMB-110 (lic; planned)
Nigeria					Bo-105 (lic)				
Pakistan					Alouette-3 (lic)			Supporter (lic) Cessna-172 (lic; 1980)	
Philippines						Super Pinto		NAMC XT-001	BN-2A Islander (lic)
South Africa			Impala-2 (lic)			AM-3C Bosbok (lic) C-4M Kudu (lic)			
Taiwan				F-5E/F Tiger-2 (lic)				T-CH-1 XAT-3 (1980) XC-2 (design)	
Thailand								New (design)	
International									
Belgium/FR Germany/ Netherlands									VFW-614 (design)
Brazil/Italy				MB-340 (planned)					
France/FR Germany					PAH-2 (design)			Alpha Jet	C-106F Transall (1980)
France/UK				Jaguar	Lynx SA-330L Puma SA-342 Gazelle Sea Lynx				

FR Germany/ Italy/UK	Tornado		
FR Germany/ Japan		BK-117 (1981)	
FR Germany/ UK		P-227 (planned)	
Romania/ Yugoslavia			Orao

(lic) = licensed production
(planned) = for introduction late 1980s
(design) = not yet in production
(1979) = first delivery

[a] Development of Yak-18; production of first version BT-5 completed.
[b] Copy of MiG-19, believed still in production.
[c] Local development based on MiG-19/21; also designated F-5bis.
[d] First prototype flight-tested but information unconfirmed; powered with Rolls-Royce Spey engine, licence-produced in China.
[e] Copy of Il-28 Beagle.
[f] New development based on Fouga Magister.
[g] Re-engined version with Rolls-Royce type for export to Libya.
[h] Local development of Mil Mi-2.
[i] BN-2A Defender/Islander to be entered under Switzerland after 1979; Pilatus purchased Britten-Norman.
[j] Lightplane list is not complete due to large number of types. Mostly export versions selected.
[k] Version of P-3C Orion for Canada.
[l] Version of Hornet under development for export only.
[m] Export version of MiG-23.

Table 2.2. Types of armoured vehicles in production or under development in 1979

Producer \ Type	AC/APC/MICV	LT	MBT	Recce	Comments
Industrialized world					
Austria	Steyr-4K7FA	Kuerassier			
Belgium	AIFV (lic) M-113-A1 (lic) Timoney BDX (lic)				
Canada	Piranha (lic)				
China	Type-55[a] Type-56[b] K-63	T-62 T-63	T-59 New (dev)		[a] Copy of Soviet BTR-40 [b] Copy of Soviet BTR-152
Czechoslovakia	OT-64-4[c]		T-72[d]		[c] Czechoslovakian improvement of OT-62 (version of Soviet BTR-50) [d] Production imminent
France	AMX-10P AMX-VCI M3 VAB VCI[g] VCR 6X6 (1978)	AMX-13	AMX-30 AMX-32 (dev) EPC (dev)	AML-81-HB AMX-10RC (1979) ERC 6X6 VPX-110[e] (designed)	[e] Developed for export to the Middle East
FR Germany	Condor Marder[f] Transportpanzer-S		Kampfpanzer-3 (planned) Leopard-1 Leopard-2 TAM[g]	Luchs	[f] Remains in production as carrier for Roland SAM [g] Designed for Argentine Army, produced in Argentina
Hungary				FUG-70	Hungarian equivalent of Soviet BRDM-2
Ireland	Timoney				Licence-produced in Belgium as BDX
Italy	Fiat-6614 M-113-A1 (lic)			Fiat-6616	

Japan	Type 73		STB		
Poland	OT-64 (lic)	T-72 (lic; 1979)			
Romania	TAB-70 (lic)				Modified Soviet BTR-60
Spain	BMR-600				
Sweden	Impr. Pbv 302 (designed)	IKV-91	New (planned)		
Switzerland	Piranha Tornado (dev)		New (planned) Pz-68-3 (1979) Pz-68-4 (1982)	Piranha-R 6X6	
United Kingdom	Sankey new (dev)		New (planned) Shir-1[h] Shir-2[i] Vickers MBT-3[j]	Fox Scorpion	[h] Ordered by Iran, but cancelled 1979 [i] Ordered by Iran, but cancelled 1979; with Chobham armour [j] In production for Kenya
USA	AM-300[k] M-113-A1 M-113-A2 (1979) SM-3 (1982) XM-2 (1982) YPR-765[m]	M-551 Sheridan	M-60 XM-1 (1984)	Commando Scout M-113R XM-3 (dev) V-150 Commando	[k] Similar to V-150 Commando [m] In production for Netherlands Army
USSR	BTR-60	BMD PT-76	T-62 T-64 T-72 T-80	BRDM-2	
Yugoslavia	M-980				Uses a number of French AMX-10P components
Third World					
Argentina	VCI (lic; 1979)	AMX-13 (lic)	TAM (lic; 1979)		
Brazil				EE-9 Cascavel[n] EE-17 Sucuri	[n] Exported to Libya and Qatar

Producer \ Type	AC/APC/MICV	LT	MBT	Recce	Comments
India			Vijayanta-2 (lic)		Vickers MBT, 37 tons
Israel			Impr. Merkava (dev) Merkava-1	RBY-1	
Pakistan			New (lic)		Licence agreement with China reported 1978
South Africa	Eland-2°		New (dev)		° Local development of Panhard AML-60/90

(1978) = first delivery
(dev) = under development 1979
(planned) = for introduction in the late 1980s
(lic) = licence produced
(designed) = not yet in production
AC = Armoured car
APC = Armoured personnel carrier
MICV = Mechanized infantry combat vehicle
LT = Light tank
MBT = Main battle tank
Recce = Reconnaissance vehicle

Table 2.3. Types of non-nuclear missiles in production or under development in 1979

Producer \ Type	AAM	AShM	ASM	ATM	SAM	ShAM/ShShM	SSM
Industrialized world							
Australia						Ikara-3	
Belgium	AIM-9L (lic)					Seasparrow (lic)	
Canada						Seasparrow (lic)	
China				AT-3[a]	CSA-1[b] New (dev)	CSSN-1[c]	
France	AA-20 R-530 R-550 Magic Super R-530	AM-39 Exocet	AM-10 Lasso AS-11/12 AS-15 AS-20 AS-30	SS-11/12	MIM-23B Hawk (lic) R-440 Crotale	MM-38 Exocet MM-40 Exocet R-460 Crotale SS-12M	
FR Germany	AIM-9L (lic)			Cobra-2000 Mamba		Seasparrow (lic)	
Italy				Cobra-2000 (lic) Sparviero		Aspide-1A Aspide/Albatross Aspide/Spada New (dev) Seakiller-2 Seakiller-Marte Seasparrow (lic)	
Japan	AIM-7E Sparrow (lic)		ASM-1	KAM-3D	MIM-23B Hawk (lic) KAM-9 (1980)	New (dev) Tan-SAM (1979)	XSSM-2 (dev)
Norway	AIM-9L (lic)					Penguin-2	
Sweden				Bantam Bill (1985) RBS-53 RBS-56	RBS-70		

Producer \ Type	AAM	AShM	ASM	ATM	SAM	ShAM/ShShM	SSM
Turkey				Cobra-2000 (lic)			
UK	Sky Flash AIM-9L (lic)			MILAN (lic) Swingfire	Impr. Rapier (1980) Rapier Tigercat	Blowpipe P-3T Sea Eagle (1980) Seacat Seadart Sea Skua (1980) Seawolf	
USA	AGM-45A Shrike AIM-54C Phoenix AIM-7F Sparrow AIM-9L Super Sidewinder AIM-9M/P Sidewinder	AGM-84 Harpoon	AGM-62 Walleye AGM-65 C/D Maverick	BGM-71A TOW FGM-77A Dragon Hellfire Roland-2 (lic) Stinger	Chaparral MIM-23B Hawk Patriot (1981)	RGM-84A Harpoon RIM-66/67 Standard Seasparrow	MGM-52C Lance[d]
USSR	AA-2 Atoll Adv. Atoll AA-6 Acrid AA-7 Apex AA-8 Aphid		AS-6 Kingfish AS-7 Keny	AT-3 Sagger AT-4 Fagot AT-6 Spiral (1979)	SA-2 Guideline SA-3 Goa SA-4 Ganef SA-6 Gainful SA-7 Grail SA-8 Gecko SA-9 Gaskin	SSN-11 SSN-18 SSN-2 Styx SSN-3 Shaddock SSN-9	SCUD-C[e]
Yugoslavia				AT-3 Sagger (lic)			
Third World							
Argentina			New (dev)	New (dev)			
Brazil			MAS-1 Carcara	Cobra-2000 (lic)	New (dev)		
Egypt				Swingfire (lic)			New (dev)[f]
India	AA-2 Atoll (lic) R-550 Magic (lic)			SS-11 (lic)			
Israel	Shafrir-3						

Pakistan				Cobra-2000[g]	
South Africa					Cactus (lic)[h]
Taiwan	AIM 9J (lic) AIM 9L (lic)				MIM-23B Hawk (lic)
International					
France/FR Germany		AS-34 Kormoran		HOT MILAN	Roland-2
France/FR Germany/UK			NATO-ASSM	ATEM (dev)	
France/Italy					Otomat-2 Otomat-2/Tesco

(lic) = licence-produced
(dev) = under development
(1978) = first delivery
[a] Copy of USSR version.
[b] Copy of USSR SA-2 Guideline.
[c] Copy of USSR SSN-2 Styx.
[d] Can carry nuclear warhead.
[e] Can carry nuclear warhead.
[f] Some reports claim SSM in production. Could refer to a restart of the Al-Kahir types under development in the 1960s.
[g] Reportedly in production without licence from FR Germany.
[h] Version of R-440 Crotale; developed with South African funding and to South African specifications.

Table 2.4. Types of conventional warships in production or under development in Third World countries[a] in 1979[b]

Producer \ Type	Auxiliary ship	Destroyer/Frigate/ Corvette	FPB	Landing craft	Submarine
Argentina		Dest: Meco-360 (lic)			Class 1700 (lic)
Brazil		Frig: Niteroi-class (lic)			Type-209 (lic)[c]
Egypt			October-class[d]		
India	Sandhayak-class	Frig: Impr. Leander-class			
Indonesia			LCM-type		
Israel		Corv: New (QU-09-35)[e]	Dvora-class Reshef-class		
Korea, North			Chaho-class Chong-Jin-class	Hanchon-class Nampo-class	
Korea, South		Frig: New (dev)			
Peru	Talara-class	Frig: Modified Lupo-class			
South Africa			Reshef-class (lic)		

(lic) = licence produced
(dev) = under development 1979
[a] For data on the industrialized world, see *SIPRI Yearbook 1979*.
[b] For an in-depth analysis of the build-up of naval forces, see forthcoming SIPRI study on the naval arms race.
[c] Planned licence-production; most of the equipment to be produced in Brazil.
[d] Old Komar-class copy being refitted with West European arms and electronics.
[e] Two under construction; probably six more to be produced.

Reference

1. Gervasi, T., *Arsenal of Democracy, American Weapons Available for Export, What They Cost, What They Do, Who Has Them* (Grove Press, New York, 1977).

3. World-wide trade in major weapons during the 1970s

Square-bracketed numbers, thus [1], *refer to the list of references on page 124.*

I. The proliferation of conventional armaments

During the 1970s, proclaimed by the United Nations to be the 'Decade of Disarmament', the spread of major conventional arms increased four times as compared to the 1960s.[1] Compared to the 1950s, the increase is eight-fold. The yearly rate of increase now runs at 25 per cent for the past five years, as compared to 15 per cent in 1970–75 and 10 per cent in 1965–70.

There is no exact, reliable or even reasonable information as to the real value of the international arms trade. (The estimate of $20 000 million per year quoted by President Carter, announcing the new US arms trade policy in 1977, was obviously much too low and contradicts other US estimates, such as that quoted on page 72.)

Two-thirds of the trade in major armaments involves transfers from the industrialized world to the Third World.[2] This fact should not, however, be interpreted to mean that the Third World absorbs most weapons in real terms: the most heavily armed regions of the world are still North America, Europe and the Soviet Union. The most heavily armed countries therefore remain the industrialized countries.

The arms business is one of the fastest growing sectors within the world economy in monetary terms: total annual production of military equipment, both nuclear and conventional, now amounts to $120 000 million.[3]

The growth of the trend in monetary terms can also be partly explained by cost increases, the effects of inflation and the fluctuations of the dollar value. But, even allowing for such effects, it still remains a fact that the largest share of the increase in the spread of conventional weapons is explained by two factors: first, individual governments are buying increasingly more sophisticated and therefore more expensive weapon systems; very few buyers today are satisfied with military equipment regarded as outmoded or obsolete in the country of origin. Second, governments in the Third World are, in absolute terms, simply buying more.

[1] All percentage comparisons, unless otherwise stated, are based on the SIPRI trend indicator values, the method for which is described in the *SIPRI Yearbook 1979*. Note that the SIPRI collection covers only *major arms* (aircraft, missiles, armoured vehicles and warships), and covers only *deliveries* per calendar year.

[2] The definition of Third World countries is implicit in the registers in Appendices 3A and 3B.

[3] Ruth Sivard gives a total figure of $120 000 million for sales alone [1].

The transfer of arms is only one among many complex inter-relationships between nations, but it does constitute a relationship of a particular kind. On both sides, it is an expression of foreign policy preferences and therefore not comparable to the trade in commercial commodities. There are also strong economic determinants for both buyers and suppliers. A beneficial balance of payments and guaranteed employment in armaments industries allow supplier nations to cover the cost of military research and development (R&D) and production for the next generations of conventional weapon systems. For the buyers, it is certainly cheaper in the short term to acquire ready-made weapons than to try to set up indigenous arms production capacities, in particular if the credit arrangements are favourable.

Finally, for the buyers, the two main determinants for an arms build-up remain the interests of the USA and the USSR, and local conflicts. This is very clearly reflected in the data basis for the rank order tables on arms importers for the periods 1970–74 and 1975–79 (see tables 3.6 and 3.7) where, for example, the Indo-China Wars alone dominate the high figure for the Far East until 1974 and explain the position of the Middle East as the largest arms-importing region throughout the 1970s.

Within the disarmament community, there is a further reason to focus attention on both production and transfers of conventional weapons: keeping the long-term goal of general and complete disarmament in mind, any schemes for disarmament will have to deal with the arsenals of conventional weapons (in addition to the nuclear arsenals, the reduction of military budgets and military personnel, and so on). Thus there is a fundamental need for information, which is rarely provided by governments or international organizations.

Linked to the goal of disarmament and the ways in which it might be achieved is the issue of underdevelopment, and the call for a new economic order. The relevant questions are: What is the link between the trade in armaments and economic dependence, and how does the militarization of the Third World influence the distribution of wealth and power? It also remains to be investigated how well the rich world can afford its investments in high-cost sophisticated weapon technology, given a future with decreasing sources of energy, a shortage of raw materials and recurring market economy crises.

Those who argue that there is a link between disarmament and development [2, 3], or rather between armaments and underdevelopment, reason as follows. Global militarization is a function of the fact that the production of arms in the industrialized countries is greater than both demand and resources, so new markets must therefore be captured in the Third World. Further, the 1970s have brought the realization that conventional armies from the industrial powers are insufficient to control

foreign markets, any more than the threat posed by nuclear arsenals can secure markets. Neither the possession of nuclear weapons nor the use of conventional weapons and troops enabled the United States to win the Indo-China War; the Portuguese armies could not win the wars in Africa; and the enormous number of weapons possessed by the Shah of Iran could not ensure the security of his régime.

Among the categories of weapon in demand by Third World countries, there is an emphasis on counter-insurgency (COIN) weaponry—in particular in the newly established domestic defence industries. Small arms, helicopters, armed trainers or COIN attack aircraft with short take-off and landing (STOL) capability, armoured cars and armoured personnel carriers (APCs) have all been put to efficient use in a large number of countries against popular uprisings and local dissidents.

Weapons are ultimately designed for use in war. Since 1945 they have been used almost exclusively in the developing parts of the world for wars in which an estimated 25 million people were killed [1a]. After having been tested, new and more efficient weapon versions are developed by the major producers. The dependence of the buyer on the supplier is heavily documented—a new weapon system entails education, training, maintenance, support, often the building of infrastructure, the supply of spare parts and other related equipment during the lifetime of the weapon, and so on. An official of the US Lockheed company stated: "When you buy an airplane, you also buy a supplier and a supply line—in other words, you buy a political partner" [4].

Arms importers have over time shown a clear understanding of the threat to independence which exclusive reliance on foreign sources of arms supplies entails. Various measures to counteract such dependence have been and are being tried. One method is to diversify sources of arms supplies, as practised, for example, by India, Iraq, Tanzania and Saudi Arabia. This method is, however, in principle not favoured by the armed forces of the recipient countries, due to practical logistics problems. Another method is to invest heavily in the establishment of local defence industries. The new producers in the Third World after 1945 which have achieved most in this field all justify this particular type of industrialization by the fact that they were subject to arms embargoes at one time or another—for example, South Africa, Israel, Brazil and Argentina—or that they became too reliant on one arms supplier, as, for example, Egypt's dependence on the Soviet Union.

Ironically, however, the establishment of local arms industries does not automatically ensure independence from the industrialized world. The establishment of technologically sophisticated military production centres in an otherwise underdeveloped economy ties the underdeveloped country even more closely to the sources of military technology. The

purchase of arms and arms technology increases the flow of resources towards the major arms producers and creates several 'vicious circles'—the major producers are enabled to continue military R&D on ever more sophisticated conventional weapons which, due to their sophistication, increase in cost. The 'next generation' of any given system is then more costly also to the buyer. In turn, the local military establishment in the recipient country can claim larger shares of national resources as the costs of weapons increase, at the expense of the civilian sectors of the economy, since very few countries outside the OPEC (Organization of the Petroleum Exporting Countries) group possess what seem to be unlimited financial resources.

The connection between armaments and underdevelopment is most visible in pre-industrial and newly industrialized countries, where increased military spending is financed by agricultural exports. According to ACDA, the oil-importing Third World countries have since 1975 increased their arms purchases at a faster rate than the OPEC group.

The economic effects seem very similar for a buyer of armaments from the socialist countries, in spite of claims to the contrary by representatives of socialist governments in the industrialized world. Some information and complaints have emerged over time: for example, Indonesia never paid its arms debt to the Soviet Union after the change of régime in 1965; Peru threatened to default on its debts and managed to renegotiate terms of payment; and both Egyptian and Indian sources claim that the Soviet Union has since 1975 demanded payment in hard currencies or roubles instead of raw materials or local currencies [5].

No major arms-producing country still supplies weapons free of charge in any great numbers; the sole exception might be military aid given by the socialist countries to national liberation movements. The military aid programmes of the United States and some West European countries have dwindled, in sharp contrast to the situation during the 1950s and first half of the 1960s.

Disarmament—or at least a reversal of the continuing arms race—may be a first prerequisite for bringing about economic development and a change in the present economic order. A reconstruction of the economic relationship between the industrialized and developing world may in turn be the subsequent prerequisite for the future curbing of the arms race.

The alternative uses of money now spent on armaments are numerous, and Ruth Sivard's list [1] may serve as an illustration. Assuming, for the sake of argument, that the annual value of world arms production lies somewhere in the range $100 000–200 000 million, and the annual value of arms exports is $50 000–100 000 million, some of it could be spent as follows for development purposes in both the industrialized and the underdeveloped world:

$5 500 million	For the establishment of primary schools and teacher-training for half of the population of the Third World which is without a minimum level of education. Primary education—from the national point of view, yields a higher return than any other form of investment.
$5 000 million	For an international programme for clean air, since pollution and environmental damage due to urbanization and energy use in the industrialized world is now a major threat to world health.
$5 000 million	For direct food aid for the victims of malnutrition in the Third World. Malnutrition is the biggest single contributor to mortality in the poorest countries.
$4 000 million	For the supply of clean water to over 1 000 million people in rural areas and 200 million in urban areas in the developing world, who are without access to safe water supplies.
$3 000 million	For the development of renewable energy resources.

Any conversion of military resources to civilian use, or to development purposes, would of course have to involve a common and planned effort and an agreed long-term programme of implementation. The list above is given merely to stimulate debate, not to present such a thoroughly researched programme.

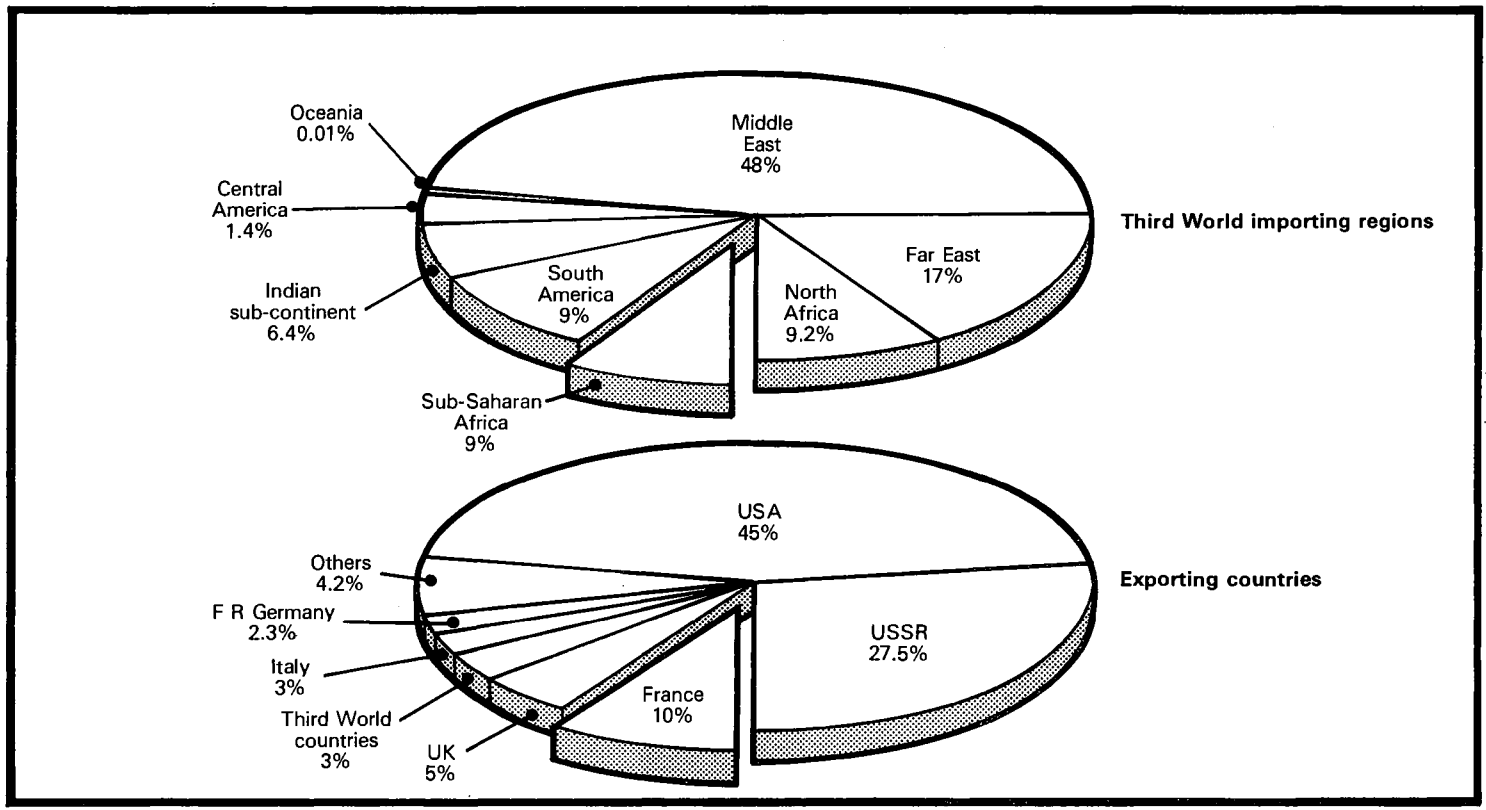
II. The flow of arms: general trends

In particular during the 1970s, the international trade in arms expanded dramatically; the arms market is now one of exceptional size for a period with no direct great-power confrontation. The expansion is four-fold—in volume, in number of importing countries, in the change to sophisticated weapon systems and in the transfer of military know-how for setting up domestic arms production facilities.

Of the SIPRI trend indicator total for the 1970s, as much as 74.3 per cent of all major weapon transfers were made to Third World countries, as compared to 25.7 per cent within the industrialized world.[4] There is no sign that the trend will level off. On the contrary, the beginning of the1980s will show an increase of investments in conventional weapons due to decisions taken by the NATO countries in late 1979. In particular, the share of the industrialized world can therefore be expected to grow.

[4] Aggregate figures for the industrialized world are available only for 1977, 1978 and 1979.

Figure 3.1. The importers' and exporters' shares of major-weapon supplies to the Third World, 1970–79



The United States has throughout the 1970s accounted for 45 per cent of the supply of major weapons to Third World countries. According to the US Arms Control and Disarmament Agency (ACDA) [6], the total US share of the export of military equipment is close to 50 per cent. The SIPRI trend indicator attributes to the United States a share of 43 per cent for the three years 1977–79, among the world-wide 43 major arms exporters, including those exporting to the industrialized world.

The Soviet Union remains the second largest individual arms supplier in the world, accounting for about 27 per cent during the 1970s, according to the SIPRI indicator for major arms deliveries to the Third World, and, according to ACDA, for 30 per cent of total arms exports, 70 per cent of which goes to the developing nations.[5]

In general, arms procurement expenditures are now estimated to represent approximately 30 per cent of total military expenditures. When comparing the United States and the Soviet Union, one finds not only inconsistencies but also significant similarities. In both the United States and the Soviet Union, military exports are small compared with overall defence expenditures. According to ACDA, US arms flows to developing countries in 1974–77, measured in 1976 dollars, were about 4 per cent of total US defence spending, and Soviet arms flows to developing countries in the same period, measured in domestic roubles, constituted 5–6 per cent of the estimated total Soviet defence expenditure. This share is much lower, however, if the SIPRI estimates of Soviet defence expenditures are used.

US estimates claim that as much as 65 per cent of US arms supplies consist of support and services, compared to 40 per cent for the Soviet Union. But Soviet arms customers also need a large Soviet military presence to service the weapons. In 1976, for example, an estimated 10 000 Soviet and East European technicians were stationed in Third World countries; in 1979 there were about 1 000 Soviet technicians in Ethiopia alone [8].

Among the inconsistencies between US and Soviet arms supplies is, for example, US assistance in building up military-related infrastructure in Third World countries. These programmes are often administered by private corporations (rather than by the Department of Defense), the largest being Northrop's Peace Hawk V programme in Saudi Arabia. This programme is related to the sale of 110 F-5E Tiger-2 fighters and involves training, maintenance and military construction. The Saudi Arabian

[5] US arms transfers, as reported by the CIA, are probably overstated in relation both to those of the USSR and Western Europe. The reasons for this are said to be, first, that no Soviet deliveries to Eastern Europe are included in the CIA estimates due to lack of reliable data, and, second, that services and support equipment are not reported for the Soviet Union and Western Europe. Thus, the conclusion is that with more consistent reporting, the gap between the US and Soviet totals might decrease somewhat. See reference [7].

programmes alone accounted for two-thirds of the US sales of military support and services during 1974–77. There is no Soviet equivalent to such a programme [9].

Further, the average lead-time between order and delivery is much longer in US arms supply programmes—three years on average for modern weapon systems, as compared to 12–18 months in the case of the Soviet Union. This has to be taken into account when comparing the deliveries from the USA and the USSR on a calendar-year basis. For example, between November 1977 and February 1978, more than 50 Soviet transport flights were made to Ethiopia carrying large amounts of weapons. Such quick deliveries are made possible by the quantities of Soviet surplus reserve equipment.

Looking at actual sales prices, Soviet prices are definitely below those for equivalent Western systems, and the credit terms are in general more favourable—a 2.5 per cent rate of interest and 10 years' credit seem to be the rule.

Compared to Soviet loans, US loans are obviously more expensive. Loans in progress by the United States to foreign governments to finance military hardware by 1979 totalled $4 600 million, which was nearly double the FY 1977 figure. These loans are guaranteed by the Defense Security Assistance Agency and are provided by the Federal Financing Bank in the Treasury Department. The Bank was credited in 1974 as part of the effort by Congress to shift from military grants to sales. The established US policy is to parcel out loans in small advances to prevent other countries from using the money to earn interest. The growing interest rates are bound to affect the buyers' economies: loans granted in 1975–76 carried interest rates of 6.2 per cent, while loans granted in 1979 are at 9.5 per cent interest rates.

Grouping the arms suppliers on a political basis, the international arms trade remains very much a Western affair: during the 1970s NATO countries were responsible for 66 per cent of total major weapon supplies, compared to 28 per cent for the WTO countries (see table 3.1).

During the 1970s, West European arms producers became serious competitors to the two great powers, selling to both US and Soviet clients. In some types of equipment, West European suppliers even dominate, for example, as regards helicopters (such as the Alouette versions), anti-tank missiles (such as MILAN and HOT), and electronics and communication equipment. Many West European producers are particularly competitive in land warfare armaments. These weapons represent about 40 per cent of total West European military exports, but make up a much greater share of the exports of some countries, for example, Belgium. Similarly, if naval weapons are included, this type makes up a very high share of the military export from Sweden and Switzerland—with highly

developed industrial bases and many years of design experience of this particular type of weapon—which is not included in the SIPRI indicator values.

In Western Europe, the export of military hardware is widely seen as an essential factor in maintaining a domestic defence industry, since the domestic markets are not sufficient to sustain production except in the case of army equipment. Even Sweden wants to produce 80–90 per cent of its own military equipment, which creates increasingly strong pressures to export weapons. Unlike the United States, the West European export guidelines are not intended to reduce global arms sales, but rather to control individual sales, on an *ad hoc* basis, to particular areas or countries.

The smaller suppliers, such as Canada, the Netherlands, Sweden, Switzerland and Belgium, are significant not for the magnitude of their military exports but rather for the larger trend they reinforce. They do contribute to the militarization of the Third World, and they do help to perpetuate the cycle of dependence between the developing countries and the industrialized countries.

Table 3.1. Rank order of all major-weapon exporters to the Third World, 1970–79

Figures are SIPRI trend indicator values, as expressed in constant US $ million, at constant 1975 prices.

Exporting country	Total value	Percentage of Third World total
1. USA	27 727	*45*
2. USSR	16 914	*27.5*
3. France	5 894	*10*
4. UK	3 044	*5*
5. Italy	1 868	*3*
6. Third World exporters[a]	1 805	*3*
7. FR Germany	1 444	*2.3*
8. China	787	*1.3*
9. Netherlands	515	*0.8*
10. Australia	421	*0.7*
11. Canada	323	*0.5*
12. Sweden	196	*0.3*
13. Czechoslovakia	154	*0.2*
14. Spain	110	*0.2*
15. Ireland	87	*0.1*
16. Poland	80	*0.1*
17. Switzerland	55	–
18. Yugoslavia	47	–
19. New Zealand	13	–
20. Belgium	5	–
21. Japan	3	–
Total	**~61 000**	*100.0*

[a] For a breakdown of the main exporting countries, see table 3.4.

III. The industrialized suppliers

The United States

During the 1970s, there has been a marked shift in US arms supplies in three aspects—the *recipients* have changed, the *weapons* have changed, and the *terms* of the deliveries have changed.

In the late 1940s and during the 1950s, Western Europe and the so-called 'forward defense areas' (non-socialist countries bordering on or near to the Soviet Union or China), such as Turkey, Greece, Iran, Taiwan and South Korea, were the main recipients of arms from the United States. In the 1960s, US military supplies were highly related to US involvement in the Indo-China War, in addition to the 'forward defense areas'. Since 1973, the three Middle East nations Iran, Israel and Saudi Arabia alone have accounted for 63 per cent of all US arms deliveries. Arms transfers to Latin America and Africa have remained relatively stable over the entire period, although there are some significant shifts among individual customers.

Political competition between the great powers is reflected in their respective dominance as major arms suppliers to the Third World regions. In the second half of the 1970s, the United States was the largest arms supplier to the Middle East, with a share of 61 per cent (compared to 1970–74, when the USSR accounted for 51 per cent). The United States is also the largest arms supplier to the Far East, with a share of 49 per cent in the second half of the 1970s. This has decreased from 62 per cent in the first half of the 1970s, reflecting the fact that West European arms suppliers are entering the arms market in Far East Asia. In South America, the United States still manages to hold the position as first in the rank order, in spite of competition from Britain, France and Italy, but accounting only for 21 per cent. If these three West European supplier countries are added together, however, they account for as much as 30 per cent.

During the 1970s, the weapons exported have been increasingly of the most modern types. Re-sales of aged US equipment now take place mostly through third-country sales; for example, Israel is selling off its aged fleet of A-4 Skyhawk fighters, and Iran resold large numbers of the F-5A Freedom Fighter to Jordan and Pakistan when the newer F-5E Tiger-2 was supplied by the United States. Even after the announcement of the Carter policy, aimed at restraining US arms exports, sales of advanced systems have increased rather than decreased—for example, sales of such weapons as BGM-71 TOW anti-tank missiles, Spruance-class destroyers and F-14 Tomcat fighters.

The shift to more advanced weapons is partly linked to the shift in the terms of arms transfers: as long as military aid and grants were the most common types of arms transfer, the customers had little choice among the weapons supplied. Military Aid Program (MAP) transfers from the USA dominated during the 1950s and early 1960s, with a resurgence in the early 1970s in connection with the US involvement in Indo-China. But since 1973, a change from MAP to direct sales is evident.

Table 3.2. US arms transfer agreements, 1950–78

US $

	1950s	1960s	1970–73	1974–78
Grants	2 213 877	1 080 855	3 159 863	686 529
Sales				
FMS agreements	162 371	1 010 749	2 523 730	12 509 100
Commercial exports	–	–	405 029	1 016 552
Total current	2 376 248	2 091 604	6 088 622	14 121 181
Total (1978 constant dollars)	6 137 887	5 292 785	9 769 081	16 399 333

Source: Report by the Comptroller General of the United States, ID-79-22 (US Government Accounting Office, Washington, D.C., 21 May 1979), appendix I.

Table 3.3. Commercial and government-to-government arms sales, 1969–78

US $ million

	Government-to-government sales agreements	Commercial deliveries[a]
1969	1 200	400
1970	1 200	400
1971	1 400	400
1972	3 100	500
1973	4 500	400
1974	10 700	500
1975	13 900	500
1976[b]	13 200	1 400
1977	11 300	1 500
1978	13 500	1 500[c]
1979	14 400	

[a] Represents what is believed to have been exported. The 25 April 1979 GAO report, *U.S. Munitions Export Controls Need Improvement* (ID-78-62), concluded that State Department statistics on commercial exports are inaccurate. Discrepancies in the export value were found in 50 per cent of all expired or returned 1976 and 1977 licences. The licences are used to prepare reports on commercial exports.
[b] Includes transitional quarter.
[c] Preliminary.

Source: Report by the Comptroller General of the United States, ID-79-22 (US Government Accounting Office, Washington, D.C., 21 May 1979), appendix I.

Thus, MAP grants had by 1976 declined to $200 million, while Foreign Military Sales (FMS) had increased to $8 600 million. FMS are sales made by the United States to foreign governments, while commercial sales are those made by private US companies to foreign governments without involvement of the US government. Today, more than 90 per cent of all US arms sales are government-to-government sales. Under FMS regulations, the buyers are divided into Category-A and Category-B countries: for sales to Category-A, the US Department of Defense may proceed with FMS orders without contract-by-contract permission from the State Department. (Category-A countries are: Belgium, Canada, Denmark, France, FR Germany, Italy, Luxembourg, the Netherlands, Norway, UK, Austria, Ireland, Sweden, Switzerland, Japan, Australia and New Zealand.) All other buyers are Category-B, requiring State Department approval of each contract, and Congressional approval is then required for orders worth more than $25 million.

Payments on FMS are handled through special accounts established by the US Department of Defense (DOD) for each buyer. The US government can aid those countries which have difficulties in paying for their arms purchases through the FMS credit programme. The credits take two forms—either a direct DOD loan to the purchasing country, or a DOD guarantee of a regular bank loan. In the past, the US Export–Import Bank could also assist US arms buyers either through the guaranteeing of DOD loans, or through direct so-called Country-X loans. But in 1968, Congress placed a ban on all Export–Import Bank guarantees and further limited its ability to offer military-related loans to developing nations. Since 1974, the Export–Import Bank has not made any loans in connection with FMS.

For all commercial military sales, export licences are obtained through the State Department's Office of Munitions Control. The US General Accounting Office (GAO) has noted, however, that the State Department's statistics on commercial exports are inaccurate. Discrepancies were found in the export values in 50 per cent of all expired or returned 1976 and 1977 licences. These licences are used to prepare the reports on commercial exports [10].

Training and infrastructure

The fact that the total share of US military sales of support and services during 1974–77 was found, according to ACDA, to be as high as 65 per cent cannot, as stated above, be used to generalize about the international arms trade as such, since both Soviet and West European sales diverge from this trend. The explanation lies partly in the sophistication of the armaments—in 1978 it was estimated that some 60 000 US contract

personnel would be needed in Iran by 1980 as instructors and maintenance personnel for the new weapon systems. The absorption of one major aircraft, the US F-5E Tiger-2 fighter, in Saudi Arabia requires over 1 600 US personnel, while the sale of the more advanced and complicated F-15 will probably require many more. The company Textron Bell Helicopters had training and logistics contracts in Iran worth $400 million, related to the sales of Bell helicopters.

US policy

The shift from grants to sales in the mid-1960s took place for several reasons—the most important was the shift in US foreign policy as expressed in the so-called Nixon Doctrine. Resulting from the experience of Indo-China, the doctrine called upon US allies to bear their own burden of defence, and implicit in this demand was the promise to supply the military hardware needed. Also, after 1973, some buyers have, due to the rise in crude oil prices, been able to afford practically whatever weapon systems they wanted, including weapons at the design state. The 1973 Arab–Israeli war and the oil crisis really pushed US arms exports into world prominence. The combination of the US resupply of Israel following the war and the Saudi Arabian and Iranian purchases made 1974 a record year, with $10 600 million in FMS sales, which was double the total for 1973. The dominant position of the United States in the international arms trade caused opposition and controversy within the country. One of the consequences of this internal concern was the campaign promise made by Carter that arms exports should be curbed. When Carter came to office in 1977, he announced a new policy of arms export restraint, including, among other measures, a ceiling on FMS sales to certain countries. The FY 1978 ceiling was set at $8 550 million, which was claimed to represent an 8 per cent reduction from the FY 1977 sales. The final year-end total of ceiling-related transfers was $8 538 million. For FY 1979, another 8 per cent reduction was implemented, mainly however due to the cancellation of orders by Iran.

There are a number of critical studies on the effects of the Carter policy. The GAO has, for example, expressed criticism of the methods of calculation, and pointed to other shortcomings as well—first of all, the fact that all the NATO countries and Australia, Japan and New Zealand, plus in some cases Israel, are excluded from the ceiling; and secondly, the fact that certain categories of sales are also excluded. The latter totalled over 25 per cent of all US sales in 1978 [7]. Finally, one condition explicitly made by President Carter on several occasions was that other suppliers would have to join the proposed restraint policy; otherwise the United States would be forced to reconsider. So far, no other suppliers

have joined, and West European governments have not only shown no interest but tend to view the US policy with scepticism at best.

On 22 March 1979, the US Department of Defense told Congress that US arms exports should be controlled on 15 kinds of military equipment described as "critical technology". They include the know-how for advanced types of computers and computer equipment, telecommunications, microwaves, military vehicle engines, advanced optics, sensors and undersea systems.

Despite all the shortcomings of the Carter policy and the lack of interest from other major arms exporters, the policy has at least caused publicity concerning the issue of the proliferation of conventional weapons. This publicity has generated several further proposals within the United States on how to achieve more efficient control, better data, and so on, as, for example, the statement by Lucy Wilson Benson, Undersecretary of State for Security Assistance, Science and Technology illustrates:

> Looking back over the last two years I am struck by the degree to which the arms transfer community, both government and industry, has been sensitized to a new set of concerns and to the fact that the arms business is not like other businesses. Exporting precision-guided munitions, high performance aircraft, and heavy armor is not a casual operation—it is something that deserves constant oversight and scrupulous attention to the whys, and wherefores, and the likely consequences. I am satisfied that this lesson has been absorbed; that the arms transfer community takes the policy seriously and wants to make it work efficiently and well. [11]

As a summary of two years of the Carter policy, it may be said that even if intentions were good, the mathematics used to construct the ceiling and hence the reduction in sales in fact need to be revised. The $7 000 million of orders from Iran which were cancelled in February 1979 alone allow the USA to emerge well below the FY 1979 ceiling and, in future, the ceiling may rather become a target.

The Soviet Union

A *Pravda* article on the need to limit the international arms trade, quoted by TASS on 27 January 1979, outlines a Soviet official view of the issue of arms transfers in which it was said that arms exports were an "inalienable part of imperialism's global strategy for shoring up its shaky positions and combating the forces of peace and progress. The Soviet Union and other socialist countries naturally show understanding when asked by various States to supply the arms they need to protect themselves from aggression. The aggressor and the victim of aggression must not be placed on a par". From a philosophical point of view, whether one supplies military aid to an aggressor or to a victim may reflect a political standpoint. From the Soviet side, this policy may justify military aid to

socialist régimes such as the WTO countries, North Korea and Viet Nam, and liberation movements. But the list of Soviet customers during the 1970s is not compatible with demands for socialist and progressive régimes, even according to the Soviet Union's own definition; Soviet customers have included Libya, Uganda, Ethiopia, Iraq, Syria, North and South Yemen, India and Afghanistan.

During the period 1970–74, the Soviet Union is ranked as the largest arms supplier to the Middle East, due among other things to the resupply of arms to Syria after the 1973 war, and the large sales to Iraq. In the second half of the 1970s, the United States re-assumed its position as the biggest supplier to this region, however.

Throughout the 1970s, the Soviet Union has been the second largest arms supplier to the Far East, above all for its military support of Viet Nam in the Indo-China Wars.

Up to 1975, the Soviet Union accounted for more than 50 per cent of all major arms transfers to the Indian Sub-continent, most of which were for India. Its share declined somewhat, to 45 per cent during the second half of the 1970s, but it remains the region's largest arms supplier, the second largest importer after India now being Afghanistan.

After 1975, the Soviet Union replaced France as the largest arms supplier to Sub-Saharan Africa. The new importers, Angola and Mozambique, account for this shift. The Soviet Union has also replaced France after 1975 as the single largest seller to North Africa, where Libya stands out as the most significant customer. The position of the Soviet Union as the dominant arms seller to Central America is due to its support of Cuba, the biggest buyer in the region.

The case of Afghanistan is the most recent exception to the official Soviet justification of arms exports; ever since the early 1930s, the Soviet Union has been the sole major arms supplier to this country. When the Tarakki government seized power in 1978, military supplies were intensified, including the landing of 25 large helicopters for dropping Afghan troops into remote areas where the Muslim rebel forces were fighting. The Soviet reaction to the internal Muslim rebellions was strong, and large amounts of military hardware were introduced into Afghanistan. The same Tarakki government was then ousted in 1979 by Hafizullah Amin who in turn had to give way to Babrak Karmal at the end of 1979. All these governments received Soviet arms, and the question remains of defining such local régimes as aggressor or victim. Just as the US official justification for intervention in Indo-China was that the Saigon régime had asked for military aid, the Soviet Union justifies its military presence as being requested by the Karmal régime. The same complication applies to Somalia and Ethiopia fighting in the Ogaden province with Soviet weapons. The Eritrean liberation movement in Ethiopia has been practi-

cally wiped out or silenced by Ethiopian troops using Soviet weapons and aided by Cuban advisers.

Idi Amin's régime in Uganda for nearly a decade bought arms worth more than $100 million, while its economy went bankrupt. The weapons came practically exclusively from the Soviet Union.

The Soviet Union did not enter the world arms market as a major arms supplier until 1955, when the first deliveries of MiG jet fighters were made to Egypt via Czechoslovakia. According to US estimates, the real value of Soviet arms exports to Third World countries was about $500 million annually in the late 1960s, and rose rapidly from the early 1970s. The value of Soviet arms exports in 1974–77 was $3 700 million annually, and about 80 per cent of recent sales have gone to the Middle East, South Asia and Africa.

Arms exports also enable the Soviet Union to import raw materials such as crude oil, natural gas, bauxite, iron and phosphates. According to a recent US Central Intelligence Agency study, the Soviet Union in 1977 exported goods to Third World countries worth a total of $39 500 million. Of this amount, almost half was military exports.

Early arms sales were conducted on a government-to-government, long-term barter basis, but after the late 1960s the terms have changed. Domestic economic demands also seem to play a great role.

It seems that since 1977 it has been increasingly important for the Soviet Union to receive hard currency for its arms. The liberal credit terms, with 2–3 per cent rates of interest and payment during up to 10 years, remain, but conditions are less generous. Cash sales take a larger share, for example, in the case of Libya, which reportedly pays cash on delivery. In 1977, Peru threatened to default on more than $600 million in arms debts to the Soviet Union, and in early 1978 a three-year repayment moratorium was negotiated. In early 1980, Zambia ordered 16 aged MiG-21 fighters and other arms worth more than $85 million from the Soviet Union, and agreed to pay 20 per cent in advance and the rest over seven years at commercial interest rates.

The change to hard-currency deals was brought about as much by the buyers as by the Soviet Union, however. In the 1970s, many developing countries began to demand hard currencies during the commodity boom when their primary products could command high prices on the international market. By now, three-quarters of the developing countries trading with the Soviet Union settle deals in hard currency, with the exception of India, Iran and Egypt. Hard-currency transactions have imposed their own strains, notably in trade with Latin America, where the Soviet Union has not sold any large amounts of major weapons, with the exception of sales to Peru and Cuba. The Soviet Union has reportedly not turned down a single arms client, but it is also true that it has refused

delivery of certain categories of weapon on a pattern similar to that of the United States: no nuclear weapons or nuclear warheads have been delivered (in accordance with the NPT); for example, the Soviet SCUD missiles in Libya, Egypt and Syria are equipped with conventional warheads, and the MiG-23 was denied to Egypt for a long time.

The recipients of Soviet weapons can be grouped according to the following criteria: ideologically compatible states such as the WTO countries and Algeria, Cuba, Viet Nam, Angola and Mozambique; non-aligned states bordering on pro-Western states, such as India; and countries embargoed by the USA such as Ethiopia and Afghanistan. In addition, there are the liberation movements, where the weapons supplied most often consist of small arms and ammunition rather than of major weapon systems. The AK-47 Kalashnikov is combat-proven in many areas of the world, just like its US counterpart, the M-16.

In one respect Soviet arms export policy differs markedly from that of the United States and West European suppliers. While the opposition or the disarmament community in the latter countries can claim that arms sales are virtually 'out of control', due to such factors as the growth of the market and the competition between individual producing companies, the supplier end of this market is certainly under control in the Soviet Union. An independent State Committee for Economic Foreign Relations is the key administrative agency. It reports directly to a Military Council which consists of four Politburo members including the Secretary General. Two offices of this State Committee, the General Engineering Department and the Technical Department, are responsible for military supplies and construction, respectively. They handle the routine decisions and are run by officers. The Ministry of Foreign Affairs seems to have less influence, whereas the Ministry of Defence provides both technical support and strategic balance information [8].

Soviet participation in the Conventional Arms Transfer (CAT) talks at least illustrates concern about the issue of proliferation of conventional weapons, which is more than can be said of many governments of Western Europe. But political factors are bound to dominate—the Soviet Union would obviously have a great interest in limiting arms sales to certain countries judged unsuitable, such as China. In an article published in *Novoye Vremya* on 18 August 1978, the following list of types of arms sales the Soviet Union would wish to limit is suggested: (*a*) to racist régimes, (*b*) to aggressors, (*c*) to militaristic régimes, (*d*) to régimes with unjust territorial claims on neighbouring states, and (*e*) to régimes which reject disarmament efforts. Also, a control on the profit-making aspects of arms sales is mentioned.

China

During the 1960s, according to US sources, the real value of Chinese arms exports is estimated to have been $1 100 million, accounting for about 4 per cent of all arms transfers to Third World nations during that period. Most of the weapons went to countries on China's borders, such as North Viet Nam ($680 million), North Korea ($115 million) and Pakistan ($200 million), and the rest to liberation movements and radical anti-Soviet groups in Africa. Between 1970 and 1976, this figure doubled to an estimated $2 150 million, of which as much as 90 per cent went to North Viet Nam, North Korea and Pakistan. A large share of Chinese weapons are made up of small arms, which are not shown in the SIPRI statistics. Arms exports now average about 3 per cent of China's total exports [8].

Most Chinese major weapons supplies have gone to the Far East, where China, according to SIPRI statistics, is ranked as the fourth largest supplier throughout the 1970s. China also ranks as fourth in the Indian Sub-continent, for its supplies to Pakistan and Bangladesh. Major arms deliveries to other parts of the world have been small, including, for example, some fast patrol boats to African states.

Very little is known about Chinese credit terms and forms of payment. The Chinese government has claimed on various occasions that China is the only arms supplier which gives away all weapons free of charge, but there is at present no way of substantiating this claim. For the future, the most likely trend seems to be that China will *import* more arms than it exports, a return to the situation in the 1950s before the break with the Soviet Union.

The WTO

While the East European countries, excluding the USSR, account for only 1.4 per cent of WTO major arms exports during 1977–79, the individual countries are, in absolute terms, increasing their shares.

The West German government has supplied information to the Bundestag on arms transfers from Eastern Europe. These countries are reported to have delivered more than $340 million worth of arms to 22 countries in Africa during the period 1975–79. The most important customers have been Algeria, Angola, Congo, Ethiopia, Guinea, Mozambique and Tanzania. At the same time, the West German government reported that, during the 1970s, total development aid from the WTO member states to Africa was $3 400 million, as compared to $21 000 million from the EEC [12].

The biggest exporter is *Czechoslovakia*, not surprisingly considering its

tradition dating back to the 1920s and its developed industrial base and design experience. The state agency OMNIPOL is sometimes described as a 'state within a state' and seemingly operates more like an independent major corporation in the West. The Czech weapons are spread to a large number of countries outside the socialist bloc. The AK-47 assault rifles in use in South Africa and Rhodesia are generally believed to originate from Czech manufacture rather than from the Soviet Union, and are delivered via private Western companies or agents.

The single most important weapon system exported by Czechoslovakia in the second half of the 1970s is the L-39 Albatross jet trainer. Iraq and Afghanistan are among the first recipients. Large-scale deliveries to the WTO only got under way in 1979. By 1990 Czechoslovakia will deliver more than 3 000 L-39 Albatross trainers to the WTO countries.

In 1979, the *German Democratic Republic* for the first time officially acknowledged that it had supported African states and liberation movements not only with military training but also with military hardware. Presently there are some 3 500–5 500 East German military advisers in Africa.

Poland re-entered the arms export market in 1979 by concluding a deal with North Yemen for the supply of 100 T-55 tanks built under Soviet licence in Poland. During the wars in the former Portuguese colonies in Africa, various national leaders mentioned their gratitude also to several East European states, including *Bulgaria*, for military aid.

NATO

France

The rise of France to the position as third largest individual arms exporter in the world is clearly illustrated in table 3.1, above. France's share of major-weapon exports to the Third World was 10 per cent for the 1970s, that is, well ahead of the UK figure of 5 per cent.

About 300 000 people are employed in the French arms industries. An estimated 55–60 per cent of all military equipment produced in France is exported. This dependence on exports is even more obvious from a look at individual French companies such as, for example, Dassault-Breguet: of the 162 Mirage fighters produced in 1977, only 44 were delivered to the French Air Force, while the remaining 118 were exported. An estimated 60 000 jobs are directly or indirectly related to Dassault-Breguet aircraft production, and three out of four Mirage fighters must be exported to maintain profitability on the production line. Dassault is also developing the new Mirage-4000 fighter, exclusively for export and designed specifically for use in Third World countries.

French arms sales in real values now total about $6 000 million a year, representing almost 8 per cent of the country's total exports. Aircraft make up two-thirds of this total, followed by missiles, military electronics and armoured vehicles. The annual volume of sales has roughly tripled since 1973. One of the largest deals ever made by France was the 1977 oil barter deal with Iraq worth $2 300 million. In 1979 France began negotiating a thousand-million-dollar deal with Saudi Arabia, which is trying to diversify from US sources.

In future, China may become a new French arms market—China has already purchased the Crotale land-mobile SAM system (originally specified and financed by South Africa), as well as the Euromissile HOT and MILAN anti-tank missile systems. French foreign policy contains more realism than moralism concerning arms exports—in 1977 a Chinese military delegation expressed interest in the highly sophisticated Mirage-2000 fighter under development, and this interest was confirmed in 1979 when Chinese officials reportedly surprised the French Defence Ministry by saying that they wanted to purchase as many as 1 000 Mirage planes. French military sources reacted by saying, "We would love to satisfy the Chinese interest in buying 1 000 Mirage fighters, but we cannot do it because of the potential Soviet reaction" [13].

From 1975, France has overtaken Britain in the rank order of exporters. In the Middle East, France was after 1975 ranked as the third largest arms exporter, compared to its position as fourth in the first half of the 1970s. The largest buyer of French weapons is Iraq.

In the Far East, French competition for arms orders has resulted in the position as the third largest exporter to the region after 1975. In Africa, on the other hand, France has had to give way to the Soviet Union as the dominant supplier, both to North Africa and Sub-Saharan Africa, but remains the second largest arms supplier.

In South America, France has become the third largest arms seller to the region, with Chile as the largest customer and Ecuador the next largest. During the first half of the 1970s, France was ranked as the biggest arms supplier to South America, but has had to give way to other West European competition and increased sales of sophisticated weapons from the United States.

The Indian Sub-continent receives an increasing share of French weapons, placing France as the second largest supplier to the area after 1975, this being a traditionally UK–USSR dominated region.

France is the fourth largest supplier to Central America.

France is commonly described as perhaps the most aggressive arms exporter, or most pragmatic in its approach. The Directorate of International Affairs (DAI) has a dual role—it is responsible for approving all private-sector export licences and at the same time for promoting French

arms exports. In general, the nationalization of arms industries seems to have resulted in stronger government *promotion* of arms exports, rather than the opposite—stronger government *restrictions*. This is particularly the case in France, where mergers have reduced the number of airframe companies from 14 to 2, and where about 60 per cent of the armaments industry is now government-owned. Shipbuilding and armour come from state-controlled and government-funded enterprises: Aérospatiale and SNECMA are government-funded but not incorporated into the defence budget, and even Dassault-Breguet is now 21 per cent government-owned, with a government veto power over board decisions from 1980.

Still, there is some concern in France about the expanding arms trade and its long-term consequences. In 1978, socialist legislators criticized the government for expanding its arms exports without control. There are complaints from the military that new equipment, like APCs, for example, have been designed for desert warfare in Arab countries rather than for French Army needs. The land-mobile Crotale SAM was exported long before the French Air Force order was fulfilled. When President Giscard d'Estaing came to office in 1974, political control of arms sales was tightened to some degree, in accordance with his pre-election promise. By 1979, the mandatory embargo on South Africa was effected, at least for such weapon types as frigates and submarines. The French attitude to the Carter policy of arms export restraint remains sceptical, as do the attitudes of the other West European suppliers. The general opinion is that the United States and the Soviet Union are such large arms suppliers that they can afford to take the first initiative towards a curb. Alternatively, the Carter policy is viewed as a purely rhetorical attempt, from which no practical results will emerge. In his speech at the United Nations Special Session on Disarmament in 1978, President Giscard d'Estaing presented an alternative arms sales control proposal to supplier restrictions: that Third World countries should agree on restraint procedures for arms purchases, which France would then be willing to help implement.

The UK

In the UK, ranking fourth among the world arms exporters in the 1970s, an estimated 25–35 per cent of all defence equipment produced is exported, with a greater proportion of exports in the aerospace, shipbuilding and electronics industries. Britain, for example, exports 60 per cent of all its Jaguar trainers, the latest big order being the licence agreement with India for 200 aircraft. As in most other arms-producing countries, the uneven geographical distribution of the local defence industries in the UK causes political problems related to production and

the need for export orders, which are out of proportion to the actual numbers of persons involved.

The UK remained a leading arms exporter for a decade after the end of World War II, surpassed only by the Soviet Union in 1955 and by France in 1975. This development reflects the changes in British foreign policy, and in particular the withdrawal from East of Suez.

The British share of major weapon exports to Third World countries during the 1970s has been 5 per cent.

In both the Middle East and the Far East, the UK's position was overtaken by France after 1975. Britain is now ranked as the fourth largest supplier to the Middle East, but is no longer among the four biggest arms suppliers to the Far East.

In North Africa, the British share of arms supplies is merely 1 per cent of the regional total, but sales to Sub-Saharan Africa have increased again during the latter half of the 1970s. Sub-Saharan Africa was, in the early post-World War II period, entirely dominated by the former colonial powers Britain and France, but the UK then had to give way to new suppliers to the region, such as the Soviet Union and Italy.

The British effort to market its arms in the Third World has had most success in South America, where after 1975 Britain achieved the position of second largest arms supplier, accounting for 18 per cent of the regional total.

In the Indian Sub-continent, Britain dominated for a long time as a major arms supplier to India, but this position has steadily declined, beginning with the entrance of the Soviet Union into the Indian arms market in the early 1960s. By the end of the 1970s the UK ranked as the third largest arms supplier to the region. In Central America, Britain has managed to sell enough arms, mostly to Mexico, to be ranked as the second largest supplier after the Soviet Union.

The British counterpart to the French DAI, known as the Office of Defence Sales, is responsible for arranging weapon demonstrations and maintains regional offices abroad to promote sales of British weapons.

Just as in France, the nationalization of defence industries in the UK has not led *per se* to a policy of restraint but rather to the opposite. Aerospace firms have dwindled in number from 23 in 1955 to 4 in 1977, but, for example, the biggest company, British Aerospace (BAe), is among the largest corporations in the world. Most of the shipyards are now incorporated in the nationalized British Shipbuilders, while most of the guns, tanks, ammunition and small arms are produced by the Royal Ordnance Factories. Production of electronics and communications equipment remains divided among some ten private companies.

FR Germany

FR Germany continues to be an important arms-exporting nation and ranked seventh in the 1970–79 list of major arms exporting countries (see table 3.1).

FR German arms sales have increased to all Third World regions during the 1970s, but most spectacularly to South America. In particular, West German-built submarines, fast patrol boats and frigates are increasingly attractive for Third World buyers. This has occurred against the background of repeated assurances by the Bonn government to pursue a restrictive arms sales policy, most recently emphasized in the 1979 White Paper on Defence [14a].

In effect, however, if not in intention, the West German arms sales restrictions of 1971 continue to be undermined. In particular, the set-up of the Euromissile consortium in which MBB and Aérospatiale are the main partners has enabled the export of West German arms technology to an increasing number of Third World countries, without being subject to West German control. Euromissile products, such as the anti-tank missiles HOT and MILAN, are officially sold by France. Many French customers would by definition be excluded from receipt of West German arms according to the West German restrictions, in particular, the restriction of arms sales to areas of tension.

The growth of FR German arms exports, like those from Italy, is a new development of the 1970s, particularly evident in the period 1975–79. There are historical as well as political explanations—after World War II, neither power was allowed to rearm until the 1950s, and then both had to rebuild their domestic arms industries. Both countries are now also among the largest arms *importers* in Europe. The Western European Union (WEU) regulations of 1954 curbed the possibilities of West German arms production, but have been progressively loosened. Shipbuilding in particular provides a striking example of the recovery of an arms industry—in 1954 FR Germany was allowed to build only submarines of 350 tons. This limit was increased to 450 tons in 1962 with an exception for submarines built for NATO countries, to which FR Germany was allowed to export submarines of 1 000 tons. In 1973 the limit was again changed, this time to 1 800 tons. Before that, FR Germany circumvented the WEU restrictions by shipping two 1 200-ton submarines in subsections to Argentina, and having the final assembly done in Buenos Aires.

In December 1979, FR Germany and Turkey reached an agreement on military aid under NATO's Defence Assistance Programme worth $75 million over a period of 18 months. With a total of $430 million, Turkey has since 1964 been the dominant NATO recipient of Bonn's military aid, followed by Greece with a total of $144 million [14b].

Italy

Successive Italian governments have largely escaped much of the criticism that has been directed against the French government, for its willingness to sell arms to any buyer who can pay. Italy does, however, adhere to much the same policy.

The build-up of the domestic arms production base has facilitated the rise of Italy as a major arms supplier, in particular to Third World countries. During the 1970s, Italy ranked as the fifth largest supplier, according to the SIPRI trend indicator.

Italy has managed to appear as the fourth largest arms supplier to South America after 1975, through the export of COIN fighters and Lupo-class frigates. Venezuela is the biggest customer in the region.

Italy is also rising as an arms exporter to Africa; in particular, it is the second largest arms supplier after France to South Africa. Large orders have also been concluded with Libya.

Italy is noted for substantial re-sales of US-designed weaponry. For example, the Agusta-Bell helicopter, licence-produced in Italy, and Sikorsky helicopters have been exported to a large number of countries in the Third World. Italy is still making deliveries on an order from Iran for 50 Agusta CH-47C helicopters, whereas Iran has cancelled its big helicopter deal with the Bell company in the USA, as well as other large orders with the USA, the UK and FR Germany.

Reportedly, US permission is required for all Italian re-sales. However, two COIN aircraft, the C-4M Kudu and the Am-3C Bosbok, produced in South Africa under an Italian licence, both contain US components. South Africa has in turn delivered a number of C-4M Kudus to Rhodesia.

An Italian-designed COIN aircraft, the Aermacchi MB-326GB/K armed trainer, is sold to the Third World in increasing numbers. The plane has been exported to Zambia, Zaire and other African states and is licence-produced in Brazil as the EMB-326 Xavante, which has in turn been sold to a number of South American countries and to Togo.

One of the few cases where the United States has prevented the export of an Italian weapon with US components is the sale to Libya of the Aeritalia G-222 military transport plane which has a US engine. However, Aeritalia is currently re-engining the aircraft with Rolls-Royce Tyne powerplants, specifically to be able to fulfil the Libyan order.

Italy also sells an increasing number of warships to Third World countries, such as Lupo-class frigates, and is also exporting considerable amounts of small arms. The Swedish-designed Bofors anti-aircraft guns, licence-produced by Breda-Bofors in Italy, are spread to many Third World countries.

Italian officials estimate the number of workers in their defence in-

dustries at just below 100 000, with another 50 000 in related jobs. This may seem relatively insignificant in a total labour force of 19 million; however, one-third of these defence workers are in the aircraft industry, so that even the slightest business fluctuations such as a sudden drop in export orders produce a reaction in the affected areas.

Other NATO exporters

In spite of its established policy of arms transfer restraint, in particular to Third World countries, *Canada* occupied the eleventh place among the major arms exporters to the Third World in the 1970s. From official Canadian statistics, it can be seen that Canada, in the period 1965 to 1974, exported military equipment worth $335 million per year, of which $30–35 million went to Third World countries. Forty-six Third World arms customers of Canada are on record, including Argentina, Brazil, Chile, Malaysia and Pakistan for each year, while the less regular buyers are, for example, Peru, Iran, Tanzania, Kenya, Venezuela and South Africa. Military sales to South Africa were last recorded in Canada in 1971, but in 1975 orders were placed for three CL-215 amphibious aircraft. In 1977, aged T-33A trainers were sold to Bolivia and DHC-6 transport planes to Chile.

From the above list of buyers one can conclude that the recipients are not strictly compatible with Canada's policy of not selling arms to areas of tension. The official Canadian justification of its arms sales is usually related to the type of equipment sold: it is true that a large share of military exports to Third World countries consists of transport aircraft, such as the Buffalo and the Twin Otter series, but there are individual sales of more 'lethal' equipment—in the early 1970s a major sale of CF-5A Freedom Fighters and CF-5D jet trainers worth $35 million was made to Venezuela.

The Netherlands, as a major arms exporter, is very similar to Canada, and sales to Third World countries have increased during the 1970s—particularly through deliveries of transport aircraft such as the Fokker F-27 and F-28 series.

During the 1970s, the Netherlands ranked as the ninth largest exporter of major arms to the Third World. Government representatives may argue that the exported equipment is not 'lethal' compared to the sophisticated arms from the biggest arms-exporting nations. But just as in the case of the supply of arms from other small suppliers like Sweden, Switzerland and Canada, this export is a contribution to world-wide militarization.

Algeria and Argentina have purchased the Fokker F-27 and F-28 transport planes, five F-27s were sold to Bolivia in 1979, and one maritime

patrol version of the F-27 was sold to Chile in 1976. Aged frigates have been sold to Ethiopia, Indonesia and Peru during the 1970s.

The Netherlands is one of the few Western countries where, as in the UK, there is more widespread public attention directed towards the issue of arms exports. There is also much public support for arms export controls but, in spite of this, economic pressures recently forced the Defence Ministry to open a small office for the promotion of arms sales.

Belgium has a long tradition of small-arms production, most of which is undertaken by the Fabrique Nationale. Nearly 90 per cent of this production is exported. Through co-production of the F-16 fighter, both Belgium and the Netherlands stand to gain some profit in the future when the F-16 is sold to more countries outside NATO, for example, to Egypt and South Korea.

IV. Neutral and non-aligned arms exporters

Sweden

Sweden is ranked as the twelfth largest supplier of major arms to Third World countries during the 1970s. Official Swedish policy is one of strict regulation aimed at restraint of arms transfers to Third World countries and areas of tension. In principle, arms exports are forbidden by law, and thus, all exports are in fact exceptions to the rule. During the 1960s, no dramatic increases took place—there were some individual sales that caused publicity, such as that of the cruiser *Göta Lejon* to Chile, and some exports which were more of an 'accident' than an expression of policy, for example, the use of the Saab MFI-9 Militrainer in Biafra initiated by a private individual. But more recently, after 1971, a marked difference is to be seen.

Increasing use is made in Sweden of the distinction between 'offensive' and 'defensive' weaponry, and the interpretation of what constitutes an area of tension has become more vague.

In 1974, Sweden for the first time sold know-how related to major arms production to a Third World country, in selling the Saab Supporter to Pakistan, which also involved licensed production of the plane. The Supporter was sold without armaments, and thus could be defined in Sweden as a trainer. When, for example, the French AS-11 and AS-12 missiles and other weapons are mounted on the plane in Pakistan, it will be transformed into a COIN aircraft.

The growth of Swedish arms sales is particularly evident in the period from 1975 onwards: in 1977 Swedish arms exports were worth $187

million, which rose to $252 million in 1978, and to $390 million in 1979.

Swedish participation in the 1979 Paris Air Show, where ten arms industries exhibited their products, supported by the partially state-financed Export Council, was interpreted by some to indicate that the government favours increased arms sales. The attitude of the government is illustrated by such official statements as the following, made by the Swedish Minister of Trade Burenstam-Linder: "It is so easy to get hold of weapons in the world. If we stop our weapons export, it could only mean that other, mainly the big powers would come and sell" [15].

It is not for want of trying that Sweden nevertheless does not account for a bigger share of the major arms market. Saab tried to sell the Viggen fighter to several NATO countries, which instead bought the F-16 in the so-called 'deal of the century', as well as to Austria, Australia and to India. The US veto of the Viggen sale to India, due to the fact that the Viggen has a US engine, caused resentment in Sweden. A Swedish defence contractor reportedly expressed it as follows: "We needed that deal badly to cover the Viggen production costs. This may mean that our next generation of fighter planes will have to be built in cooperation with foreign manufacturers" [15]. By end-1979, however, Sweden still hoped to win a submarine order from India, again involving licensed production.

Some Swedish arms customers cannot by any definition be described as located in non-tension areas—in 1977, Sweden exported arms to Indonesia worth $250 000, but in 1978 the export value rose to $6.35 million and included, among other equipment, Bofors guns for West German-built fast patrol boats. In 1977–78 the civil war in East Timor intensified, and the issue was taken up for the fifth year in the United Nations in 1979. Sweden recently sold newly designed Spica-class fast patrol boats equipped with Bofors cannons to Malaysia. Swedish Foreign Minister Blix, replying to criticism of these sales, claimed that the Bofors cannon cannot be used for firing on guerilla forces, which is technically not correct.

Most Swedish major arms are still sold to other Scandinavian countries, however, and to Austria and Switzerland. A very large share of Swedish arms exports consists of small arms, for which legislation is also in effect circumvented through the sale of production licences. Bofors cannons are licence-produced in a large number of countries, the list of which is classified.

Transfer of military know-how is becoming an increasing problem, in Sweden as in other major industrial countries. In 1979 it became known that the state-owned company TELUB, specializing in military electronics and computer technology, was to educate 80 officers from the Libyan armed forces during a four-year period. Questions raised in Parliament

confirmed the fact that this type of know-how transfer is not covered by present legislation.

The growth of Swedish arms exports and increasing publicity about controversial single deals prompted the Parliament to ask for a review of arms export regulations dating from 1971, and a reviewer was appointed in October 1979. However, the review directives do not state explicitly that the aim should be to *restrict* sales.

Switzerland

Switzerland remains among the smallest exporters of major arms to Third World countries, ranking seventeenth. But Switzerland increased its arms sales opportunities through the purchase in 1979 of the Britten-Norman aircraft company. Switzerland is now to export the BN-2A Islander and Defender military aircraft, which are increasingly attractive to many Third World countries. Further, like Sweden, Switzerland is one of the leading world exporters of anti-aircraft guns, from the Oerlikon company. In fact, a very large percentage of the world's navies are armed with either Swedish Bofors or Swiss Oerlikon guns. Several Third World countries have acquired the Pilatus PC-6 and PC-7 transport aircraft, including Argentina, Bolivia, Burma, Iraq, Jordan and Mexico. The AS-202 Bravo trainer has been sold to Morocco.

In 1979 Switzerland took another important step toward a future increase in arms exports. After lengthy debates, the Swiss Parliament recommended in September 1979 that the Swiss government liberalize the 1972 arms export regulations. In particular, the recommendations of Parliament suggested: (*a*) exempting wheeled armoured personnel carriers entirely from the regulations of the 1972 arms export law;[6] (*b*) simplifying and speeding up the general procedure for obtaining licences for arms exports; and (*c*) reviewing the definition of 'areas of tension' into which the government must not allow arms exports [16–18].

While this does not change the basic Swiss arms export regulations of 1972, it seems obvious that the Swiss government has been given a mandate to use its space of manoeuvre in a generous way.

Spain

Spain belongs to the group of still relatively small but growing major arms suppliers, ranked as thirteenth during the 1970s. This trend reflects the growth of the Spanish industrial base. Daphne-class submarines,

[6] According to the 1972 Swiss arms export regulations, a licence must be obtained from the government for all exports of war matériel, a definition which clearly includes armoured personnel carriers.

built in Spain under French licence, have been exported to Libya. Spain has figured also as an arms supplier to South Africa, although on a much smaller scale than, for example, France and Italy and mostly in connection with the delivery of small arms. However, Spain was involved in the sale of some 60 aged Centurion tanks from India to South Africa in 1979. The tanks were refurbished in Spain and then resold to South Africa. The light transport plane CASA C-212A Aviocar has been sold to Chile, and a general marketing effort is being made in the Third World for this aircraft.

Yugoslavia

Yugoslavia has diversified its sources of arms continuously during the whole period since World War II. It has also built up a domestic production capacity and has become an arms exporter, selling, for example, the SOKO Galeb jet trainer to Libya.

V. Third World arms exporters

The Third World major arms exporters as a group actually occupy sixth place among the exporters (see table 3.1). When broken down by individual suppliers (see table 3.4), the following countries stand out as the most significant new exporters which have emerged, in particular during the 1970s: Israel (26 per cent), Brazil (21 per cent), Iran, Jordan and South Africa (9 per cent each), and Libya (6 per cent).

The two largest Third World exporters, Israel and Brazil, are also the two largest new arms producers, having invested heavily in building up a domestic arms production capacity. Iran has sold US-supplied fighter aircraft to Pakistan, Jordan and Ethiopia. Jordan has also resold obsolete equipment, such as British-supplied Tigercat SAM missiles and Centurion tanks to South Africa. None of the Third World exporters has so far managed to sell major weapon systems to buyers in the industrialized world.

Israel

Until 1973 Israel was a minor arms exporter, but development of the local production base had started much earlier. Israeli arms export statistics are highly classified, but in the 1960s, Israel sold less than $10 million worth of weapons per year; by 1976 the figure had reached an estimated $300 million and by now it is about $1 000 million per year [11].

Table 3.4. Rank order of 13 Third World major-weapon exporting countries, 1970–79

Figures are SIPRI trend indicator values, as expressed in constant US $ million, at constant 1975 prices.

Suppliers	Total value	Percentage of Third World total exports	Largest recipients	Recipient's percentage of supplier's total
Israel	447	*26*	South Africa	*35*
			Argentina	*29*
			El Salvador	*6*
Brazil	349	*21*	Libya	*25*
			Chile	*23*
			Abu Dhabi	*6*
Iran	160	*9*	Pakistan	*75*
			Jordan	*21*
			Ethiopia	*2*
Jordan	159	*9*	South Africa	*90*
			Oman	*10*
			Pakistan	*0.2*
South Africa	150	*9*	Zimbabwe-Rhodesia	*98.7*
			Malawi	*1.3*
Libya	107	*6*	Uganda	*70*
			Syria	*24*
			Pakistan	*
Singapore	48	*3*	Brunei	*62*
			Thailand	*21*
			Kuwait	*2*
Argentina	39	*2*	Chile	*54*
			Mauritania	*20*
			Uruguay	*13*
Saudi Arabia	31	*2*	Somalia	*65*
			Yemen, North	*33*
			Oman	*2*
Cuba	28	*2*	Peru	*100*
Egypt	25	*1*	Somalia	*84*
			Nigeria	*10*
			Libya	*5*
India	18	*1*	South Africa	*61*
			Bangladesh	*27*
			Nepal	*12*
Indonesia	16	*1*	Benin	*63*
			Zimbabwe-Rhodesia	*25*
			Thailand	*13*

* Less than 0.1 per cent.

The largest buyer of Israeli arms is South Africa, accounting for 35 per cent, followed by Argentina and El Salvador (see table 3.4). Israeli arms are sophisticated and competitive on the arms market, as products from a highly industrialized base with low salary costs and thus lower production costs (in comparison to the United States). The Uzi sub-machine-gun is a standard infantry weapon in many NATO armies and in South

Africa (where it is in production, originally from a Belgian sub-licence which was formally revoked in 1963). The Israeli modification of the Mirage-3/5 fighter with a US General Electric J-79 engine resulted in the fighter-bomber Kfir-C2, which is now subject to a concentrated sales drive in the Third World. The Kfir-C2 was also among the competitors for Austria's new fighter plane. Israel Aircraft Industries (IAI), the largest armaments industry in the country, expects to export $300 million worth of Kfir aircraft alone in FY 1980. Possible sales, for example, to Ecuador, have so far been vetoed by the United States, however, and the much publicized efforts to export the Kfir to Taiwan have not yet resulted in a firm contract. The US veto has reportedly been motivated by other than purely political reasons—the Kfir is seen as a serious competitor to US designs in that it is a highly sophisticated plane at a much cheaper price. The Arava military transport has been exported to some countries, including licensed assembly in Mexico. Westwind transport sales are steadily growing, with over 100 exported so far at an average price of $2.4 million each. The electronics division of the IAI developed the Gabriel ship-to-ship missile, exported to Taiwan and South Africa, and various ELTA electronics systems.

Reshef-class fast patrol boats, equipped with Gabriel missiles, in production both for the Israeli Navy and for export, are highly attractive for many Third World navies, for both their relatively low cost and their performance. They have been sold to South Africa.

Exports by IAI alone totalled more than $300 million in 1978, and the share of exports was half of total sales. The company now has orders on hand for at least two years. IAI intends to double the allocation for R&D in its next budget [19]. At the end of 1978, IAI employed over 20 000 workers as compared to 18 700 in 1977, to increase to 22 600 in 1979. IAI currently markets a total of 834 services and products, including 17 models of aircraft, and has sold its products to 43 countries. IAI alone accounts for 39 per cent of Israel's industrial exports.

Israel Military Industries (IMI) produces army infantry weapons. Like IAI, it is wholly government-owned. The most important private firm is Tadiran Electronics. This company's expansion began after the 1967 war, and it now produces a wide range of communications equipment and is heavily export-oriented. In 1978, Tadiran's sales were valued at about $160 million, of which about 50 per cent was exported to 60 countries. In turn, 80 per cent of the 1978 exports were military goods. In 1977, it was reported that Tadiran would set up a subsidiary in South Africa for the manufacture of electronic devices for counter-insurgency. The outcome of these plans is not known, but Israel claimed by 1979 to observe the UN embargo on South Africa. The official Israeli arms export policy emphasizes the necessity of keeping and developing the domestic arms in-

dustry for the sake of the nation's existence. Israeli officials argue that the United States should welcome Israeli arms exports as a means of reducing US costs for supporting the Israeli military effort.

In 1972 an agency called SHAPEX was set up both to monitor and to promote Israeli arms sales. The aim is to expand arms exports and reduce the dependence on the United States, because of the danger of a veto. The next-generation fighter, known as the Arye, will—if approved by Parliament—be constructed without reliance on US licences.

Israel is currently trying to sell obsolete jet fighters—65 A-4E Skyhawks to Malaysia, 42 Mirage-5s of which 25 were actually sold to Argentina during 1979, and 27 Mirage-3s.

Israeli arms sales to such Central American states as Honduras, Guatemala and Nicaragua have caused international criticism.

Brazil and Argentina

Arms production in both Brazil and Argentina actually dates back to the 1930s. The rise of both countries as important arms exporters occurred during the 1970s.

Brazil is one of the Third World's largest military producers, particularly after the military government came into power in 1965. Its main customers are Libya, Chile and Abu Dhabi. In 1979, Brazil's export of weapons and military equipment totalled $300 million. There are about 350 enterprises, employing some 100 000 workers in the Brazilian arms industry. Annual production is valued at $4 800 million, which is 3 per cent of the GDP according to the Army Ministry.

Around 70 per cent of Brazilian arms exports consist of light tanks and military vehicles produced by ENGESA. Between 1977 and 1979, Brazil received at least 80 requests for purchases of Brazilian equipment or for joint production undertakings [20].

The private company ENGESA produces much of the equipment for the Brazilian Army, and exported tactical vehicles in 1976 alone worth $60 million. The EE-11 Cascavel and EE-9 Urutu are sold to Libya and Iraq. Much of the Brazilian export is made up of sales of licence-produced weapons, in particular the EMB-326 Xavante COIN aircraft of Italian design.

The government-owned aircraft company EMBRAER has sold aircraft to Chile, Paraguay, Uruguay and Togo. Brazil also exports considerable amounts of small arms.

Brazil reportedly expects to export four weapons for each one delivered to its own armed forces. Plans for the future involve the export of more than $1 000 million worth of arms annually by the early 1980s.

Argentina, technologically on a par with Brazil, has a smaller industrial

base and is thus lagging behind Brazil on the arms export market. A new export drive has been made possible by the acquisition of West German licences to produce the TAM tank, for re-export to Pakistan, and the VCI combat vehicle. Series production of these vehicles started in 1979.

Both Brazil and Argentina claim to prohibit arms exports to countries where UN embargoes apply. But otherwise, the arms export issue is no domestic problem: "All of our military export sales require the prior approval of the Ministry of Foreign Relations, but aside from certain zones in which there are countries disputing frontiers, such as Central America, we have been encouraged by the government to sell whatever we can, wherever we can." [21]

India

During the 1970s, the Indian policy of building up a domestic arms production capacity was further reinforced. As a result, Indian defence industry today employs almost 250 000 workers and can produce all but the most sophisticated military hardware. Exports almost exclusively consist of small arms, produced by ten ordnance factories. Over the period 1972–76, Indian arms exports were estimated at only $68 million, and the official policy is not to expand this export.

Expansion may nevertheless occur in the future, in particular for warships. Malaysia is reportedly interested in Indian fast medium-sized warships. According to Indian industry sources, India has the infrastructure as well as the technical capability to provide ships which can meet the requirements of Malaysia and other developing countries in the region. Malaysia has also indicated interest in receiving aid from India to set up a naval dockyard.

VI. The industrialized importers

The industrialized world's share of imports of major weapons in 1977–79 (inclusive) was 25.7 per cent of the total. Table 3.5 clearly shows the dependence of NATO and the WTO members upon the United States and the Soviet Union, respectively. Some effects of the efforts to increase the European share of NATO armaments are visible.

Four NATO members—Italy, Greece, the Netherlands and FR Germany—together account for 46 per cent of the total. Grouped politically, the NATO share of imports is 67 per cent, the WTO 6.4 per cent,[7] non-

[7] The figure for the WTO may underestimate their total arms imports because of the paucity of data.

Table 3.5. Rank order of the major industrialized arms importers, 1977–79

Figures are SIPRI trend indicator values, as expressed in constant US $ million, at constant 1975 prices.

Importing country	Total value	Percentage of industrialized world total	Largest exporter per importer	Percentage of importer's total
Italy	1 584	*16.5*	USA	*90*
Greece	1 364	*14.2*	USA	*62*
Netherlands	732	*8.0*	USA	*71*
FR Germany	731	*8.0*	USA	*96*
Japan	720	*7.5*	USA	*78*
Spain	700	*7.3*	USA	*78*
Turkey	667	*7.0*	USA	*76*
Belgium	537	*6.0*	France	*32*
Australia	481	*5.0*	USA	*68*
UK	294	*3.0*	USA	*47*
Sweden	289	*3.0*	USA	*89*
Denmark	244	*2.5*	USA	*88*
Czechoslovakia	173	*2.0*	USSR	*100*
Yugoslavia	133	*1.4*	USSR	*81*
German DR	116	*1.2*	USSR	*80*
USA[a]	103	*1.1*	Australia[a]	*75*
Poland	96	*1.0*	USSR	*100*
Portugal	95	*1.0*	USA	*84*
Finland	90	*0.9*	USSR	*100*
Canada	86	*0.9*	FR Germany	*100*
USSR	77	*0.8*	Czechoslovakia	*70*
Bulgaria	73	*0.8*	USSR	*100*
Romania	61	*0.6*	USSR	*54*
China	57	*0.6*	France	*68*
Switzerland	45	*0.5*	USA	*100*
Hungary	26	*0.3*	USSR	*100*
France	11	*0.1*	USA	*100*
Malta	5	*0.05*	Libya	*100*
Norway	2	*0.02*	UK	*100*
Austria	2	*0.02*	France	*100*
Ireland	*	–	Italy	*100*

* Less than $0.5 million.
[a] Value not representative of trend, due to resale of aged C-130 transports.

aligned Europe 11.8 per cent, Japan 7.5 per cent, Australia 5.0 per cent, China 0.6 per cent, the USA 1.1 per cent, and the USSR 0.8 per cent. France is low on the rank order, reflecting its determination to be militarily independent.

For both Japan and Italy, the greater share of their imports is made up of licensed production of US designs.

NATO

It is sometimes said that the only factor working against the unlimited expansion of European arms industries, and hence their arms exports, is the threat this poses to the NATO standardization goal and thereby to

the region's security. NATO still has 35 different types of tactical combat aircraft, 10 tank models, 14 types of anti-tank missiles, and 28 types of howitzers in use. Six tactical communications systems are reportedly under development that are unable to interact with one another. The US policy of advocating standardization of the NATO weapon inventory is accompanied by promises to achieve the so-called 'two-way street' regarding arms sales between European NATO members and the USA. This has not materialized, however, and arms sales go primarily in one direction: in FY 1977, for example, the United States sold $1 200 million worth of arms to Europe, and purchased only $125 million. Among the reasons for the difficulty European producers have in competing with US technology are, of course, purely national obstacles such as the "Buy American" Act, and the US demand that standardization must concern cost-effective equipment—European arms are as a rule more expensive to produce and thus incur higher unit prices. The lack of unity among European states on this issue is another major factor—no government is really willing to depend on others for defence equipment where a local production line exists.

European officials also claim that if fewer sales are made by Western Europe to Third World countries, this could further impede the two-way street, since the unit prices of European weapons could become even higher if export profits were lost.

Within NATO it has been discussed whether there is a possibility of linking NATO standardization to the issue of arms export restraints, by getting a US agreement to 'offset' European sales lost in the Third World. It is highly doubtful whether such offsets would be acceptable to the US Congress, however.

When General Dynamics won 'the deal of the century' with the sale of 348 F-16 fighters to Belgium, the Netherlands, Norway and Denmark in 1977, this was described as one step on the road to standardization. General Dynamics offered 58 per cent industrial offsets, a 'not-to-exceed' price of $6 million per aircraft, substantial high-technology transfer, and a 15 per cent share in F-16 sales to third parties. A US GAO report puts Belgian offsets at 70 per cent, Dutch at 50 per cent, Norwegian at 40 per cent and Danish at 33 per cent. Belgium and the Netherlands have the final assembly lines, whereas Norway and Denmark are mainly involved in licensed assembly of electronic and systems components.

So far, European producers have won their share of the Israeli order for 75 F-16s. South Korea and Egypt want the aircraft, and Canada and Australia have expressed interest. It still seems unrealistic that the initial export target of 5 000 aircraft will materialize. The Iranian order for 160 F-16 planes was cancelled in 1979.

Turkey

One of the poorest countries in NATO, Turkey—with a dramatically worsening economic situation—ranks high among the arms importers as the seventh largest purchaser of major arms in 1977–79.

Turkey must import 80 per cent of its petroleum requirement, unemployment is about 20 per cent, inflation is above 50 per cent, and industrial production has dropped below 50 per cent of capacity [22].

The embargo applied by the United States in connection with the conflict over Cyprus is hardly visible in the arms statistics. The USA and FR Germany share the position as main suppliers of arms, and in 1979 the US Congress voted for an aid package to Turkey consisting of $100 million in support economic aid plus $50 million in MAP, intended for spare parts and support.

Turkey is also making an effort to build up a domestic arms production capacity, as illustrated by the new licence agreement for assembly of a number of weapons, such as Type 209 submarines, SAR-33 patrol boats and the Hughes Model-500 helicopter.

The motivation for the new US aid was not only concern about the Turkish economy and the need to bring a NATO ally up to standard, but is also closely related to the reopening of US defence facilities and listening posts in Turkey.

During Congressional hearings in connection with US aid to Turkey, protests were voiced to the effect that this aid was not in the best of US interests since the United States does not need a 'listening post' in Turkey for the verification of the SALT II Treaty. Secondly, it was claimed that the root of the bankrupt Turkish economy could lie in the militarism and occupation of northern Cyprus: "Has it ever occurred to the administration that a deemphasis on appropriations accorded the Turkish military would go a long way toward reducing some of Turkey's economic problems? One of Turkey's key problems is the economic burden of its oversized army." [22a]

The 1979 and 1980 aid is planned in conjunction with FR Germany, which is supposed to extend a similar amount of economic and military aid to Turkey. After the continued tensions in Iran and the Soviet intervention in Afghanistan, reports indicated in early 1980 that the agreement of December 1979 between FR Germany and Turkey might be expanded to a total value of about $250 million. According to one source [23], the main emphasis of the aid programme will lie on assistance for Turkey's rudimentary arms industry and its maintenance facilities. In particular, it is planned to: (*a*) expand the infantry rifle and machine-gun factories at Kirikkale; (*b*) step up the licensed production of Cobra-2000 anti-tank missiles in Elmadagi; (*c*) extend the capacities of the components and

spares factory for armoured vehicles in Arifiye; (*d*) modernize the two shipyards at Gölcüküy and Taskizak; and (*e*) establish maintenance facilities for aircraft engines in Eskizak.

Furthermore, the government in Ankara seems to be interested in receiving second-hand Leopard-1 main battle tanks and F-104G Starfighter jet fighters to be phased out by the Bundeswehr.

The WTO

The standardized weapon inventories in the WTO countries are one of the causes of US policy aimed at similar standardization within NATO. The WTO countries use Soviet fighters, missiles and tanks, and Czech trainers. In addition, Czechoslovakia produces many of the small arms for the WTO under Soviet licences.

In several cases it is evident that the Soviet Union has supplied the latest versions of modern weapon systems to countries outside the WTO before supplying the WTO members. The MiG-23 was delivered to Libya and Syria well before Poland and Czechoslovakia received it. The same is true of the T-72 tank, which only began to be supplied on a large scale to the WTO in 1978–79. During 1979, all the WTO members received the T-72, the production rate of which is 2 000 per year in the Soviet Union.

The new standard trainer for the WTO air forces, the Czech L-39 Albatross, was delivered to Afghanistan and Iraq before the East European allies received it.

Warships are somewhat less standardized—Poland builds some of its own designs, as do the German Democratic Republic and Romania. The missile inventory is exclusively Soviet. Hungary produces an armoured car—the FUG 60—which is a local development of the Soviet BTR-60, and Czechoslovakia and Poland produce Soviet tanks under licence.

China

The People's Republic of China ranks low among the importers of major arms so far. The first orders placed with European producers were concluded after 1975, and the trend will continue as French weapons begin to be delivered, notably the Euromissile HOT and MILAN and the French Crotale.

The second largest European producer to enter the Chinese market may well be Britain. In fact, some years ago Britain sold licence-production rights for the Rolls Royce Spey engine to China, presumably to power a new Chinese fighter design.

After several years of negotiations for the AV-8A Harrier, a contract

has still not been signed, although the order is repeatedly reported as imminent. A first batch of 30 aircraft is said to be most likely.

China has also expressed interest in the British 300-ton Super-4 hovercraft, which is suitable for minesweeping and minelaying, as well as in the Chieftain tank version Shir-2. The US Fairchild Industries held informal talks with China during 1979 about the possible supply of A-10 close support aircraft. China is also interested in the Tornado, SAMs, ATMs and a wide range of other weapons, but large-scale direct imports are unlikely. Future deals will most probably involve licensed production.

The neutral importers

Sweden imports a substantial amount of weaponry in spite of its near self-sufficiency in major systems. In the future, the share of imports may become higher, in relation to the future of the aircraft industry and the origin of the next-generation fighter aircraft.

Switzerland is increasing its imports, which will be seen more clearly as the F-5E fighters are delivered. *Finland* is also increasing its arms imports, having purchased the British Hawk advanced trainer, and modernizing its air force with the MiG-21bis and Soviet anti-aircraft missiles.

Yugoslavia has diversified its arms imports to a certain extent, and is producing British and French equipment. Some major arms are still imported from the Soviet Union, however. *Albania* does not appear in the table, since Chinese major arms supplies have stopped.

VII. The Third World importers

The Third World's major arms imports were four times greater in the 1970s than in the 1960s.

The 1970s has, however, been a decade of change among the individual importing countries, as is evident from a comparison of tables 3.6 and 3.7.

The Middle East

The Middle East remains the largest arms importing region, as throughout the whole period since 1945, accounting for 48 per cent of the major arms imports during the 1970s.

Several factors explain this trend: first, arms imports to the Middle East remained during the 1970s very much conflict-determined. Again, as in each decade since the end of World War II, a major war between

Israel and some of its Arab neighbours erupted in 1973 and caused a marked increase in military expenditures and arms imports in the countries concerned.

Second, during the 1970s, various other inter- and intra-state conflicts have occurred in the region, especially along the Persian Gulf.

Third, the explosive rise in crude oil prices has brought new and quick 'wealth' to some Middle Eastern countries, which has been used for extensive purchases of modern arms and military equipment as well as for investments in respective infrastructure projects. Financial support from several of the richer countries of the region, notably Saudi Arabia, in turn allowed also some of the poorer countries to embark upon ambitious arms-purchasing schemes.

The positions of the individual Middle Eastern importers have shifted. In the 1960s, the major arms importers were Israel, Egypt and Syria. In the first half of the 1970s, Iran appeared as the third largest arms importer after Syria and Egypt. After 1975, the participants in the Israeli–Arab confrontation gave way to the oil producers Iran and Saudi Arabia. The heavy arms build-up in Iraq is also reflected in table 3.7, where Iraq ranks as the fourth importer. For the future, it can be deduced that Iran would not appear in such a table, at least for some years, and would be replaced by Saudi Arabia. Egypt would again show up as a major arms importer, once US and West European arms deliveries begin on an appreciable scale. Egypt and Israel have been promised a total of $4 500 million in military grants and loans from the United States as a consequence of the bilateral peace treaty. The US Military Aid Program (MAP) for FY 1981 has allocated 70 per cent of its total of $2.8 thousand million to Middle Eastern countries. And the 1980 Soviet intervention in Afghanistan will most certainly have measurable effects on the military postures of states both in the Middle East and in neighbouring areas.

In summary, little can be added to the following observations on the Middle Eastern scene:

> The interaction of local tensions and conflicts, ready availability of cash, appetite for sophisticated arms and the opportunity for political influence through arms transfers lends little prospect of success for attempt to achieve regional arms control. Indeed, the underlying trends point to an intensification of arms spending and an increase in competition to land lucrative contracts. Some patterns are indeed changing, but these will bring their own problems: one instance is the gradual shift of American supplies from equipment to training and support which, if less immediately lethal, necessitates the introduction of an army of American advisers and technicians into the region. Broadly speaking, however, the opportunity and encouragement to spend lavishly on weapons will persist until such time as the stubborn unresolved confrontations are settled. It is one of the grim ironies of the Middle East that few parties to those conflicts seem willing to contemplate compromise without the assurance of massive military backing. [24]

Table 3.6. Rank order of major Third World arms importers, 1970–74[a]

Importing region	SIPRI total indicator value of arms imports (1975 $mn)	Percentage of Third World total	Largest recipient countries	SIPRI total indicator value of country's arms imports (1975 $mn)	Percentage of region's total	Largest supplier to each country	Percentage of country's total	Four largest suppliers per region	Percentage of region's total
Middle East	9 344	*50*	Syria	2 320	*25*	USSR	*95*	USSR	*51*
			Egypt	2 181	*23*	USSR	*98*	USA	*34*
			Iran	2 053	*22*	USA	*60*	UK	*10*
			Israel	1 688	*18*	USA	*97*	France	*2*
			Iraq	336	*4*	USSR	*94*		
			Saudi Arabia	324	*3*	USA	*51*		
Far East	3 738	*20*	S. Viet Nam	1 475	*39*	USA	*100*	USA	*62*
			N. Viet Nam	861	*23*	USSR	*93*	USSR	*28*
			N. Korea	261	*7*	USSR	*100*	UK	*4*
			Thailand	243	*6*	USA	*82*	China	*2*
			Taiwan	213	*6*	USA	*100*		
			S. Korea	169	*4*	USA	*98*		
South Asia	1 869	*10*	India	1 281	*68*	USSR	*70*	USSR	*54*
			Pakistan	457	*24*	China	*53*	UK	*15*
			Afghanistan	60	*3*	USSR	*100*	China	*13*
			Bangladesh	49	*3*	USSR	*92*	France	*10*
			Sri Lanka	15	*1*	UK	*47*		
			Nepal	6	*0.3*	UK	*33*		
South America	1 479	*8*	Venezuela	270	*18*	France	*53*	France	*27*
			Brazil	255	*17*	USA	*15*	USA	*24*
			Chile	255	*17*	UK	*41*	UK	*21*
			Argentina	254	*17*	USA	*33*	FR Germany	*10*
			Peru	204	*14*	USA	*30*		
			Uruguay	51	*3*	USA	*25*		
Sub-Saharan Africa	1 276	*7*	South Africa	483	*38*	France	*51*	France	*36*
			Zaire	122	*10*	France	*82*	USSR	*17*
			Uganda	111	*8*	Libya	*49*	China	*9*
			Tanzania	107	*8*	China	*78*	Italy	*7*
			Sudan	96	*7*	USSR	*83*		
			Somalia	81	*6*	USSR	*100*		
North Africa	783	*4*	Libya	656	*84*	France	*67*	France	*63*
			Morocco	64	*8*	USA	*69*	USSR	*17*
			Tunisia	41	*5*	France	*96*	USA	*12*
			Algeria	23	*3*	France	*52*	UK	*4*
Central America	231	*1*	Cuba	153	*66*	USSR	*100*	USSR	*66*
			Guatemala	17	*7*	USA	*92*	USA	*19*
			Mexico	17	*7*	USA	*72*	UK	*7*
			Nicaragua	12	*5*	Israel	*98*	Israel	*4*
			El Salvador	7	*3*	USA	*57*		
			Jamaica	5	*2*	USA	*86*		
Third World total	**18 720**	**100**							

[a] This table replaces the aggregate import table from 1950, which is being revised in connection with the computer storage of data. The revised aggregate yearly export and import tables will be published in the *SIPRI Yearbook 1981*.

Table 3.7. Rank order of major Third World arms importers, 1975–79[a]

Importing region	SIPRI total indicator value of arms imports (1975 $mn)	Percentage of Third World total	Largest recipient countries	SIPRI total indicator value of country's arms imports (1975 $mn)	Percentage of region's total	Largest supplier to each country	Percentage of country's total	Four largest suppliers per region	Percentage of region's total
Middle East	20 141	*48*	Iran	6 229	*31*	USA	*81*	USA	*61*
			Saudi Arabia	2 806	*14*	USA	*79*	USSR	*15*
			Jordan	2 615	*13*	USA	*98*	France	*7*
			Iraq	2 418	*12*	USSR	*93*	UK	*5*
			Israel	2 008	*10*	USA	*95*		
			Syria	1 170	*6*	USSR	*84*		
Far East	6 679	*16*	S. Korea	2 515	*38*	USA	*98*	USA	*49*
			Viet Nam	1 094	*16*	USSR	*91*	USSR	*21*
			Taiwan	845	*13*	USA	*95*	France	*2*
			Malaysia	325	*5*	USA	*54*	China	*1*
			Philippines	307	*5*	USA	*61*		
			Indonesia	306	*5*	USA	*36*		
North Africa	4 848	*11*	Libya	3 151	*65*	USSR	*79*	USSR	*62*
			Morocco	863	*20*	France	*81*	France	*19*
			Algeria	660	*14*	USSR	*79*	USA	*3*
			Tunisia	72	*1*	Italy	*38*	UK	*1*
Sub-Saharan Africa	4 021	*10*	South Africa	969	*24*	France	*53*	USSR	*31*
			Ethiopia	533	*13*	USSR	*95*	France	*21*
			Angola	350	*9*	USSR	*99*	USA	*7*
			Mozambique	315	*9*	USSR	*100*	UK	*5*
			Sudan	232	*6*	France	*64*		
			Nigeria	188	*5*	UK	*22*		
South America	3 963	*9*	Brazil	965	*24*	USA	*34*	USA	*21*
			Peru	806	*20*	USSR	*41*	UK	*18*
			Argentina	692	*17*	UK	*26*	France	*11*
			Chile	543	*14*	France	*22*	Italy	*11*
			Venezuela	511	*13*	Italy	*51*		
			Ecuador	304	*8*	France	*45*		
South Asia	2 031	*5*	India	1 055	*52*	USSR	*57*	USSR	*42*
			Pakistan	564	*28*	France	*53*	France	*18*
			Afghanistan	253	*13*	USSR	*100*	UK	*14*
			Bangladesh	59	*3*	China	*78*	China	*7*
			Nepal	7	*0.3*	France	*57*		
			Sri Lanka	4	*0.2*	France	*50*		
Central America	624	*1.5*	Cuba	279	*45*	USSR	*100*	USSR	*45*
			Mexico	172	*28*	UK	*74*	UK	*21*
			Bahamas	37	*6*	USA	*100*	USA	*8*
			Honduras	34	*5*	USA	*50*	France	*3*
			El Salvador	30	*5*	Israel	*83*		
			Guatemala	23	*4*	Israel	*39*		
Oceania	8	*0.02*	Papua New Guinea	5	*63*	Australia	*100*	Australia	*63*
			Fiji	3	*37*	USA	*100*	USA	*37*
Third World total	**42 315**	**100.5**							

[a] This table replaces the aggregate import table from 1950, which is being revised in connection with the computer storage of data. The revised aggregate yearly export and import tables will be published in the *SIPRI Yearbook 1981*.

Iran

Shah Mohammed Reza Pahlevi came to power with US support in 1953, and since then Iran has enjoyed complete political and military support from the United States: as a highly valuable 'forward defense area' and, during the 1970s, as the first guardian of the Persian Gulf. Arms transfers have hardly ever played such a direct role in US foreign policy as they have in the case of Iran. US interests coincided with the Shah's ambitions to restore the ancient Persian Empire, in fact, if not in name—that is, the modernization of Iran should make the country into a big regional power, politically and militarily.

In addition to conventional weapons, Iran also imported vast quantities of police weapons and paramilitary hardware such as tear gas, riot sticks and small arms from the United States, which also provided training to Iranian police and SAVAK officers, and instruction in COIN warfare [25].

In mid-1978 President Carter described Iran as "an island of stability", and in November 1978, when anti-Shah demonstrations paralysed the administration, the Carter Administration approved the delivery of more police equipment, including helmets and shields, to the Iranian Army. In the anti-US demonstrations in 1979, Bell employees were injured in a bomb attack and the Grumman headquarters in Iran was destroyed.

This particular era in the development of a new Persian Empire came to an end on 17 January 1979, when the Shah went into exile.

The United States accounted for 60 per cent of all supplies of major weapons to Iran in the 1970s, but the UK, Italy and FR Germany also secured large orders. In 1971, the Shah purchased 764 Chieftain tanks from Britain, and then ordered 125 units of the specially modified and improved version known as Shir-1, and 1 225 Shir-2s (or Shir Irans) with Chobham armour. (Chobham armour was developed in the 1960s in Britain and is also being fitted to the latest US tank, the XM-1, and to the FR German Leopard-2; it is believed that the Soviet T-80 tank is built with the same type of armour.)

The new régime cancelled all US arms orders, including, for example, 160 F-16 fighters, worth $3 500 million, seven AWACS worth $1 300 million and 400 Phoenix missiles worth $1 000 million. In addition, the agreement worth $12 000 million for building the Chah Bahar naval base was cancelled, as were numerous smaller contracts covering munitions, communications equipment, vehicles, spares, support equipment, and services. In comparison, cancelled West European orders were of course smaller, but in real terms large sums of money were also involved. Iran asked the UK to discuss suspending or altering all the arms contracts, worth $4 000 million and providing jobs for 20 000 workers in Britain.

The largest cancelled order was that for Shir tanks; the second largest order was for Tracked Rapier SAM systems. British Shipbuilders lost a contract for the first phase of the military industrial plant at Isfahan. Similarly, all contracts for licensed production of armaments were cancelled by the new régime in Iran.

Arms exporters to the Middle East, notably the United States and the UK, openly complain about the severe economic problems caused by the cancellation of arms orders by the Iranian régime—the loss to US industry is enormous and the longer production runs are also lost, meaning that the unit cost of some weapons for US armed forces will increase. The existence of at least one major aircraft project is at risk—the Northrop lightweight fighter F-18L Cobra, which was developed on Iranian request as a land-based version of the US Navy's F-18A Hornet. (In 1979, it was reported that President Carter allowed Northrop to go ahead with the development of the F-18L, which is a move directly contrary to the Carter policy, prohibiting the development of weapons solely for export.)

In Britain, the general economic situation and the direct threat to industries working on the Shir Iran tank have made the government conduct an almost desperate sales drive, which succeeded when Jordan in 1979 purchased 200 Shir-1 tanks. India and China are also reportedly interested in acquiring this highly sophisticated tank.

This, in effect, illustrates a situation in which a Third World country actually supported the economies of industrialized nations through arms purchases; when the support is cut off, the industrialized nation is faced with a problem. It also illustrates the fact that even the industrialized countries, although 'rich' in GNP terms, cannot afford to be too dependent on arms exports to Third World countries, especially not on export orders to guarantee employment.

The presence in Iran, when the new régime took over, of the 80 Grumman F-14 Tomcat fighters armed with Phoenix missiles presented the United States with yet another problem, this time related to security. One of the most sophisticated weapon systems currently in production, aimed at safeguarding the security of Iran as well as of the United States in the region, overnight became a potential threat to their security, for fear the classified electronics and command system should fall into the wrong hands. President Sadat of Egypt offered to take the Iranian F-14s into custody, but the United States in the end decided to leave them. Later during 1979, there were discussions to the effect that the United States might repurchase the F-14s, which thus far had not been flown in Iran since the fall of the Shah, for a unit price of $10–13 million. This is roughly half of the programme unit cost paid for the Tomcats by the Shah's régime, illustrating another interesting financial aspect of arms sales, namely, that the poorer partner does not reap the profits of an arms deal.

(The number to be repurchased at this sell-out price by the USA is actually 78, since two Tomcats crashed in 1974.) There is also a financial obstacle to such a repurchase, however. The addition of the ex-Iranian aircraft to the US inventory could shorten Grumman's production run by several years, which the company cannot afford.

In the United States, reports in mid-1979 about the resumption of US arms sales to the Khomeini régime caused protests in Congress. The suggestion concerned the deliveries to Iran of spare parts, helicopters and ammunition, valued at $5 000 million. Senator Proxmire is on record as saying:

> Mr President, plans to resume dollars 5 000 million in arms sales to Iran are foolhardy and shortsighted. Secretary Kissinger's blank check arms policy failed miserably in Iran and now the current administration is moving down the same path. When President Nixon and Secretary Kissinger gave the Shah of Iran a blank check on which to order any US weapons, US policy in that region took an inexorable course toward self-destruction. The dollars 8 million per day in weapons ordered by the Shah drained his country of financial resources needed for internal development, education, health and the building of democratic institutions. US policy failed miserably. [26]

Saudi Arabia

Saudi Arabia is emerging as the largest arms importer in the Middle East. Although it ranked only sixth in the first half of the 1970s, by 1979 it occupied second place in the rank order.

The build-up in Saudi Arabia and the increasing US involvement are closely related to developments in Iran and around the Persian Gulf, to the wars in the two Yemen republics and, by late 1979, to developments in Afghanistan.

The United States is, according to table 3.7, responsible for 79 per cent of the major arms imports to Saudi Arabia, but Saudi Arabia is actively trying to diversify from a position of sole dependence on the United States. France is a main competitor for major arms, but the United States has stepped up its involvement in Saudi Arabia since the fall of the Shah of Iran. From the period February 1979 until 15 August 1979, contracted US FMS sales had reached $6 300 million in goods and services. Of this, Saudi Arabia's share was as much as $3 700 million, or 58 per cent. The arms sales are closely related to oil production—within one week of the Saudi announcement in July 1979 that oil production was to be increased, the US State Department recommended the additional sale of $1 200 million worth of arms for the para-military national guard.

Since the revolution in Iran, Saudi Arabia has had primary security responsibilities for the Persian Gulf and the oilfields of the region. But the Saudi government turned down an early offer in 1979 by the United States

to send a squadron of F-15 Eagle fighters to the country as a token of support.

Meanwhile, on 15 July 1979, a defence co-operation agreement was signed between Saudi Arabia and France. One immediate result will be the delivery of the Crotale landmobile SAM system to the army. This will take place well before the more sophisticated version, known as Shahine, is delivered. Shahine was developed in France on an order from 1974, to Saudi specifications, but delivery has been delayed beyond early 1980. The Crotale will be mounted on the AMX-30 chassis, of which Saudi Arabia has bought a total of 400 units.

The Arab Organisation of Industrialisation (AOI) project to build a missile site at Kharj, south of Riad, worth $10 000 million, may also have included the assembly of the Shahine air defence system. After the disbanding of AOI, work has still been continued by the French company Thomson-CSF at Kharj, indicating that the Saudi Defence Ministry has taken over this particular AOI project.

North and South Yemen

The military build-up in the two Yemen states is in turn related to Saudi Arabia and to Iran, apart from being a function of the military conflict situation between the two states. During the 1970s, North and South Yemen have come to appear as yet another example of a post-colonial conflict, where the great powers compete for influence and extending military aid. The People's Democratic Republic of Yemen (South Yemen) has a Marxist government and has over its years of existence received some advanced Soviet equipment, including assistance by some 800 Soviet and 500 Cubans advisers, in both instances half of them military [27].

North Yemen also received some military equipment and 200 military advisers from the Soviet Union. In 1972, diplomatic relations between the United States and North Yemen were resumed. (North Yemen has a population of eight million, which is more than that of Saudi Arabia, making it the most populous state in the Arabian Peninsula. It is a poor country, with more than 85 per cent of the population illiterate. South Yemen has a population of fewer than one million.)

Until mid-1978, the situation between the two Yemen states remained more or less static—there were constant border fights, but the Soviet Union put most of its military support on the side of South Yemen. At the same time, however, the Soviet Union maintained a presence in North Yemen.

Based on a possible threat to Saudi Arabia from South Yemen, the superior military strength of that country, and its support for the guerillas in Oman, the United States concluded a trilateral agreement in 1976 with

Saudi Arabia and North Yemen for $140 million for defence equipment to North Yemen, paid by Saudi Arabia.

The traditional fighting between North and South Yemen escalated after the assassination of the North Yemen president in 1978 (the fourth president in four years), and in February 1979 South Yemen forces attacked the North. The United States decided to accelerate deliveries of weapons to the North, while the Arab League tried to devise diplomatic means to solve the conflict. On 7 March, President Carter decided to waive the 30-day period for Congress to veto arms exports so that the delivery of 12 F-5E fighters could be speeded up. The F-5Es were part of a $300 million aid package, including spares, support and training.

US military experts accompanied the urgent shipments of sophisticated tanks, anti-aircraft weapons and jet fighters. The Mobile Training Teams involved about 70 US Army and Air Force instructors. In a co-ordinated effort, both Saudi and US weapons were brought into North Yemen.

The official US policy in the area has been stated on many occasions, for example:

> ... we felt, that this situation was of sufficient gravity so that it should enter the arena of United States–Soviet global relations. We sought to serve clear evidence to the Soviet Union that we regard the territorial integrity of Saudi Arabia as vital to the interests of the United States; that the security and integrity of North Yemen is important because it is in turn regarded as vital by the Saudis. In addressing ourselves to the Soviet Union, in addition to diplomatic approaches, we added the movement of the carrier task force Constellation into the zone to serve as testimony of the abiding, very profound interest that we have in the security and integrity of the Arabian Peninsula, and particularly Saudi Arabia. [27]

Events in the Yemen states took an unexpected turn in mid-1979 when South Yemen halted its offensive against North Yemen after intense fighting. Saudi Arabia then delayed payment for weapons to North Yemen, which then turned to the Soviet Union again, and Soviet arms started to arrive to North Yemen. In December 1979, crates with MiG-21 fighters were seen in the Yemeni port of Hodeida. Presently the Soviet Union still has some 100 military advisers in North Yemen, meaning that both US and Soviet instructors now train the North Yemenis.

If the military presence of both great powers continues, the future scenario might be one where the North Yemeni MiG-21s and F-5Es are both used in combat against the South Yemeni Air Force's MiG-21s.

Other buyers

In particular during the second half of the 1970s, a heavy rearming of the pro-Western nations in the Middle East has taken place. This is reflected in particular in *Jordan's* position in table 3.7 as third largest buyer during the period. The arms build-up in Jordan has been accompanied by US

declarations to the effect that it is not an arms build-up but merely a replacement of equipment. The purchases have not caused so much attention compared to those by Iran, for example, with the exception of the order for the MIM-23B Hawk surface-to-air missile system. The Jordanian government wanted to acquire the mobile system, which is classified as 'offensive', however, and in the end settled for a fixed system. In addition, well over 1 000 armoured vehicles were ordered, including the M-60-A3 main battle tank, as well as the F-5E Tiger-2 fighter.

In 1979, Jordan concluded a deal for 36 Mirage-3 fighters, breaking the pattern in which the USA was virtually the sole supplier of major arms. It also ordered the Pilatus PC-7 military transport from Switzerland the same year, and 200 Shir-1 tanks from Britain, originally intended for Iran.

Iraq, increasingly advancing among the ranks of major arms importers during the 1970s, is usually described as a Soviet customer but is also in fact making an effort to diversify—since 1975, nearly 50 per cent of the new arms orders have been for French weapons, in exchange for oil. Iraq has purchased the Euromissile HOT, and the ERC-90S Sagaie vehicle, in 1979, specially designed for use in Third World countries. It has also recently ordered the Swiss PC-7 transport aircraft. From the Soviet Union, Iraq received the MiG-23 export version well before it was introduced into the WTO, and also the T-72 sophisticated main battle tank. In 1979, Iraq ordered three submarines from the Soviet Union. The arms build-up in Iraq reflects its political involvement both in the Arab–Israeli conflict and in relation to the development in Iran and along the Persian Gulf.

Syria, being the largest Soviet arms customer in the area, has since 1975 moved down along the rank order of importers. Its record year was 1974, when large Soviet replacements arrived after the 1973 war. It is still the largest buyer of Soviet equipment, but, just as in the case of Iraq, there is a noticeable trend towards diversification—France, FR Germany, Italy and Switzerland have since 1975 entered the Syrian arms market. Syria has purchased the Euromissile HOT and MILAN systems, ostensibly from France, which means that FR Germany does not have to approve the sales, even though West German technology is involved. Syria purchased two US transport planes in 1976, the civil version of the Hercules, but the most sophisticated fighter aircraft still come from the Soviet Union—for example, the MiG-23, some being supplied from Libya, and the MiG-25 Foxbat, for which Syria is the second Third World buyer after Algeria.

The two traditionally biggest arms importers in the area, *Israel* and *Egypt*, show a change in position after 1975, as compared with the first half of the 1970s when Egypt still ranked second among the Middle East

arms importers. The 1973 war was followed by large resupplies of armaments to Israel, whereas Egypt, due to the break in military relations with the Soviet Union, went down on the list. Egypt's switch to US and other Western armaments begins to show up in the statistics after 1975, and will be more visible as contracted sophisticated weapons, such as the F-5E, start to arrive. In 1979, Egypt received a batch of F-4 Phantoms, due to a delay of F-5 deliveries. During the whole period of the 1970s, the United States has been practically the sole supplier of arms to Israel, with the exception of German-designed IKL submarines delivered from Vickers in Britain in 1977 and 1978, armed with the Blowpipe SLAM missile.

In Egypt, France has conquered a big share of the major arms market, having sold Mirage-5 fighters, helicopters, the Crotale SAM system and the Euromissile MILAN; in 1980 Egypt may purchase the Mirage-2000 and the Mirage F-1C fighters.

Britain entered the Egyptian market after 1975, in particular in connection with the AOI projects for licensed production of the Hawk trainer, the Swingfire anti-tank missile and the Lynx helicopter. It seems as if these projects are likely to continue in Egypt, as national undertakings with US funding, in spite of the dissolution of AOI in 1979.

The peace treaty, signed between Israel and Egypt on 17 September 1978, was accompanied by a military aid package to both countries from the United States worth $3 000 million for Israel, and $1 500 million for Egypt. Of the amount for Israel, $800 million are MAP grants for the construction of two airfields in the Negev Desert; the rest is FMS credits, as is the whole amount for Egypt. This supplemental 1979 military aid package was motivated in the US Congress as being cheaper for the United States than the cost of another war in the Middle East:

> What is more, even in purely economic terms peace is surely less costly to our country than a continuation of the state of war. The US and the rest of the world have paid an incalculable economic price for war because of disruptions caused to our economy and the economies of others. It has been estimated, for example, that even a partial reckoning of the direct cost to US taxpayers of four Middle East wars totals something between $55 and $70 billion while the price we have paid in inflation, unemployment and other adverse economic developments attributable at least in part to Middle East instability would add billions more to this total. [28]

The US military aid packages to Israel and Egypt, agreed on in connection with the signing of the peace treaty that "will create stability in this area", include the supply to Egypt of F-5E fighters and possibly the F-16 which may be contracted in 1980, plus 750 M-113-A2 armoured personnel carriers and several hundred other military vehicles, the AIM-7 and AIM-9 air-to-air missiles and 500 Maverick air-to-surface missiles. Israel will receive 35 additional F-15 Eagle fighters and 75 F-16s armed with AIM-7

and AIM-9 missiles, 800 M-113-A2s, and other vehicles, as well as Maverick and Shrike missiles.

Thus, if another war should occur between Israel and Egypt, both sides will be armed with practically identical types, if not numbers, of the most sophisticated US weapon systems. This will also facilitate the logistic support, since the combatants will need the same spare parts, maintenance, and so on.

The Far East

The Far East (including Indo-China) has been the second largest arms-importing region during the 1970s. The Indo-China Wars account for a large share of the regional total—amounting to 62 per cent of the imports of major weapons in the period 1970–74. From 1978, Viet Nam is back on the list of importers due to the new Indo-China Wars.

The Far East as such still imports approximately half as many major weapons as the Middle East. The conflict determinant has been dominant, as in the Middle East. But since 1975, a significant shift has taken place—South Korea has emerged as the largest single new major arms importer, followed by Taiwan. The positions of both these countries reflect US foreign policy in Asia and its rapprochement with China. The Far East Asian nations Philippines, Malaysia, Singapore and Indonesia are all engaged in arms build-ups.

Indo-China

The re-emergence of *Viet Nam* in the rank order of major arms importers occurred when the large deliveries of Soviet weapons were restarted in 1978, and particularly during 1979, when they were used against China and Kampuchea. Over 100 MiG-21s and some MiG-23 fighters were delivered, plus a large number of armoured cars, tanks and ships.

The Vietnamese Army has been described as Asia's most well-armed army. After the collapse of the Saigon régime, the Vietnamese Army recovered some 550 tanks, 1 300 artillery pieces and 130 000 tons of ammunition, according to a US Department of Defense report published in November 1976. The total value of arms left by the South Vietnamese forces was, according to the same source, estimated at $5 000 million, including 940 ships, 90 transport aircraft and 466 helicopters. Immediately after the North Vietnamese takeover, speculation had it that these arms would be sold on the international market, which they never were. Instead they were put to use in yet another war in Indo-China.

In 1978, as the border confrontation expanded between Kampuchea and China, Viet Nam began to receive large quantities of arms and

military equipment from the Soviet Union for the first time since 1975. China withdrew all aid from Viet Nam in early 1978. Viet Nam also used some of the warplanes left behind in 1975. In the period from January to May 1979, the Soviet Union delivered by air and sea to Viet Nam some 74 000 tons of armaments. The Thai Air Force reportedly tracked 79 Soviet flights over Thailand to Viet Nam during the spring of 1979.

From 1975 onwards, the Pol Pot régime in *Kampuchea* received arms exclusively from China. In spring 1978, the Pol Pot forces also used some half a dozen North American T-28 light strike aircraft against Viet Nam. In April new supplies from China began to arrive, including some radar-controlled anti-aircraft guns, and fuel stocks at Pocheng airfield were established. According to Vietnamese officials, in 1978 China supplied military aid which allowed Kampuchea to expand its armed forces substantially [29].

The result of the great power involvement over the whole post-World War II period in the area is, among other things, the near extinction of the population in Kampuchea.

South Korea

One aspect of the rapid economic growth of South Korea is its emergence as a regional military power. The country has been under martial law since 1972. By September 1978, the United States had already given or pledged some $1 500 million worth of surplus military equipment and FMS credits as compensation for proposed withdrawals of US troops. Another $1 000 million will be offered in the next four years. The approximately 1 000 US tactical nuclear weapons stored in Korea have been withdrawn, however. Korea was allowed to take over the Honest John SAM batteries, but only after the nuclear warheads had been dismantled. South Korea has almost exclusively been supplied by the United States during the 1970s. From 1976, Italian and French producers have entered the market but as yet on a small scale. Over 100 F-5E fighters and some 50 F-4 Phantoms have been ordered, but the United States has delayed approval of the sale of the F-16, judged too sophisticated. South Korea, however, wishes to buy both the F-16 and the A-10A fighters, and may well succeed in doing so during 1980.

Taiwan

During the 1970s Taiwan has, through a combined effort of its own government and that of the United States, become a modern military power. The trend was visible at the beginning of the decade, and after 1975 Taiwan ranks as the second largest arms importer after South Korea. Taiwan is

nearly totally dependent on the United States for major arms, with the exception of some orders for missiles from Italy and Israel. It possesses nearly 200 F-5E fighters and also the F-4 Phantom. Like South Korea, Taiwan wishes to order the F-16, which has not yet been approved, and the F-4G Wild Weasel, which so far has been denied to all Third World countries.

The Carter Administration, in connection with the normalization of its relations with China, agreed to a one-year moratorium on arms sales to Taiwan during 1979. Arms already contracted were delivered, however, so the moratorium is not yet visible in the statistics on deliveries. On 23 December 1978, the Taiwanese Commander-in-Chief Admiral Soon urged the United States to reconsider its refusal to sell the F-16 and the F-18, claiming that "Taiwan's defence is important not only to keep the peace in this area, but in the whole Western Pacific" [30].

The Philippines

The Philippines ranked as the fifth largest importer of major arms in 1975–79 in the Far East. It was placed under martial law by President Ferdinand Marcos on 21 September 1972; the constitution was suspended, universities were closed, newspapers were banned, and at least 70 000 people were arrested for political reasons, according to the government's own admission.

The United States has still provided over 90 per cent of the arms since 1966. Despite the declaration of martial law, MAP doubled, and in particular COIN equipment was supplied, such as the OV-10 Bronco fighter, the Cadillac Gage V-150 armoured car, and helicopter gunships. A licence agreement was also achieved to produce the Colt M-16-A1 rifle (which fires a bullet that "does cart-wheels as it penetrates living flesh" [31]). COIN arms have been put to use against the Muslim insurgents in the south, resulting in over 50 000 casualties and over one million refugees. Heavy fighting also continues against the new People's Army in the north. A new military base agreement with the USA in January 1979 was accompanied by a promise from President Carter to persuade Congress to accept $300 million for the Philippines in MAP and FMS credits over the next five years.

Indonesia

Indonesia possesses large supplies of oil, tin and copper, and suffers from economic underdevelopment. It ranks as the sixth largest importer of major arms in the region, close behind the Philippines, for the period 1975–79. Unemployment and underemployment among the population is

estimated at 30 per cent and, according to the Indonesian Health Ministry, as much as 60 per cent of the population is undernourished.

In 1975 Indonesia invaded the former Portuguese colony of East Timor. Since this time, war has been waged against the local FRETILIN liberation movement in defiance of several United Nations resolutions to end the fighting. One Australian MP charged that 30 000–40 000 East Timorese have died of starvation because of the use of defoliants in FRETILIN-controlled areas. The Carter Administration has not restricted arms exports to Indonesia but instead extended $40 million in FMS credits in FY 1978, which was a 78 per cent increase over the previous year. The weapons supplied were, for example, the OV-10A Bronco COIN fighter, the Cadillac Gage V-150 Commando armoured car, revolvers, ammunition and tear gas. The United States and France are competing for Indonesian major arms orders as is Britain, which sold the advanced trainer Hawk. FR Germany sold two Type 209 submarines, and Sweden supplies Indonesia with Bofors guns.

Malaysia

During 1979, Israel and the United States competed in Malaysia over the sale of refurbished A-4 Skyhawks. FR Germany and Sweden have sold fast patrol boats. In 1979, the first order was signed for the US F-5E Tiger-2 fighter. COIN weapons, such as the S-61 helicopter and the V-150 Commando armoured car, have also been supplied.

Thailand

Thailand, although not yet among the six largest arms importers of the region, is nevertheless rapidly building up its armed forces. A number of new orders, mostly for US arms, have been concluded since 1976: Thailand purchased the F-5E Tiger-2 fighter, AIM-9 Sidewinder air-to-air missiles, M-48 and M-60 tanks and armoured cars. In the wake of developments in Indo-China, the United States will take a more favourable attitude to Thailand's request for armaments.

Thailand is one of the buyers of the Israeli Gabriel ship-to-ship missile, and has purchased the Spanish C-212A Aviocar transport aircraft from Indonesia, where it is licence-produced. Fast patrol boats have been acquired from Singapore and Italy.

Africa

At the end of the 1960s, the African continent still had a low military profile. Military expenditure and major arms imports were low, in relative terms. The next decade showed, however, that the conflicts which deter-

mine the need for armaments were still to come: the 1970s brought liberation wars in the former Portuguese colonies of Angola, Guinea-Bissau and Mozambique, and the end of Portuguese rule in Africa. These wars brought white rule in Africa nearer to an end, and led to the military build-ups in Rhodesia, South Africa and the so-called Black-ruled front-line states. White rule in Zimbabwe came formally to an end in early 1980, leaving South Africa as the last representative of white rule on the continent. At the end of 1979, reports on the existence of small guerilla groups in the province of Natal in South Africa appeared.

Conflicts and great-power involvement, as well as involvement of the former colonial powers in Africa, stand out as the main determinants of the military build-up. Added to this is the fact that most of the new nations which have achieved independence during the 1970s are located in Africa. The pressure of the 'prestige determinant'—or the 'industrialization determinant' (modern weapon systems are interpreted by the military as an increase of national prestige, and the modernization of the armed forces may sometimes be regarded as part of a general industrialization programme)—is as yet not so significant in Africa, not even in the case of the Republic of South Africa. In economic terms, South Africa is not a developing country, for the white population. Due to the increasingly open conflict with Black Africa, military policy has been oriented towards practical needs ever since the National Party came into power in 1948. Further, the UN embargoes and international protests against apartheid since 1963 have prevented South Africa from acquiring the sophisticated weapons to which other regional big powers in the Third World have access.

World Bank studies point out that, in terms of per capita income, 25 of the world's poorest nations are in Africa. ACDA statistics show, however, that Africa as a region imported ten times more weapons in 1976 than in 1966.

According to the SIPRI trend indicator, adding North Africa, Sub-Saharan Africa and the Republic of South Africa together, the region became the third largest Third World arms-importing area in the first half of the 1970s. This position was further strengthened from 1975 to 1979, when Africa accounted for 21 per cent of Third World arms imports. The single largest importer has for the past two decades been South Africa, but the position of the next largest arms buyers has shifted somewhat during the 1970s.

The military build-ups in Zaire and in Uganda are shown in table 3.6. By the end of the decade, new developments were reflected—Mozambique and Angola are ranked as the third and the fourth largest arms importers, respectively, following the long wars against Portugal and subsequent Soviet support and large arms deliveries after independence in 1974 and 1975, respectively.

The conflict in the Horn of Africa is illustrated in both tables 3.6 and 3.7—during the first half of the 1970s, Somalia received a number of modern Soviet armaments and it was reported that the Soviet Union was constructing a naval base at Berbera. After the change of régime in Ethiopia, the Soviet Union shifted its support; when war broke out between Ethiopia and Somalia in the Ogaden province in 1977, the Soviet Union shipped large amounts of weapons to Ethiopia. Both countries were fighting with Soviet weapons. Somalia failed to solicit support from the United States and West European countries, and received only minor amounts of second-hand arms from Egypt, Iran and some Muslim states. Reportedly, at the end of 1979, Somalia was again seeking rapprochement with the Soviet Union.

Sudan is affected by developments in Egypt, and in the Horn of Africa. It has turned to the United States for military equipment and stands out as one of the new US customers in the area.

The military build-up connected with the Southern Africa situation is also evident in the front-line states, that is, Tanzania and Zambia, in addition to Mozambique and Angola.

Zambia is the only country in the region which has invested in a modern air defence capacity, in view of the fact that the ZANU guerilla bases in Zambia have been constantly subjected to air attacks by the Rhodesian Air Force. Tanzania, with one of the few governments that try to fight underdevelopment, has nevertheless built up its armed forces, mostly with Chinese aid.

The traditional arms suppliers to African states were, obviously, the former colonial powers, contributing to a pattern of neocolonialist dependence. The UK and France were for a long period after 1945 almost the sole arms suppliers to the region. In the first half of the 1970s, France maintained this position with its military presence in Africa, unlike Britain. The main buyers of French arms are Gabon, the Ivory Coast, Togo, Madagascar, Morocco, Upper Volta, South Africa, Tunisia and Zaire, while the British arms customers are Ghana, Kenya, Nigeria, Sudan, Zambia and Uganda—this includes the sale not only of major weapons but also of small arms and military training. Britain has sold mostly aircraft, missiles, artillery, and warships to South Africa before 1960. France supplies mostly aircraft and armoured cars. The colonial supply monopoly was broken first of all by the Soviet Union, which in the second half of the 1970s stands out as the largest supplier of major arms to the region. The major Soviet buyers are Angola and Mozambique, followed by Libya and Algeria.

Other arms producers, such as China, Canada, Italy and FR Germany, are also interested in the African market. The raw material supplies of some African states, notably South Africa, Zaire, Zambia, Nigeria and

Angola, make them attractive as trading partners.

The MiG-21 fighter has been in combat in Africa in several wars—in Angola since 1976 in the fighting against the South African-supported FNLA, in the conflict between Egypt and Libya in 1977, in the invasion by Tanzania of Uganda in 1978, and in the Ethiopia–Somalia war of 1977–78. The Mirage fighters are the most sophisticated aircraft in Southern Africa, used by the South African Air Force against Angola. Italian COIN aircraft have been used by South Africa internally in Namibia, and have also been supplied to Rhodesia.

The United States increased its involvement in African politics during the 1970s. Previously, relatively few African countries possessed US weapons—but at present the largest buyers of US arms are Morocco and Tunisia in North Africa, and Kenya, Sudan and Zaire.

North Africa

In the second half of the 1970s, North Africa advanced to the position of third largest arms-importing region (the same position held by Africa as a continent). Libya stands out as the single largest arms buyer among the four Maghreb countries throughout the decade, responsible for as much as 65 per cent of the imports. But the supply pattern to Libya has changed —up to 1974, France was still by tradition the largest arms supplier, but it was replaced by the Soviet Union after 1975. Libya is one of the Soviet customers which has received very sophisticated weapons, such as SCUD missiles, MiG-23 fighter aircraft and T-72 tanks, before the USSR's East European allies.

Since 1973, Libya, one of the oil-producing countries, has diversified its arms suppliers to a certain extent. In a major oil deal, 400 Brazilian armoured cars were purchased in 1977, and large orders for helicopters and COIN aircraft have been placed with Italy. The Khadaffi régime has received armoured cars and the Seacat ship-to-air missile from the UK, and four Daphne-class submarines have been acquired from Spain. The Libyan government's request for sophisticated armaments aroused attention in the 1960s when the first batches of Mirage fighters were purchased. In 1975, 36 more of the new version Mirage F-1C were bought. Libyan weapons have to a large extent been used to support other Muslim states in their fight against Israel, as well as radical organizations such as the PLO. Idi Amin of Uganda on several occasions received Libyan arms and other military support, including some troops towards the end of his rule.

Sub-Saharan Africa

During the 1950s and 1960s, the Republic of South Africa alone imported nearly as many weapons as the rest of Sub-Saharan Africa together. By

the end of the 1970s, however, this situation changed, indicating increased militarization of the region.

In the second half of the 1970s, France supplied 53 per cent of the major arms transferred to the *Republic of South Africa.*

Although subject to a UN embargo on arms supplies since 1963, extended to a mandatory embargo in 1978, South Africa has succeeded in acquiring a large number of modern arms. This was due first of all to the acquisition of production licences, and secondly, to loopholes in the embargoes.

There are many means of circumventing an arms embargo—aside from direct smuggling, 'civilian' arms may be imported, that is, goods with dual civilian/military applications such as light utility aircraft, electronics, engines, and so on. Arms can also be imported via a third party, usually a private sales company. The Cessna company has, for example, achieved an export licence for its Model 185 lightplane, which is used by South Africa for border patrol. All of the approximately 500 privately owned lightplanes are officially assigned to the air force for use in wartime. Military matériel can also be acquired if the original producing company establishes a local branch in South Africa. Many US and other Western firms have such subsidiaries; in particular, the British aerospace industry has collectively threatened to move a large share of its production to South Africa unless the British government loosens the embargo on arms exports to the country [32].

Through semi-private and industry contacts in the USA, the South African Army has been able to modernize its artillery. It is now equipped with the reportedly "most advanced artillery in the world", the GC-45 howitzer. The agent involved in the sale, the Space Research Corporation, is under investigation by the US Senate.

Israel has to a certain extent substituted for the Western suppliers who wish to avoid the embarrassment of too openly breaking the embargo. South Africa has purchased Reshef-class missile boats, Gabriel ship-to-ship missiles, and small arms.

COIN aircraft from Italy, produced under licence, do not seem to be affected by the embargo. Via Italy, aircraft with US components have also been supplied to South Africa—for example, the AL-60 lightplane, and the Cessna Model-337 Skymaster from France. Throughout the 1970s, Italy remained the second largest arms supplier to South Africa.

South Africa managed to purchase C-130 Hercules transport aircraft from the United States, ostensibly for use with the domestic airline. Reports such as the following reveal the real use:

> In the midst of the panic, of the cries of the wounded, other aircraft were heard approaching. This time it was four gigantic American C-130 Hercules transport

planes, which dropped their cargoes of parachutists, armed to the teeth, around the village. Terrified, the Namibians tried to break through the infernal circle, and the small group of guerillas protecting the village held on to their defensive positions. But how were they to stop this force of half a thousand parachutists, with 3 000 civilians on hand? ... Of the 3 608 Namibians living there, more than 600 were killed, some 350 were wounded, 160 of them severely. [33]

The mandatory embargo has had some effect, notably on arms imports from France. In early 1979, deliveries of Agosta submarines and A-69 frigates were stopped, and there are reports to the effect that the South African fleet of Mirage-F-1Cs is now grounded due to lack of spares.

Zimbabwe-Rhodesia has been placed under a mandatory arms embargo ever since the Ian Smith régime unilaterally declared the country independent from Britain in 1965. South Africa has been practically the sole supplier of all types of armaments. But in the case of Rhodesia, the illegal arms trade has also prospered. Before 1974, for example, arms shipments for Rhodesia passed through the port of Beira in former Portuguese Mozambique. The Rhodesian armed forces have consistently been upheld by the original suppliers of arms, including Britain, through the supply of spare parts without which the weapons would long ago have become useless.

The intensification of the Southern African conflict is reflected also in the increase of arms supplies to Rhodesia during the second half of the 1970s, despite the embargo.

In 1976, the military version of the Cessna-337, produced in France as the FTB-337 Milirole, was delivered via 'circuitous routes', reportedly involving sale to a Spanish fishing company based in the Canary Islands for further shipment to Rhodesia. There, bomb racks were fitted and the planes are used for reconnaissance and light air strikes against guerilla encampments.

In December 1978, it was revealed that the Rhodesian Air Force used 11 Bell-205A utility helicopters against guerilla forces. This helicopter is licence-produced in Italy, and was originally sold to the Israeli Air Force, then to a US company operating in Singapore, and then to Rhodesia.

In 1973 South Africa received the Euromissile MILAN, presumably from France, which was some years later seen in combat in Rhodesia. South Africa has also supplied the Eland armoured car and the Impala COIN fighter, as well as a relatively large number of Alouette helicopters, to Rhodesia.

President Nixon stated that *Zaire* was "a good friend and a good investment" [34] and President Carter pointed out that the United States

had "substantial commercial investments there". Money has been poured into the tourist business and the copper mines, whereas agricultural production has declined and real wages have fallen by an estimated 50 per cent since 1963. From late 1962, the United States has been one of the arms suppliers, providing anti-personnel rockets and C-130H Hercules transport aircraft, although France still accounted for over 80 per cent in the first half of the 1970s. These US weapons have been used by the government to crush several revolts. When the rebellion in 1977 in the Shaba province threatened the copper mines, the United States organized an air-lift of fuel and C-130 spares to Zaire. When French and Belgian forces finally intervened in 1978 to crush the new Shaba uprising, the United States provided transport services.

Zambia tends to purchase much the same type of equipment as Zaire, but on a smaller scale and with more diversification. Zambia has purchased Italian SF-260 armed trainers and helicopters, Chinese MiG-19 fighters and transport planes, and the Swedish Saab Supporter. In August 1979, President Kaunda declared that Zambia should buy more defensive weapons to counter what he termed "rebel Rhodesian attacks". There is no indication of how a financially stripped Zambia will be able to pay for new weapons. At the end of 1979, Zambia purchased 16 MiG fighters, tanks and armoured cars worth $85.4 million, from the Soviet Union, and hundreds of Zambians are currently undergoing training there.

South America

Similarly to Africa, South America may be described as a continent with a low military profile. In the first half of the 1970s the continent as a whole imported only 15 per cent of the amount that went to the Middle East in the same period.

In South America, unlike the Middle East and the Far East, there has not been the type of conflict which necessitates the acquisition of modern major weapon systems for actual use in war. The need for weapons has been for other purposes, namely for internal security—or internal repression—and supplies of small arms and police equipment are therefore important in the region.

> Since the agreement on the Alliance for Progress in 1961, there have been sixteen military coups leading to military governments that now rule over the majority of people in Latin America. That the military aid from the United States, even when restricted to equipping the armed forces with weapons dating mostly from the Second World War or shortly thereafter, has eased the way for military juntas to take over the government is obvious and indisputable. [35]

The supplies of small arms, police equipment and training to Latin America have been well catalogued and analysed by the North American

Congress on Latin America (NACLA), in particular by Michael Klare. Concerning major arms, the United States has since the 1960s adhered to a restrictive policy, but not for arms-control reasons alone. By the mid-1960s the result of this policy was that the leading West European producers saw an opportunity to conquer the South American market for sophisticated systems. Between 1967 and 1972, South America spent $1 200 million on European military hardware and only $335 million on US equipment [36].

Since 1973, the USA has increased its sales of major weapons, and in 1973 President Nixon invoked a provision of the FMS Sales Act in order to permit the sale of the F-5E Tiger-2 fighter to Argentina, Brazil, Chile, Colombia and Peru. Since then, Chile, Ecuador and Peru have purchased the Cessna A-37 Dragonfly COIN aircraft.

Brazil was ranked as the single largest arms importer in 1975–79, followed by Peru. Venezuela has used a large part of its oil revenues for the acquisition of modern weapons, ranking first in the period 1970–74. There is, furthermore, a big gap between the six importing nations listed in table 3.7 and the remaining countries in the region: after Ecuador, with a trend indicator value of $304 million, comes Bolivia, with $35 million.

The largest supplier to the region during the 1970s has been France, followed by the USA and the UK. FR Germany has also found customers in South America, in particular for its submarines, and Italy is exporting modern frigates.

Brazil

Brazil, ruled by a military junta since 1964, imported 24 per cent of the regional total of arms imports in 1975–79. The country has experienced rapid economic growth in GNP terms, a substantial increase in US investments, a decline of more than 40 per cent in workers' real earnings, as well as harsh suppression of dissent. In 1977, the US State Department issued a report criticizing Brazil for violating human rights. The Brazilian government responded by cancelling the 25-year-old military assistance pact with the United States; the USA did not, however, stop direct arms sales to Brazil. In FY 1977, Brazil purchased $20 million worth of US arms, including 5 000 tear-gas grenades. Brazil's main purchases have been missiles and helicopters from France, Euromissile HOT and MILAN from FR Germany, and helicopters and frigates from Britain. Brazilian policy can be summarized as aimed at making the country a regional great power, both economically and militarily. Success in the latter is probable, in particular with the assistance of West European arms and other forms of military aid.

Argentina

In March 1976, General Jorge Rafael Videla was installed as president in a military coup. He has since then been reputed to be one of the worst violators of human rights in the world. Amnesty International estimated in 1978 that Argentina held more than 10 000 political prisoners, and that another 15 000 persons have been arrested or abducted and have then 'disappeared'. The long-established labour movement in Argentina has lost its right to strike and the right to collective bargaining. The US Congress voted to end all US military aid and arms sales to Argentina from 1 October 1978, shortly before which the Carter Administration had authorized $120 million in military exports, including trainer aircraft and the C-130H Hercules transport aircraft. In spite of the cut-off, Argentina will still be allowed to receive dual-purpose goods, such as cars and computers, as well as military training. Some 30 Argentinian officers received US training during 1979.

Argentina has purchased the Mirage fighter from France, as well as helicopters and missiles. In 1979, Argentina—itself subject to an embargo by the United States—managed to acquire two sophisticated missile-armed modern frigates, the French-built A-69 type, denied to another customer under embargo. The A-69s were originally ordered and constructed for South Africa, but were blockaded in late 1978 in accordance with the UN mandatory embargo on South Africa. FR Germany received orders for six new-construction MECO-360 frigates in 1978, 20 new fast patrol boats, as well as Class 1700 submarines. Israel succeeded in selling 26 of its aged Mirage-5 fighters to Argentina in 1978 as part of a general effort to sell off obsolete equipment, and Italy sold the G-222 transport plane. The Netherlands has provided transport aircraft, and Sweden sold the Bofors Bantam portable anti-tank missile. The European sellers have never related these arms sales to the violation of human rights in Argentina.

Chile

Chile, ranked as the region's third largest arms importer in the first half of the 1970s and as the fourth largest in the second half of the decade, has obviously had difficulty in purchasing armaments since the fall of the Allende régime.

Sweden sold the cruiser *Göta Lejon* to Allende's government, at a time when Chile was classified as a non-tension area with a democratic government. This illustrates a supplier's dilemma—namely, that conditions in purchasing countries do tend to change. Although the fall of Allende in 1973 prompted the US Congress to cancel MAP and FMS deliveries to

Chile in late 1974, commercial sales by private companies were still allowed, which enabled Pinochet's régime, strengthened economically by US loans and investments in the country, to purchase riot control agents and $1.2 million worth of ammunition before this loophole was closed by Congress in 1976. The US embargo still allowed delivery of the $120 million backlog of arms orders placed before 30 June 1976, and so Chile received more than $50 million worth of arms in FY 1977: these deliveries included the Cessna A-37 Dragonfly COIN fighter. In FY 1978, arms worth more than $10 million were delivered. (Normal business practice, observed in all embargo cases, is that orders already contracted must be fulfilled.)

Since then, however, the Chilean régime has experienced difficulties in obtaining arms. An attempt to buy the entire fleet of obsolete Hunter aircraft from India failed. France entered the market, however, and delivered AMX-13 armoured light tanks, the AMX-30 main battle tank, and AS-11 and AS-12 anti-tank missiles; and Israel has sold its own design, the Shafrir-2 air-to-air missile.

South Asia

The region of South Asia has decreased its imports of major arms between the first and second halves of the 1970s, relative to the other Third World regions. Ranking third in 1970–74, the region now occupies sixth place, accounting for 5 per cent of Third World major arms imports during 1975–79.

India

The single largest arms importer in South Asia has been the world's largest democracy, India, which during the 1970s imported more than twice as many major weapons as the remaining five states together. In the latter half of the 1970s, India accounted for 57 per cent of the region's major arms imports.

There is a certain resemblance between India and Brazil—India, too, is a regional great power in its own right; it is modernizing, industrializing and bent on becoming a developed country, and one with adequate military forces. The official Indian explanation of its purchase of major arms from the Soviet Union has been the need to achieve independence from the former colonial power Britain. The result was, however, that in the first half of the 1970s the Soviet Union accounted for 70 per cent of the supplies of major arms to the region, most of which consisted of MiG fighters, missiles and warships to India. There is, all the same, a policy in India of trying to diversify the sources of major arms—Britain is most

noticeable, with the sale of production know-how, and France is supplying anti-tank missiles. During 1979, India was among the potential customers for the cancelled Shir-2 tanks from Britain to Iran, but no contract was signed.

Pakistan

Pakistan, a country which has experienced considerable political unrest during the 1970s, remains the region's second largest arms importer, accounting for 28 per cent of the major arms imports to the region. Pakistan has been, and still is, involved in a regional arms race with India, but much of Pakistan's military policy is also oriented toward the Muslim world. During the first half of the 1970s, major arms imports from China made China the second largest supplier to the region. In the wake of developments in Iran and Afghanistan, the United States may well decide to make a come-back on the arms market in the region. Already in February 1979, former Indian Minister for Foreign Affairs Vajpayee warned the United States about rearming Pakistan, following the crisis in Iran: "Now it [the United States] should know that *arms cannot bring about political stability inside the country or economic development*" [37].

Afghanistan

In April 1978, Nur Mohammed Tarakki became head of state of Afghanistan after a bloody military coup, and proclaimed that his revolution had ended an aristocracy that had ruled for 130 years. However, the Soviet Union had delivered arms to the Kingdom of Afghanistan from the early 1930s. After World War II, Afghanistan requested aid from the United States to modernize its armed forces, but received no response at that time. The Afghan Prime Minister said in 1946: "I am convinced that America's championship of the small nations guarantees my country's security against aggression. America's attitude is our salvation. For the first time in our history we are free of the threat of great powers using our mountain passes as pathways to empire" [38].

Throughout the post-World War II period, Soviet major arms supplies to Afghanistan have been substantial: restarting in 1956, supplies have included MiG-17s, Yak-11s, Il-28s, and MiG-19s and MiG-21s, the latter from 1966. Missiles and tanks were also supplied. In February 1979 the small US military and economic aid, worth $250 000, was cancelled.

The Tarakki military coup provoked an uprising by Muslim rebels throughout the country. Already in March 1979 it was reported that Tarakki might be replaced as head of the government since his régime could not cope with the rebellion, and the leading contender mentioned was Foreign Minister Hafizullah Amin [39].

The Soviet Union reacted strongly to the internal rebellion and accused the United States, Pakistan, Iran and Egypt of aiding the Muslims. In March, helicopters, tanks and APCs were brought in. Troop-carrying Mi-24 Hind helicopters were used to transport Afghan troops to attack the rebel bases, clustered in rough mountain terrain—the same tactic that the United States tried in Viet Nam.

On 14 September 1979, former Foreign Minister Amin took control of the country, and his government, too, received heavy Soviet military support—some 800 main battle tanks and 800 additional APCs were delivered, as well as mortars and artillery pieces. The Muslim rebellion was, however, not crushed, in spite of the fact that this turned out to be the most extensive Soviet military involvement in any current conflict, surpassing that in Ethiopia in 1978 and in Viet Nam earlier in 1979. Before the end of the year, a large number of fighter aircraft, including MiG-21s, had also been delivered. The resemblance to the US presence in Viet Nam was striking to most observers, as Muslim opposition to the Soviet presence continued to grow. At the end of December, the Hafizullah Amin government was ousted in a coup in favour of Karmal, and in early 1980 the Soviet Union invaded Afghanistan with a large number of troops.

The hope voiced in 1946 that Afghanistan would no longer be used as a "pathway to empire" by any great power has not been fulfilled. However, judging from events during the first months of 1980, the Soviet Union may find, as did the United States in Viet Nam, that in what is defined as an "assymetric war", sophisticated weapons alone may not be enough to subjugate the opposition.

Nepal

The region of South Asia contains a small new arms importer, Nepal, on the scale of Botswana and Swaziland in Southern Africa. Nepal decided in 1979 to set up an air force, whose nucleus will be a few helicopters and ex-British Skyvan transport aircraft hitherto in the possession of the army. France, Britain, the United States and China have already shown interest in providing fighter aircraft. Nepal's first requirement is likely to be one squadron of fighters.

The army has been modernized and has diversified its arms suppliers to a certain extent during the past few years. India was previously the sole arms supplier, but Nepal recently received several million rupees worth of small arms, anti-tank grenades and mines from the Soviet Union.

Sri Lanka

Sri Lanka, after an initial phase of building up the armed forces to a certain degree, remained a very small importer of major arms during the second half of the 1970s.

Central America

The small states in Central America remain at the bottom of the rank order list of arms-importing regions. Just as in the case of South America, small arms and police equipment have been much more crucial than the possession of sophisticated major armaments for keeping the régimes in power. Military training at the US Southern Command School in Fort Gulick in the Panama Canal Zone is another form of military aid, concentrating on increasing the counter-insurgency capabilities of the Central and South American army and police forces.

Cuba

Cuba stands out as the sole exception to the pattern of the military profile of Central America, being equipped with highly modern major arms by the Soviet Union since the Castro régime came to power. The most sophisticated delivery took place when MiG-27 fighters appeared in 1978, a transaction which caused much publicity and caused US forces to call an alert. Both the Cuban and Soviet governments came forward with assurances that the MiG-27s were not equipped with nuclear armaments.

Cuba alone has during the 1970s imported nearly three times as many major weapons as all the other states in the region together; all the arms have been supplied by the Soviet Union, which in turn has made the Soviet Union the biggest supplier to the region.

The United States remains the second largest supplier to the area, supporting the dictatorships in Guatemala, El Salvador, Honduras, Haiti and Nicaragua. Israel has found an arms market in Central America, selling military equipment to Honduras, El Salvador and Guatemala. In the 1976 border conflict between Honduras and El Salvador, both countries used Israeli-made infantry weapons. Israel was also a main supplier of armaments to the Somoza régime in Nicaragua before its fall in 1979.

Nicaragua

In 1934, US Marines installed Somoza's father in power as head of the Nicaraguan National Guard, and the US government has kept close ties with the Somoza family ever since. Before Israel entered the market, virtually all arms came from the United States, and most of the officers were trained at the Fort Gulick school. After Somoza declared martial law in 1974, US military aid doubled to over $5 million in FY 1975, including the supply of the Cessna A-37B Dragonfly COIN fighter, revolvers, ammunition and Colt M-16 rifles. Although the Carter Administration announced an informal arms embargo and an embargo on

economic aid, diplomatic relations were never broken with the Somoza régime, and in May 1979 the United States supported a $65 million loan to Nicaragua from the International Monetary Fund (IMF). US military aid to Nicaragua was ended on 17 July 1979, however.

Oceania

The last group of Third World countries, belonging to Oceania, merits attention more for its existence than for the size of its imports of major armaments. The region shows up in the statistics for the period 1975–79, and contains three countries—Papua New Guinea, the Fiji Islands and the Seychelles. Like the other new, very small nation-states, they are all establishing some token military force. It is evident that no nation, however small, is willing to abstain from establishing armed forces.

VIII. Control of the arms trade

The CAT talks

Soon after taking office, US President Carter announced in May 1977 his intention to pursue a policy of: (*a*) unilateral US arms export restraint; (*b*) negotiations with other major suppliers of arms; and (*c*) encouragement of regional restraint in the recipient areas. In his own words:

> I am initiating this policy of restraint in the full understanding that actual reductions in the worldwide traffic in arms will require multilateral cooperation. Because we dominate the world market to such a degree, I believe that the United States can, and should, take the first step. However, in the immediate future, the United States will meet with other arms suppliers, including the Soviet Union, to begin discussions of possible measures for multilateral action. In addition, we will do whatever we can to encourage regional agreements among purchasers to limit arms imports. [40]

Following this initiative, four rounds of Conventional Arms Transfer (CAT) talks between a US delegation, headed by Leslie H. Gelb, and a Soviet delegation, led by Lev Mendelević, took place [41]. A general exchange of views seems to have been the main purpose of the first meeting in Washington in December 1977. Some progress towards discussing more substantial matters was obviously achieved during the second and third rounds of talks held in Helsinki in May and July 1978, respectively.

After the meetings in Helsinki, US sources believed that both sides could agree before the end of the year on a broad framework for arms transfer restraint and on specific measures to implement such restraint [42]. However, the fourth meeting, held in Mexico City on 5–15 December 1978, ended in a deadlock. Each side made accusations concerning the

other's arms exports and, furthermore, a serious conflict of opinion within the US Administration about the usefulness of the CAT talks as an instrument of arms control arose. Shortly before the June 1979 summit meeting between the USA and the USSR in Vienna, several reports indicated that the issue of controlling conventional arms transfers might, apart from SALT II and despite the set-back in December 1978, become an important item on the agenda [43–45]. This hope was further supported by an explicit reference to the problem of arms transfer controls in the communiqué issued at the end of a visit of the French president to the USSR in April 1979. However, the issue of conventional arms transfer restraints seems to have played practically no role at all during the Carter–Brezhnev summit meeting. Both sides were unable to overcome the impasse of December 1978, despite the one sentence on this matter in the final communiqué: "The two sides agreed that their respective representatives will meet promptly to discuss questions related to the next round of negotiations on limiting conventional arms transfers" [46]. No such meeting had taken place by the end of 1979.

Other initiatives

As in many previous years, the issue of monitoring or limiting conventional arms transfers was taken up neither at the 34th UN General Assembly nor in the Committee on Disarmament in Geneva. This seems particularly disappointing since the Final Document of the UN Special Session on Disarmament had explicitly made reference to the arms transfer problem:

> 85. Consultations should be carried out among major arms supplier and recipient countries on the limitation of all types of international transfer of conventional weapons, based in particular on the principle of undiminished security of the parties with a view to promoting or enhancing stability at a lower military level, taking into account the need of all States to protect their security as well as the inalienable right to self-determination and independence of peoples under colonial or foreign domination and the obligations of States to respect that right, in accordance with the Charter of the United Nations and the Declaration on Principles of International Law concerning Friendly Relations and Co-operation among States. [47]

With no sign of progress on either the bilateral US–Soviet level or in multilateral forums, it is not surprising that parliamentary initiatives in various West European countries aimed at tightening national arms export regulations or criticizing their governments' arms export policies have been even more sparse in 1979 than in previous years.

A new international appeal to take up the issue of containing the arms build-up in the Third World was launched at the beginning of 1980, however. On 12 February, after two years of deliberations, the Independent Commission on International Development Issues (ICIDI), chaired by former West German Chancellor Brandt, submitted its final report to

the Secretary-General of the United Nations. The ICIDI report, whose main aim was to put forward new proposals to overcome the gross economic disparities between industrialized and developing countries, has as a matter of course taken up the issue of armaments. In a chapter on 'Disarmament and Development', the report points to the obstacles that high military spending, massive arms imports and considerable investment in domestic arms production efforts create for developing countries in their efforts to overcome poverty, hunger and massive unemployment.

Two recommendations are made:

(1) Military expenditure and arms exports might be one element entering into a new principle for international taxation for development purposes. A tax on arms trade should be at a higher rate than that on other trade.

(2) Increased efforts should be made to reach agreements on the disclosure of arms exports and the exports of arms-producing equipment. The international community should become more seriously concerned about the consequences of arms transfers or of exports of arms-producing facilities and reach agreement to restrain such deliveries to areas of conflict or tension. [48]

The idea of taxing military expenditures and arms exports obviously has such serious shortcomings that it should be reconsidered. First the chances for such a proposal being accepted are currently and for the foreseeable future close to nil. Second, it can be argued, with some justification, that a tax on military expenditures and arms exports might in a sense help to 'legitimize' the attempts to acquire more weapons. Third, and most important, very few states reveal information about their military expenditures and arms exports, so it would hardly be possible to collect reliable figures upon which to base such a taxation in the first place. On the other hand, the proposal to disclose arms transfers and arms-producing facilities might be worth pursuing. Monitoring arms transfers through an international organization, such as the United Nations, might be a small step toward a better multilateral overview of the arms trade and, possibly, a first attempt to apply some control mechanisms to the otherwise unrestricted arms trade.

Prospects

After the obvious failure of both the CAT talks and the unilateral pledge by the United States to restrain US arms exports, the prospects for controlling arms exports during the 1980s look dim. If unilateral restraint fails to convince potential partners of bilateral or multilateral attempts to curtail arms transfers, then the chances for a settlement become minimal. If, on the other hand, multilateral initiatives do not lead to acceptable agreements, then it will become extremely difficult for a single supplier country to sustain a policy of unilateral restraint. And if, finally, not even

the two biggest arms suppliers of the world can at least agree on a framework for talks on arms transfer restraints, then it will hardly be possible to win the support of other suppliers and, just as important, the consent of major arms recipients.

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Appendix 3A

Register of the arms trade with industrialized and Third World countries, 1979

See the *SIPRI Yearbook 1979* for sources and methods (Appendix 3C, pages 242–55), for conventions and abbreviations used in the registers (pages 252–55), and for the key to the region codes (page 255).

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
I. Industrialized countries								
11 Australia	FR Germany	90	Leopard-1-A3	MBT	1975	1976	(18)	
						1977	(18)	
						1978	(54)	
	France	1	Durance Class	Support ship	1977			
	United Kingdom	100	Rapier	Landmob SAM	1975	1978	25	
						1979	25	
						1980	25	
						1981	25	
	USA	2	B-707-320C	Transport	1978	1979	2	
		2	FFG-7 Class	Frigate	1976	1981	2	
		1	FFG-7 Class	Frigate	1977			Third ordered 1977; total cost: $700 mn, includes all 3 ships; to be delivered Dec 1982
		10	P-3C Orion	ASW/mar patrol	1976	1977	1	
						1978	7	
						1979	2	
		90	RGM-84A Harpoon	ShShM	1976			30 launchers ordered for 2 FFG-7-class and 3 Perth-class frigates; may buy 30 more
7 Austria	France	4	SA-319B	Hel	1979	1979	4	Attrition replacement
	Italy	24	AB-212	Hel	1978			
	USA	50	M-60-A3	MBT	1979			
4 Belgium	FR Germany	55	Gepard	AAV	1973	1978	20	
						1979	35	
	France	16	Alpha Jet	Trainer	1977	1979	(16)	Total order: 33, of which 50 percent to be licence-produced
		6000	MILAN	ATM	1979			Offset order from Euromissile; total requirement: 420 by 1986
	United Kingdom	136	Scorpion FV-101	Recce AC	1972	1975	14	
						1976	20	
						1977	30	
						1978	36	
						(1979)	(36)	
		90	Spartan	APC	(1978)			On order; in addition to 238 in use
	USA	1224	AIM-7E Sparrow	AAM	1977	1979	(60)	For 102 F-16 fighters

	FR Germany	1224	AIM-9L	AAM	1977	1979	(60)	NATO coproduction programme; main contractor Bodenseewerke
	USA	. .	MIM-23B Hawk	Landmob SAM	(1979)			
		. .	NATO Seasparrow	ShAM/ShShM	1970	1976	(96)	Part of NATO Seasparrow programme; for Westhinder Class ships
						1977	(48)	
						1978	(48)	
5 Bulgaria	Czechoslovakia	125	L-39 Albatross	Trainer	1972	1979	(25)	Entered service in 1977 in Czechoslovakia
	USSR	. .	T-72	MBT	(1978)	1979	(15)	
4 Canada	FR Germany	114	Leopard-1-A3	MBT	1976	1978	57	
						1979	57	
	USA	1728	BGM-71A TOW	ATM	1978			
		18	CP-140 Aurora	ASW/mar patrol	1976	1980	9	Special design for Canada based on P-3C Orion and S-2A Viking
						1981	9	
		. .	E-3A Sentry	AEW	1978			
3 China	Egypt	. .	MiG-23S	Fighter	(1979)	(1979)	1	Reportedly delivered Jan 1979 as part of payment for 60-80 Shenyang F-6 (MiG-19) delivered from China to Egypt; may be for use as model for new Chinese fighter design
	France	15000	HOT	ATM	1979			
		15000	MILAN	ATM	1979			Negotiating; total cost: including HOT and Crotale
		. .	MM-38 Exocet	ShShM	(1979)			
		. .	R-440 Crotale	Landmob SAM	(1979)			Negotiating
		. .	Super Frelon	Hel	1978	(1979)	(13)	
	United Kingdom	30	AV-8A Harrier	Recce	(1979)			Order near finalization; will probably be licence produced
		125	Shir-1	MBT	(1979)			
	USA	9	Model 212	Hel	1979	1979	9	Delivery Sep-Dec 1979
5 Czechoslovakia	USSR	. .	Il-76 Candid	Transport	1977	1979	(10)	Czechoslovakia and Poland first WTO states to receive new plane, after Iraq
		300	T-72	MBT	(1978)	1979	60	
4 Denmark	United Kingdom	7	Lynx	Hel	1977	1979	7	
	USA	46	F-16A	Fighter/strike	1977	1979		
		12	F-16B	Fighter/strike	1977	1979		
		3	Gulfstream-3	Transport	1979	1981		For maritime patrol transport and SAR duties; delivery late 1981-82

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		240	NATO Seasparrow	ShAM/ShShM	1968	1975	96	
						1976	96	
						1977	24	
						1978	24	
		240	RGM-84A Harpoon	ShShM	1975	1976	16	
						1977	8	
						1978	8	
7 Finland	USSR	180	AA-2 Atoll	AAM	1978	1979	(90)	
						1980	(90)	
		7	Mi-8 Hip	Hel	(1972)	1973		First delivery 1973; total of 6 in use
		30	MiG-21bis	Fighter	1978	1979	(15)	
						1980	(15)	
		5	Osa-2 Class	FPB	1976			
		. .	SA-3 Goa	Landmob SAM	1977	(1979)	(10)	
		. .	SA-7 Grail	Port SAM	1978			
		60	SSN-2 Styx	ShShM	1976			For 5 Osa-class FPB
4 FR Germany	France	16	MM-38 Exocet	ShShM	1973	1975	4	
						1976	4	
						1977	4	
						1978	4	
		24	MM-38 Exocet	ShShM	1977			
	Italy	600	M-47 Patton	MBT	1977	1978	50	
	United Kingdom	12	Lynx	Hel	(1978)	1979	(6)	For 6 Type 122 frigates; contract signed Jun 1979; total cost: $164 mn; delivery 1981-82; Westland will meet 15-20% of offset agreement during first year of programme
						1980	(6)	
	USA	15000	BGM-71A TOW	ATM	1977	1978	7500	
						1979	7500	
		. .	BGM-71A TOW	ATM	1979			Agreement signed at Paris Air Show; to arm Bo-105 hel
		. .	E-3A Sentry	AEW	1978			
		96	NATO Seasparrow	ShAM/ShShM	1977			FRG joined NATO Seasparrow production group in 1977
		142	RGM-84A Harpoon	ShShM	1978			

4	France	Canada	20	CL-89	Transport	(1979)		
		United Kingdom	4	HS-748 Coast	Coast patrol	(1979)		Tactical transport version
		USA	. .	BGM-71A TOW	ATM	1979		
5	German DR	Czechoslovakia	. .	L-39 Albatross	Trainer	1972	1978	15
		USSR	. .	AT-4 Fagot	Port ATM	1977	1978	240
			4	Berlin	Frigate	(1977)	1979	1
								Koni-class; to replace Riga-class frigates
			. .	M-1973	SPH	(1978)	1979	(20)
								First shown in military parade Oct 1979; 152-mm SPH
			. .	SA-6 Gainful	Landmob SAM	(1978)	1979	(30)
								First shown in military parade Oct 1979
			. .	SA-9 Gaskin	Landmob SAM	(1978)	1979	(100)
								First shown in military parade Oct 1979
			200	T-72	MBT	(1978)	1979	(25)
4	Greece	FR Germany	1	Type 209	Submarine	1976	1979	1
								Order date: Sep 1976
		France	. .	AMX-10P	AC	(1977)		
			115	AMX-30	MBT	(1978)		On order
			540	MILAN	ATM	1978	1978	270
							1979	270
			20	MM-38 Exocet	ShShM	1977		
		Italy	6	AB-212AS	Hel	(1978)		On order
			120	Aspide-1A	AAM	1976	1978	60
							1979	60
								For modernization of 5 ex-US Navy Gearing-class destroyers: 1 8-cell launcher/ship
		Norway	100	Penguin-2	ShShM	1976		
								For 6 Combattante-2-class FPB being licence produced in Greece
		USA	5	A-7E Corsair-2	Fighter	1977	1978	2
			100	AIM-7E Sparrow	AAM	1977	1978	100
			300	AIM-9L	AAM	1977	1978	150
							1979	150
			. .	AIM-9P	AAM	(1978)		
								Five hundred to be delivered 1980
			10	CH-47C Chinook	Hel	1977	1979	(5)
							1980	(5)
			600	Chaparral	Landmob SAM	1979		
								Pending congressional approval; order including 37 launchers
			11	M-109-A1	SPH	1979		
			32	RGM-84A Harpoon	ShShM	1979		
								Order including support and equipment; for Navy; pending congressional approval
			6	TA-7H Corsair-2	Fighter/trainer	1977		
								MAP order
			5	TA-7H Corsair-2	Fighter/trainer	1979		
			3	Tang Class	Submarine	1977		

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
5 Hungary	USSR	4	An-26 Curl	Transport	1978	1979	4	
		60	T-72	MBT	(1978)	1979	(30)	First seen during manoeuvre in 1979; not clear whether actually transferred, could be Soviet units taking part in manoeuvre
7 Ireland	France	. .	MILAN	ATM	(1978)			On order
	Italy	1	SF-260W Warrior	Trainer/COIN	(1978)	1979	1	
	United Kingdom	1	HS-125/600B	Transport	1979			Contract signed on 5 Jun 1979; for training, transport and SAR duties
		4	Scorpion FV-101	Recce AC	(1978)			On order
4 Italy	USA	. .	BGM-71A TOW	ATM	1979			Agreement signed at Paris Air Show; to arm A-129 hel
		. .	E-3A Sentry	AEW	1978			NATO allocated 5% of AWACS programme cost to Italy, who claims it can pay only token sum of $1 mn
10 Japan	USA	. .	BGM-71A TOW	ATM	(1979)			
		40	CH-47C Chinook	Hel	(1979)			Army request; for delivery 1983
		3	CH-47D Chinook	Hel	(1979)			
		3	DC-10	Transport	(1979)			
		4	E-2C Hawkeye	AEW	(1979)			
		22	F-15A Eagle	Fighter/interc	1977	1978	4	Including some F-15B trainers; FY 1978
						1979	4	funding; delivered prior to licence production of 78 planes
		16	King Air C-90	Trainer	(1979)			Included in $13 000 mn modernization programme for 1980-84
		2	Model 209 AH-1S	Hel	(1979)	1979	1	
						1980	1	
		7	Model 212	Hel	1978	(1979)	(7)	
		3	P-3C Orion	ASW/mar patrol	1977			To be delivered prior to licensed production
		. .	RGM-84A Harpoon	ShShM	(1978)			
		6	RH-53D	Hel	(1979)			Included in $13 000 mn modernization programme for 1980-84
		. .	RIM-66A/SM-1	ShAM/ShShM	1975	1976	(3)	
						1979	(3)	
		. .	RIM-66A/SM-1	ShAM/ShShM	1975			

		. .	Seasparrow	ShAM/ShShM	1977			
7 Malta	FR Germany	3	Do-24/72	Flying boat	1978			
	Libya	24	AS-11	ASM	1978	1979	(24)	
		2	Super Frelon	Hel	1978	1979	2	Based on Malta; expected transfer to Malta AF in 1979
4 Netherlands	FR Germany	100	Gepard	AAV	1973	1978	(30)	
						1979	(30)	
		445	Leopard-2	MBT	1979			Contract signed on 22 Jun 1979; chosen instead of US XM-1; offsets to Netherland industry at 59% of purchase value, may reach 100%; to replace 369 Centurions and 130 AMX-13s
	USA	288	NATO Seasparrow	ShAM/ShShM	1970	1978	24	NATO coproduction programme
						1979	(24)	
	United Kingdom	8	Lynx	Hel	1978	1980		For ASW frigates
		8	Lynx	Hel	1977	1978	2	Total of 24 purchased for navy: 6 for
						1979	6	recce and 18 for ASW
	USA	860	XM-765	ICV	1975	1976	(290)	
						1977	(290)	
						1978	(280)	
		889	XM-765	ICV	(1976)	1977	(296)	
						1978	(296)	
						1979	(297)	
		840	AIM-9L	AAM	1977	1979	(42)	For 102 F-16 fighters
		2300	Dragon FGM-77A	ATM	1978	1978	1000	
						1979	1300	
		90	M-109-A2	SPG	(1979)			
		13	P-3C Orion	ASW/mar patrol	1978	1981		
		288	RGM-84A Harpoon	ShShM	1975	1978	24	
11 New Zealand	United Kingdom	. .	Scorpion FV-101	Recce AC	1979			Approved by UK Feb 1979
	USA	. .	RGM-84A Harpoon	ShShM	(1978)			On order
4 Norway	France	600	Roland-2	Landmob SAM	1975			Missiles purchased from Euromissile, 40 launchers from USA
	USA	72	F-16A	Fighter	1977			To be delivered from licence production in Netherlands
	Sweden	1	Gassten	Minesweepcr	(1976)			
		. .	RBS-70	Port SAM	1978			
		5	SAAB-91D Safir	Trainer	1978	(1979)		From Swedish AF stocks

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
	United Kingdom	4	Lynx	Hel	1978			Option on 2 more
		2	Lynx	Hel	(1979)			Additional order to 4 of 1978; including spares and support equipment; for Coast Guard
		. .	Rapier	Landmob SAM	1978			Order depends on offset agreements for Norwegian industry; total cost: including Vickers sub and Lynx hel
		10	IKL	Submarine	(1979)			Order depending on offsets for Norwegian industry; displ: 750 tons
	USA	432	AIM-9L	AAM	1977	1979	(60)	NATO coproduction programme
		7	P-3B Orion	ASW/mar patrol	(1979)			Two to be delivered 1980
5 Poland	USSR	. .	Il-76 Candid	Transport	1977	1979	(10)	Czechoslovakia and Poland first WTO states to receive new plane, after Iraq
		100	T-72	MBT	(1978)	1979	(30)	First seen during manoeuvre in Oct 1979; uncertain whether import from USSR or licensed production
4 Portugal	USA	600	BGM-71A TOW	ATM	1979			
		6	C-130H Hercules	Transport	1978	1978	2	Included in modernization programme
5 Romania	France	. .	SA-330L Puma	Hel	1978			
	USSR	30	T-72	MBT	(1978)	1979	30	
7 Spain	Canada	7	CL-215	Amphibian	1979			Follow-up order
	FR Germany	10	Bo-105CB	Hel	1979	1979	10	Sixty new to be delivered 1980-82; 28 as anti-tank hel with 6 HOT ATM each, 14 as recce, 18 as armed recce; final assembly at Casa
		. .	HOT	ATM	1979			To arm licence-produced Bo-105 hel; delivery from 1980
	France	. .	MILAN	ATM	(1978)	(1979)	(2000)	
		42	Mirage F-1A	Fighter/ground	1978			Order finalized after long negotiations; Spanish industry to produce 20% of planes; total cost: including 6 F-1B
		6	Mirage F-1B	Trainer	1978			Total cost: including 42 F-1A
	Italy	12	AB-212AS	Hel	1978	1978	6	
						1979	6	
		. .	Aspide/Albatros	ShAM/ShShM	1979			For installation in second batch of new

								F-30-class frigates: ordered number unknown
		6	CH-47C Chinook	Hel	1978	1980		
	Netherlands	3	F-27 Maritime	Mar patrol	1978	1979	3	For SAR duties
	USA	108	AIM-7F Sparrow	AAM	(1979)			US letter of offer Apr 1979; including 8 practice missiles, spares and support equipment
		30	AIM-9L	AAM	1977			
		448	AIM-9P	AAM	(1978)	1980	448	
		6	AV-8A Harrier	Recce	1977			
		3000	BGM-71A TOW	ATM	1978	(1979)	(500)	Pending congressional approval
		2	C-130H Hercules	Transport	1979	1979	2	Delivered late 1979
		4	F-4C Phantom	Fighter	(1979)	1979	4	
		18	M-109-A1	SPH	1978	1979	18	
		102	M-113-A1	ICV	1977	1978	(51)	Pending congressional approval; total cost: including M-125 and M-577 vehicles
						1979	(51)	
		550	M-113-A1	ICV	(1978)			
		18	M-125-A1	Cargo	1978	(1979)	18	Pending congressional approval; total cost: including M-113-A1 and M-577 vehicles
		4	M-577-A1	Cargo	1978	(1979)	4	Pending congressional approval; total cost: including M-113-A1 and M-125 vehicles
		18	OH-58A Kiowa	Hel	(1978)			On order; in addition to 13 in Army use
		. .	P-3A Orion	ASW/mar patrol	(1978)	1979	1	Total number ordered: 8
						1980	3	
		4	RF-4C Phantom	Fighter/recce	(1979)	1979	4	Ex-USAF reserve stocks; for tactical recce duties
		40	RGM-84A Harpoon	ShShM	1978			Pending congressional approval
		. .	Seasparrow	ShAM/ShShM	1976	1978	72	For 4 F-30-class frigates; 1 octuple Selenia Albatross launcher/ship with 16 reload missiles
						1979	24	
						1980	24	
7	Sweden	Norway	288	Penguin-1	ShShM	1975	1978	36	
		United Kingdom	. .	Sky Flash	AAM	1978			Contract date Dec 1978
		USA	6700	BGM-71A TOW	ATM	1977	1979	6700	Total cost: including 340 launchers
			. .	MIM-23B Hawk	Landmob SAM	(1978)			
			I	Model 402C	Transport	(1979)			For Coast Guard
7	Switzerland	United Kingdom	. .	Centurion	MBT	(1979)			Replacement for 150 AMXs sold to Singapore
		USA	132	AIM-9L	AAM	1977	1978	42	
			11790	Dragon FGM-77A	ATM	1978			Order including 3 210 practice missiles

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		207	M-109-A2	SPG	1979			Third batch being negotiated; u.c. rose from $1.73 mn 1968 and $1.90mn 1974 to $2.56 mn; total cost: $173.5 mn; may purchase Swedish field howitzer-77; order approved by Parliament autumn 1979
		225	M-113-A1	ICV	1979			Order approved by Parliament autumn 1979
		160	M-548	Cargo	1979			Order approved by Parliament autumn 1979
4 Turkey	FR Germany	193	Leopard-1-A4	MBT	1976			
		1	Type 209	Submarine	1974	1978	1	
	Italy	10	AB-212AS	Hel	1976	1977	2	
						1978	4	
						(1979)	(4)	
	Norway	. .	Penguin-2	ShShM	(1978)			
	USA	258	AIM-7E Sparrow	AAM	1978			Order date Aug 1978
		240	AIM-7F Sparrow	AAM	1978	1979	240	
		400	AIM-9J	AAM	1978			Order date Aug 1978
		. .	BGM-71A TOW	ATM	(1979)			
		40	Citabria-150	Trainer	(1979)	1979	40	
		3		Destroyer	(1978)			USA delayed delivery for political reasons
		2	Guppy-3	Submarine	1977	1979	2	Embargoed 1975; expected transfer in 1979
		8	RF-4E Phantom	Recce	1977	1978	4	
						1979	4	
		. .	RGM-84A Harpoon	ShShM	(1976)			
		. .	Seasparrow	ShAM/ShShM	1978			
		30	T-38 Talon	Trainer	1979	1979	(15)	Ordered Apr 1979, including spare engines, training and support equipment; ex-USAF
						1980	(15)	
4 United Kingdom	Australia	. .	Ikara-2	ShShM	1977			
	France	5000	MILAN	ATM	1976	1977	500	Delivered prior to licence production of 50 000 missiles; Euromissile sale
						1978	2000	
						1979	2500	
		. .	MM-38 Exocet	ShShM	1975	1976	12	
						1977	36	
						1978	12	
	Sweden	. .	Bloodhound-1.	SAM	1978	(1979)	(500)	Repurchase of missiles sold to Sweden in 1961, to augment reserve stocks in UK

		USA	1709	AIM-9L	AAM	1977	1979	(20)	NATO coproduction programme
			. .	BGM-71A TOW	ATM	1977			US government offer to UK Army
			. .	C-130K Hercules	Transport	(1978)			
			33	CH-47C Chinook	Hel	1978			
			. .	M-109-A2	SPG	1979			
			3	M-578	ARV	1978			
			. .	RGM-84A Harpoon	ShShM	1977			
			1	Speedy	Hydrofoil FPB	1979	1980	1	U.c.: $20.5 mn
1	USA	Australia	12	C-130A Hercules	Transport	(1978)	1979	12	
		France	41	Falcon-20G	Mar patrol	1976			For Coast Guard; provision made for future integration of special sensor
			90	SA-365N	Hel	1979			For Coast Guard; new vers of SA-365 Dauphin to be test-flown in 1979; total requirement: 90 hel; delivery from 1982
		Norway	. .	Penguin-2	ShShM	1978			
		Switzerland	2	PC-6 Porter	Transport	(1978)	1979	2	
2	USSR	Czechoslovakia	. .	L-39 Albatross	Trainer	1972			
		Finland	2	Dubna Class	Tanker	1977			
6	Yugoslavia	Sweden	. .	RBS-70	Port SAM	(1979)			Yugoslav Chief of Army visit to Sweden to see RBS-70 may have resulted in deal according to unconfirmed information
		USSR	60	SSN-2 Styx	ShShM	1975	1977	6	
							1978	12	
II. Third World countries									
8	Abu Dhabi	Brazil	200	EE-9 Cascavel	Recce AC	1977	1978	50	
		FR Germany	4	Jaguar-2 Class	FPB	1977			For UAE
		France	. .	Alpha Jet	Trainer	(1979)	1980		
			. .	R-440 Crotale	Landmob SAM	1976	1977	(50)	
							1979	(50)	
			. .	R-440 Crotale	Landmob SAM	(1978)	1979		
		United Kingdom	1		FPB	1976			For UAE
			. .	Rapier	Landmob SAM	1976	1978	50	
9	Afghanistan	Czechoslovakia	. .	L-39 Albatross	Trainer	1978			
		USSR	240	AA-2 Atoll	AAM	1978	1978		
			20	BTR-40P	Recce AC	(1979)	1979	20	Delivered Mar 1979
			12	Mi-24 Hind-C	Hel	1979	1979	(12)	Up to 30 in service; reportedly delivered Mar 1979
			25	Mi-8 Hip	Hel	1979	1979	(25)	Reportedly delivered Mar 1979; military aid also including artillery; according to US intelligence, manned by Soviet pilots

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		24	MiG-19PF	Fighter	(1979)	1979	(24)	About two dozen reportedly delivered; information on delivery of MiG-21/23 unconfirmed
		. .	MiG-23S	Fighter	1979	1979		
		. .	SA-3 Goa	Landmob SAM	(1978)	(1979)	(30)	
		. .	Su-7B Fitter-A	Fighter/bomber	1979	1979	(20)	In addition to 30 delivered in 1978
		. .	T-62	MBT	1979	1979	(50)	Delivered in airlift for use against Muslim rebel forces; airlift also reportedly included APCs
12 Algeria	Netherlands	2	F-28 MK-3000	Transport	1978			For Navy
	USA	. .	T-34C-1	Trainer	1978	1979	6	To replace Gomhouriah
						1979	6	
	USSR	40	MiG-23S	Fighter	(1978)	(1978)	(20)	
						(1979)	(20)	
		9	MiG-25R	Recce	1978	1979	3	
						1979	(6)	
		. .	SA-9 Gaskin	Landmob SAM	(1978)	1979	(100)	First shown in military parade Nov 1979
		32	Su-20 Fitter-C	Fighter/bomber	1978	1979	32	Delivered 1978-79
		. .	T-72	MBT	(1978)	1979	(20)	First shown in military parade Nov 1979
13 Angola	USSR	. .	MiG-21uti	Trainer	1979	1979	6	Unspecified type of trainers delivered May 1979
		. .	SA-7 Grail	Port SAM	(1976)	(1976)	(2000)	
						(1977)	(2000)	
						(1978)	(2000)	
		4	Shershen	FPB	(1978)	(1979)	4	
		85	T-34	LT	(1976)	(1976)	(30)	
						(1977)	(55)	
15 Argentina	Austria	120	Panzerjager K	SPG	1978			
	FR Germany	1	Class 1700	Submarine	1977			
		20		FPB	(1978)			Small PB ordered from Blohm & Voss; cost: $107 mn
		2	MECO-360 Class	Frigate	1977			Order reportedly placed with Thyssen Concern
		2	Type TR-1400	Submarine	1977			
	France	2	A-69	Frigate	(1978)	1979	2	

		1	A-69	Frigate	1979			New construction; in addition to 2 delivered 1979, originally purchased by South Africa but embargoed
		. .	MM-38 Exocet	ShShM	1978	1979	(24)	For 2 A-69 frigates originally purchased by South Africa but embargoed
		12	SA-315B Lama	Hel	1978			For Army Air Wing
		12	SA-330J Puma	Hel	1978	1978	12	
	Israel	6	Gabriel-2	ShShM	1975			For 2 Type 148 FPB; licence produced in Argentina: 1 triple launcher/ship
		26	Kfir-C2	Fighter/bomber	(1978)			Unconfirmed
		26	Mirage-5	Fighter	1978	1978	13	
						1979	13	
	Italy	. .	A-109 Hirundo	Hel	1977			For Army
		2	G-222	Transport	1974	1977	1	
						1978	1	
	Netherlands	1	F-27 MK-400M	Transport	1979	1979	1	One out of 4 originally purchased by Indonesia but cancelled
	United Kingdom	2	Lynx	Hel	1977	1978	1	
						(1979)	1	
	USA	5	CH-47C Chinook	Hel	1978	1979	2	For Army and AF
		2	KC-130H	Transport	(1979)			AF plans to purchase for use as tanker
		6	King Air E-90	Trainer	1978	1979	2	Pending congressional approval; ordered via US Navy
		1	Metro-2	Transport	(1979)			Pending congressional approval; for ambulance use; delivery held up by US arms export embargo
		2	Model 205 UH-1H	Hel	1978			
14 Bahamas	United Kingdom	3		FPB	1975	1978	3	
8 Bahrein	FR Germany	2	TNC-45	FPB	(1978)	1979	2	Delivered Sep 1979
9 Bangladesh	China	36	F-6	Fighter	1978	1979	24	
13 Benin	France	1	SN-601 Corvette	Transport	(1979)	1979	1	
	USSR	2	An-26 Curl	Transport	(1978)	1979	2	
15 Bolivia	Argentina	18	IA-58A Pucara	Trainer/COIN	1975	1976	2	
						1977	2	
	Brazil	12	T-25 Universal	Trainer	(1979)			Production line to be re-opened if contract is signed; requested for COIN use
	France	5	SA-315B Lama	Hel	(1978)	1979	5	
	Italy	6	SF-260C	Trainer/COIN	1978	1979	6	

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
	Netherlands	5	F-27 MK-400M	Transport	1979	1979	5	Ordered Jun 1979 for military transport service
	Switzerland	16	PC-7	Trainer	1977	1979	(8)	
	Taiwan	. .	C-47	Transport	1979	1979	6	Designation unconfirmed; also reported as C-46 Commando; AF confirmed purchase of 12 trainers and 6 transport aircraft after visit to Taiwan; delivered Apr-Jun 1979
		12	T-6 Harvard	Trainer	1979	1979	12	Delivered Apr-Jun 1979
13 Botswana	United Kingdom	3	BN-2A Defender	Transport	(1979)			
		2	Skyvan-3M	Transport	1978	1979	2	First aircraft for newly established AF
15 Brazil	FR Germany	2000	HOT	ATM	1977			For EE-9 Cascavel vehicles
		2000	MILAN	ATM	1977			For EE-11 Urutu vehicles
	France	. .	AS-11	ASM	1972	1974	(144)	
						1975	(144)	
						1976	(144)	
						1977	(144)	
						1978	(144)	
						1979	(114)	
	United Kingdom	104	Seacat	ShAM/ShShM	1972	1976	18	
						1977	18	
						1978	18	
10 Brunei	FR Germany	6	Bo-105C	Hel	1979			On order; probably version C
	France	36	MM-38 Exocet	ShShM	1976	1978	36	
	United Kingdom	2	BN-2A Defender	Transport	(1979)			Planning to purchase, according to unofficial reports
		. .	Rapier	Landmob SAM	(1978)			One battery ordered, incl Blindfire radar; total cost: $82 mn
		. .	Sabre	ATM	1979			
10 Burma	Australia	6	Carpentaria	FPB	1979			Order date Feb 1979
	Switzerland	16	PC-7	Trainer	1977	1978	(2)	Delivery began Nov 1978 from first production run of 35 planes
						1979	(14)	
		16	PC-7	Trainer	1979			Second order of 16 for delivery 1980
13 Cameroon	FR Germany	2	Do-28D-1	Transport	1979			

	France	2	CM-170	Trainer	1979			Order including spares; in addition to 4 in use
	USA	1	B-727-200	Transport	(1979)			On order for VIP transport
15 Chile	Brazil	30	EE-9 Cascavel	Recce AC	1978	1978	(15)	
						(1979)	(15)	
		6	EMB-326 Xavante	Trainer/COIN	(1978)			Unconfirmed
		10		PB	1977	(1978)	(5)	Seller previously reported as USA
						(1978)	(5)	
	France	16	Mirage-50	Fighter/MRCA	1979			French government reportedly approved sale; designation also reported as Mirage-5
	India	100	Hunter F-56	Fighter	(1979)			Chile proposed to purchase in Aug 1979 against payment in gold or hard currency
15 Colombia	Portugal	4		Corvette	(1979)			Final order depends on US financing of external loan at 7% interest on unpaid balance after 4 years
13 Comoros	USA	1	C-47	Transport	1977			
		1	Model 402C	Transport	1978			
14 Cuba	USSR	20	An-26 Curl	Transport	(1977)	1978	(10)	
						1979	(10)	
		1	Foxtrot Class	Submarine	1978	1979	1	
		2	Turya Class	Hydrofoil TB	1978	1979	2	
		1	W-Class	Submarine	(1978)	1979	1	
13 Djibouti	France	10	Mirage-3C	Fighter	(1978)	1979	10	
14 Dominican Rep.	USA	2	Model 205A-1	Hel	1976			Order date May 1976
8 Dubai	Italy	20	Leopard-1	MBT	1979			
		4	MB-326K	Trainer	1978			Designation: including version L
	Sweden	. .	RBS-70	Port SAM	(1979)			Bofors negotiating via branch company in Singapore
	United Kingdom	. .	Lynx	Hel	(1979)			On order for United Arab Emirates AF
		36	Scorpion FV-101	Recce AC	1978			
15 Ecuador	France	28	M-167 Vulcan	AAV	1979			
		2	Mirage F-1B	Trainer	1977	1979	2	Ordered instead of Kfir-C2
		16	Mirage F-1C	Fighter/interc	1977	1979	(8)	Ordered instead of Kfir-C2
						1980	(8)	

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		6	Mirage-5	Fighter	(1978)	1979	6	
		. .	MM-40 Exocet	ShShM	1979			Six systems=6 sextuple launchers ordered in Apr 1979 for 6 new Italian corvettes
		. .	VAB	APC	(1977)			On order
	Israel	. .	IAI-201 Arava	Transport	1976			
	Italy	. .	Aspide-1A	AAM	(1979)			
		6		Corvette	1978			
		. .	LST Type	LST	1977			
	USA	. .	Chaparral	Landmob SAM	1979			US proposed sale of 72 btys of Chaparral Vulcan AA-system for three battallions
		. .	Flagstaff-2	Hydrofoil FPB	1977			
		44	M-163 Vulcan	AAV	(1979)			US DOD proposed sale of Vulcan/Chaparral air defence system
8 Egypt	China	60	F-6	Fighter	1979	1979	(40)	Being delivered since Jan 1979; reportedly at low cost
	France	20	C-160F Transall	Transport	1976			Production line re-opened
		14	Mirage-5R	Recce	1978			
		60	OTOMAT-2	ShShM	1978			Egypt first export customer of coastal defence version
		20	R-440 Crotale	Landmob SAM	1976	1979	20	Designation Arab-Crotale; licence production planned
		10	SA-342L Gazelle	Hel	1979	1979	10	
	Italy	. .	Aspide-1A	AAM	(1979)			
		2	Lupo Class	Frigate	(1979)			
		30	OTOMAT-1	ShShM	1977	1978	15	
						1979	15	
	United Kingdom	1		Destroyer	(1979)			
		2		Frigate	(1979)			
		200	Hawk-1	Trainer/strike	1978			May be licence produced
		12	HS-748-2A	Transport	(1979)			Negotiating; including Rolls-Royce engine
		20	Lynx	Hel	1978			
		6		FPB	1978			
		5	SH-3D Sea King	Hel	(1979)	(1980)	(5)	
		1		Submarine	1978			
	USA	500	AGM-65A	ASM	1979			To arm F-4E Phantom aircraft; pending congressional approval
		70	AIM-7E Sparrow	AAM	1979			To arm F-4E Phantom aircraft; pending

								congressional approval
		100	AIM-9F	AAM	1979			
		420	AIM-9P	AAM	1979			To arm F-4E Phantom aircraft; pending congressional approval
		11	C-130H Hercules	Transport	(1979)			
		35	F-4E Phantom	Fighter	1979	1979	20	Delivered instead of delayed F-5E aircraft; incl spares and training of 50-120 Egyptian pilots and mechanics in USA
		50	F-5E Tiger-2	Fighter	1978			Included in US package sale to the Middle East 1978
		4	Gearing Class	Destroyer	(1978)			
		50	M-106-A2	Mortar carrier	(1979)			Requested Jul 1979
		750	M-113-A2	APC	1979	1979	50	Deal arranged Jun 1978 during War Minister Gamassi's visit to USA; several hundred reportedly on order to replace Soviet types
		50	M-125-A2	APC	(1979)			Requested Jul 1979
		50	M-548	Cargo	(1979)			Requested Jul 1979
		50	M-577-A2	CPC	(1979)			Requested Jul 1979
		. .	MIM-23B Hawk	Landmob SAM	1979			Twelve btys requested Jul 1979, including missiles, radar, spare parts, training; deal concluded for 5 btys
14 El Salvador	Brazil	12	EMB-111	Mar patrol	1977	1978	6	
						1979	6	
13 Ethiopia	FR Germany	2	Do-28D-2	Transport	1978	1979	2	
	USSR	10	Mi-6 Hook	Hel	1977	1978	10	
		100	T-54	MBT	1978	1978	(25)	Delivered Dec 1978-1979; ordered number unknown; total cost including T-55, BTR-152, BMP-1, SA-2, SA-3, MiG-17, MiG-21, MiG-23; 500 T-54/55 in use
						1979	(75)	
		. .	T-70	MBT	1977	1978	30	
13 Gabon	FR Germany	2	Jaguar-2 Class	FPB	1976			Arms: 2x76-mm Oto Melara AA cannon
		2	Jaguar-3 Class	FPB	1976			
13 Ghana	FR Germany	2	Type 57M	FPB	1976	1979	2	
		2	Type TNC-45	FPB	1976	1979	2	
	France	24	MM-38 Exocet	ShShM	1977	1979	(24)	
	Italy	9	MB-326K	Trainer	1976	1978	4	
						1979	(4)	
						1980	(1)	

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
	New Zealand	3	C-47	Transport	1979	1979	3	Ex-New Zealand AF; purchased by Island Associates Company, then resold to Ghana
	USA	12	RGM-84A Harpoon	ShShM	1976	1979	(12)	
14 Guatemala	France	3	CM-170	Trainer	(1978)	1979	3	
	Israel	. .	Kfir-C2	Fighter/bomber	(1979)			Considering purchase of one squadron
	Switzerland	12	PC-7	Trainer	1978	(1979)	2	
	USA	6	F-5E Tiger-2	Fighter	1978			Pending congressional approval: defence pact with USA broken off 1977
13 Guinea	France	1		PB	(1978)			
	USSR	1	Sadji Kaba	PB	(1978)	1979	1	Transferred to Navy Jul 1979
13 Guinea Bissau	France	2		PB	1977			
14 Honduras	United Kingdom	. .	Scorpion FV-101	Recce AC	1978			
	USA	1		FPB	(1978)	1979	1	
		4		FPB	(1977)	1978	2	
						1979	2	
9 India	Canada	. .	DHC-5D Buffalo	Transport	1979			Canadian offer to HAL to meet request for medium-range tactical transport; decision expected 1979-80
	Korea South	6		FPB	1979			Designation may be PSMM-5
	United Kingdom	40	Jaguar	Fighter	(1979)	1979	(4)	Delivery prior to licence production; fly-away u.c. of $7.27-9.7 mn
		6	Sea Harrier	Fighter/ASW	1979			For use with aircraft carrier Vikrant; delivery 1981-82
		2	Sea Harrier T-4	Fighter/trainer	1979			Order date Nov 1979; total cost including 6 Sea Harrier
		144	Seacat	ShAM/ShShM	1972	1972	(24)	
						1974	(24)	
						1976	(24)	
						1977	(24)	
						1979	(24)	
		5	SH-3D Sea King	Hel	1977			
	USA	2	B-737-100	Transport	1977	1978	2	
	USSR	5	Ka-25 Hormone	Hel	1976			
		. .	Krivak	Frigate	(1979)			

		..	Mi-8 Hip	Hel	1979			Minister of Defence said agreement reached; also discussing MiG-23 as new tactical aircraft in spite of Jaguar purchase
		..	MiG-25R	Recce	(1979)			Negotiating; to replace aged Canberras; designation reported as Foxbat-B
		6	Nanuchka Class	Corvette	1975			
		70	T-72	MBT	(1978)	1979		Contracted Feb 1978; to replace licence produced Vijayanta MBT from 1979
10	Indonesia	Australia	6	N-22L Nomad	Coast patrol	1978	(1979)	(6)	
		FR Germany	2	Type 209	Submarine	1977			Modified enlarged version; FRG government approval Feb 1977
		France	200	AMX-13	LT	(1979)	1979	(200)	Transited via Singapore; reportedly from "one previous owner of Swiss nationality"
			3	C-160F Transall	Transport	1979			Aerospatiale received order Sep 1979; first delivery year 1982; civil version but easily converted
			36	MM-38 Exocet	ShShM	1976	1979	(12)	For 3 FPB purchased from Netherlands
		Italy	6	SF-260M	Trainer	1979			On order; in addition to 6 already in use
		Korea South	4	PSMM-5 Type	FPB	1976	1979		
							(1979)	(4)	
		Netherlands	3		FPB	1975	1979	1	Arms: Bofors 375-mm RL
		United Kingdom	8	Hawk T-53	Adv trainer	1978			
		USA	12	F-5E Tiger-2	Fighter	1977			USA agreed to sell 1978; first ordered in 1977; total cost: including 4 F-5F trainers
			4	F-5F Tiger-2	Trainer	1977			
			2	King Air C-90	Trainer	(1978)			
			3	L-100-30	Transport	1979			Recent order
			21	Musketeer Sport	Lightplane	(1978)			
			16	RIM-66A/SM-1	ShAM/ShShM	1976	1979	(48)	For PSMM-5 FPB; 4 launchers/ship
			2	TA-4H Skyhawk	Fighter	(1979)			
		Yugoslavia	..		Training ship	(1977)			
8	Iran	France	360	HOT	ATM	(1979)			
			12	Kaman	FPB	1974	1979	1	
		Italy	50	CH-47C Chinook	Hel	1977	1978	20	
							(1979)	(20)	
			..	Seakiller/Marte	AShM	(1978)	(1978)	(50)	Ongoing dispute concerning delay of deliveries: according to Sistel spokesman, some 50 missiles remain to be delivered
		United Kingdom	2		Support ship	1977	1981		

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
8 Iraq	Brazil	150	EE-11 Urutu	APC	(1979)	1979	(25)	Total number sold: 2 000 EE-9, EE-11 and trucks; being delivered at rate of 10 EE-9/11 per month from Jul 1979
		150	EE-9 Cascavel	Recce AC	(1979)	1979	(25)	
	Czechoslovakia	24	L-39 Albatross	Trainer	1973	1978	10	
						1979	(14)	
	France	. .	AMX-10P	AC	1977	1978	50	
		100	AMX-30	MBT	1978			
		. .	ERC-90S Sagaie	AC	(1979)			Export designation
		360	HOT	ATM	1979			
		4	Mirage F-1B	Trainer	1977			
		32	Mirage F-1C	Fighter/interc	1977			
		24	Mirage F-1C	Fighter/interc	1979			Second order, according to French press; reduced from 36 due to wish to buy Mirage-2000
		. .	R-440 Crotale	Landmob SAM	(1979)			Requested
		. .	R-550 Magic	AAM	1977			
	Sudan	10	MiG-21MF	Fighter	1979	1979	10	Purchased for spares
	Switzerland	48	AS-202 Bravo	Trainer	1978	1979	48	U.c.: $0.1 mn in standard form, $0.2 mn fully equipped
		48	PC-7	Trainer	1979			Average u.c.: $913 000, equipped
	USA	6	Jetstar-2	Transport	1979			Lockheed received State Department permission to sell
	USSR	. .	Il-18	Transport	1979			
		. .	Il-20	Transport	1979			
		. .	Il-76 Candid	Transport	1978	(1979)	2	
		. .		LST	1979			Order date Jan 1979; designation unknown
		. .	Mi-8 Hip	Hel	(1977)	(1977)	(40)	
						1978	(20)	
						(1979)	(20)	
		138	MiG-27	Fighter/strike	1976	1977	(40)	
						1978	(40)	
						1979	(40)	
		. .	SCUD-B	Landmob SSM	(1978)			
		60	SSN-2 Styx	ShShM	1977	1978	12	
		3		Submarine	1979			Order date Jan 1979
		600	T-62	MBT	1976	1977	(150)	

						1978	(150)	
						1979	(150)	
		50	T-72	MBT	(1979)	1979	50	Delivered Aug 1979
8 Israel	USA	600	AGM-65A	ASM	1979			Included in peace treaty arms package
		170	AIM-7F Sparrow	AAM	1978	(1979)	170	
		600	AIM-9L	AAM	1979			Included in peace treaty arms package
		. .	BGM-71A TOW	ATM	(1979)			
		5000	Dragon FGM-77A	ATM	(1979)			
		35	F-15A Eagle	Fighter/interc	1978	1981		Included in US sales package to Middle East, approved Feb 1978; total cost: including 75 F-16A fighters
		75	F-16A	Fighter/strike	1978	1980	35	Israel may develop local design Arye, since USA refused co-production of F-16A and reduced number ordered from 250 to 75
		200	M-109-A2	SPG	(1979)			Requested Jul 1979
		800	M-113-A2	APC	(1979)			Included in peace treaty arms package
		200	M-60-A3	MBT	(1979)			
		60	MIM-23B Hawk	Landmob SAM	1978	(1978)	(30)	Pending congressional approval
						(1979)	(30)	
		100	MIM-23B Hawk	Landmob SAM	1979			
		30	Model 500M	Hel	1978	1979	30	
		100	RGM-84A Harpoon	ShShM	1975			
		100	RGM-84A Harpoon	ShShM	(1979)			At least 100 ordered to complement Gabriel; also probably ordered AShM version for F-4
13 Ivory Coast	France	6	Alpha Jet	Trainer	1977	1980		
		6	Alpha Jet	Trainer	1978	1980		
						1981		
		1	Batral Type	Transport ship	1977			
		4	SA-365	Hel	(1979)	1979	4	
		. .	VAB	APC	(1978)	1979	6	
	United Kingdom	2		FPB	(1978)	1979	2	Recent delivery; attack FPB
	USA	2	C-130H Hercules	Transport	(1978)	1979	2	
8 Jordan	France	36	Mirage F-1C	Fighter/interc	1979			Agreed in principle to purchase instead of F-16, vetoed by USA; Saudi Arabia funding
	Switzerland	. .	PC-7	Trainer	1979			
	United Kingdom	200	Shir-1	MBT	1979			UK hopes to sell, out of cancelled Iranian order
	USA	. .	AIM-9J	AAM	1979			Contract confirmed Aug 1979; for 6 F-5Fs

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		1	C-130H Hercules	Transport	1978	1979	1	
		4	F-5F Tiger-2	Trainer	1979			Pending congressional approval; deal includes AIM-9 and 20-mm guns
		18	M-109-A2	SPG	(1979)			US letter of offer Apr 1979
		. .	M-110	SPH	1977			
		700	M-113-A1	ICV	1976	(1976)	280	
						1977	100	
						1978	220	
						(1979)	100	
		100	M-113-A1	ICV	1979			US letter of offer Apr 1979, although Jordan was denied export licence in FY 1978 for M-113
		300	M-60-A3	MBT	(1979)			Requested Jul 1979; US government approved of sale; to replace aged M-47 and Centurion
		10	Model 209 AH-1S	Hel	(1979)			US government approved sale but contract not final; Saudi Arabia refuses funding
10 Kampuchea	China	. .	T-60	Amph LT	1977	1978	100	
13 Kenya	Israel	48	Gabriel-2	ShShM	(1978)	(1979)	(48)	
		. .		PB	1978			Unconfirmed order; from Israeli Navy surplus stocks
	United Kingdom	60	Commander	Tank transporter	(1979)	1979	60	
		12	Hawk T-52	Adv trainer	1978	1980		
		38	MBT-3	MBT	1977			
		22	MBT-3 Recce	Recce AC	1979			Small number ordered
		. .	Rapier	Landmob SAM	1979			Order date Mar 1979; ordered number unknown
		. .	Swingfire	ATM	(1978)	1979	(1920)	
	USA	2100	BGM-71A TOW	ATM	(1979)			To arm 15 Hughes Model-500MD hel
		32	Model 500MD	Hel	1979	1979	2	Order date Mar 1979; for border defence against Somalia and Uganda; Hughes received $31 mn contract from US Army for MAP to Kenya
10 Korea South	USA	200	AGM-65A	ASM	1977	1978	(150)	
						1979	(50)	
		341	AIM-7E Sparrow	AAM	1978	1979	341	For 18 F-4E Phantom fighters, to be delivered from 1979

		600	AIM-9L	AAM	1975	1977	60	
						1978	200	
						1979	220	
		4	Asheville Class	LST	(1979)			To be purchased instead of licence production of 7 Tacoma FPB financial reasons
		2208	BGM-71A TOW	ATM	1978	(1979)	(500)	Pending congressional approval; total deal worth $67 mn, of which $59 mn for spare parts for aircraft already in service
		1800	BGM-71A TOW	ATM	(1979)			US letter of offer Apr 1979, including 10 TOW launchers, spares and ancillary equipment
		6	C-130H Hercules	Transport	1977			Pending congressional approval
		6	CH-47C Chinook	Hel	1977			Pending congressional approval; deal includes spare parts, support equipment for $8.7 mn
		37	F-4E Phantom	Fighter	1977	1978	19	
						1979	18	
		54	F-5E Tiger-2	Fighter	1975	1978	25	
						1979	29	
		14	F-5E Tiger-2	Fighter	1978			
		37	M-109-A2	SPG	1978			Order date Aug 1978
		45	Model 205 UH-1H	Hel	1977			Pending congressional approval
		25	Model 500MD	Hel	(1979)			
		56	OH-6A Cayuse	Hel	(1978)			On order
		120	RGM-84A Harpoon	ShShM	1975	1978	60	
						1979	60	
		4		Submarine	(1978)	(1979)	1	Soon to be delivered; will receive total of 4 submarines
8	Kuwait	France	120	MM-38 Exocet	ShShM	1978			For 10 Vosper FPB
		Singapore	3		Landing craft	1978			
		United Kingdom	160	Chieftain-5	MBT	1977	1978	(80)	Order first announced in 1976; may purchase total of 300
							1979	(80)	
			2	Type 16M	FPB	(1979)			
			4	Type 20M	FPB	(1979)			
		USA	1350	BGM-71A TOW	ATM	1979			
			1	Dhaher	PB	(1979)	1979	1	
			175	M-113-A1	ICV	(1979)			
			32	MIM-23B Hawk	Landmob SAM	1979			Requested Sep 1979; including radar, containers, spare parts, support equipment, training and 2 years of technical assistance

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
	USSR	. .	SA-6 Gainful	Landmob SAM	1978			According to local sources; total cost: including SA-7, $100 mn
		. .	SA-7 Grail	Port SAM	1978	1979	(500)	
8 Lebanon	FR Germany	3		PB	1976			
	France	70	AMX-13	LT	1978	1978	70	
		30	AMX-30	MBT	1978	1978	30	
		200	MILAN	ATM	1978	(1979)	200	
		. .	SA-330L Puma	Hel	1978			Order date Nov 1978; ordered number unknown; total cost including FPB, AMX-13/30, Gazelle
		. .	SA-342K Gazelle	Hel	(1978)			
	Italy	6	Type 17M	FPB	1979			Order date Dec 1979
		6	Model 212	Hel	1979			Order date Jul 1979; follow-up order
	United Kingdom	2		FPB	1979			Order date Oct 1979
		200	Saladin FV-601	AC	(1978)			
	USA	50	M-113-A1	ICV	(1978)			On order; in addition to 80 in use
		69	M-113-A2	APC	(1979)			Required Sep 1979; total cost including M-125, M-577
		27	M-125-A1	Cargo	(1979)			
		8	M-577-A2	CPC	(1979)			
13 Lesotho	Canada	2	DHC-3 Otter	Transport	1979			
12 Libya	Brazil	200	EE-11 Urutu	APC	1978			Unconfirmed order
		200	EE-9 Cascavel	Recce AC	1977	1978	100	
						1979	100	
	Canada	14	DHC-6	Transport	1979			
	Czechoslovakia	4	L-39 Albatross	Trainer	1978	1979	4	
	France	12	Combattante-3	FPB	1975	1979	1	
		6	PR-72 Type	FPB	1977			
		. .	MM-38 Exocet	ShShM	1975			
		. .	OTOMAT-1	ShShM	1977	1979	(12)	
		. .	SA-342K Gazelle	Hel	(1978)	1979	(30)	
	Italy	1	AB-212	Hel	1978	1979	1	Order date Dec 1978
		20	CH-47L	Hel	(1978)	1979	20	
		20	G-222L	Transport	1978			
		210	Leopard-1	MBT	1978	(1978)	5	

		..	M-109	SPH	1979			
		..	M-113-A1	AC	1979			
		260	SF-260M	Trainer	1978	1978	30	
						1979	80	
		..	Type 6616M	AC	1979			
		1	Wadi Magrawa	Corvette	1974			Last of 4 launched
		1	Wadi Majer	Corvette	1974			Second of 4; sea trials started
		1	Wadi Marseat	Corvette	1974			Launched Dec 1978; third of order for 4
		1	Wadi Mragh	Corvette	1974	1979	1	
	Spain	4	Daphne Class	Submarine	1976	1980		
	United Kingdom	18	Seacat	ShAM/ShShM	1976			
	USA	1	Model 212	Hel	1978			
	USSR	6	Foxtrot Class	Submarine	1975			Reportedly on order
		..	Mi 24 Hind-D	Hel	(1978)	1978	(10)	According to Arab sources, Libya was
						1979	(10)	first non-WTO customer; reportedly flown by Soviet pilots; delivered Mar 1979
		100	MiG-27	Fighter/strike	1978	1978	(10)	
						1979	(14)	
		12	Tu-22 Blinder-A	Bomber	(1978)	1979	(12)	
	Yugoslavia	50	G-2AE Galeb	Trainer/strike	1975	1977	(10)	
						1978	(10)	
						1979	(20)	
13 Madagascar	France	1	Toky	LST	(1977)	1979	1	Batral type; arms: 1x76-mm cannon, 1x88-mm mortar, 2x20-mm cannon
	Korea North	8	MiG-17F	Fighter	1978	1978	8	
	USSR	8	MiG-21FL	Fighter	1978	1979	8	
		1	Yak-40 Codling	Transport	(1979)	1979	1	New military and economic aid agreement signed during President's visit to Moscow in 1979; for VIP transport
13 Malawi	FR Germany	6	Do-27	Transport	(1978)	1979	3	
		6	Do-28D-2	Transport	1979			Order date Apr 1979
	France	1	SA-316B	Hel	1978	1978	1	
10 Malaysia	France	96	MM-38 Exocet	ShShM	1976	1979	(48)	
	Sweden	4	Spica Class	FPB	1976	1979	4	Crew of 200 training in Sweden; payment: 30% on signing contract, 15% on completion of first keel, 10% on completion of second keel
	United Kingdom	15	AT-105	APC	1977			
		..	Blowpipe	ShAM	1976	1979		For 4 Spica-class FPB: 1 launcher/ship

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
	USA	. .	AIM-9J	AAM	(1978)			
		2	C-130H Hercules	Transport	(1979)			For AF maritime patrol of South China Sea
		1	F-5E Tiger-2	Fighter	1979			On order; replacement
		4	F-5F Tiger-2	Trainer	(1979)			US letter of offer Apr 1979; including logistics and support equipment
		130	V-150 Commando	APC	1977	1978	65	
13 Mauretania	Argentina	12	IA-58A Pucara	Trainer/COIN	1977	1978	4	
						1979	(4)	
13 Mauritius	Argentina	6	IA-58A Pucara	Trainer/COIN	(1979)			Order not finalized due to funding problems
	France	11	VAB	APC	(1978)	1979	11	
14 Mexico	France	5	SA-330L Puma	Hel	(1978)	(1979)	5	
	Switzerland	12	PC-7	Trainer	1978			
12 Morocco	FR Germany	. .	Do-28D-2	Transport	(1979)			Decided to purchase unspecified number
	France	24	Alpha Jet	Trainer	1978	1979	(2)	Order confirmed in 1978
		. .	AML-90	AC	(1978)			
		. .	AMX-10RC	Recce AC	(1978)			
		25	Mirage F-1C	Fighter/interc	(1979)			
		25	Mirage F-1C	Fighter/interc	1977	1979	25	
		6	P-32 Type	CPB	1976			New construction programme: first reported as PR-92
		2	PR-72 Type	PB	1976			New construction programme
		. .	R-440 Crotale	Landmob SAM	1978	1979	(96)	Several batteries recently ordered
		300	R-550 Magic	AAM	1976	1978	150	
						1979	150	
		400	VAB	APC	(1978)			
	Italy	6	CH-47C Chinook	Hel	1977			12 more to be purchased
		. .	SH-3D Sea King	Hel	(1979)			Negotiating for purchase of unspecified number
	Spain	1	F-30 Class	Frigate	1977			
		4		FPB	1977			
	USA	. .	AIM-9J	AAM	1978			
		334	M-113-A1	ICV	1975	1978	100	
						1979	234	

		40	M-163 Vulcan	AAV	(1979)			Seventy more Vulcan cannons ordered for M-113
		100	M-48 Patton	MBT	1978	1978	50	
						1979	50	
		24	Model 209 AH-1J	Hel	1978			
		24	OV-10A Bronco	Trainer/COIN	1978			US government vetoed sale
13 Mozambique	Portugal	7	Noratlas 2501	Transport	1978	1978	7	
	USSR	. .	MiG-23 Flogger	Fighter	(1979)			
13 Niger	USA	2	C-130H Hercules	Transport	1979	1979	1	Ordered Mar 1979; delivered Sep-Dec 1979; including spares, training, technical support; for military/civilian use
						1980	1	
13 Nigeria	FR Germany	12	Alpha Jet	Trainer	1979			
		1		Frigate	1977			
		2	RO-RO-1300	LST	1976	1979	2	
		3	S-143 Type	FPB	1977	1980		
	France	3	Combattante-3B	FPB	1977			
		36	MM-38 Exocet	ShShM	1977	1980	36	For Combattante-3-class; to be delivered 1980
	Italy	. .	Aspide/Albatros	ShAM/ShShM	(1978)			
		15		GB	1978			
		5	MB-326C	Trainer	1978			
		18	OTOMAT-1	ShShM	1977			For 3 S-143 FPB
	United Kingdom	2	Erinmi	Corvette	1975	1979	1	
		. .	Seacat	ShAM/ShShM	1975	1979	(9)	
		10	Tracker Class	FPB	(1979)			On order from Fairey Marine
	USSR	100	T-55	MBT	(1979)			May order
8 Oman	Canada	2	DHC-5D Buffalo	Transport	(1978)			On order
	Italy	1	SH-3D Sea King	Hel	1977			
	United Kingdom	1		Support ship	1977	1979	1	
		3	Skima-12	Hydrofoil FPB	1978			On order; order date Dec 1978
	USA	250	AIM-9P	AAM	(1979)			Requested Oct 1979; to protect Strait of Hormuz; pending congressional approval
9 Pakistan	Argentina	400	TAM	MT	1977			
	France	2	Agosta Class	Submarine	1978	1979		Built for South Africa but embargoed Jan 1978
		32	Mirage-3E	Fighter/bomber	1979			Contract signed Mar 27, including a number of Mirage-5s; cost: $350 mn; delivery 1981-83; armed with AM-39 Exocet AShM; payment terms: 1/7 deposit plus

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
								long-term French credit will cover 80% of costs
		32	Mirage-5	Fighter	(1979)			Delivery 1981-83
		35	SA-330L Puma	Hel	1977	1978	(15)	For Army
						1979	(20)	
	United Kingdom	16	SH-3D Sea King	Hel	1977			
	USA	350	AIM-9P	AAM	(1978)	1979	20	
						1980	330	
		. .	M-113-A1	ICV	(1978)			On order; 550 in service
		. .		CPB	1977			Reported building several 78-ft CPBs
14 Panama	Brazil	. .	EMB-110	Transport	1977			Unconfirmed order
	United Kingdom	1	Skyvan-3M	Transport	1978	1979	1	
	USA	. .		PB	1978			
15 Paraguay	Brazil	10	EMB-110	Transport	1977			Ordered by president
15 Peru	Australia	2	N-22L Nomad	Coast patrol	(1978)			
	FR Germany	2	Type 209	Submarine	1977			
	France	3	Combattante-2	FPB	1977			France won FPB order over Israel, due to offer of 10-year credit
		. .	MM-38 Exocet	ShShM	1977			For 3 Combattante-2 class FPB
		6	PR-72P Type	FPB	1976			Arms: 1x76mm Oto Melara cannon; 2x40/70mm Breda-Bofors cannon; 2x20mm Oerlikon cannon
	Italy	. .	Aspide-1A	AAM	1975	1978	(24)	
						1979	(48)	
		2	Maestrale Class	Frigate	1977			2 more licence produced in Peru
		40	OTOMAT-1	ShShM	1974	1978	12	
						1979	24	
		. .	SH-3D Sea King	Hel	1977	1978	2	
	Netherlands	1		Cruiser	1977	1979	1	From Netherlands Navy; De Zeven Provincien; converted to hel carrier; Terrier ShShM returned to USA
	USSR	23	Mi-8 Hip	Hel	1978	1978	17	
						(1979)	6	
		12	OSA-3 Class	FPB	1976			Reportedly on order
		72	SSN-2 Styx	ShShM	1976			Reportedly on order for new FPB
		200	T-55	MBT	(1978)			

		200	T-62	MBT	1978			
10 Philippines	Singapore	1		Command ship				
	USA	11	F-5E Tiger-2	Fighter	(1978)			
		17	Model 205 UH-1D	Hel	(1978)			On order; 12 UH-1D in service
		6	PSMM-5	FPB	1978			Order date Aug 1978; missile FPB with ShShM
8 Qatar	Brazil	20	EE-11 Urutu	APC	1977			Being fitted with French guns
	France	30	Mirage F-1C	Fighter/interc	1977			
	USA	. .	MIM-23B Hawk	Landmob SAM	1977			Unconfirmed order
13 Rwanda	United Kingdom	1	BN-2A Defender	Transport	1978	(1979)	1	
8 Saudi Arabia	France	250	AML-90	AC	1978	(1978)	(125)	Two hundred AML-60/90s in use
						(1979)	(125)	
		900	AMX-10	AC	1979			Several hundred of unspecified type ordered
		. .	AMX-155 GCT	SPG	1978			
		300	AMX-30S	MBT	1975	1977	100	
						1978	100	
						1979	100	
		. .	MM-40 Exocet	ShShM	1978			
		8	P-32 Type	PB	1976			
		. .	R-440 Crotale	Landmob SAM	1979			In addition to earlier order for Shahine version
		. .	Shahine	Landmob SAM	1974			
	Indonesia	40	C-212A Aviocar	Transport	1978			Unconfirmed order from Indonesian licence production
	USA	916	AGM-65A	ASM	(1979)			Proposed sale Dec 1979 to arm F-5 fighters; part of large package deal to Saudi Arabia; pending congressional approval
		240	AIM-7F Sparrow	AAM	1978			For 60 F-15A fighters to be delivered from 1981
		240	AIM-9J	AAM	1978			For 60 F-15A fighters to be delivered from 1981
		660	AIM-9P	AAM	(1979)			Included in large proposed sale to Saudi Arabia; pending congressional approval
		9		Corvette	1977			
		4292	Dragon FGM-77A	ATM	(1979)			Including 172 trackers, support equipment, training and maintenance
		45	F-15A Eagle	Fighter/interc	1978	1981		Included in US sales package to Middle East, approved in Feb 1978

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		15	F-15B Eagle	Fighter/trainer	1978			Delivery 1981-84
		12	M-106-A1	Mortar carrier	1979			Received from Food Machinery Corp. to replace 12 sent to North Yemen
		26	M-113-A1	ICV	1979	1979	26	
		. .	M-163 Vulcan	AAV	(1977)	1978	(25)	Being delivered or are delivered
						1979	(25)	
		6	M-577-A1	Cargo	(1979)	1979	6	Received from Food Machinery Corp. to replace 6 sent to North Yemen
		170	M-60-A1	MBT	1976	1977	(10)	
						1978	(20)	
						1979	(50)	
		118	M-60-A1	MBT	1979			US letter of offer to replace 32 sent to North Yemen; extra cost of $60.6 mn for 33-mm Oerlikon AAG
		6	M-88-A1	ARV	1979	(1979)	6	Received from Food Machinery Corp. to replace several sent to North Yemen
		. .	MIM-23B Hawk	Landmob SAM	1976	1978	(400)	
						1979	(400)	
		. .	MIM-43A Redeye	Port SAM	1977	(1979)	(400)	
		200	Model 209 AH-1S	Hel	1976			
		117	RGM-84A Harpoon	ShShM	1977	1979		For 6 new corvettes and 6 FPB
		100	RGM-84A Harpoon	ShShM	(1979)			
		4		FPB	1974			
		15	TF-15A Eagle	Trainer	1978			Included in US sales package to Middle East, approved in Feb 1978
		94	V-150 Commando	APC	1978			For National Guard
13 Senegal	Canada	3	Casamance-2	FPB	(1977)	1979	2	First 2 delivered; to be armed in Senegal
		3	DHC-6	Transport	(1978)			
	France	6	F-27 MK-600	Transport	1977	1978	4	
						1979	2	
		. .	MILAN	ATM	(1978)	(1979)	(50)	
		1		FPB	1979			Order date Nov 1979; to be delivered 1981; arms: 2x76-mm Oto Melara cannon, 2xF2
11 Seychelles	France	1	Sirius	LST	(1978)	1979	1	Handed over Apr 1979; ex-French Navy Sirius-class minesweeper

	Switzerland	1	BN-2A Islander	Transport	1979	(1979)	1	Agreement at Paris Air Show; armed; for maritime patrol duties; NB: seller Switzerland since Pilatus bought Britten-Norman
10 Singapore	FR Germany	36	M-2B	MT	1978	1978	18	
						1979	18	
	France	150	AMX-13	LT	1978			
	Italy	6	SF-260MS	Trainer	1979			Follow-on order to 16 purchased in 1971
	Switzerland	150	AMX-13	LT	1979			Old type reportedly purchased
	USA	200	AIM-9J	AAM	1976	(1979)	200	For 21 F-5E/F fighters
		200	AIM-9P	AAM	1978	1979	40	In addition to 200 AIM-9J delivered 1979
						1980	160	
		18	F-5E Tiger-2	Fighter	1976	1979	18	Total cost: including 3 F-5F trainers
		3	F-5F Tiger-2	Trainer	1976	1979	3	
		. .	M-113-A1	ICV	(1978)			On order; 250 in service
		. .	MIM-23B Hawk	Landmob SAM	1979			Order date Jul 1979; 3 systems ordered
		20	Model 206B	Hel	1978			
13 Somalia	Italy	4	G-222	Transport	(1979)			Negotiating; probably for version with UK engine similar to aircraft for Libya
		. .	Type 6614	APC	1979			
13 South Africa	France	. .	AS-12	ASM	1974	1975	(48)	
						1976	(360)	
						1977	(360)	
						1978	(360)	
						1979	(360)	
		. .	MILAN	ATM	(1979)			Reportedly ordered
		. .	Mirage-50R	Fighter	1979			Recce version ordered
		36	MM-38 Exocet	ShShM	1976			
	Israel	. .		Corvette	1979			New class ordered after French embargo on A-69; Italian government denied reports of frigate being armed with Aspide ShShM
	Italy	. .	Aspide/Albatros	ShAM/ShShM	1979			Order date Mar 1979; 3 systems ordered
		. .	M-109	SPH	1977	(1978)	(100)	
						(1979)	(100)	
	Japan	1		Survey ship	1976			
	Spain	60	Centurion	MBT	(1978)	1979	(60)	
	USA	80	Cessna	Lightplane	1978	(1979)	(80)	
13 Sudan	Brazil	6	EMB-111	Mar patrol	(1979)			On order; for AF
	France	24	Mirage-50	Fighter/MRCA	1977	1978	12	
						1979	12	

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
	USA	2	C-130H Hercules	Transport	1979			Order date Feb 1979; 6 C-130E in AF use
		10	F-5E Tiger-2	Fighter	1978			First requested in 1977; congressional approval received in 1978
		2	F-5F Tiger-2	Trainer	1978			
		100	M-113-A1	ICV	1979			Order date Feb 1979
		50	M-60-A1	MBT	1979			Order date Feb 1979
13 Swaziland	Israel	1	IAI-201 Arava	Transport	(1979)	1979	1	Received Jun 1979; for light transport
	Netherlands	1	F-28 MK-3000	Transport	1978	1978	1	
8 Syria	FR Germany	. .	AS-34 Kormoran	AShM	1977			Euromissile sale
	France	. .	HOT	ATM	1978			
		1000	MILAN	ATM	1978	1978	500	Euromissile sale; FRG claims France has sole responsibility for exports
						1979	500	
		50	SA-342K Gazelle	Hel	1979			
		40	Super Frelon	Hel	(1979)			Negotiating for 14-40 hel
	Libya	500	T-62	MBT	1978			MAP
	Switzerland	32	MBB-223K	Trainer	1977	1977	16	
						1978	16	
	USSR	. .	Mi-8 Hip	Hel	1978	1978	10	
						(1979)	(18)	
		. .	MiG-25 Foxbat-A	Fighter/interc	(1979)	1979	(12)	Delivered Scp 1979; Syria may also want MiG-27 Flogger-D
		12	MiG-27	Fighter/strike	1978	1979	12	
	Libya	3	MiG-27	Fighter/strike	(1979)	1979	3	Deal negotiated Jan 1978, including hel, ATM and tanks; similar to Soviet deal with Iraq; Libyan or Iraqi funding
	USSR	. .	SA-8 Gecko	Landmob SAM	1977			
		. .	SA-9 Gaskin	Landmob SAM	1978	1978	(200)	
						(1979)	(200)	
		. .	Su-22 Fitter-C	Fighter/bomber	(1979)	1979	(6)	Delivered, according to Israeli Chief of Military Intelligence
		100	T-72	MBT	1979	1979	100	Delivered by sea Jul 1979; total requirement: 250; second customer after Libya outside WTO

10 Taiwan	USA	500	AGM-65A	ASM	1979	1979	288	
		600	AIM-9J	AAM	(1979)			Approved 1978; delivery Dec 1980-May 1981
		. .	F-100F	Fighter	(1979)			Requested for spares
		. .	F-104S	Fighter	(1979)			Requested for spares
		60	F-4E Phantom	Fighter	(1979)			
		50	F-8H Crusader	Fighter	(1979)			Ex-USN; 10 years of spares requested
		100	M-109-A2	SPG	1978			
		100	M-109-A2	SPG	1978			To be delivered Mar 1983
		25	M-110	SPH	1978			Order date Aug 1978; to be delivered May 1983; 203-mm SPH
		12	Model 300C	Hel	1979			Order date Oct 1979; for new air-police squad; total cost including 5 Model-500Ds
		5	Model-500D	Hel	1979			
		12	Model 500MD	Hel	(1979)	1979	(6)	
						1980	(6)	
		18	S-2E Tracker	Fighter/ASW	(1977)	(1978)	(9)	Approved
						(1979)	(9)	
13 Tanzania	FR Germany	1		Survey ship	1976	1979	1	
	Italy	6	AB-205	Hel	(1979)	1979	6	
	United Kingdom	36	Scorpion FV-101	Recce AC	1978			Order date Sep 1978
10 Thailand	France	. .	MM-38 Exocet	ShShM	1976	1979	(48)	For 3 Breda FPB
	Italy	4		FPB	1976	1979	4	
		10	SM-1019E	Lightplane	(1979)			Negotiating; first export customer
	United Kingdom	117	Scorpion FV-101	Recce AC	1978	1978	(91)	
						1979	(26)	
	USA	. .	AIM-9P	AAM	(1978)	1979	60	
						1980	146	
		. .	BGM-71A TOW	ATM	(1978)			
		3	C-130H Hercules	Transport	(1979)			US letter of offer Apr 1979, including spares, training and support equipment
		4	CH-47A Chinook	Hel	1978			Order date Oct 1978
		. .	Dragon FGM-77A	ATM	(1979)			Delivery expected before end 1979
		15	F-5E Tiger-2	Fighter	1979			
		3	F-5F Tiger-2	Trainer	1979			
		25	F-8H Crusader	Fighter	(1979)			From US Navy surplus stocks: to be used for spares during 10 years
		30	M-113-A1	ICV	(1979)	1979	30	Delivered Jul-Aug 1979; designation unconfirmed

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		25	M-48 Patton	MBT	(1979)	1979	(25)	
		16	M-60-A3	MBT	(1978)	(1979)	16	Delivery soon; including M-41
		3	Merlin-4A	Lightplane	1978			
		16	Model 205 UH-1H	Hel	1977			Pending congressional approval
		6	OV-10C Bronco	Trainer/COIN	1977			Pending congressional approval
		94	V-150 Commando	APC	1978			
13 Togo	Brazil	6	EMB-326 Xavante	Trainer/COIN	(1979)			
	France	5	Alpha Jet	Trainer	1977			
		1	C-160F Transall	Transport	1978			
		1	SA-315B Lama	Hel	(1979)			
	USA	1	L-100-20	Transport	(1979)			
15 Trinidad and Tobago	Sweden	2	Spica Class	FPB	1979			For Coast Guard
	United Kingdom	1	Sword Class	FPB	(1978)			
12 Tunisia	Austria	45	Panzerjager K	SPG	1976	1979	45	
	Italy	18	AB-205	Hel	1979			
		12	MB-326K	Trainer	1979			
	Sweden	. .	RBS-70	Port SAM	1979			Agreement at Paris Air Show
	USA	1320	BGM-71A TOW	ATM	1978			Pending congressional approval; including 120 practice missiles; total cost: including M-113-A1 AC and M-577 vehicles
		328	Chaparral	Landmob SAM	1978			Pending congressional approval; Vulcan-Chaparral air defence system
		60	M-113-A1	ICV	1978			Pending congressional approval; total cost: including BGM-71A TOW ATM and M-577 vehicles
		20	M-113-CPC	CPC	1978	1979	(20)	Order date Jun 1979; total cost including M-113-A1, TOW
		26	M-163 Vulcan	AAV	1978			Pending congressional approval; Vulcan-Chaparral air defence system
		6	M-577-A1	Cargo	1978			Pending congressional approval
15 Uruguay	France	3	Vigilante	PB	1979	(1980)	3	Strikes reported in Uruguay as expressing protests by opposition against French arms sales to present regime

15 Venezuela	FR Germany	2	Type 209	Submarine	1977			
	Italy	8	A-109 Hirundo	Hel	(1979)			Order unconfirmed
		6	AB-212AS	Hel	1977			
		10	AB-212AS	Hel	(1977)			
		48	Aspide/Albatros	ShAM/ShShM	1977	1978	(48)	
		6	Lupo Class	Frigate	1975	1979	1	
		72	OTOMAT-1	ShShM	1975	1979	24	
	USA	1	C-130H Hercules	Transport	(1979)	1979	1	
		1	Citation-2	Transport	(1979)	1979	1	
		2	Merlin-4A	Lightplane	(1979)	1979	2	
		3	Model 205 UH-1H	Hel	(1979)	1979	(3)	At least 3 delivered
10 Vietnam	USSR	12	An-12 Cub-A	Transport	(1979)	1979	12	Delivered Jul 1979
		2100	BTR-60P	APC	(1979)	1979	2100	Unconfirmed
		2	Destroyer VN 79	Destroyer	(1979)	1979	2	
		110	MiG-17PF	Fighter	(1979)	1979	110	Delivered Feb 1979
		60	MiG-19P	Fighter	(1979)	1979	60	Delivered Feb 1979
		120	MiG-21F	Fighter	(1979)	1979	(120)	Number also reported as "tens of fighters"
		30	MiG-27	Fighter/strike	(1979)	(1979)	(30)	Unconfirmed
		2		FPB	(1979)	1979	2	
		900	SA-2 Guideline	Landmob SAM	(1978)	1978	360	Designation unconfirmed; 360 delivered Sep 1978 and 500 Feb 1979
						1979	500	
		..	SSN-2 Styx	ShShM	(1979)	1979	(6)	
		60	Su-7 Fitter	Fighter	(1979)	1979	60	Delivered Feb 1979
		200	T-62	MBT	1978	1978	200	
						1979	(200)	
		2		TB	(1979)	1979	2	
		100	ZSU-23-4 Shilka	SPG	1978	1978	100	
8 Yemen North	Saudi Arabia	12	M-106-A1	Mortar carrier	1979	1979	12	
		26	M-113-A1	ICV	1979	1979	26	
		..	M-577-A1	Cargo	1979	1979	6	
		6	M-88-A1	ARV	1979	1979	6	
	USA	..	BGM-71A TOW	ATM	(1979)	1979		Included in $370 mn FMS programme paid by Saudi Arabia
		2	C-130H Hercules	Transport	1979	1979	2	Transferred Mar 1979
		300	Dragon FGM-77A	ATM	1979			Transferred Mar 1979
		12	F-5E Tiger-2	Fighter	(1979)			Included in $390 mn FMS programme paid by Saudi Arabia; 70 Taiwanese pilots and technicians also financed by Saudi Arabia
		100	M-113-A1	ICV	1979	1979	100	Included in $390 mn FMS programme paid by Saudi Arabia

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		74	M-163 Vulcan	AAV	(1979)	1979	74	
		64	M-60-A1	MBT	1979	1979	32	
	USSR	. .	FROG-7	Landmob SSM	(1979)			Eight or more mobile launchers delivered
		10	MiG-21F	Fighter	(1979)	1979	(10)	Delivered because Saudi government withheld payment for F-5E Tiger-2 fighters from USA; pilots reportedly training in USSR
		2	Osa-2	FPB	(1979)	1979	2	Two missile-armed FPBs supplied
		12	SSN-2 Styx	ShShM	(1979)	1979	(12)	For 2 new FPBs
		5	Su-7 Fitter	Fighter	(1979)	1979	(5)	
		50	T-55	MBT	(1979)	1979	(50)	
		50	T-62	MBT	1979	(1979)	(50)	Number also reported as 100
8 Yemen South	Poland	50	T-54	MBT	1978	1979	50	
		100	T-55	MBT	1979	1979	100	
	USSR	. .	Mi-8 Hip	Hel	1979	1979	(50)	
		10	MiG-21F	Fighter	(1979)	1979	10	Delivered Mar 1979
		. .	MiG-27	Fighter/strike	(1979)	1979	5	Delivered Mar 1979
		2	Osa-2	FPB	1979	1979	(2)	
		. .	SSN-2 Styx	ShShM	(1978)	1979	(28)	
		30	Su-22 Fitter-C	Fighter/bomber	(1979)	1979	30	Reportedly delivered May 1979
		. .	Su-7 Fitter	Fighter	1979	1979	(20)	
		. .	T-62	MBT	1979	1979	(50)	
13 Zaire	Canada	3	DHC-5D Buffalo	Transport	(1978)			
	China	2		GB	1978	1979	2	
	Italy	2	MB-326GB	Trainer/strike	1979			
		3	MB-326KG	Trainer	1979			
		12	SF-260M	Trainer	1978			For training and liaison
13 Zimbabwe	USA	5	T-28A Trojan	Trainer	(1979)	(1979)	(5)	Unconfirmed

Appendix 3B

Register of licensed production of major weapons in industrialized and Third World countries, 1979

See the *SIPRI Yearbook 1979* for sources and methods (Appendix 3C, pages 242–55), for conventions and abbreviations used in the registers (pages 252–55), and for the key to the region codes (page 255).

Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of production	No. produced	Comments
I. Industrialized countries								
11 Australia	United Kingdom	15	Fremantle	FPB	1977	1979	1	
4 Belgium	France	17	Alpha Jet	Trainer	1975	1978	2	First aircraft delivered from France in Jun 1978; first Belgian-assembled was completed in Nov 1978; production rate 1979: 2/month
						1979	(10)	
						1980	(5)	
	Ireland	1000	Timoney	APC	1977	(1978)	(300)	
						(1979)	(700)	
	USA	514	AIFV	MICV	1979			
		104	F-16A	Fighter/strike	1977	1979	5	
		12	F-16B	Fighter/strike	1977	1979	5	
		525	M-113-A1	APC	(1979)			Total number ordered: 1200 including M-113; u.c.:$100 000
4 Canada	Switzerland	350	Piranha	AC	1977			
	USA	..	Seasparrow	ShShM/ShAM	1970	1979	50	
7 Finland	United Kingdom	46	Hawk-1182	Trainer	1977	1980	4	Delivered prior to licence production of 46 aircraft; total of 50
4 FR Germany	USA	9000	AIM-9L	AAM	1977			NATO coproduction programme
4 France	USA	..	FR-172K Hawk XP	Trainer	(1975)	1977	25	
						1978	25	
						1979	25	
		..	FT-337 Milirole	Trainer	1969	1977	5	Designation: FTB-337 Milirole; exported to Africa
						1978	6	
						1979	3	
		..	Model-172K	Lightplane	1976	1976	1	
						1977	(160)	
						1978	(160)	
						1979	(160)	
		..	F-182	Lightplane	1975	1975	(10)	
						1976	(20)	
						1977	(20)	
						1978	35	
						1979	35	
		..	FR-182RG	Lightplane	1975	1978	(10)	
						1979	(10)	

4	Greece	France	4	Combattante-2	FPB	1976			
			2	Combattante-3	FPB	1975			
4	Italy	FR Germany	..	Cobra-2000	ATM	1974	1974	(500)	
							1975	(1000)	
							1976	(1000)	
							1977	(1000)	
							1978	(1000)	
							1979	(1000)	
			600	Leopard-1	MBT	1973	1974	(30)	
							1975	(50)	
							1976	(50)	
							1977	(50)	
							1978	(50)	
							1979	(100)	
		USA	..	AB-205A-1	Hel	1969	1978	(120)	
							1979	(120)	
			..	AB-206B-3	Hel	1972	1978	(50)	
							1979	(50)	
			..	AB-206B-LR	Hel	1978	1979	(50)	Long-range version at test stage
			87	AB-212AS	Hel	1975	1978	(60)	
							1979	(60)	
			..	AB-214A	Hel	1977	1977	(10)	
							1978	(10)	
							1979	(10)	
			160	CH-47L	Hel	1979	1979	(40)	Number ordered: 150-160 to be produced for export to Libya and Morocco
			500	Model-500MD	Hel	1976	1977	(12)	
							1978	(12)	
							1979	(20)	
			200	M-109	SPH	1968	1977	(18)	
							1977	(18)	
							1978	(18)	
							1978	(18)	
							1979	(18)	
			..	M-113-A1	AC	1963	1977	(150)	
							1978	(150)	
							1979	(150)	
			20	S-61R	Hel	1972	1977	(2)	
							1978	(8)	
							(1979)	(10)	
			..	Seasparrow	ShAM/ShShM	1968	1978	50	
							1979	(50)	

Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of production	No. produced	Comments
10 Japan	USA	. .	AIM-7E	AAM	1972	1977	(90)	Total number produced for F-4Ej fighter 700; to continue in production for use with F-15 Eagle fighters
						1978	(90)	
						1979	(90)	
		54	Model UH-1H	Hel	1976	1977	(20)	
						1978	(20)	
						1979	(14)	
		78	F-15A Eagle	Fighter/interc	1977			Total programme cost expected to be $3 300 mn: AF wants 23 more; planned delivery in 1981
		148	F-4Ej Phantom	Fighter	1969	1977	15	
						1978	15	
						1979	10	
		200	Model-500C	Hel	1972	1977	(20)	
						1978	20	
						1979	10	
		115	KV-107/2A-4	Hel	1961	1977	(2)	
						1978	(2)	
						1979	(2)	
		36	KV-107/2A-5	Hel	1962	1978	2	Local modification of Boeing-Vertol 107; first delivered to Sweden in 1972; FY 1978 funding: $8.90 mn for 3
						1979	(2)	
		. .	MIM-23B Hawk	Landmob SAM	1978	1978	(100)	
						1979	(100)	
		135	OH-6J	Hel	1967	1977	(12)	FY 1978 funding: $6.25 mn for 10
						1978	(12)	
						1979	(12)	
		83	P-2J Neptune	ASW/mar patrol	1969	1976	8	
						1977	11	
						1978	11	
						1979	(2)	
		42	P-3C Orion	ASW/mar patrol	1978			
		97	S-61B	Hel	1965	1977	(4)	Designation: including S-61B-1 version; 4 more ordered by Navy in FY 1978
						1978	(4)	
						1979	(4)	
		51	SH-3B	Hel	1979	1980	4	
		14	TF-15A Eagle	Trainer	1978	1978	4	
4 Netherlands	USA	152	F-16A	Fighter	1977	1979	7	Total number planned: 102 for Nether-

								lands plus 72 for Norway; first delivered in 1979; production rate 1984: 3/month; offset for Netherlands industry involves 250 jobs
		22	F-16B	Fighter/strike	1977			
5	Poland	USSR	. .	An-2 Colt	Lightplane	1960	1977	200	
							1978	200	
							1979	200	
			. .	An-28	Transport	1978			Production to start 1980-81
			. .	Mi-2 Hoplite	Hel	1964	1977	300	
							1978	300	
							1979	300	
5	Romania	France	130	SA-316B	Hel	1971	1977	(10)	
							1978	(10)	
							1979	(10)	
		United Kingdom	25	BAC-111	Transport	1979			Total cost: $410 mn plus $205 mn for licensed production of Rolls-Royce Spey engine; 20 aircraft for Romanian AF
			315	BN-2A Defender	Transport	1968	1977	(30)	
							1978	(30)	
							1979	(30)	
7	Spain	FR Germany	69	Bo-105CB	Hel	1979			Contract signed; chosen instead of SA-342 Gazelle; licenced production of up to 30% of components plus final assembly by CASA; to be armed with HOT ATM; delivery from 1980
		France	4	Agosta Class	Submarine	1974			Spanish designation: S-30 Class; to be delivered 1980-83
			200	AMX-30E	MBT	1975	1978	(60)	
							1979	(60)	
		USA	3	FFG-7 Class	Frigate	1977			
7	Switzerland	USA	53	F-5E Tiger-2	Fighter	1976	1979	(17)	Total number planned: excluding 13 F-5E and 6 F-5F delivered from USA
4	Turkey	FR Germany	. .	Cobra-2000	ATM	1970			Has 85 systems in use; current status of production programme uncertain
			13	SAR-33 Type	PB	1978			Prototype delivered from FRG in 1977 for trials; rest of building in Turkey
			2	Type 209	Submarine	1974			Total number planned: 2 delivered from FRG 1975-77

Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of production	No. produced	Comments
	USA	100	Model-500MD	Hel	(1979)			New plant to start licenced production within one year of contract: planned indigenization of 30% in 1980, to increase to 80% in 1983; planned production rate: 25-30/year
4 United Kingdom	France	50000	MILAN	ATM	1976	1979		
	USA	. .	Commando MK-2	Hel	1966	1978	20	
		200	SH-3D Sea King	Hel	1966	1978	20	
						1979	20	
1 USA	France	6000	Roland-2	Landmob SAM	1974	1978	157	Cost escalation by 1978 of 56.7%; planned production for 1979: 15 launch units and 314 missiles; Norway may buy US launch units but missiles from Euromissile
						1979	157	
	Switzerland	. .	AU-23A	Transport	1965	1978	20	
						1979	(20)	
	United Kingdom	336	AV-8B Harrier	Fighter	1975			Designation: Advanced Harrier, UK origin; USA continued study when UK withdrew from joint programme in 1975; for US Marine Corps
6 Yugoslavia	France	132	SA-342 Gazelle	Hel	1971	1978	(10)	
						1979	(10)	
II. Third World countries								
15 Argentina	FR Germany	3		Submarine	1977			
		4	MECO-360 Class	Frigate	1977			
		200	TAM	MT	(1976)	1979	(50)	
		2	S-148 Type	FPB	1975			
		300	VCI	MT	1976	1979	(100)	
	Switzerland	. .	Roland	APC	1970	1974	(10)	
						1975	(10)	
						1976	(10)	
						1977	(10)	
						1978	(20)	
						1979	(20)	
	USA	. .	Arrow-3	Trainer	1977	1978	(10)	Local development of licence-produced Piper aircraft; for use as military
						1979	(10)	

								trainer
		120	Model-500M	Hel	1972	1977	(12)	Assembly of knocked-down components
						1978	(12)	
						1979	(12)	
15 Brazil	FR Germany	..	Cobra-2000	ATM	1973	(1975)	(10)	
						(1976)	(100)	
						(1977)	(200)	
						(1978)	(200)	
						(1979)	(200)	
	France	200	AS-350M Esquilo	Hel	1978			
		80	Roland-1	Landmob SAM	1972	1977	(20)	
						1978	(20)	
						(1979)	(20)	
		30	SA-315B Lama	Hel	1978	1979	(5)	France owns 45% of new company; assembly of 30 over 10 years, most for civilian market
	Italy	167	EMB-326 Xavante	Trainer/COIN	1970	1971	4	Designation: AT-26 Xavante; first licence production contract in 1970 for 112, second order 1975 for 40 plus option on 30 more
						1972	24	
						1973	24	
						1974	24	
						1975	24	
						1976	12	
						1977	24	
						1978	12	
						1979	(19)	
	USA	..	EMB-810C	Lightplane	1974	1975	27	Designation: Piper Seneca-2; licence production contract includes 6 versions, mostly for civilian market; 10 delivered to Brazilian AF in 1978; production slowed down
						1976	23	
						1977	20	
						1978	48	
						(1979)	(48)	
15 Colombia	USA	..		Lightplane	1969	1978	120	
						1979	114	
8 Egypt	France	160	Alpha Jet	Trainer/strike	(1979)			
	United Kingdom	30	Lynx	Hel	1978			Licence production contract signed in 1978 for 280 hel and 750 Rolls Royce P; AOI funding
		4000	Swingfire	ATM	1977	1979	(100)	Arab-British Dynamics Ltd set up with 30% of the capital from BAC and 70% from AOI; initial contract value $77.6 mn; planned production run: 7 years

Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of production	No. produced	Comments
9 India	France	140	SA-315B Lama	Hel	1971	1973	(6)	First 40 assembly only, then licence production of 100 from local raw material
						1974	(10)	
						1975	(10)	
						1976	(10)	
						1977	(10)	
						1978	(10)	
						1979	(10)	
		. .	SA-316B Chetak	Hel	(1977)			
		3000	SS-11	ATM	1970	1972	250	For use with licence-produced B-1 Jonga vehicle
						1973	250	
						1974	400	
						1975	400	
						1976	400	
						1977	400	
						1978	250	
						1979	250	
	United Kingdom	. .	Gnat T-2 Ajeet	Trainer	1978			Local development from licence-built Gnat; first flight planned for 1979
		80	Gnat-2 Ajeet	Fighter	1973	1976	(5)	Local development from licence-built Gnat; production run of 4 years expected; total requirement: 100; arms: 2xAden cannon
						1977	(5)	
						1978	(10)	
						1979	(10)	
		20	HS-748M	Transport	1972	1975	2	
						1976	2	
						1977	2	
						1978	2	
						1979	2	
		110	Jaguar	Fighter	(1979)			Selected instead of Mirage F-1 and Viggen; contract signed on 6 Oct 1979; first 40 to be delivered from UK followed by at least 110 licence-produced; delivery of first Indian-assembled aircraft late 1981
		6	Taragiri	Frigate	1964	1979	1	
		1000	Vijayanta-2	MT	1965	1975	(100)	
						1976	(100)	
						1977	(100)	

						1978	(100)	
						1979	(100)	
		6	Vindhyagiri	Frigate	1964			
	USSR	100	An-32 Cline	Transport	1979			Minister of Defence Subramaniam said agreement reached to replace aged transport aircraft; to be delivered early 1980s; later licence production
		50	MiG-21bis	Fighter	1976	1979	(15)	
		100	MiG-21M	Fighter	1972	1973	(5)	
						1974	(10)	
						1975	(20)	
						1976	(20)	
						1977	(20)	
						1978	(15)	
						1979	(10)	
10 Indonesia	FR Germany	50	Bo-105CB	Hel	1975	1976	6	Some components are locally produced
						1977	6	
						1978	6	
						1979	12	
	France	25	SA-330L Puma	Hel	1977	1977	(5)	
						1978	(10)	
						1979	(10)	
	Spain	82	C-212A Aviocar	Transport	1975	1976	3	New plant set up in 1976; assembly
						1977	7	
						1978	10	
						1979	(10)	
8 Israel	USA	10	Flagstaff-2	Hydrofoil FPB	1977			To be licence-produced after delivery of first pair from USA
10 Korea North	USSR	. .	MiG-21MF	Fighter	1974			First delivery was reportedly planned for 1978 but no information available
10 Korea South	Italy	150	Type 6614	APC	1976	1977	20	Not yet in production in Italy
						1978	(20)	
						1979	(50)	
	USA	12	Model 500D	Hel	(1979)			
		. .	PSMM-5 Type	FPB	1976			
13 Nigeria	FR Germany	20	Bo-105D	Hel	1978	1978	(10)	Final assembly only
						1979	(10)	

Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of production	No. produced	Comments
9 Pakistan	China	. .		ATM	1978			
		. .		LT	1978			
	France	. .	SA-316B	Hel	1968	1978	12	
	Sweden	25	Supporter	Trainer/strike	1974	1978	5	Designation: MFI-17; first 45 delivered
						1979	(5)	from Sweden; total number planned may be 100
	USA	. .	Model-500C	Hel	1976			
		. .	T-41D Mescalero	Trainer	1976			Planned production rate: 50/year
15 Paraguay	Brazil	12	EMB-326 Xavante	Trainer/COIN	1979	1979	12	First jet aircraft for Paraguay AF; ordered Apr 1979
15 Peru	Italy	2	Lupo Class	Frigate	1974	1979	1	Additional to first pair delivered from Italy
10 Philippines	Australia	80	DH-9209	CPB	1975			
	FR Germany	12	Bo-105C	Hel	(1979)			
		14		FPB	1977			
	United Kingdom	100	BN-2A Defender	Transport	1974	1978	6	Phase 1: 6 delivered from UK in 1974; phase 2: 14 delivered empty and unpainted; phase 3: assembly of 20 from kits; phase 4: local manufacture of 60
13 South Africa	France	. .	Cactus	Landmob SAM	1974	1978	(100)	
						1979	(100)	
		1000	Eland-2	AC	1965	1977	(100)	Designation: Panhard AML-60/90; second
						1978	(100)	generation locally developed; local P
						1979	(100)	
	Italy	. .	Impala-2	Trainer/COIN	1974	1974	(4)	Designation: MB-326 K; Rolls Royce P
						1976	(30)	
						1977	(30)	
						1978	(50)	
						1979	(50)	
10 Taiwan	USA	1046	AIM-9J	AAM	1973	1974	6	
						1975	30	
						1976	180	
						1977	288	

						1978	288	
		..	AIM-9L	AAM	(1979)	1979	(288)	US government agreed in principle to licenced production of Super Sidewinder AAM
		187	F-5E Tiger-2	Fighter	1973	1974	1	
						1975	5	
						1976	30	
						1977	48	
						1978	48	
						1979	48	
		39	F-5E Tiger-2	Fighter	1979			New batch licence contracted Jun 1979, including 9 F-5F fighter/trainers
		21	F-5F Tiger-2	Trainer	1976	1978	(5)	
						1979	(10)	
						1980	(6)	
		9	F-5F Tiger-2	Trainer	(1979)			
		24	MIM-23B Hawk	Landmob SAM	1976			
15	Venezuela	Italy	11		CPB	1973		

4. Eurostrategic weapons

Square-bracketed numbers, thus [1], *refer to the list of references on page 185.*

I. Definitions

The term 'Eurostrategic' is used to describe nuclear weapons located in or likely to be used in Europe, and which are capable of hitting targets located a significant distance within the territory of the opponent. They are thus distinguished from tactical nuclear weapons [1] which are usually of shorter range and which are intended to be used within a battlefield.

More commonly, and especially as a consequence of the SALT (Strategic Arms Limitation Talks) debate, such weapons have been described as grey-area weapons, a term which indicates that they constitute contentious issues in arms control negotiations. Eurostrategic weapons are here regarded as encompassing the following:

(*a*) weapons with performance parameters that satisfy one side's criteria for a strategic weapon but not so clearly that the other side cannot dispute the matter (i.e., borderline cases);

(*b*) weapons that one side can regard as strategic while claiming that its own weapons of comparable performance are non-strategic due to geographic asymmetries;

(*c*) weapons intended primarily to counter strategic threats from other than the rival great power (or to pose strategic threats for countries other than the rival great power) but which the latter nevertheless regards as a potential threat on the grounds that capability exists and intentions cannot be fathomed; and

(*d*) weapons that exist in strategic and non-strategic versions which are indistinguishable by external observation.

There is a heterogeneous array of aircraft and missile systems that can then be considered as Eurostrategic weapons.

II. The weapons and the threat

NATO Eurostrategic weapons

As far as the Soviet Union is concerned, any NATO missile or aircraft with a primary mission enabling it to deliver a nuclear warhead on European Soviet territory is accountable as a Eurostrategic weapon. In practical terms this means NATO missiles and aircraft with a combat radius in

excess of about 800 km. For ship- and submarine-based weapons, the range threshold may be even lower, say, 400 km. This range threshold will clearly encompass most of the British and French nuclear forces: the French currently have operational 18 intermediate-range ballistic missiles (IRBMs), 64 submarine-launched ballistic missiles (SLBMs) and 33 Mirage IVA bombers, while the British possess 64 SLBMs and 48 Vulcan B2 bombers.

The United States also assigns 5 SSBNs (ballistic missile-equipped, nuclear-powered submarines) with a total of about 800 Poseidon C-3 re-entry vehicles, to SACEUR (Supreme Allied Commander, Europe). These weapons are, however, also counted in the SALT totals.

In addition to these systems, NATO has various types of tactical strike aircraft capable of delivering nuclear weapons, both land-based and carrier-based types. This is where the accounting problems become really formidable. In the first place, with the probable exception of the US F-111, not all aircraft of each type are configured to carry nuclear weapons, but the nuclear-capable aircraft are indistinguishable on external characteristics from the others. Moreover, modification to provide a nuclear capability does not preclude the carriage of conventional ordnance; that is, these aircraft are dual-capable. Secondly, the range capability of most strike aircraft is highly sensitive to payload and flight profile, so that a quoted maximum range of, say, 2 000 km for a given type does not necessarily imply an effective capability to deliver a nuclear warhead 750 km or more into WTO territory and return to base.

At present 156 US Air Force F-111s based in the United Kingdom provide the most important element of NATO's long-range, supersonic, low-level nuclear strike capability. With a range of 5 000 km, the F-111 can reach well into the Soviet Union from bases in the UK, and can carry at least two nuclear weapons.

The strategic bombing version, the FB-111A, is not based in Europe, but is still intended for and must be counted within the European theatre. There are 66 FB-111As, and each can carry up to six nuclear bombs or short-range attack missiles (SRAMs).

The SRAM can fly either semi-ballistically or in terrain-following mode like a cruise missile, but travels three times as fast. It delivers a nuclear warhead with an explosive yield reportedly of 170 kt—the same as that of the Minuteman 3 intercontinental ballistic missile (ICBM) or the SS-20 IRBM. An FB-111A can fire off its six SRAMs in six different directions, regardless of the direction the plane happens to be flying, and each SRAM has a range of over 100 km. In effect, the FB-111A has been 'MIRVed'.

Apart from the US F-111s, NATO has roughly 1 000 nuclear-capable strike aircraft deployed in the European area, including those on aircraft carriers in the Atlantic and the Mediterranean. At least half of these can

reach Soviet territory [2, 3]. The current NATO aircraft types include the F-4 Phantom II, the A-6E Intruder, the A-7E Corsair II, the Mirage F-1, the Buccaneer, the F-104 Starfighter, the Jaguar and soon the F-16. The US-owned aircraft in this total, over 600, constitute the bulk of the forward-based systems (FBSs) that the Soviet Union has long argued should be counted under the SALT ceilings.

WTO Eurostrategic weapons

On the other side of the coin, NATO is concerned about an even wider panoply of Soviet weapon systems. Two additional complications are, first, that all the Soviet systems—medium- and intermediate-range missiles, medium bombers, and strike aircraft and sea-based weapons—are highly mobile and, since the Soviet Union lies partly in Asia and partly in Europe, it is extremely difficult to be definitive about the number of systems directed towards the European theatre. Second, the range threshold for Soviet nuclear weapons is lower than that generally assumed for NATO weapons, since the criterion used is the ability to deliver weapons deep into the territory of any NATO state from anywhere in WTO territory. Interestingly, most discussions of the 'grey area' seem to ignore the interests of the WTO states—primarily Poland, the Democratic Republic of Germany and Czechoslovakia—that lie between NATO and the Soviet Union. Only the ability to strike into Soviet territory is considered to be relevant for Western forces.

As regards land-based missiles, the relevant Soviet systems include the SS-14 Scamp/Scapegoat IRBM (estimated range of 4 000 km; reportedly deployed only in the eastern USSR but fully mobile; number not known) and the SS-12 Scaleboard short-range ballistic missile (SRBM) (estimated range of 800 km; number not known). In addition, the SS-22, which is considered to be a follow-on to the SS-12 with a comparable range, is just entering service. Furthermore, the Soviet Union is known to deploy a mobile land-based version of the naval SS-N-3 Shaddock and, possibly, its successor, the SS-N-12. Both these weapons have a maximum range of about 750 km.

At sea, the Soviet SS-N-3/12 is widely deployed on submarines (Echo II- and Juliet-classes) and surface ships (Kiev-, Kresta I- and Kynda-classes). Two older and relatively short-range SLBMs are deployed on Golf- and Hotel-class submarines. These missiles—the SS-N-4 and SS-N-5 (550 km and 1 200 km range, respectively)—are not included in the SALT totals. Six Golf-class submarines restricted to Baltic waters presumably can cover only European targets.

In the field of medium bombers, the most numerous Soviet type remains the Tu-16 Badger—approximately 500 aircraft, of which about one-half

are oriented toward the European theatre. There are also some 140 Tu-22 Blinder bombers, of which two-thirds are estimated to be oriented toward the European theatre [4].

Finally, candidate strike aircraft types would include the Su-19 Fencer, the MiG-27 Flogger and the Su-17/20 Fitter C. The total number of these types deployed in the European theatre is estimated to be 690, although it is unclear whether all of them are in fact configured for the nuclear delivery role [3].

This brief review indicates the potential scope of the grey area and the extremely difficult accounting and verification problems that would arise in any negotiations that addressed these weapons.

III. Eurostrategic weapons after SALT II

The current debate on Eurostrategic weapons is focused on a handful of weapon systems: three Soviet missile systems and a medium bomber, all of which are operational, and three US missile systems in development. The known technical characteristics of these systems are summarized in table 4.1 and the discussion below provides background on them.

The SS-20 IRBM

The Soviet SS-20 is a two-stage, solid-fuel missile system that is transported on and launched from the same vehicle. The weapon has been tested with single- and multiple-warhead payloads of varying weight with the result that estimates of its range vary quite considerably. It seems to be generally accepted that the deployed version carries three MIRVed warheads and the weapon's range with this payload is of the order of 5 000 km. Similarly, estimates of the yield of each warhead range from 150 to 500 kt [5].

The SS-20 consists of the upper two stages of the SS-X-16 ICBM, the latter being one of the family of fourth-generation Soviet ICBMs. The SS-X-16 was in fact the first of this family of missiles to reach the flight-test stage, in March 1972. By 1976 it was apparent that an IRBM had been derived from the SS-16 by using the first two stages of the latter missile. There has been concern in the USA that the SS-20 could easily and quickly be converted into an SS-16 ICBM by adding a stockpiled third stage, thus allowing the Soviet Union to 'break out' from the ICBM limitations of SALT II. The SS-16 missile is specifically banned by the SALT II treaty.

The SS-20 became operational during 1977, with units being deployed roughly on a 60 : 40 pattern between the western and eastern USSR, with the Ural Mountains as a dividing line [6]. The production rate is an

Table 4.1. Major Eurostrategic weapons

State	Weapon designation	Year first deployed	Max. range (km)	No. of RVs	Yield	CEP (m)	No. deployed in 1979
Missiles							
USSR	SS-4	1959	2 000	1	1 Mt	2 400	390
	SS-5	1961	3 700	1	1 Mt	1 250	80
	SS-12	1969	~800	1	1 Mt	..	72
	SS-20	1977	~4 000	3	150 kt	400	~120[b]
	SS-N-5	1964[a]	~1 200	1	1–2 Mt	..	18
USA	Pershing IA	1962	~750	1	60–400 kt	450	108[c]
	Pershing IA	1962	~750	1	60–400 kt	450	72[d]
	Pershing II	(1983)	~1 600	1	10–20 kt	45	0
	GLCM	(1983)	2 500	1	200 kt	90	0
UK	Polaris A-3	1967	4 600	1	3×200 kt	800	64
France	S-2	1971	3 000	1	150 kt	..	18
	M-20	1977	5 000	1	1 Mt	..	64

State	Weapon designation	Year first deployed	Range[e] (km)	Weapon load (t)	Nuclear weapons per aircraft	Speed (Mach)	No. deployed in 1979
Aircraft							
USSR	Tu-16 Badger	1955	6 500	9.1	2	0.8	318
	Tu-22M Backfire	1974	9 000	8.0	4	2.5	50
USA	FB-111A	1969	10 000	17.0	6	2.5	66
	F-111E/F	1967	4 900	12.7	2	2.2/2.5	156
UK	Vulcan B2	1960	6 500	9.6	2	0.95	48
France	Mirage IVA	1964	3 000	7.3	1	2.2	33

[a] On board Golf-2 submarines in the Baltic.
[b] The figure is for launchers. Probably only 80 of these are targeted on Western Europe.
[c] Deployed in Western Europe.
[d] Deployed in FR Germany under joint US–FRG command.
[e] The maximum combat radius, which allows a mission to be fulfilled and the return of the aircraft, is less than half this maximum range.
RV = Re-entry vehicle. .. = Number unknown.

estimated 36–60 launchers per year, with possibly more than one missile for each launcher. As anticipated, the SS-20 missiles replaced the obsolescent SS-4 and SS-5 IRBMs on a one-for-one basis and by mid-1979 an estimated 140 of these older weapons had been dismantled.

The SS-4 (2 000-km range) and the SS-5 (3 700-km range) were first deployed in 1959 and 1961, respectively. By 1964, a total of 590 (500 SS-4s and 90 SS-5s) were deployed, mostly above the ground in unprotected sites. Both weapons are liquid-fuelled and grossly inaccurate by modern standards. On all these grounds—MIRVing, range, accuracy and survivability—the SS-20 represents a noteworthy quantitative and qualitative improvement.

The Tu-22M Backfire

The first reports of this new Soviet medium bomber came as early as July 1970 and the prototype is believed to have flown for the first time in 1971. The Backfire became operational with the Soviet Air Force and Navy in 1974 and promptly became one of the most contentious weapon systems in the SALT II negotiations. Although classed as a medium bomber, it is considerably larger than its Tu-22 Blinder and Tu-16 Badger predecessors. Assuming a reduced payload, a fuel-saving flight profile, and possible recovery in a third country, some quarters within the US government consider the Backfire capable of strategic missions against the United States and therefore accountable in SALT, a contention that the Soviet Union has consistently rejected.

Whatever the merits of this argument, the Backfire remains an impressive qualitative improvement over its predecessors. This twin-engine variable-geometry aircraft has a maximum speed of Mach 2.5 at high altitude and is also capable of supersonic speed at low altitude. Most sources credit it with a maximum unrefuelled range of about 8 000 km at cruising speed . Backfire is reported to carry highly sophisticated electronic eq ment comparable to that of the US F-111, including terrain-following radar, which will facilitate penetration of NATO air defences [7].

The Backfire can carry two air-to-surface missiles externally and bombs internally. The AS-4 Kitchen missile weighed 6 tons and had a maximum range of about 600 km. Since 1976 it has come to be replaced by the AS-6 Kingfish, which, thanks to a high-performance solid-fuel rocket motor, achieves the same range with a weight of about 4.8 tons. The AS-6 travels at Mach 2.5, carries radar homing guidance, and is believed to carry a megaton-class nuclear warhead.

The production rate of the Backfire, including the naval version, has averaged about 30 aircraft per year and, by the end of 1979, out of a total of about 180, 110 were deployed in the European theatre, and 50 of these are equipped for penetrating bomber missions [8]. The naval version does not carry penetration aids and is not classed as Eurostrategic.

Ground-launched cruise missiles (GLCMs)

The GLCM is a US cruise missile that has been under development since 1972. The missile (including its rocket booster) is 6 metres long and 0.5 metre in diameter. It is launched from a canister mounted on a cross-country vehicle. The GLCM was developed first as a sea-launched cruise missile (SLCM) intended to be launched from the torpedo tube of a submarine.

The small size of the GLCM enhances its efficacy as a penetrating

weapon, by giving it a radar cross-section of only 0.05 square metre—making it about as difficult to detect as a seagull. A second important capability is the weapon's ability to fly at extremely low altitudes, less than 50 m even over moderately hilly terrain. Taken together, these two characteristics give the GLCM a high probability of penetration, despite the fact that it cruises at sub-sonic speed.

The GLCM achieves remarkable accuracies by being able, periodically, to 'recognize' its whereabouts and determine the course changes necessary to 'hit the bullseye'. This system is known as TERCOM (terrain contour matching). Portions of the selected flight path to the target are surveyed to determine variations in ground elevation—a task performed by satellites for many years. These surveyed areas are divided into a matrix of squares and each square is given a number representing the average elevation of the ground. The resulting digital contour map is stored in the memory of a small computer installed in the missile. As the missile reaches each surveyed area, a radar altimeter takes readings which the computer compares with the map in its memory. This allows flight path corrections to be made so that the missile can find the next TERCOM checkpoint and, eventually, the target.

The computer used in the GLCM can store contour maps for up to 20 segments of the route to the target. This permits considerable flexibility in plotting the route: the missile can zigzag in a fashion unpredictable by the enemy, known defences can be by-passed, and terrain features such as mountains can be either avoided or exploited to conceal the weapon from enemy radars.

Between TERCOM checkpoints, the GLCM is maintained on a set course by means of an inertial guidance system. The TERCOM system, in addition to correcting accumulated navigational errors arising from inertial 'draft', resets the inertial system so that further error does not accumulate. The end result is that the GLCM is expected to achieve operational accuracies in the region of 30–100 m. A lightweight 200-kt warhead is carried and the weapon has achieved ranges in excess of 3 000 km in tests.

In mid-December 1979, NATO accepted a US plan to base 464 cruise missiles in Western Europe. This is a development with wide-ranging implications. If the Soviet Union attempts to counter the cruise missile, it will be involved in enormous expenses improving air defence systems along its western border. The cruise missile decision also signals an important US attitude towards SALT II. A protocol to the SALT II Treaty bans deployment of cruise missiles of range greater than 600 km. This protocol will expire at the end of 1981, before any cruise missile of over 600 km range could have been made ready. However, it must have been assumed that there was a hope of extending the duration of this protocol or it

would not have been signed. The US decision to deploy 2 000 km range cruise missiles indicates now that the USA has no intention of extending this otherwise worthless portion of the protocol.

Pershing II

The new US Pershing II theatre ballistic missile provides a qualitatively new extension of NATO nuclear capability. Although it incorporates rocket components identical to the earlier 750 km range Pershing I, it differs considerably in other important features [9].

Most important is the new guidance system called 'RADAG'. Pershing relies on conventional inertial guidance during boost. In the terminal phase of the trajectory, as the warhead is descending to the target area, a video radar scans the target area, and the resulting image is compared with a reference image stored in the on board computer. The computer generates commands to aerodynamic vanes which guide the warhead on to the target with a degree of accuracy unprecedented for a ballistic missile of this range—a CEP of about 45 m.

The Pershing II terminal guidance system can be pre-programmed purposely to 'overshoot' the target, and it can 'veer off' at high angles from the target, in both cases being able to backtrack precisely on it. These features of the Pershing II manoeuvrable re-entry vehicle make it not only highly accurate but also able to evade any future anti-missile defences around the target.

Pershing II has new rocket motors and new, high-energy content solid fuel, which result in a range about double that of the Pershing I, that is, about 1 500–1 800 km. This makes Pershing II the only ballistic missile based in NATO Europe with range sufficient to reach a significant distance into the Soviet Union. Flight-times will be extremely short—perhaps only seven minutes, thus giving virtually no warning time against surprise attack. Pershing is also a quick-reaction weapon, with no count-down period between a decision to launch and initiation of launch.

Two types of warhead are available for Pershing II: an ordinary air- or surface-burst nuclear warhead and a ground penetrator warhead, both having about 10 to 20 kt explosive yield. The penetrator warhead consists of a nuclear explosive encased in a high-strength steel case which can penetrate deep into hard ground before exploding. The combination of exceptionally high accuracy and the ground penetrator constitute a weapon very well suited to destruction of hardened missile silos and other buried structures. Pershing II must thus be seen as part of the Western counterforce capability.

Smaller and variable yields of nuclear warheads, as well as the conventional warhead available, all of different operational applications, create

greater employment feasibility of the Pershing II, that is, an ability to cover many diverse military targets, with maximum efficiency and the smallest collateral damage.

Pershing II was at first intended to have only 750 km maximum range to avoid the political implications of a weapon that could strike deep into the Soviet Union from NATO territory but, during 1977–78 and with the SS-20 as the ostensible justification, it was decided to increase the weapon's range capability to about 1 500 km. In December 1979 a decision was reached within NATO to deploy 108 Pershing IIs together with the 464 GLCMs to provide NATO with an extra Eurostrategic nuclear missile force of 572 missiles. The Pershing IIs would replace the same number of Pershing IAs currently deployed in Europe.

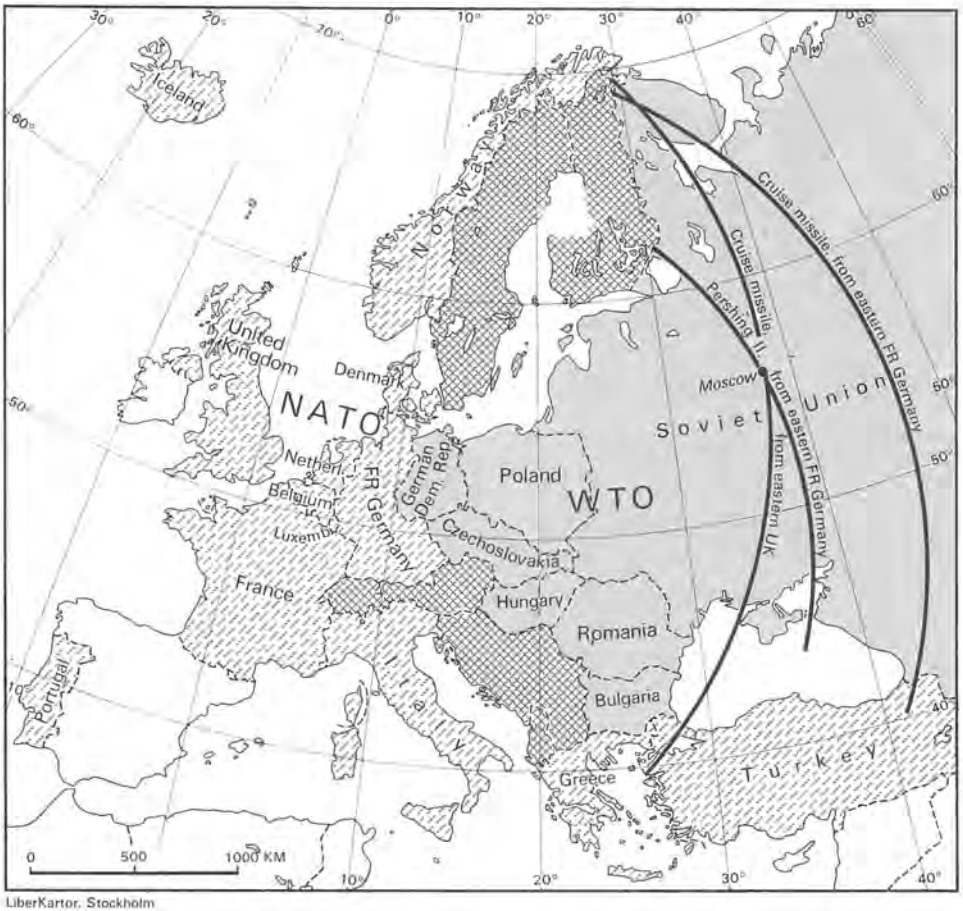
Targets and target coverage

The probable targets at which theatre nuclear weapons are directed can, of course, only be guessed at, but some brief comments are in order. The most obvious candidates are the major centres of population. The Soviet SS-4 and SS-5 missiles, for example, are probably targeted in this way, since they lack the accuracy to destroy smaller and/or harder targets. In the war-fighting counterforce role, the prime targets for theatre weapons would include mobilization centres and concentrations of weapons and equipment far to the rear of the frontline, rail and road transportation checkpoints, fuel storage depots, storage facilities for nuclear weapons, and major airports and airbases beyond the reach of battlefield nuclear weapons. As regards the latter, it can be presumed that a priority Soviet objective would be to inhibit NATO's ability to secure prompt reinforcements by air from the United States.

It seems virtually certain that the majority of these types of target in the western USSR, and probably in the other WTO states as well, are already covered by the US strategic forces. The key issue is that the Soviet Union, particularly with the SS-20, can threaten these types of target in Western Europe with weapons that, in the great-power context, are not strategic. In other words, the Soviet Union can pose this threat without crossing the psychological threshold of invoking its central strategic systems.

Figure 4.1 shows the potential target coverage of the theatre nuclear missile systems that NATO plans to deploy in the 1980s. The launch-points assumed were close to the borders with the German Democratic Republic and Czechoslovakia in the case of the Federal Republic of Germany; the eastern extremity of the border between Belgium and the Netherlands; the Norfolk/Suffolk region in the UK; and the northern central plains in Italy. The line for the SLCM assumes a launch-point approximately 100 miles off the Norwegian coast near Narvik.

Figure 4.1. Target coverage of proposed NATO theatre nuclear weapons



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The three Soviet missile systems can target all of Western Europe (including the UK) from Soviet territory. The SS-4 would have to be deployed relatively close to the Polish border to achieve this coverage. The SS-5 and the SS-20 can do so from any point west of the Ural Mountains (located at the extreme right of the map). Indeed, if the range of the SS-20 is 5 000 km, it could be deployed well to the east of the Urals and still remain within range of London.

NATO claims that it presently lacks an equivalent capability. This ignores the ability of such weapons as the F-111s based in the UK, the British Vulcan bombers and the British Polaris missiles, the latter soon to be replaced by longer-range, more accurate, MIRVed Trident missiles. The essential rationale behind the planned NATO nuclear modernization programme is that these should be a balance at every rung of the escalation ladder.

IV. Conclusions

The build-up of Eurostrategic systems is the most disturbing development in the global nuclear arms race in 1979–80. Whatever control SALT II might exert over the nuclear arms race is being undermined by the European developments.

On the Soviet side, the motivations and enhancement of capability are difficult to assess. If SS-20 deployment is only a one-for-one replacement of existing missiles, then the new missile does not introduce a threat quantitatively different from that already existing. MIRVing and launcher re-loadability confuse this assessment, however. In qualitative terms, the improved accuracy, MIRVing and reduced explosive yield of the SS-20 offer a new possibility for 'surgical strikes' against Western Europe, as do the improved avionics and other features of the Backfire bomber.

The NATO developments are described as 'modernization', a term which understates the significance of the changes. Both the GLCM and the Pershing II confer qualitatively new capabilities on the West. It is argued that, in response to a Soviet attack on Europe, a US president would be more likely to launch nuclear weapons based in Europe than ICBMs from the USA or SLBMs from the North Atlantic. At best, the logic here seems doubtful. Under some conditions of 'controlled escalation' the USA might be more willing to launch European-based weapons rather than ICBMs or SLBMs, in the expectation that Soviet retaliation would be confined to Europe. The new weapons, it should be noted, are entirely under US control—there is no 'two key' system for sharing control with the host country. The new so-called NATO weapons constitute a supplement to the US strategic arsenal, one which is outside the limitations of SALT.

The new Eurostrategic weapons on both sides of the NATO/WTO border must be seen as an enhancement of war-fighting capabilities. The enhanced effectiveness of the new weapons makes all of Europe more vulnerable to nuclear devastation. Existing arms control efforts have been undermined, and the task of achieving further arms control has been made more difficult.

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5. A role for satellites in verification of arms control agreements

Square-bracketed numbers, thus [1], *refer to the list of references on page 207.*

I. An International Arms Control Monitoring Agency

During the past decade, increasing use has been made of military satellites in the conduct of international relations. Various types of satellites have been used, for example, to identify military targets, to predict weather conditions and to assist in communications and navigation. One of the main roles of several types of civilian satellites during this period has been to identify and plot the natural resources of the Earth in order to facilitate their exploitation.

While military satellites are currently capable of contributing to an important aspect of arms control and disarmament agreements—that of verifying their implementation—civilian satellites may in future also assume such a role. The only two countries which today possess the space technology for extensively gathering sensitive data relevant to the verification of arms control agreements are the United States and the Soviet Union, but a number of other countries are developing the technological capability.

Broad international participation in the verification of arms control agreements by satellites has been proposed in order to contribute to confidence and security among nations. Several proposals for such participation have been made, beginning in 1973 [1–3]. A recent proposal by France during the 1978 UN General Assembly Special Session on Disarmament [4] is currently being examined by a committee of experts and envisages the establishment of an International Satellite Monitoring Agency (ISMA).

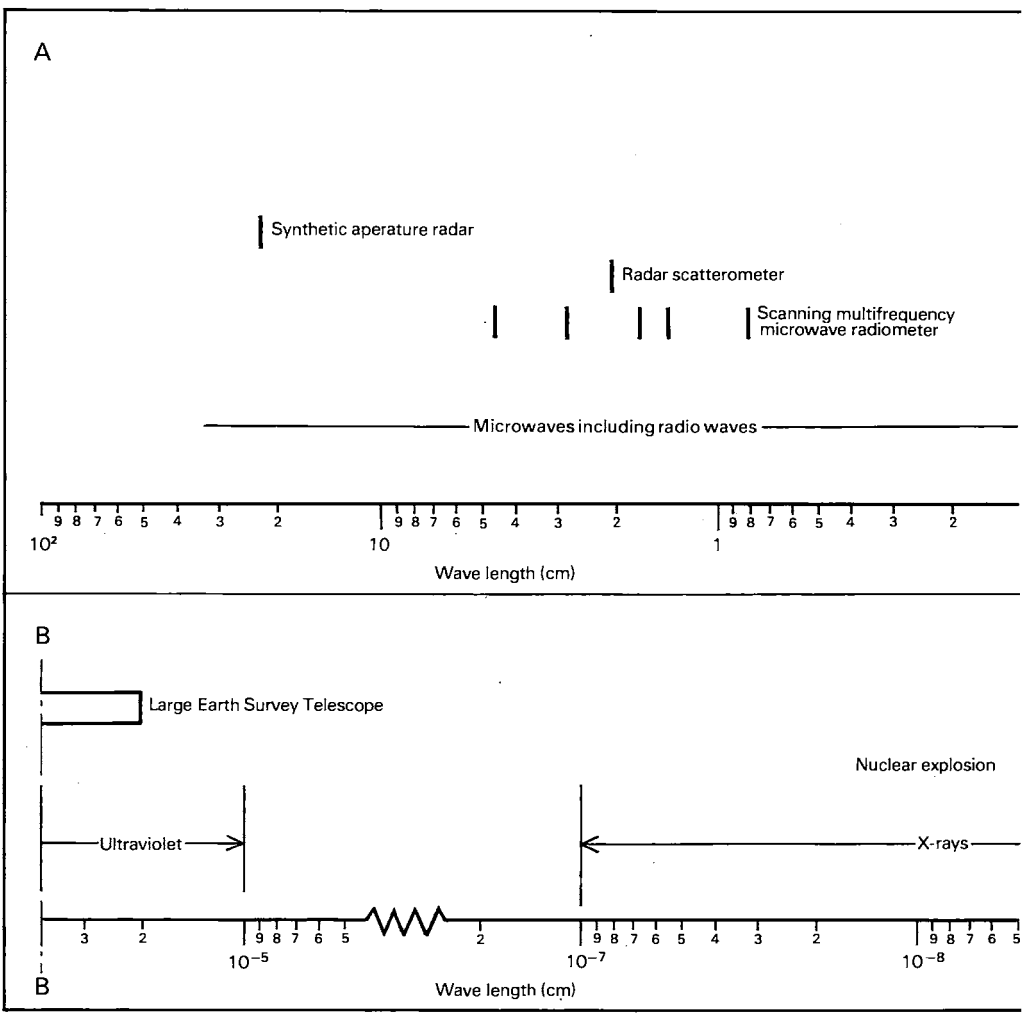
Such an Agency would be set up in three stages. In the initial stage, its task would be to analyse data provided by countries operating surveillance systems from space. During the second phase, the Agency would establish data-receiving stations for satellites from many nations, including those satellites used for Earth resources missions. As a third step, the Agency would be provided with satellites of its own in order to supplement data made available by individual states.

A second element of the French proposal is the use of satellites to obtain essential information for settling disputes between nations. The Agency could provide information for UN observers and peace-keeping forces and provide early warning of potential armed conflicts.

A number of problems must be overcome before an ISMA could become fully operational: in addition to closing the technological gap between civilian and military satellite capabilities, complex problems of management, dissemination of data and developing resources for such an Agency need to be examined.

While it may be presumed that military surveillance satellites have ample capabilities for monitoring compliance with arms control agreements, it may be some time before countries operating such satellites are willing to make their data available to an international agency. The following section briefly examines some aspects of non-military satellite sensor technology that may have application to arms control monitoring.

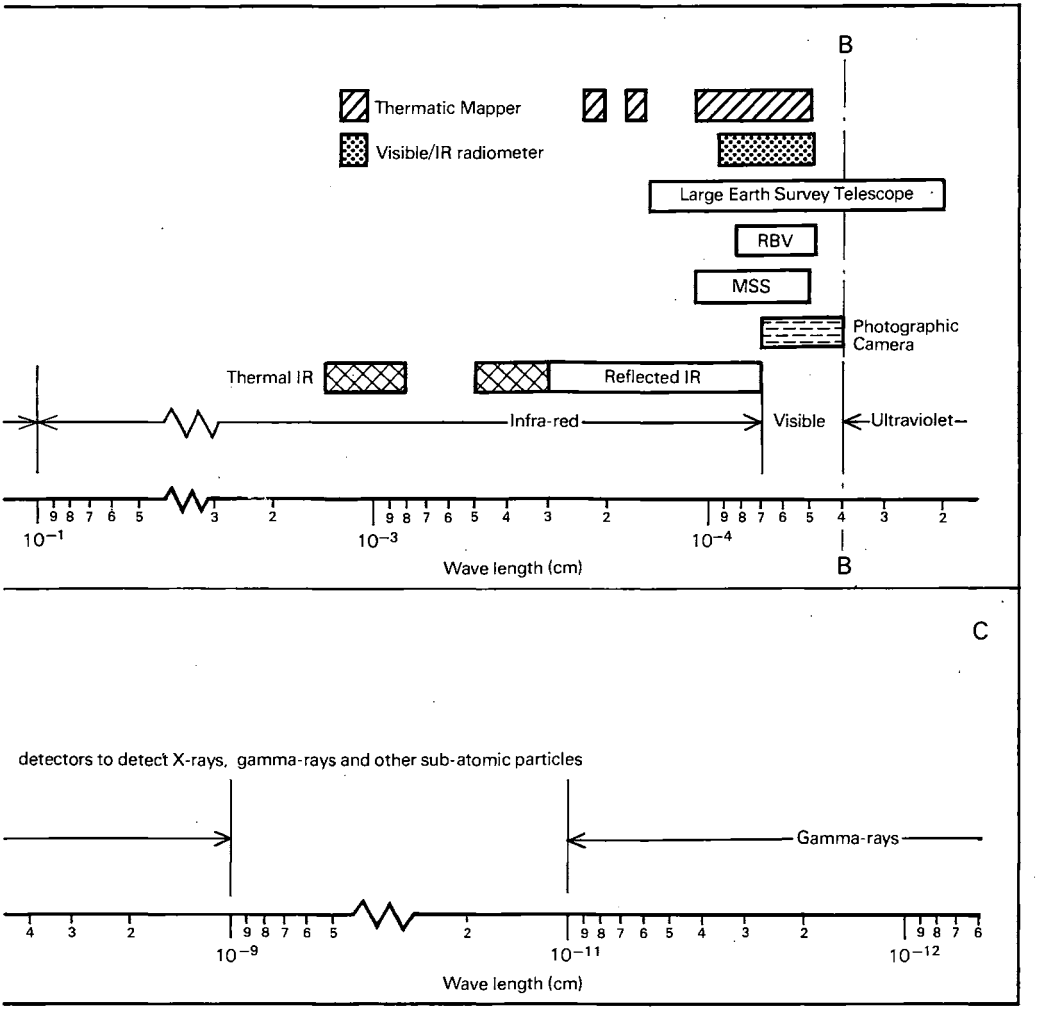
Figure 5.1. Electromagnetic spectrum showing band used by various sensors on board satellites



II. Sensors and satellites

A number of types of sensors are used on Earth resources, ocean surveillance and weather satellites. These range from photographic and return-beam vidicon (RBV) television cameras, multi-spectral scanners, visible/infra-red radiometers and microwave radars, to microwave radiometers and scatterometers. Different sensors are sensitive to electromagnetic radiation of different wavelengths, as is illustrated in figure 5.1.

Spatial resolution is a key characteristic of satellite sensors and may be defined as the minimum distance between two objects which are separately distinguishable by the sensor. Resolution depends on the shape, size,



configuration and contrast ratio of the object. For scanning sensors, the term 'instantaneous field of view' (IFOV) is often used and is defined as the size of the spot on the ground viewed at any one instant of observation. Ground resolution for a scanning system is normally about 1.4 times as big as the IFOV of the system, assuming a 2 : 1 contrast ratio [5].

The other important measure of the quality of a satellite sensor is contrast resolution—the ability to distinguish variations in the intensity of light received from an object. This may be thought of as the number of shades of grey that can be distinguished in a black-and-white image.

The degree of resolution needed depends on the monitoring task. The 40-metre resolution of an RBV on a Landsat satellite, under favourable conditions, shows airfields and space launching facilities. Objects such as aircraft may be detected with 10-metre resolution, but can only be recognized as aircraft with 5-metre resolution, while better than 2-metre resolution may be needed to recognize the features of an aircraft that allow it to be identified by type. A resolution of 5 metres is barely sufficient to allow distinguishing between bow and stern of a destroyer. Contrast resolution is important, especially when camouflaged facilities or equipment must be recognized. In this respect it is also important that sensors should operate at the optimum wavelengths—for example, certain wavelengths favour distinguishing interference with vegetation from the natural surroundings, and so on.

Any satellite intended for arms control monitoring must have sensors operating in the infra-red (IR) band. 'Photographic' infra-red coverage helps to 'see through' camouflage, while thermal infra-red assists in night-time detection and emphasizes objects such as smokestacks and engines which are radiating heat. The following are some sensors typically found on non-military Earth observation satellites.

Photographic cameras

Photographic cameras have been used in particular on manned spaceflights. An Earth terrain camera on the US Skylab, for example, with a focal length of 46 cm had a ground resolution of 15 m. At an altitude of 150 km, such a camera could give a resolution of 5 m. While photographic sensors are currently in use for arms control monitoring, it is likely that they will in future be replaced by the charged couple device (CCD) sensors.

Vidicon cameras

A vidicon camera is in essence a colour television camera. Such a camera on board the US Landsat satellite provides coverage throughout the visible and near-infra-red range and has a resolution of 40 m from an altitude of about 900 km. Man-made features such as airfields are visible with this

Figure 5.2. An enlarged section of a photograph of Granada, in southern Spain, taken from Landsat 3 from an altitude of about 900 km. A single runway and possibly the parking bay can be clearly seen

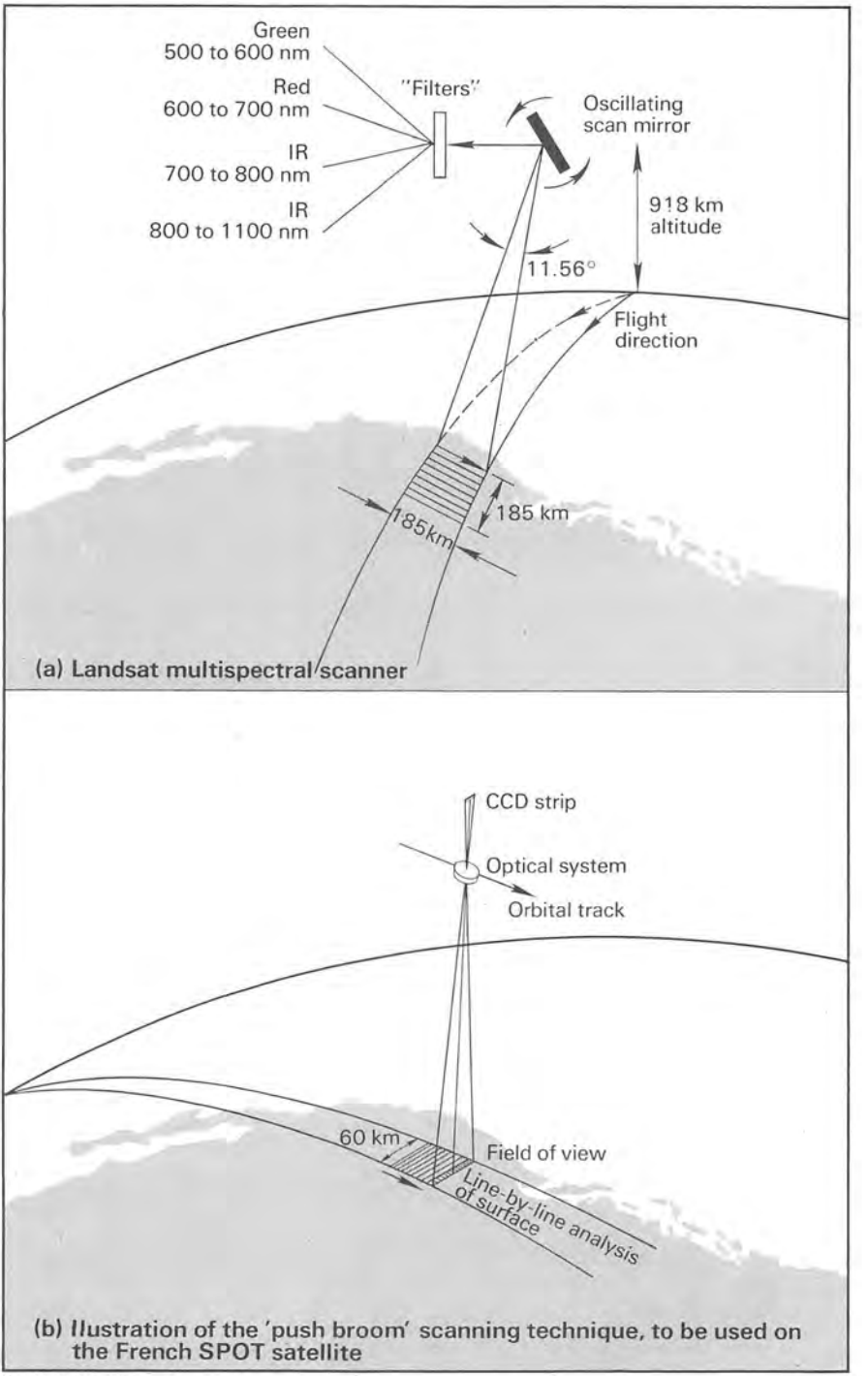
The RBV image was received by ESA/Earthnet, and was processed by the Royal Aircraft Establishment in the UK

resolution (see figure 5.2). There are no technical obstacles to better resolution being obtained from vidicon cameras.

Scanners

To obtain better contrast resolution, at the expense of spatial resolution, some variety of scanner is used. Until recently this has generally taken the form of an oscillating mirror that scans the field of view perpendicularly to the orbital track, and directs the received radiation across an array of photometers (figure 5.3*a* shows the arrangement used in Landsat). More recent scanners dispense with the moving mirror, and electronically scan an array of CCD sensors (see figure 5.3*b*). Scanners can operate at a variety of wavelengths, depending on filters and photometric materials

Figure 5.3. Two types of multispectral scanner



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used. A wavelength of about 0.6 to 0.7 micrometres emphasizes man-made features, and would be particularly suitable for arms control monitoring.

Synthetic aperture radars

A synthetic aperture radar utilizes the movement of the satellite to gather radar reflections from the ground that could otherwise be gathered only with a very large antenna, and produces quite detailed oblique-view imagery. It requires only a small satellite-borne antenna and radar

Figure 5.4. Seasat SAR image of part of the St Lawrence River near the city of Trois (1), Quebec; highways (2), railway tracks (3), ships (4), bridge (5) and the Gentilly nuclear power station (6) can be detected

(Image received by the Canada Center for Remote Sensing, and processed by Macdonald, Dettwiler & Assoc. Ltd.)

transmitter, but a high data-rate telemetry link and very extensive ground-based data processing. The latter characteristics may make the technique difficult to develop for an international agency, but such a radar would have very definite applications in such tasks as detecting ships at sea. A radar carried by the US Seasat satellite had a resolution of 25 m, and successfully detected ships (see figure 5.4). Such radar will function in all weather and lighting conditions.

France is proposing utilization of its proposed Earth observation satellite by an ISMA. This satellite is generally called by its acronym SPOT (Système Probatoire d'Observation de la Terre) (see figure 5.5) [6]. The SPOT satellite is designed as a multi-mission platform which can carry various payloads concerned with, for example, Earth observation (for geological mapping and Earth resources surveys), meteorology and oceanography. The satellite will orbit at a basic altitude of about 600 km, but will carry fuel to permit altitude changes to suit particular observations. The first satellite in the series will carry Earth observation sensors, including scanners recording in four separate spectral bands, together with a panchromatic scanner (see figure 5.3*b*). Characteristics of the SPOT sensors are given in table 5.1, below. Significantly, SPOT will carry CCD scanned arrays with a ground resolution of as good as 25 m [7]. This is significantly better than other non-military satellite imagery. Even more significantly, the first SPOT satellite will provide stereoscopic imagery, that is, imagery which can be reconstructed in three dimensions so that, for example, land surfaces can be contoured. Stereoscopic imagery has previously only been publicly available in limited form from the US Landsat series.

The SPOT programme is partly military-financed, and there is expected to be a military version of the satellite, which will probably have even better ground resolution. Here the stereoscopic capability will also be important, because the topographic detail that can be collected on the territory of other nations is vital to programming the terrain-recognition guidance systems of cruise missiles, and for mapping the penetration paths of low-level strategic bombers [8].

Table 5.2 presents details on various Earth observation satellites which have yielded or will yield publicly available data, and which may be of relevance to arms control monitoring. It will be noted that, in general, the spatial resolution of these sensors is inadequate for meaningful arms control monitoring.

III. Military satellites

In 1979, a total of 94 military-oriented satellites were launched by the United States and the Soviet Union—10 by the USA and 84 by the USSR.

Such spacecraft as photographic and electronic reconnaissance, ocean surveillance, early-warning, meteorological, communications, navigation, nuclear explosion-detection and inspector/destructor satellites launched during 1979 are listed in tables 5.3 to 5.10.

Figure 5.5. Artist's impression of the French SPOT satellite

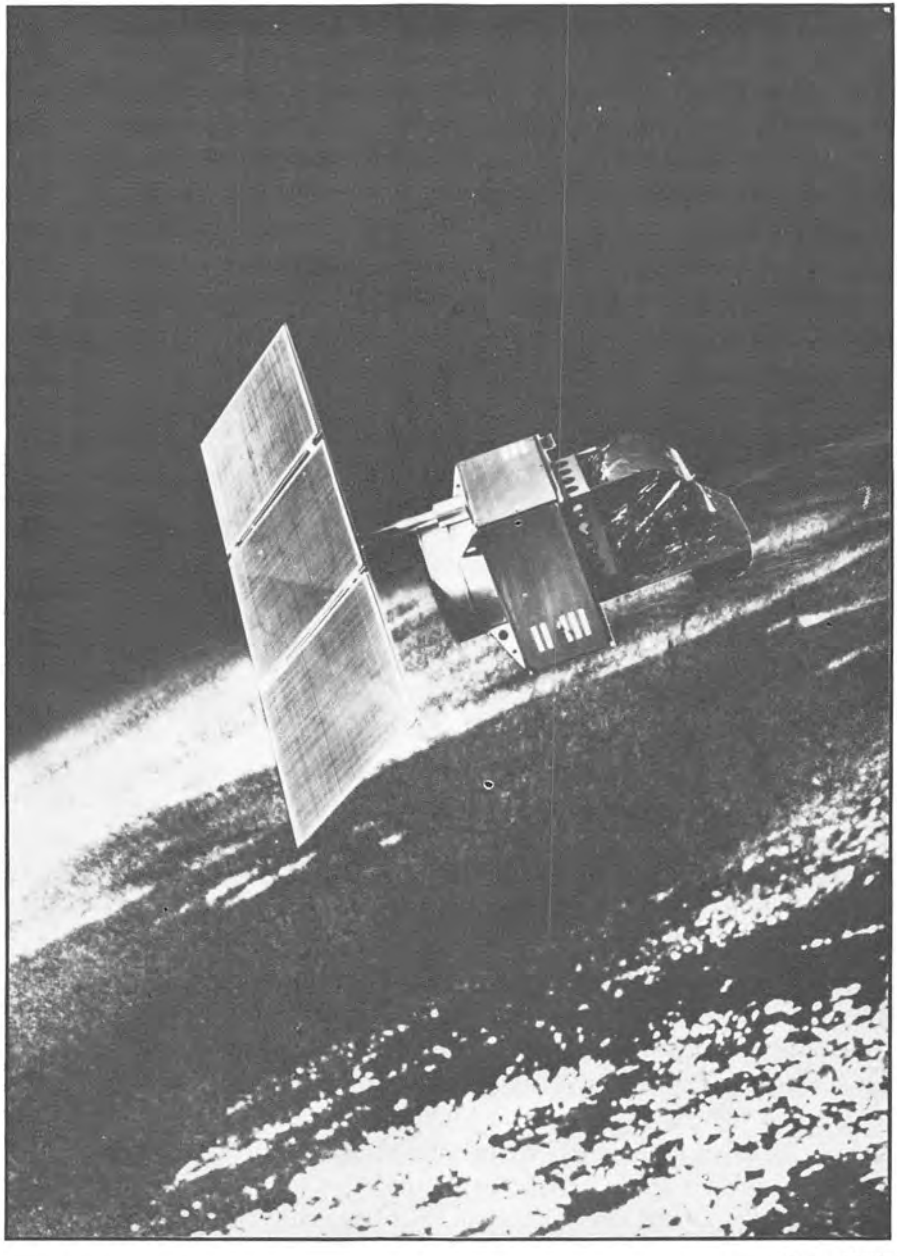


Photo: CNES

Photographic and electronic reconnaissance satellites

In 1979 two US photographic reconnaissance satellites were launched—a Big Bird on 16 March and an area-surveillance satellite on 28 May. A previous Big Bird satellite decayed on 11 September 1978 (lifetime of 179 days). During the period between 11 September 1978 and 16 March 1979, reconnaissance was performed by the second of a new US satellite, the KH-11. The first of these was launched in December 1975 and decayed in January 1979 (lifetime of 770 days); the second was launched in June 1978 and was still in orbit as of January 1980. The KH-11 development programme may have begun in early 1972 [9]. The satellites are orbited about 50 km higher than the Big Bird satellites, and they transmit real-time photography in digital form [10].

It has been reported that of the 35 Soviet photographic reconnaissance satellites launched in 1979, some nine performed Earth resources missions as well. Only three of the new generation of long-lived satellites were launched in 1979.

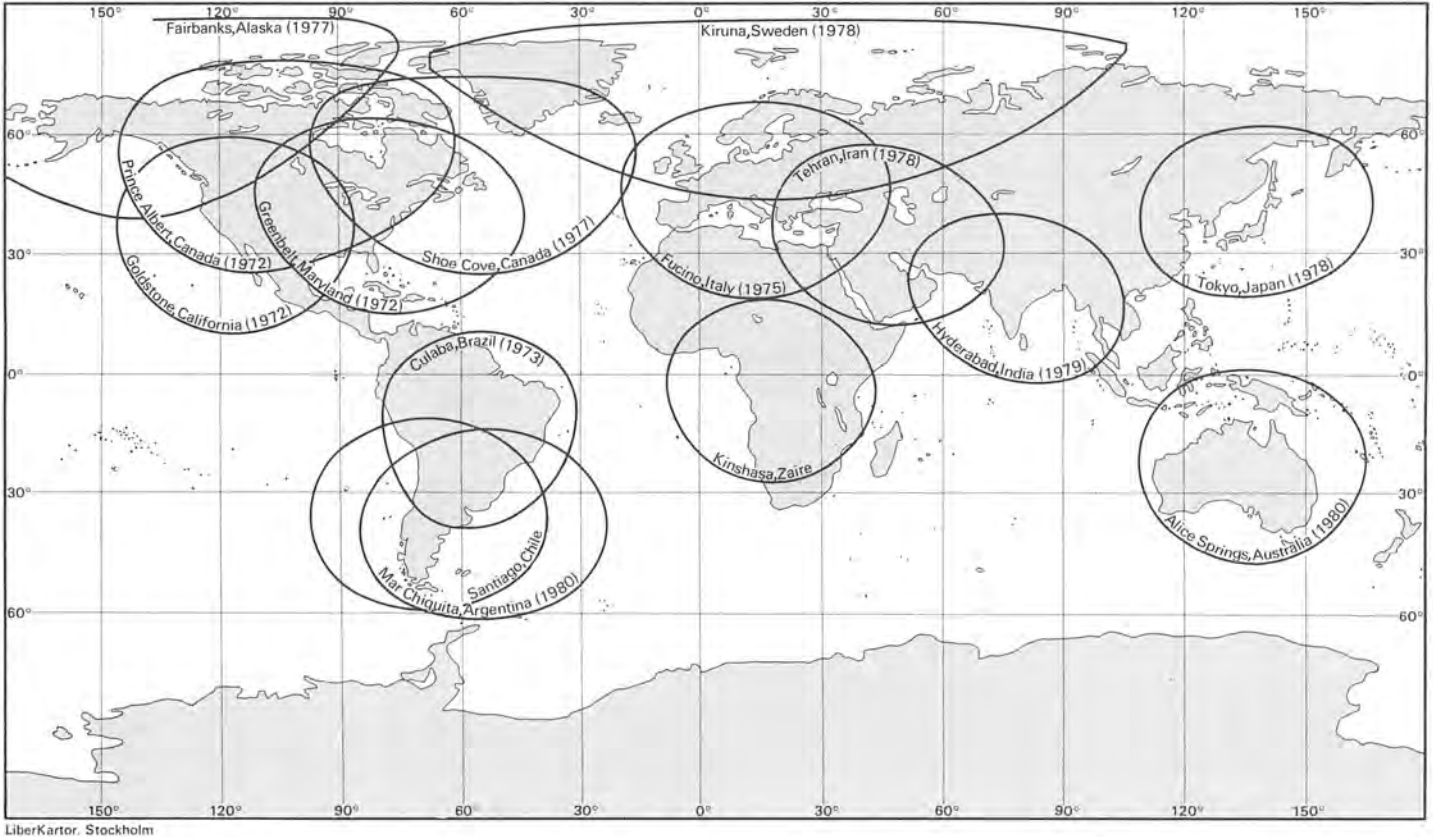
Early-warning satellites

Early-warning satellites have been used to detect the launch of missiles. However, four US so-called Rhyolite satellites orbiting in geosynchronous orbit perform an additional task: they also monitor the telemetry of Soviet ballistic missiles when they are being tested [11]. The first of these satellites was launched on 6 March 1973 and the second on 23 May 1977; the third was launched on 11 December 1977 and the fourth on 7 April 1978, these two being stand-by satellites.

The extent to which satellites in geosynchronous orbit could monitor telemetry signals is limited by the fact that the satellite is some 35 000 km from the source of the signals, and the strength of the signals falls off inversely as the square of the distance. Multiple manoeuvrable re-entry vehicles cannot be detected by the sensors currently on board these satellites.

Under a programme called high-altitude large optics (HALO), new mosaic focal-plane array or staring-type infra-red detectors are being developed. These will replace the current sensors used on early-warning satellites [12]. The HALO programme includes both studies of large focal planes and lightweight optics, and investigations on adaptive optics. The technique involves correction for distortions of images introduced by atmospheric turbulence, which is made by selectively distorting or modifying properties of the optical system. For example, flexible mirrors could be used which can be deformed to correct the deformed image [13].

Figure 5.6. The status of Landsat ground stations. The known date for when the station began or will begin receiving data is given in brackets.



LiberKartor, Stockholm

Nuclear explosion-monitoring satellites

Twelve nuclear explosion-monitoring satellites have been launched by the USA, only three of which are operational today. The last of the 12 satellites launched to monitor nuclear explosions in the atmosphere and in outer space detected what may have been a low-yield nuclear explosion over the sea in the South Atlantic near the South African coast on 22 September 1979. From an altitude of 60 000 km, the sensors on the satellite detected the explosion, estimated to be 2–4 kt in yield. However, the satellite's sensors could not accurately locate the position of the explosion. Although the satellite carries sensors for detecting nuclear radiation and electromagnetic disturbances, only the optical sensors appear to have registered the explosion.

It was recently reported that the USA is planning to test nuclear explosion-detection sensors on board a Navstar global positioning satellite [14]. Initial feasibility of this Integrated Operational Nuclear Detection System (IONDS) was conducted during early 1975.

IV. Conclusions

Current trends in space technology indicate that an increasing number of countries are developing their own launchers and satellites. However, this trend is confined to industrialized nations only. Among the developing nations, only China has launched satellites using indigenously developed launch vehicles. India has developed a launcher but has not yet successfully launched a satellite into orbit. A number of nations are acquiring image-processing technology (figure 5.6). Thus, the spread of space technology is limited to only a few nations. It is essential to have more participation of the developing nations in this new technology if the concept of the ISMA is to be successful.

V. Tables

Table 5.1. Some characteristics of the French SPOT Earth resources satellite

	Multispectral mode	Panchromatic mode
Spatial resolution	~50 m	~25 m
Field of view	60 km	60 km
Number of spectral bands	3 or 4	1
Spectral band width	⩾ 50 nm	⩾ 400 nm
Amount of information to be transmitted	21 or 28 Mb/s	28 Mb/s

Source: See reference [7].

Table 5.2. Characteristics of some past, current and proposed Earth observation satellites

Country and satellite	Date of launch	Orbital altitude (km); Orbital inclination (deg); Scanning width (km)	Types of sensor	Ground resolution (m)	Comments
Canada	1983–85	1 000	Synthetic aperture radar	100	A feasibility study was made in 1974
–		99			
		400			
ESA	Mid	567	Synthetic aperture radar	25	First feasibility study completed
SARSAT	1980s	98			
		80			
ESA	Mid	–	Passive microwave radiometer		Feasibility study completed in 1974
PAMIRASAT	1980s	–			
		–			
France	Early	800	Multi-spectral scanner	~50	
SPOT	1984	98			
		60			
			Panchromatic imager	~25	
India	1979	525	2 TV cameras (vidicon), microwave radiometer	1 000	Satellite launched by USSR; problems with power supply prevented TV transmissions; area covered by image is 341 × 341 km
SEO		51			
Japan	1983	540	Visible and near IR radiometer, thermal IR radiometer	50	Plans to launch LOS-II (1985), LOS-III (1987), LOS-IV (1989) and LOS-V (1991); LOS-III and LOS-V satellites will have optical sensors with resolutions of 30 m and 15–20 m, respectively
LOS-I		70			
		–		1 000 to 2 000	
USA					
Landsat-1	1972	915	Multi-spectral scanner	~140	Landsat-1 stopped functioning after 5.5 years; Landsat-2 is still operational
and -2	and	99			
	1975	185 (RBV)			
			Return-beam vidicon 3 cameras	80	
Landsat-3	1978	915	Multi-spectral scanner (MSS)	~140	The satellite carried a sensor to scan thermal energy emitted from the Earth's surface, permitting night-time images, but contamination problems developed in scanner have degraded data
		99		240 (IR)	
		185 (MSS)	Return beam vidicon 2 cameras	40	
		183 (RBV)		(panchromatic)	

Country and satellite	Date of launch	Orbital altitude (km); Orbital inclination (deg); Scanning width (km)	Types of sensor	Ground resolution (m)	Comments
Landsat-D	1982	705 99 185 (Thematic mapper)	'Thematic mapper' Multi-spectral scanner	30–40 (visible/IR range) 100–160 (IR range) ~140	
Seasat-1	1979	800 108 1 500 (VIIR) 920 (SMMR) 500 (SCAT) 100 (SAR)	Visible IR radiometer, scanning multi-frequency microwave radiometer, radar scatterometer, synthetic aperture radar	3 000–5 000 (VIIR) 31 km × 53 km (IFOV) 50 000 25	
Nimbus-G	1978	917 99 920 (SMMR)	IR radiometer Coastal zone colour scanner, SMMR SMMR	19 000 7 000 (visible range) 8 000 33–245 (27 km × 40 km IFVO) (16 km × 25 km IVFO)	
HCMM	1978	620 98.9	HCMR	600	
SEOS	1982	35 800 2 200 (LEST)	LEST, IR sounder, microwave sounder	100 (visible range) 800 (IR)	Geosynchronous; planned to be positioned at 100° west longitude
TIROS-N	1979	812 99	Advanced, very high-resolution radiometer TIROS operational vertical sounder	1 100	Sensors for search and rescue, sensors similar to those in Nimbus-G Vertical sounder provides vertical atmospheric temperature profiles, water vapour measurements at three levels
USSR					
Salyut 6	1977	190–250 52	MSS	20	Manned spacecraft
–	1978	500 97 200–300	RBV, film camera	100 (RBV) 80–120 (film camera)	The planned satellite includes on-board film-developing equipment and an electronic scanner

Table 5.3. Photographic reconnaissance satellites launched during 1979[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 (1979-25A)	16 Mar 1829	96.39 88.80	170 258	Big Bird satellite decayed after 190 days; last one, launched on 16 Mar 1978, decayed after 179 days
USAF (1979-44A)	28 May 1814	96.41 88.64	131 285	Area surveillance satellite; images transmitted to Earth; decayed after 90 days
USSR				
Cosmos 1070 (1979-01A)	11 Jan 1507	62.81 89.47	205 293	Lifetime 9 days; low-resolution
Cosmos 1071 (1979-02A)	13 Jan 1536	62.50 89.67	179 159	Lifetime 13 days; high-resolution
Cosmos 1073 (1979-06A)	30 Jan 1522	62.81 89.59	182 328	Lifetime 12.6 days; high-resolution; manoeuvrable
Cosmos 1078 (1979-16A)	22 Feb 1214	72.86 88.99	168 250	Lifetime 7.8 days; high-resolution; manoeuvrable
Cosmos 1079[b] (1979-19A)	27 Feb 1507	67.14 89.60	174 337	Lifetime 11.8 days; fourth-generation; high-resolution; satellite may have malfunctioned
Cosmos 1080 (1979-23A)	14 Mar 1048	72.85 89.14	169 294	Lifetime 14 days; high-resolution; manoeuvrable; TF recovery beacon
Cosmos 1090 (1979-27A)	31 Mar 1048	72.85 89.79	202 326	Lifetime 13 days; high-resolution; TG recovery beacon
Cosmos 1095 (1979-34A)	20 Apr 1131	72.84 90.30	199 379	Lifetime 13.8 days; manoeuvrable; TF recovery beacon
Cosmos 1097 (1979-37A)	23 Apr 1717	62.79 89.33	173 331	Lifetime 29.5 days; fourth-generation
Cosmos 1098 (1979-40A)	15 May 1146	72.87 89.75	170 354	Lifetime 12.75 days; high-resolution; manoeuvrable; TF recovery beacon
Cosmos 1099 (1979-41A)	17 May 0712	81.35 89.14	215 247	Lifetime 13 days; high-resolution; manoeuvrable; also Earth resources mission
Cosmos 1102 (1979-43A)	25 May 0658	81.34 89.24	212 260	Lifetime 12.8 days; high-resolution; also Earth resources mission
Cosmos 1103 (1979-45A)	31 May 1634	62.82 90.82	257 375	Lifetime 14 days; medium-resolution; TF recovery beacon
Cosmos 1105 (1979-52A)	8 Jun 0712	81.35 89.18	212 254	Lifetime 13 days; high-resolution; manoeuvrable; TK recovery beacon; also Earth resources
Cosmos 1106 (1979-54A)	12 Jun 0658	81.36 89.05	216 237	Lifetime 13 days; low-resolution; TG recovery beacon; also Earth resources mission
Cosmos 1107 (1979-55A)	15 Jun 1102	72.86 89.50	198 301	Lifetime 14 days; high-resolution; manoeuvrable; TF recovery beacon
Cosmos 1108 (1979-56A)	22 Jun 0658	81.33 89.11	214 245	Lifetime 13 days; high-resolution; TK recovery beacon; series of Earth resources satellites; data will be transmitted to Priroda State Research and Production Centre

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
Cosmos 1111 (1979-61A)	29 Jun 1605	62.80 90.60	255 328	Lifetime 15 days; medium-resolution; TF recovery beacon
Cosmos 1113 (1979-64A)	10 Jul 0907	65.00 89.52	173 330	Lifetime 13 days; high-resolution; manoeuvrable; TF recovery beacon
Cosmos 1115 (1979-66A)	13 Jul 0824	81.35 89.04	217 235	Lifetime 13 days; high-resolution; manoeuvrable; 2000th satellite; TK recovery beacon; Earth resources mission
Cosmos 1117 (1979-68A)	25 Jul 1522	62.80 89.53	179 325	Lifetime 13 days; high-resolution; manoeuvrable; TF recovery beacon
Cosmos 1118 (1979-69A)	27 Jul 0712	81.35 89.12	217 243	Lifetime 13 days; low-resolution
Cosmos 1119 (1979-71A)	3 Aug 1048	81.35 89.10	216 242	Lifetime 12 days; low-resolution; TL recovery beacon; special subset
Cosmos 1120 (1979-73A)	11 Aug 0922	70.56 89.84	170 362	Lifetime 13 days; high-resolution; fourth-generation; manoeuvrable; TF recovery beacon
Cosmos 1121 (1979-74A)	14 Aug 1536	67.16 89.69	171 348	Lifetime 30 days; high-resolution; manoeuvrable; fourth-generation
Cosmos 1122 (1979-75A)	17 Aug 0741	81.34 89.06	214 239	Lifetime 13 days; low-resolution; Earth resources
Cosmos 1123 (1979-76A)	21 Aug 1117	81.36 88.99	212 234	Lifetime 13 days; high-resolution; TK recovery beacon; also Earth resources mission
Cosmos 1126 (1979-79A)	31 Aug 1117	72.85 90.42	197 395	Lifetime 14 days; medium-resolution; TF recovery beacon
Cosmos 1127 (1979-80A)	5 Sep 1019	81.35 89.40	215 272	Lifetime 13 days; high-resolution; manoeuvrable; TF recovery beacon; Earth resources mission also
Cosmos 1128 (1979-81A)	28 Sep 1536	72.86 89.54	199 328	Lifetime 14 days; medium-resolution; TF recovery beacon
Cosmos 1139 (1979-88A)	5 Oct 1131	72.85 89.81	202 327	Lifetime 13 days; low-resolution; TL recovery beacon; special subset
Cosmos 1142 (1979-92A)	22 Oct 1243	72.86 90.32	198 382	Lifetime 13 days; medium-resolution; TF recovery beacon
Cosmos 1144 (1979-97A)	2 Nov 1605	67.16 89.44	158 337	Lifetime 32 days; high-resolution; manoeuvrable; fourth-generation; TF recovery beacon
Cosmos 1147 (1979-102A)	12 Dec 1229	72.86 90.30	196 382	Lifetime 14 days; medium-resolution
Cosmos 1148 (1979-106A)	29 Dec 0419	67.14 89.64	173 343	Lifetime 13 days; high-resolution; manoeuvrable

[a] Recovery beacon data supplied by the Kettering Group.

[b] It is not certain that this satellite is a fourth-generation satellite since, of the four satellites launched at 67° orbital inclination during 1979, Cosmos 1079 and Cosmos 1148 had similar orbital lifetime of about 12 days instead of 30 days, typical for the fourth-generation satellites. While signals recorded by the Kettering Group from Cosmos 1148 were typical of older generation satellites, no signals were recorded from Cosmos 1079 (G. E. Perry, private communication).

Table 5.4. Electronic reconnaissance satellites launched during 1979

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USA				
USAF (1979-25B)	16 Mar 1829	95.78 97.23	621 628	Launched from Big Bird 1979-25A
USSR				
Cosmos 1114 (1979-65A)	11 Jul 1550	74.05 95.22	506 552	Lifetime 9 years

Table 5.5. Ocean surveillance and oceanographic satellites launched during 1979

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USSR				
Cosmos 1076 (1979-11A)	12 Feb 1258	82.53 97.78	637 666	Oceanographic satellite; lifetime 60 years; carries two telescopes
Cosmos 1094 (1979-33A)	18 Apr 1200	65.04 93.31	426 442	Orbit 200 km higher than that of Cosmos 954 which carried a nuclear reactor and fell over Canada; lifetime 2 years
Cosmos 1096 (1979-36A)	25 Apr 1005	65.06 93.32	428 442	EORSAT satellite placed into same orbit as Cosmos 1094 but 23 minutes ahead of Cosmos 1094; three of the seven EORSAT exploded in orbit; lifetime 2 years

Table 5.6. Early-warning satellites launched during 1979

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USA				
USAF (1979-53A)	10 Jun 1341	1.95 1 448.5	35 801 36 261	New Rhyolite satellite to monitor Soviet and Chinese missile tests as well as space launches
USAF (1979-86A)	10 Oct 1131	– –	– –	Synchronous orbit; orbital characteristics not announced
USSR				
Cosmos 1109 (1979-58A)	27 June 1814	62.89 724.20	613 40 060	Lifetime 12 years
Cosmos 1124 (1979-77A)	28 Aug 0000	62.98 727.27	561 40 267	Lifetime 12 years

Table 5.7. Meteorological satellites launched during 1979

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USA				
AMS 4	6 Jun	98.77	819	Incorporates a block-5D bus;
(1979-50A)	1829	101.50	838	besides USAF, weather-pictures available to US weather service
NOAA	27 Jun	98.75	812	Second in a series of eight
(1979-57A)	1550	101.31	828	spacecraft; first was Tiros N
USSR				
Meteor 29	25 Jan	98.00	622	
(1979-05A)	0546	97.42	645	
Cosmos 1077	13 Feb	81.23	625	
(1979-12A)	2150	97.30	631	
Meteor 2-04	1 Mar	81.22	839	Second-generation satellite
(1979-21A)	1843	102.33	897	
Cosmos 1093	14 Apr	81.25	621	
(1979-32A)	0531	97.30	635	
Cosmos 1116	20 Jul	81.19	590	
(1979-67A)	1200	97.07	643	
Cosmos 1143	26 Oct	81.24	624	
(1979-93A)	1814	97.44	646	
Meteor 2-05	31 Oct	81.21	873	
(1979-95A)	0936	102.62	890	
Cosmos 1145	27 Nov	81.22	624	
(1979-99A)	1005	97.33	635	

Table 5.8. Communications satellites launched during 1979

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USA				
Fleetsatcom 2/USN (1979-38A)	4 May 1858	2.34		Provides communications for USAF and USN between aircraft, ships, submarines, ground stations, SAC and NCA for the Atlantic, European and African areas
DSCS 13 USAF (1979-98A)	21 Nov 0210	2.42 1 413.14	35 594 35 789	
DSC 14 (1979-98B)	21 Nov 0210	2.41 1 450.73	35 792 36 357	
USSR				
Molniya 3-11 (1979-04A)	18 Jan 1550	62.82 735.98	433 40 817	Third-generation
Cosmos 1081 (1979-24A)	15 Mar 0253	74.02 114.60	1 406 1 467	
Cosmos 1082 (1979-24B)	15 Mar 0253	74.03 114.78	1 424 1 466	
Cosmos 1083 (1979-24C)	15 Mar 0253	74.02 114.99	1 443 1 465	
Cosmos 1084 (1979-24D)	15 Mar 0253	74.02 115.24	1 463 1 463	Octuple launch; probable operational life 5–6 months
Cosmos 1085 (1979-24E)	15 Mar 0253	74.03 115.70	1 467 1 507	
Cosmos 1086 (1979-24F)	15 Mar 0253	74.03 115.46	1 468 1 484	
Cosmos 1087 (1979-24G)	15 Mar 0253	74.03 115.92	1 468 1 526	
Cosmos 1088 (1979-24H)	15 Mar 0253	74.02 116.14	1 466 1 548	
Molniya 1-43 (1979-31A)	12 Apr 0029	62.89 735.31	623 630	Replaced Molniya 1-32
Raduga 5 (1979-35A)	25 Apr 0350	0.41 1 436.2	35 789 35 789	Statsionar series satellite located over Indian Ocean at Statsionar-1 position
Molniya 3-12 (1979-48A)	5 Jun 2331	62.84 735.19	439 449	
Cosmos 1110 (1979-60A)	28 Jun 2010	74.02 100.94	791 814	Store-dump communications satellite
Gorizunt 2 (1979-62A)	5 Jul 2331	0.8 1 477	36 550 36 550	
Molniya 1-44 (1979-70A)	31 Jul 0405	62.84 717.73	452 39 902	
Cosmos 1125 (1979-78A)	28 Aug 0000	74.05 100.84	784 812	Store-dump communications satellite

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
Cosmos 1130 (1979-84A)	25 Sep 2053	74.03 114.69	1 400 1 482	Octuple launch
Cosmos 1131 (1979-84B)	25 Sep 2053	74.04 114.85	1 410 1 486	
Cosmos 1132 (1979-84C)	25 Sep 2053	74.02 115.02	1 429 1 483	
Cosmos 1133 (1979-84D)	25 Sep 2053	74.05 115.18	1 441 1 485	
Cosmos 1134 (1979-84E)	25 Sep 2053	74.01 115.35	1 455 1 486	
Cosmos 1135 (1979-84F)	25 Sep 2053	74.02 115.53	1 465 1 493	
Cosmos 1136 (1979-84G)	25 Sep 2053	74.03 115.70	1 472 1 501	
Cosmos 1137 (1979-84H)	25 Sep 2053	74.03 115.90	1 472 1 519	
Cosmos 1140 (1979-89A)	11 Oct 1634	74.07 100.73	780 805	Store-dump communications satellite
Molniya 1-45 (1979-91A)	20 Oct 1200	62.83 735.87	818 40 627	
Gorizont 3 (1979-105A)	28 Dec			Synchronous orbit similar to (1979-62A)

Table 5.9. Navigation satellites launched during 1979[a]

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USSR				
Cosmos 1072 (1979-03A)	16 Jan 1731	82.93 104.98	965 1 020	Number 5 to replace Cosmos 991
Cosmos 1089 (1979-26A)	21 Mar 0405	82.97 104.90	973 1 005	Number 2; it has been referred to as maritime support navigation system
Cosmos 1091 (1979-28A)	7 Apr 0614	82.92 104.94	969 1 012	Number 4
Cosmos 1092 (1979-30A)	11 Apr 2150	82.95 104.90	969 1 009	Number 14
Cosmos 1104 (1979-46A)	31 May 1800	82.95 104.85	962 1 010	Number 1
Cosmos 1141 (1979-90A)	16 Oct 1214	82.95 104.76	961 1 003	Number 6

[a] Numbers are the Soviet identity numbers for each satellite; numbers have been changed since about August 1978 (G. E. Perry, private communication).

Table 5.10. Satellites launched during 1979 probably related to interceptor/destructor programme

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USSR				
Cosmos 1075 (1979-10A)	8 Feb 1005	65.83 94.50	473 516	Orbital characteristics similar to target satellites
Cosmos 1146 (1979-100A)	5 Dec 1033	65.85 93.98	444 494	Calibration mission; orbital characteristics similar to target satellites

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6. SALT II: an analysis of the agreements

Square-bracketed numbers, thus [1], *refer to the list of references on page 241.*

I. Introduction

On 18 June 1979, in Vienna, Presidents Carter and Brezhnev signed a series of documents that represent the outcome of the second round of the Strategic Arms Limitation Talks (SALT II) between the USA and the USSR. The SALT II documents include:

A treaty which imposes limits on strategic nuclear offensive weapons until 31 December 1985 (SALT II Treaty);

A protocol—an integral part of the treaty—which sets forth certain limitations until 31 December 1981 (SALT II Protocol); and

A joint statement of principles and basic guidelines for subsequent negotiations on the limitation of strategic arms (that is, for SALT III).

The treaty and the protocol are accompanied by an extensive list of agreed statements and common understandings designed to clarify the provisions of these agreements. A memorandum of understanding establishes an agreed data base on the numbers of strategic offensive arms, and includes statements of data as of 18 June 1979. Also, two days before the signing of the SALT II documents, President Brezhnev handed President Carter a written statement of Soviet intentions concerning the capabilities and rate of production of the Soviet Tu-22M (Backfire) bomber. (For the texts of all the SALT II documents, see appendices 6A–6F.)

The Interim Agreement on strategic offensive arms, which was signed in May 1972, as a result of the first round of SALT (SALT I), introduced a temporary freeze on the number of strategic ballistic missile launchers then operational or under construction; it permitted the number of submarine-launched ballistic missile (SLBM) launchers to be increased to an agreed level, but only if a corresponding number of older strategic ballistic missile launchers were dismantled or destroyed. (For the texts and the analysis of the SALT I agreements, see *SIPRI Yearbook 1973*, chapter 1.) The Interim Agreement formally expired on 3 October 1977, when negotiations for a new, more permanent agreement were well advanced. The parties then decided to continue to comply with the interim arrangement beyond its expiration date.

Certain essential elements of the SALT II Treaty were agreed upon between the parties in November 1974, at a summit meeting held at Vladivostok. The Vladivostok framework established the principle of

equal ceilings on strategic nuclear delivery vehicles. The agreed aggregate limit for each side was 2 400 intercontinental ballistic missile (ICBM) launchers, SLBM launchers and heavy bombers. Of these 2 400 delivery vehicles, only 1 320 launchers of ICBMs and SLBMs equipped with multiple independently targetable re-entry vehicles (MIRVs) were allowed. Within these ceilings, each side had freedom to compose its forces as it wished. Further progress in negotiations was delayed, among other reasons, by a disagreement on whether or how the so-called Backfire bomber and cruise missiles should be limited. 'Backfire' is the NATO designation for a modern Soviet bomber, Tu-22M, which is currently deployed for use in a theatre role, but which under certain conditions could have an intercontinental capability. Cruise missiles are guided, jet-propelled, pilotless vehicles, which can fly at very low altitudes and can be air-, ground- or sea-launched.

In March 1977, the US government tried to go beyond the Vladivostok formula and offered the USSR a so-called comprehensive proposal, which would have significantly reduced the nuclear arsenals, as well as imposed strict limits on the deployment of new systems and on the modernization of existing ones. In particular, the overall ceiling on strategic nuclear delivery vehicles would have been lowered from the Vladivostok level of 2 400 to between 1 800 and 2 000; the ceiling on MIRVed strategic ballistic missiles would have been fixed between 1 100 and 1 200, as compared to 1 320, agreed at Vladivostok; and limitations on the permitted number of MIRVed ICBMs and 'heavy' ICBMs would have been set at, respectively, 550 and 150. In concentrating on ICBMs, which constitute the most important component of the Soviet nuclear forces, the comprehensive proposal would have had a much greater limiting impact on Soviet strategic nuclear weapon programmes than on US programmes. It was immediately rejected by the USSR. Another US proposal, which incorporated the Vladivostok terms while deferring consideration of the Backfire bomber and cruise missile issues until SALT III, was also rejected. Subsequently, in the negotiations which resumed in Geneva in May 1977, the parties adopted a new framework for SALT II that permitted a long-term agreement on limits below the overall Vladivostok ceiling, a short-term arrangement for the most contentious issues, and a statement of more far-reaching goals to be achieved in SALT III. This 'three-tier' arrangement became the structure of the SALT II agreements reached two years later.

The ostensible objectives of the US–Soviet strategic nuclear arms control negotiations are: to place constraints on the nuclear arms competition; to reduce the likelihood of nuclear war by securing strategic stability; to attenuate the damage should war occur; and to diminish the costs of preparations for war. The following analysis is an attempt

to evaluate whether and, if so, to what extent the SALT II agreements further these objectives.

II. Aggregates[1]

The numerical restrictions under the SALT II Treaty apply to the following weapon systems: (*a*) intercontinental ballistic missiles, (*b*) submarine-launched ballistic missiles, (*c*) heavy bombers, (*d*) long-range air-to-surface ballistic missiles (ASBMs), (*e*) long-range air-launched cruise missiles (ALCMs), and (*f*) multiple independently targetable re-entry vehicles (MIRVs).

The treaty imposes equal overall ceilings on the total number of strategic nuclear delivery vehicles and provides sub-ceilings on systems capable of attacking separate targets with multiple warheads. An initial ceiling of 2 400, a level agreed to at Vladivostok in 1974 (see above), will be placed on launchers of ICBMs, launchers of SLBMs, and heavy bombers, counted together (III, 1). Long-range ASBMs (capable of a range in excess of 600 km) are also included in the overall aggregate, but neither side is known to have plans for deploying such missiles before 1985, the year of the expiration of the treaty. Reductions necessary to comply with the 2 400 ceiling must begin upon entry into force of the treaty, and must be completed within four months for ICBM launchers, six months for SLBM launchers, and three months for heavy bombers (XI, 2). From 1 January 1981, the overall ceiling of 2 400 will be lowered to 2 250, both sides having one year to dismantle or destroy strategic nuclear systems in excess of the latter figure.

The US statement of data on the numbers of strategic offensive arms shows that at the time of the signing of the treaty, the USA possessed 2 283 strategic nuclear delivery vehicles: 1 054 launchers of ICBMs, 656 launchers of SLBMs, and 573 heavy bombers. The Soviet statement of data shows that, at the same time, the USSR possessed 2 504 strategic nuclear delivery vehicles: 1 398 launchers of ICBMs, 950 launchers of SLBMs, and 156 heavy bombers. To comply with the 2 250 aggregate limitation by the 31 December 1981 deadline, as required by the treaty, the USA will have to dismantle 33 vehicles; it will probably choose for this purpose mothballed B-52 bombers or Polaris missile launchers now being removed from service. The USSR will have to dismantle 254 operational strategic nuclear delivery vehicles; it may choose ageing bombers or older types of ICBM or SLBM launchers.

Within the permitted overall aggregate number of 2 250 strategic

[1] In the following sections, (IV, 2, b), for example, denotes Treaty article IV, paragraph 2, sub-paragraph b; and (Protocol, I, 2), for example, denotes Protocol article I, paragraph 2.

SALT II Glossary*

Aggregate. The SALT II agreement provides for several "aggregate" numerical limits on various categories of strategic offensive arms. The term "aggregate" refers principally to the overall aggregate of ICBM launchers, SLBM launchers, heavy bombers, and ASBMs.

Air-Launched Cruise Missile (ALCM). A cruise missile designed to be launched from an aircraft. See also *Cruise Missile (CM)*.

Air-to-Surface Ballistic Missile (ASBM). A ballistic missile launched from an airplane against a target on the Earth's surface.

Air-to-Surface Ballistic Missile (ASBM) Carrier. An airborne carrier for launching a ballistic missile capable of a range in excess of 600 km against a target on the Earth's surface.

Backfire. The NATO designation of a modern Soviet two-engine, swing-wing bomber.

Ballistic Missile. Any missile designed to follow the trajectory that results when it is acted upon predominantly by gravity and aerodynamic drag after thrust is terminated. Ballistic missiles typically operate outside the atmosphere for a substantial portion of their flight path and are unpowered during most of the flight.

Circular Error Probable (CEP). A measure of the delivery accuracy of a weapon system. It is the radius of a circle around a target of such size that a weapon aimed at the target has a 50 per cent probability of falling within the circle.

Cruise Missile (CM). A guided missile which uses aerodynamic lift to offset gravity and propulsion to counteract drag. A cruise missile's flight path remains within the Earth's atmosphere.

Cruise Missile Carrier (CMC). An aircraft equipped for launching a cruise missile.

Encryption. Encryption is encoding communications for the purpose of concealing information.

Flight-Test. For the purposes of SALT II, a flight-test of a missile is an actual launch of the missile (as distinct from a static test) conducted for any purpose, including for development of the missile, for demonstration of its capabilities, and for training of crews.

Fractional Orbital Bombardment System (FOBS). A missile that achieves an orbital trajectory but fires a set of retrorockets before the completion of one revolution in order to slow down, re-enter the atmosphere, and release the warhead it carries into a ballistic trajectory toward its target.

Fractionation. The division of the payload of a missile into several warheads. The use of a MIRV payload is an example of fractionation.

Functionally Related Observable Differences (FRODs). The means by which SALT II provides for distinguishing between those aircraft which are capable of performing certain SALT-limited functions and those which are not. FRODs are differences in the observable features of airplanes which specifically determine whether or not these airplanes can perform the mission of a heavy bomber, or whether or not they can perform the mission of a bomber equipped for cruise missiles capable of a range in excess of 600 km, or whether or not they can perform the mission of a bomber equipped for ASBMs.

Ground-Launched Cruise Missile (GLCM). A cruise missile launched from ground installations or vehicles. See also *Cruise Missile (CM)*.

Heavy Ballistic Missile. For the purposes of SALT II, ballistic missiles are divided into two categories according to their throw-weight and launch-weight—light and heavy. Heavy missiles (ICBMs, SLBMs, and ASBMs) are those missiles which have a launch-weight greater or a throw-weight greater than the launch-weight or throw-weight of the Soviet SS-19 ICBM.

Heavy Bomber. The term used in SALT II to describe those aircraft included in the aggregate limitations of the agreement.

Intercontinental Ballistic Missile (ICBM). A land-based fixed or mobile rocket-propelled vehicle capable of delivering a warhead to intercontinental ranges. Once they are outside the atmosphere, ICBMs fly to a target on an elliptical trajectory. An ICBM consists of a booster, one or more re-entry vehicles, possibly penetration aids, and, in the case of a MIRVed missile, a post-boost vehicle. For the purposes of SALT II, an ICBM is considered to be a land-based ballistic missile capable of a range in excess of 5 500 km (about 3 000 nautical miles).

Intercontinental Ballistic Missile (ICBM) Silo Launcher. An ICBM silo launcher, a "hard" fixed ICBM launcher, is an underground installation, usually of steel and concrete, housing an intercontinental ballistic missile and the equipment for launching it.

Launch-Weight. The weight of the fully loaded missile itself at the time of launch. This would include the aggregate weight of all booster stages, the post-boost vehicle (PBV), and the payload.

* This is an abridged version of the glossary found in *SALT II Agreement*, US Department of State, Selected Documents 12B, July 1979.

Launcher. That equipment which launches a missile. ICBM launchers are land-based launchers which can be either fixed or mobile. SLBM launchers are the missile tubes on a ballistic missile submarine. An ASBM launcher is the carrier aircraft with associated equipment. Launchers for cruise missiles can be installed on aircraft, ships, or land-based vehicles or installations.

Multiple Independently Targetable Re-entry Vehicle (MIRV). Multiple re-entry vehicles carried by a ballistic missile, each of which can be directed to a separate and arbitrarily located target. A MIRVed missile employs a post-boost vehicle (PBV) or other warhead-dispensing mechanism. The dispensing and targeting mechanism manoeuvres to achieve successive desired positions and velocities to dispense each RV on a trajectory to attack the desired target, or the RVs might themselves manoeuvre toward their targets after they re-enter the atmosphere.

Multiple Re-entry Vehicle (MRV). The re-entry vehicle of a ballistic missile equipped with multiple warheads where the missile does not have the capability of independently targeting the re-entry vehicles—as distinct from a missile equipped for MIRVs.

National Technical Means of Verification (NTM). Assets which are under national control for monitoring compliance with the provisions of an agreement. NTM include photographic reconnaissance satellites, aircraft-based systems (such as radars and optical systems), as well as sea- and ground-based systems (such as radars and antennas for collecting telemetry).

Observable Differences (ODs). Externally observable design features used to distinguish between those heavy bombers of current types which are capable of performing a particular SALT-limited function and those which are not. These differences need not be functionally related but must be a design feature which is externally observable.

Payload. Weapons and penetration aids carried by a delivery vehicle. In the case of a ballistic missile, the RV(s) and anti-ballistic missile penetration aids placed on ballistic trajectories by the main propulsion stages or the PBV; in the case of a bomber, those bombs, missiles, or penaids carried internally or attached to the wings or fuselage.

Penetration Aids (Penaids). Devices employed by offensive weapon systems, such as ballistic missiles and bombers, to increase the probability of penetrating enemy defences. They are frequently designed to simulate or to mask an aircraft or ballistic missile warhead in order to mislead enemy radar and/or divert defensive anti-aircraft or anti-missile fire.

Post-boost Vehicle (PBV). Often referred to as a "bus", the PBV is that part of a missile's payload carrying the re-entry vehicles, a guidance package, fuel, and thrust devices for altering the ballistic flight path so that the re-entry vehicles can be dispensed sequentially toward different targets. Ballistic missiles with single RVs also might use a PBV to increase the accuracy of the RV by placing it more precisely into the desired trajectory.

Rapid Reload. The capability of a launcher to fire a second missile within a short period of time after an initial missile firing.

Re-entry Vehicle (RV). That portion of a ballistic missile which carries the nuclear warhead. It is called a re-entry vehicle because it re-enters the Earth's atmosphere in the terminal portion of the missile trajectory.

Sea-Launched Cruise Missile (SLCM). A cruise missile launched from a submerged or surface ship. See also *Cruise Missile (CM)*.

Submarine-Launched Ballistic Missile (SLBM). A ballistic missile carried in and launched from a submarine.

Telemetry. Telemetry refers to data, transmitted by radio to the personnel conducting a weapon test, which monitor the functions and performance during the course of the test.

Throw-Weight. Ballistic missile throw-weight is the useful weight which is placed on a trajectory toward the target by the boost stages of the missile. For the purposes of SALT II, throw-weight is defined as the sum of the weight of:

- The RV or RVs;
- Any PBV or similar device for releasing or targeting one or more RVs; and
- Any anti-ballistic missile penetration aids, including their release devices.

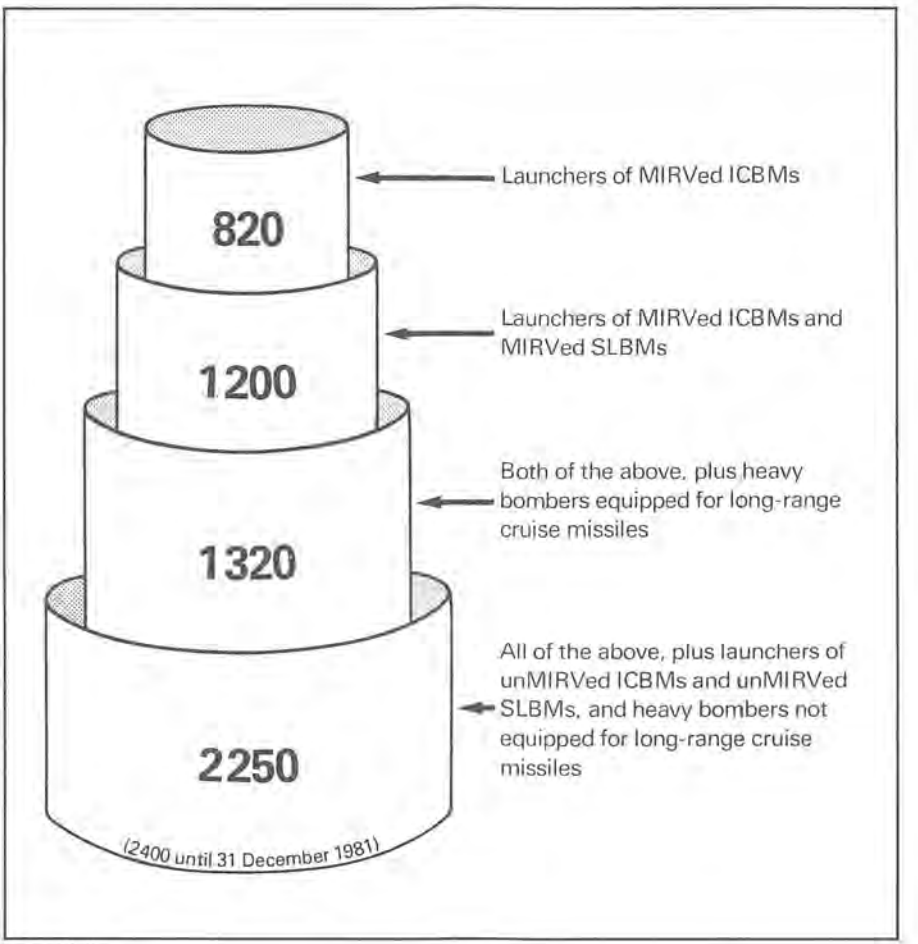
Warhead. That part of a missile, projectile, torpedo, rocket, or other munition which contains either the nuclear or thermonuclear system, the high-explosive system, the chemical or biological agents, or the inert materials intended to inflict damage.

Yield. The energy released in an explosion. The energy released in the detonation of a nuclear weapon is generally measured in terms of the kilotons (kt) or megatons (Mt) of TNT required to produce the same energy release.

nuclear delivery vehicles, both sides will be limited to 1 320 launchers of ICBMs and SLBMs equipped with MIRVs (as well as MIRVed ASBMs), and heavy bombers equipped for ALCMs capable of a range in excess of 600 kilometres (V, 1). (All these 1 320 delivery vehicles will subsequently be referred to as 'MIRVed' systems.) A sub-limit of 1 200 will be placed on launchers of ICBMs and SLBMs equipped with MIRVs (as well as MIRVed ASBMs) (V, 2), and of that number, no more than 820 may be launchers of MIRVed ICBMs (V, 3). (Figure 6.1 gives a schematic presentation of the treaty's aggregate limitations.)

At the time the treaty was signed, the US statement of data showed that the USA had 496 launchers of MIRVed SLBMs (Poseidon C-3) and 550 launchers of MIRVed ICBMs (Minuteman III), totalling 1 046 launchers of MIRVed ballistic missiles. Thus the USA will be allowed

Figure 6.1. The SALT II aggregate limits



to deploy 154 additional launchers of MIRVed ballistic missiles to reach the 1 200 sub-limit. This means that it may deploy six of its missile-launching submarines, the so-called Trident submarines, each with 24 launchers of the Trident I SLBM. The seventh Trident submarine is expected to begin sea trials around 1983 [1a]. But since this seventh submarine will bring the total of US launchers of MIRVed ballistic missiles to 1 214, or 14 launchers in excess of the 1 200 sub-limit, the USA will have to reduce the number of its Poseidon or Minuteman III launchers to compensate for Trident submarine deployments. As far as US ICBMs are concerned, the Minuteman III production line has been closed, and the new MX ICBM will probably not be available for deployment before 1986. The USA plans to strengthen the bomber component of its strategic forces by equipping its B-52 bombers to carry long-range ALCMs. If the USA reached the 1 200 sub-limit for launchers of MIRVed ballistic missiles, it could deploy more than 120 bombers equipped for long-range ALCMs and still remain within the 1 320 sub-limit on MIRVed systems only by dismantling a Minuteman III or Poseidon launcher for every ALCM-equipped bomber above 120. Current projections call for more than 120 B-52s to be modified to carry long-range ALCMs by 1985 [2a].

At the time the treaty was signed, the Soviet statement of data showed that the USSR possessed 608 launchers of MIRVed ICBMs and 144 launchers of MIRVed SLBMs, totalling 752 launchers of MIRVed ballistic missiles. Thus, the USSR will be allowed to deploy 448 additional launchers of MIRVed ballistic missiles to reach the 1 200 sub-limit. But the nature of future Soviet deployments of launchers of MIRVed missiles is less predictable than that of US deployments. According to US sources, since 1976, the USSR has been replacing older, unMIRVed SS-11 ICBMs with MIRVed SS-17 and SS-19 ICBMs at a rate of roughly 100 per year. In addition, it has been placing MIRV-capable SS-18 heavy ICBMs into silos formerly containing unMIRVed SS-9 ICBMs. But single-warhead SS-18 ICBMs have been deployed along with MIRVed SS-18s, and no public evidence gives an indication of the proportion of MIRVed and unMIRVed SS-18s in this mix. For the purposes of the treaty, all SS-18 launchers, whether they contain MIRVed or unMIRVed missiles, will count against the sub-limit of 820 launchers of MIRVed ICBMs. Following its current production schedules, the USSR could reach this sub-limit in the early 1980s. If the USSR actually deploys the maximum allowable number of launchers of MIRVed ICBMs, which it is expected to do, it will still have the right to deploy up to 380 launchers of MIRVed SLBMs while staying within the 1 200 sub-limit on launchers of MIRVed ballistic missiles. As regards the 1 320 sub-limit on all MIRVed systems, the USSR will probably not reach it by 1985, since it is unlikely to deploy long-range ALCMs by that time [1b].

To remain within the overall aggregate of 2 250 for strategic nuclear delivery vehicles, the USSR must, as mentioned above, dismantle about 250 delivery vehicles by the end of 1981. Subsequently, for any new ICBM and SLBM launchers or heavy bombers deployed, it will have to dismantle the corresponding numbers of existing missile launchers or bombers.

III. Intercontinental ballistic missiles

The enhancement of strategic stability has often been referred to by the USA and the USSR as a primary benefit of nuclear arms limitation agreements. Strategic stability means that neither side perceives that it could gain a significant advantage through a nuclear pre-emptive strike against the other side's retaliatory forces. Therefore, all measures supporting strategic stability would tend to decrease the likelihood of nuclear war. It is questionable, however, whether the SALT II Treaty achieves this goal, especially considering the way it deals with ICBMs.

The deployment of many separately targetable warheads (MIRVs) on a single ICBM, when coupled with the improved accuracy of each warhead, increases ICBM lethality against hardened military targets, most notably ICBM silos. At the same time, current ICBMs are, unlike missile-launching submarines and strategic bombers, fixed targets whose location cannot be camouflaged. As both sides increase their capabilities to destroy the other side's silo-based ICBMs, pressures may mount to prepare for launching these missiles on very short notice—perhaps a few minutes—to avoid their being destroyed by the other side's missiles. This compression of the time available for the evaluation of information and of options in a serious crisis heightens the chance of nuclear war by accident or miscalculation.

The treaty evidences only a marginal attempt to inhibit the growth of MIRVed ICBM forces. Both sides are allowed to possess as many as 820 launchers of MIRVed ICBMs, while the number of warheads on current types of ICBMs is allowed to reach the maximum number of warheads with which each type of missile has been tested (IV, 10) (see table 6.1). MIRVs on 'new' types (defined below) of ICBMs will be limited to a maximum of 10 per missile (IV, 11). Both sides are allowed, during the period 1979–85, to increase their number of MIRVed ICBMs, and this, in turn, will bring about a substantial increase in ICBM warheads.

To facilitate verification, every launcher of a type developed and tested for launching MIRVed ICBMs or SLBMs is counted as a launcher of MIRVed missiles, regardless of whether it actually contains a MIRVed missile (First Agreed Statement to II, 5). Also, if an ICBM or SLBM has

Table 6.1. US and Soviet MIRVed ICBMs

MIRVed ICBM type	Maximum number of MIRVs
USA	
Minuteman III[a]	7
USSR	
SS-17	4
SS-19	6
SS-18	10

[a] The USA has tested Minuteman III with seven re-entry vehicles, but the missile has been deployed with only three re-entry vehicles and, consistent with US plans, will be limited to three re-entry vehicles for the duration of the treaty (Common Understanding to IV, 10) [1c].

been flight-tested with MIRVs, all missiles of that type will be considered to be MIRVed, regardless of whether they have also been tested without MIRVs (Second Agreed Statement to II, 5). These rules remove verification ambiguities that could have been caused by the inability to distinguish between MIRVed and unMIRVed missiles. For instance, all 308 Soviet launchers for the SS-18 ICBM will be included in the 820 limit on MIRVed ICBMs (and in all other SALT II aggregates), even though some of those launchers may actually contain unMIRVed SS-18s or SS-9s. Furthermore, for similar reasons, all 180 ICBM launchers in the Derazhnya and Pervomaysk areas in the USSR will be counted as launchers of MIRVed ICBMs, even though many of these launchers still contain the unMIRVed SS-11 ICBM (Fourth Common Understanding to II, 5) [3a].

A ban is placed on the flight-testing or deployment of an ICBM with a re-entry vehicle lighter than the lightest re-entry vehicle that had previously been tested on an ICBM of that type (Agreed Statement 3(a) to IV, 10). The purpose of this provision is to prevent clandestine increases in the number of MIRVs carried by existing types of ICBMs. (To increase the number of re-entry vehicles on a given missile, without changing other characteristics of the missile, it is necessary to reduce the weight of individual re-entry vehicles.) Perhaps a more important treaty restriction is the one prohibiting flight test procedures for dispensing more MIRVs than the number permitted for each missile type (Second Agreed Statement to IV, 10). Reportedly, in 1978 and 1979, the USSR tested the SS-18 ICBM with procedures indicating a capability to release more MIRVs than would now be permitted under the treaty [4]. Such tests are now prohibited.

The 'fractionation limitations'—the treaty limitations on the maximum number of re-entry vehicles per missile—will have a greater limiting impact on the USSR than on the USA. The latter could not increase the capability of the three-warhead Minuteman III ICBM by further dividing its payload. The USSR, however, has over the years chosen to deploy ICBMs far larger than Minuteman and could therefore deploy sub-

stantially more ICBM warheads than are permitted by the treaty. With the SS-17 and SS-19 MIRVed ICBMs (both of which are still being produced and deployed) limited to four and six warheads, respectively, and with the 'heavy'[2] SS-18 ICBMs limited to 10 MIRVs each, the USSR will probably not deploy more than approximately 6 400 ICBM warheads by 1985.[3] This level is twice the number of ICBM warheads deployed by the USSR at the time the treaty was signed [1d], but it is also substantially lower than the number of ICBM warheads that the USSR could deploy, given the payload of its missiles. All three types of Soviet ICBMs now being produced and deployed—the SS-17, the SS-19 and especially the SS-18—are capable of carrying more warheads than they currently carry [1e, 1f].

Since the treaty freezes at current levels the number of modern heavy ballistic missiles (IV, 3), the USSR has the right to maintain its 308 heavy ICBMs, while the USA, which has none, is barred from deploying any. Neither side may deploy an ICBM having a launch-weight or a throw-weight greater than that of the heaviest of the heavy ICBMs deployed by either party (IV, 7), that is, heavier than the Soviet SS-18 ICBM. The limits on ICBM warhead fractionation, as described above, reduce somewhat the military utility of heavy ICBMs.

In the opinion of the US Secretary of Defense, the new US ICBM, the 10-warhead MX (Missile Experimental), which will not be 'heavy' according to the terms of the treaty, "will have roughly equivalent military capability against both hard and soft targets to that of the SS-18 . . ." [1g].

Each side will be allowed to flight-test and deploy one "new type" of ICBM (IV, 9). The MX will be the US new type of ICBM. The Soviet new type could be either a single-warhead replacement for the unMIRVed SS-11 ICBM or a new MIRVed ICBM (that could be equipped for up to 10 warheads) to replace SS-17 and SS-19 MIRVed ICBMs. The USSR will not be permitted to deploy both the SS-11 replacement and a new MIRVed ICBM [1h].

[2] For the purposes of the SALT II agreements, heavy ICBMs are those ICBMs which have a launch-weight or throw-weight greater than that of the heaviest of the light ICBMs deployed by either party as of the date of signature of the treaty (II, 7). The Soviet SS-19 is the heaviest of the deployed light ICBMs in terms of both launch- and throw-weight (Third Common Understanding to II, 5). The launch-weight of an ICBM is defined as the weight of the fully loaded missile itself at the time of launch (First Agreed Statement to II, 7). The throw-weight of an ICBM is defined as the sum of the weight of: re-entry vehicles; any post-boost vehicles or other devices for targeting, releasing, or dispensing re-entry vehicles; and penetration aids, including devices for their release (Second Agreed Statement to II, 7).

[3] This assumes that the USSR will choose as its only permitted new type of ICBM a single-warhead replacement for the unMIRVed SS-11 ICBM. If the new type is MIRVed—and it may carry up to 10 MIRVs under the treaty limits—then by 1985 the Soviet ICBM warhead total could top 8 000. In the latter case, however, the new type of ICBM would have to be compensated for by the elimination of MIRVed ICBMs such as the four-warhead SS-17 and the six-warhead SS-19—both still being produced and deployed—to comply with the treaty sub-limit of 820 on launchers of MIRVed ICBMs.

The line between a modernized current type of ICBM and a new type of ICBM is drawn by an elaborate constellation of provisions (IV, 9). Such restraints were absent from the SALT I Interim Agreement, which contained only quantitative limitations. However, the attempt made in the SALT II Treaty to limit new types of ICBMs, as well as to limit modernizations of current types of ICBMs, will not prevent either side from making existing ICBMs more accurate, more explosive and more reliable, through the replacement of re-entry vehicles, guidance systems, warheads and other components. Any type of ICBM tested or deployed after 1 May 1979 will be considered a new type of ICBM if it is different from previously flight-tested types of ICBMs in any one of the following respects: the number of stages; the type of propellant (liquid or solid) of any of the stages; or a 5 per cent or greater change in length, largest diameter, launch-weight or throw-weight of the missile.

In addition, the treaty contains a provision designed to prevent the testing of several different types of new ICBMs under the guise of tests of 'modified' versions of the one permitted type. After the twenty-fifth launch of an ICBM of the new type, or after the last launch before deployment begins, whichever occurs earlier, the sides are prohibited from altering by more than 5 per cent the length, largest diameter, launch-weight or throw-weight of the missile (Second Agreed Statement to IV, 9). This rule is further refined by a restriction stating that the values demonstrated in each of the above parameters during the last 12 of the first 25 test launches or during the last 12 launches before deployment begins, whichever 12 launches occur earlier, may not vary by more than 10 per cent from any of the corresponding values demonstrated during those 12 launches (Second Common Understanding to IV, 9).

No known Soviet programme for the modernization of existing types of ICBMs would be affected by the '5 per cent rule' on modernizations [1i, 2b]. Similarly, the USA will continue to improve its Minuteman III MIRVed ICBM, by increasing the accuracy and explosive yield of individual warheads on 300 (of 550) such ICBMs from 170 to 350 kt through the use of a new re-entry vehicle (the Mark XIIA) and a new nuclear warhead (the W78) [5a]. (The accuracy of individual Minuteman III warheads has already been improved by the now fully deployed NS-20 guidance system.) The combination of accuracy and yield improvements permitted by SALT II will considerably increase the capability of a Minuteman III warhead to destroy a hardened missile silo.

In any event, the ability of existing monitoring systems to detect 5 per cent changes in such parameters as ICBM launch-weight, throw-weight and dimensions is questionable [1j], and the USA and the USSR have not even exchanged data on baseline values for each missile type to which the 5 per cent limitations are to be applied.

Several other restrictions apply to ICBM launcher construction and modification, and to ICBM production and deployment. A ban on the construction of new fixed ICBM launchers, established in the SALT I Interim Agreement, is continued (IV, 1) and is refined by a ban on the relocation of fixed ICBM launchers (IV, 2). The SALT I freeze on the conversion of launchers of light ICBMs or of ICBMs deployed before 1964 into launchers of heavy ICBMs is re-enacted (IV, 3). The sides are further prohibited from developing, testing or deploying rapid reload systems for ICBM launchers, that is, systems capable of firing a second missile shortly after an initial missile firing. Accordingly, the sides are not permitted to store at ICBM launch sites more than one ICBM per launcher, nor may they provide storage facilities at launch sites for such extra ICBMs (IV, 5). However, there are no limits set on the number of ICBMs that can be produced and stored elsewhere. Both sides pledge to follow "normal construction schedules", that is, schedules consistent with past or present construction practices, for strategic offensive arms (IV, 6). Thus, the parties are not allowed to construct large numbers of such arms to a stage short of final construction, and thereby avoid having them counted in the treaty aggregates. In the absence of this provision, either party could find it easier to acquire a so-called breakout potential, that is, the ability suddenly to abrogate the treaty in a way that could provide this party with a real or perceived strategic advantage.

The Soviet SS-16 ICBM, suitable for mobile launchers, is banned (IV, 8). Since the SS-16 can be created from the two-stage SS-20 intermediate-range ballistic missile (IRBM), which is currently deployed on mobile launchers, the USSR agreed (upon US insistence) not to produce the SS-16's third stage, the re-entry vehicle of that missile, or the device for targeting the re-entry vehicle (Common Understanding to IV, 8). Although prior to signing the treaty the USSR was reported to have built SS-16s [6, 7], the banning of the SS-16 may not have a substantial limiting impact on Soviet military capability, primarily because of this missile's poor accuracy [1k].

The provisions pertaining to ICBMs served as an important focal point of criticism of the SALT II Treaty by some opponents of the treaty in the USA. They claimed that SALT II had not done enough to inhibit the growing capability of the Soviet ICBM force, which, due to extensive MIRVing and to faster than anticipated accuracy improvements, may make US silo-based ICBMs vulnerable to a first strike sometime in the early 1980s. (It has been reported that Soviet SS-18 and SS-19 ICBM tests in 1978 achieved a Circular Error Probability (CEP)[4] of 0.1 nm [8].)

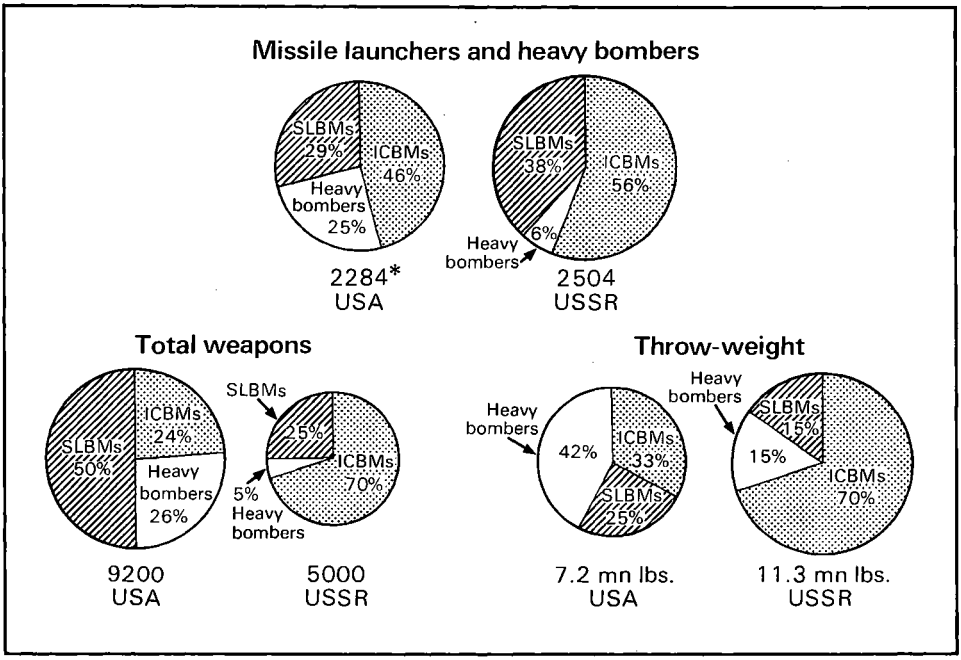
[4] CEP, the standard measure of the delivery accuracy of a weapon system, is the radius of a circle, centred on the target, within which 50 per cent of the weapons aimed at the target will fall.

However, numerous technical uncertainties would accompany an attempt to destroy missile silos in a pre-emptive attack: hundreds of missiles would have to be launched at precisely staggered times to ensure that the separately aimed warheads arrived simultaneously at dispersed targets after having followed untested polar trajectories; just a small reduction in accuracy would greatly decrease a warhead's capability to destroy a silo; and full reliability of the complex systems at launch, re-entry and detonation cannot be assumed. Moreover, 'fratricide effects' —the destruction or disruption of a re-entry vehicle approaching a nuclear explosion caused by a preceding re-entry vehicle—could reduce the effectiveness of warheads targeted on a single silo. And finally, it would be imprudent for a planner of a first strike to assume that the other side would await the destruction of its missile silos rather than launch its missiles on warning or during the attack.

Even if one were to suppose that one side could overcome all these operational uncertainties and succeed in destroying the other side's ICBM force, the surviving nuclear delivery vehicles could devastate the attacking side in retaliation. The US Defense Secretary stated that, in the mid-1980s, even without the Minuteman force, the USA would have "surviving bomber and submarine forces still fully capable of selectively attacking military, economic, and control targets" [1 l]. Nevertheless, some analysts still argue that even a presumed vulnerability of a portion of one side's strategic forces could induce the other side to undertake a more aggressive foreign policy [1m]. This argument lacks substance: a 'vulnerability' which is known to be devoid of military significance can hardly lead to adverse political consequences.

In the early to mid-1980s, the era termed by some observers 'the window of vulnerability' for the USA, the US Minuteman III warheads could destroy approximately half the number of Soviet ICBMs [1n, 1 o], which comprise roughly 70 per cent of the Soviet strategic nuclear forces, measured in either warheads or throw-weight. By comparison, the USA derives only 24 per cent of its warheads and 33 per cent of its total throw-weight from its ICBM force (see figure 6.2). Consequently, ICBM vulnerability may be an issue of greater concern to the USSR than to the USA. In spite of this, several improvements for US strategic forces in the early 1980s have received serious consideration to compensate for the presumed vulnerability of Minuteman. These include: increasing the bomb load and readiness of B-52 bombers; accelerating the development and deployment of a wide-bodied cruise missile-carrying aircraft; increasing the number of warheads on each Poseidon SLBM from 10 to 14; improving the accuracy of the Trident I (C-4) SLBM; placing Trident I SLBMs in the 10 Polaris submarines which currently carry unMIRVed, relatively inaccurate missiles, and deferring the retirement date of the

Figure 6.2. Composition of US and Soviet forces in 1979, accountable under the SALT II Treaty



* This total includes approximately 220 non-operational B-52 bombers that will be counted within the SALT II limits.

Source: Based on *The SALT II Treaty*, Part 1, testimony of US Secretary of Defense Harold Brown, Hearings, US Senate Committee on Foreign Relations (US Government Printing Office, Washington, D.C., 1979), p. 99.

submarines; and accelerating construction of the Trident submarine [9]. None of the above plans would be precluded by the SALT II Treaty. The latter two options, which would add to the US MIRVed missile total—limited by the treaty to 1 200—would necessitate the dismantling or destruction of Poseidon SLBMs and/or Minuteman III ICBMs sooner than is currently anticipated.

The one major weapon system planned to remedy the perceived vulnerability of Minuteman is the new MX ICBM. However, it is not the missile itself that would reduce ICBM vulnerability, but its mobility—and mobility could be achieved with missiles already in existence. In effect, the MX will significantly increase the capability of the USA to threaten the entire Soviet ICBM force from the late 1980s on. President Carter approved the MX missile one week before signing the SALT II Treaty. This decision may have been motivated by the need to appease the senators who were dissatisfied with the US–Soviet strategic balance as they saw it and whose votes were necessary to ratify the treaty.

The MX will have a launch-weight of more than 86 000 kg, roughly twice that of Minuteman, and a throw-weight more than four times that of Minuteman's 900 kg [10, 11]. MX will probably be fitted with 10 MIRVs, the maximum allowed on a new type of ICBM. Depending upon the warhead chosen for deployment, each warhead could have from around 335 kt to more than 500 kt explosive yield [12, 13]. These warheads are likely to be carried to their targets by manoeuvrable re-entry vehicles (MaRVs), which use terminal guidance capable of CEPs of a few tens of metres [14a]. The USA is developing a further accuracy improvement, the Advanced Inertial Reference Sphere (AIRS), for use with the MX [1 o]. The MX will probably be first flight-tested in 1983. Deployment is expected to begin in 1986 (after the treaty is due to expire) and to be completed by 1989 [1g]. The current official cost estimate for MX deployed with its racetrack basing system is $33 thousand million, but the immense cost overruns of the other recent US strategic weapon systems (e.g., the B-1 bomber and the Trident submarine) should lead one to view the total of $33 thousand million as a decidedly conservative estimate.[5]

The racetrack basing scheme, officially called the "sheltered road-mobile system", as currently envisaged, will consist of 200 road loops, each containing 23 hardened horizontal shelters at regular intervals of about 2 km. Each loop will contain one MX missile, carried on a transporter–erector–launcher (TEL), a vehicle with a length of about 55 metres and a weight of about 300 tons [18]. A shield vehicle will cover the TEL when it moves from shelter to shelter, thus preventing observers from detecting in which shelter the TEL resides. Once the TEL has been deposited in a shelter, the shield vehicle will continue to visit empty shelters.

A significant factor in the choice of the TEL/racetrack basing system was that it would enable Soviet verification by photoreconnaissance satellites of US compliance with the treaty. Most important, the missile cannot be launched within this system without the huge TEL, whose construction and numbers will be apparent. In addition, each shelter will have in its roof four removable ports. All of the ports in a loop could be opened simultaneously to show that only one TEL operated within the loop. The final assembly of the MX missile will occur at designated areas within each road loop. The loop will be closed off by an earth barrier once the TEL and missile are inside the loop.

The SALT II agreements will probably not affect development and deployment of the MX or its basing system. In the protocol, which is due to expire at the end of 1981, the sides agreed not to deploy mobile ICBM

[5] The B-1 quadrupled in cost in three years, from $25 million each in late 1971 to $100 million in 1974. (B-1 production plans were cancelled in 1977.) The cost of a Trident submarine has risen from $723 million to $1.5 thousand million, and is expected to rise even more [15–17].

launchers or to flight-test ICBMs from such launchers (Protocol, I). But the underlying assumption in the USA is that the protocol will not be extended past 1981 [3b], and the development, construction and testing of mobile ICBM launchers, provided the testing does not involve ICBM test-flights from such launchers, is permitted even during the protocol period.

The combination of treaty limitations on launchers and warheads has led US planners to believe that the USA need not build more than the currently planned 4 600 shelters to ensure the survivability of the MX force. But if the MIRVed ICBM limits are not extended past 1985, the USSR might be able to deploy larger numbers of warheads on existing ICBMs or to deploy larger numbers of MIRVed ICBMs to enable it to hit all MX shelters, whether full or empty. The USA would then have to build additional shelters, and a new race would develop between the number of US shelters and the number of Soviet warheads aimed at them. The MIRV story may be repeated: gargantuan expenditures will be made for a new generation of weapons that may confer a temporary advantage to one side, but will in the end leave both sides less secure.

Furthermore, the USSR could also deploy mobile ICBMs with counter-force capabilities, and it would probably have better conditions to do so than the USA, at least from the point of view of geography. Should all this happen, the chances of controlling the nuclear arms race would diminish even further due to the enormous verification difficulties inherent in mobile ICBM systems. Pressures could mount to revise or abrogate the Anti-Ballistic Missile (ABM) Treaty (which severely limits ABM deployments) in order to permit ABM defences to protect land-based offensive missiles.

IV. Submarine-launched ballistic missiles

Unlike SALT I, the SALT II agreements contain no specific ceilings on numbers of missile-launching submarines or their missiles. SALT I froze the numbers of SLBM launchers (and fixed ICBM launchers) then operational or under construction, but the USA and the USSR were permitted to expand their SLBM launcher totals, respectively, from 656 to 710, and from 740 to 950, by dismantling, on a one-for-one basis, older ICBMs or SLBMs carried on old submarines. Since the signing of the SALT I Interim Agreement in 1972, the USSR has deployed an average of five new nuclear-powered ballistic missile submarines every year. The USA has not deployed a new SLBM launcher since the early 1960s, although US SLBM capabilities have been significantly upgraded through accuracy and warhead yield improvements as well as through MIRVing.

Communication links between US missile submarines and the authorities that would issue orders to fire the SLBMs have also been improved. In addition, the USA will launch a new class of missile submarine with the deployment of the first Trident submarine in 1981.

It is generally accepted that SLBMs are at present the most stabilizing portion of the strategic nuclear forces of the USA and the USSR. Submarines are difficult to detect in the world's oceans. They are, therefore, less vulnerable than are fixed-site ICBMs. Moreover, the combined accuracy/yield capabilities of current SLBMs are not sufficient to allow SLBMs to pose a significant threat to silo-based ICBMs, and SLBM flight times from probable launch areas provide strategic bombers at most bases with a warning period sufficient for escape.

While SLBM launchers are not specifically limited in the SALT II agreements, they are indirectly constrained by the overall ceiling on strategic nuclear delivery vehicles (2 400, to be reduced to 2 250 at the end of 1981) and the sub-limit on MIRVed ballistic missile launchers (1 200). These aggregates allow for a variety of possible mixes, discussed above, for the strategic nuclear forces on both sides.

Both sides are permitted to deploy up to 14 re-entry vehicles on an SLBM (IV, 12). This is the maximum number of re-entry vehicles with which an SLBM, namely the Poseidon C-3, has ever been tested. The SS-N-18 SLBM, the only MIRVed SLBM deployed by the USSR, carries three MIRVs, although the missile has been tested with as many as seven MIRVs (First Agreed Statement to IV, 12). As far as is known, neither side has plans to reach the limit of 14 MIRVs per SLBM.

In 1979, shortly before the signing of the SALT II Treaty, the first US Trident submarine, the *USS Ohio*, was commissioned. Trident submarines carry 24 SLBM launchers and will displace 18 700 tons when submerged. They can cruise more quietly and at greater depths than present US missile-launching submarines. The 7 000-km range of the Trident I missile will enable the Trident submarine to move in an ocean area almost five times as large as that which was possible for older US missile-launching submarines [1p]. The larger the patrol area, the more difficult it is for the anti-submarine warfare (ASW) forces to locate the submarine. Moreover, increased SLBM range will allow the submarine to stay close to home waters, where the chances of a successful enemy ASW attack are considerably less.

Six or seven Trident submarines may be operational by 1985. The total number of Trident submarines to be deployed has not yet been determined. Polaris submarines, carrying 16 Polaris A3 missiles with 3 MRVs—multiple re-entry vehicles which are not independently targetable—of 200 kt each (with relatively poor accuracy of 0.5 nm) [1q], will probably be withdrawn from active service by the end of 1981. The retention in

service of these unMIRVed Polaris missiles would not violate the treaty; they will be retired due to obsolescence.

Each Trident I missile will carry seven or eight warheads of roughly 100 kt. With stellar-aided inertial guidance providing an accuracy of 0.25 nm, as compared to 0.3 nm for the 40-kt Poseidon warheads, a Trident I MK-4 warhead could have nearly twice the hard-target kill capability of a Poseidon warhead [5a]. Still, this capability is small in comparison to the anti-silo capabilities of ICBM warheads on both sides. The USA also plans to place Trident I SLBMs into 12 Poseidon submarines in the years 1979–81 and to double the explosive yield of more than 2 000 warheads on approximately 300 Poseidon SLBMs [19].

The USSR will probably continue to produce and deploy the 'Delta III'-class submarine, which contains 16 SS-N-18 SLBMs carrying three MIRVs of 200 kt each. The SS-N-18 has a range comparable to that of Trident I (approximately 7 000 km). The USSR is also developing a new submarine and SLBM, both called Typhoon in the West [1r].

The two aforementioned attributes of SLBMs—survivability and only modest capabilities to destroy hard targets—which mutually support strategic stability, could have been preserved into the indefinite future if certain specific limitations had been agreed upon, including: restrictions on anti-submarine warfare (ASW) equipment and operations; restrictions on new types of SLBMs; and a ban on the testing of SLBMs along "depressed trajectories" (explained below).

Concern over the survivability of missile submarines has become more acute in the past few years due to the increasing vulnerability of ICBMs and due to advances in anti-submarine warfare (ASW) technology. Ongoing military research in the ASW field may lead to the sides' acquiring a first-strike capability against each other's missile-launching submarines. (There is general agreement among Western analysts that the USA has a long lead in almost every qualitative measure of ASW capability [14b].) The increased range of SLBMs, however, has somewhat offset ASW advances by expanding the ocean area in which the missile submarines can patrol within range of their targets. Despite the potential threat that ASW poses to the sea-based deterrent, limitations on strategic ASW were, as far as is known, only cursorily discussed in SALT II.

The SLBM is not, as yet, an effective counterforce weapon, because it is not accurate enough. However, several technological developments now under way could eventually give the SLBM the requisite accuracy/yield combination that would greatly increase its capability to destroy hard targets. The USA will be able to choose from a variety of precision guidance mechanisms for use with the Trident II SLBM, now in development, which will have a larger payload as well as greater accuracy than the Trident I missile [14c].

These projected improvements in SLBM accuracy and hence SLBM lethality could have been forestalled by a treaty limitation on the testing and deployment of new types of SLBMs. However, no agreement could be reached on this issue [20]. The untrammelled growth in the lethality of SLBMs will, in turn, further increase the incentives to develop ASW capabilities, as both sides will seek to protect their land-based missiles from this growing threat from the sea.

Another inadequacy is the absence of a provision banning the depressed trajectory testing of SLBMs. The firing of SLBMs along depressed trajectories shortens the ballistic flight path, reducing flight-time and hence warning time, thereby enhancing the first-strike capability of SLBMs. This shorter warning time would increase the vulnerability of both sides' bomber forces. As SLBM accuracies improve, depressed trajectory SLBMs could also pose a serious threat to hardened targets. The USA raised the issue of depressed trajectory testing of SLBMs late in the negotiations, but no agreement on this issue was reached. Here again, the USA and the USSR missed an opportunity to prohibit a possible future avenue of destabilizing competition.

V. Heavy bombers and air-launched cruise missiles

Long-range strategic bombers were not limited in the SALT I Interim Agreement. At Vladivostok, in November 1974, the USA and the USSR agreed that "heavy bombers" (defined below) would be included in the SALT II overall aggregate limits on strategic nuclear delivery vehicles. Attempts to create specific treaty terms to limit heavy bombers raised several contentious issues. Disagreement on how to handle two systems —Soviet Backfire bombers and US cruise missiles—slowed the negotiations time and again. Further difficulties were encountered in trying to carve a distinction, for verification purposes, between heavy bombers to be counted in the SALT II aggregates and other aircraft of similar types.

Currently, heavy bombers are defined to be bombers of the US B-52 and B-1[6] types and of the Soviet Bear (Tupolev-95) and Bison (Myasishchev) types (II, 3, a). In the future, any type of bomber which can carry out the mission of a heavy bomber in a manner "similar or superior" to the bombers listed above will be considered to be a heavy bomber (II, 3, b). The treaty does not list the attributes of current types of heavy bombers against which future types of bombers will be judged to determine if they are similar or superior to current types. Such determinations will be made by the US–Soviet Standing Consultative Commission on a case-by-case

[6] Although B-1 production was cancelled in 1977, four B-1 prototypes have been produced and will be included in the aggregate.

basis (Third Agreed Statement to II, 3). Also, any type of bomber equipped for long-range cruise missiles will be considered to be a heavy bomber (II, 3, c). Such aircraft will also be included, along with launchers of MIRVed ICBMs and SLBMs, in the 1 320 aggregate ceiling on MIRVed launchers.

All aircraft of a type considered to be heavy bombers will be included in the treaty's overall aggregate unless such aircraft have "functionally related observable differences" which prove that the aircraft cannot perform the mission of a heavy bomber (Fourth Agreed Statement, (a), to II, 3). As an example of this rule, the reconnaissance variant of the Soviet Bear (Tu-95) bomber will be excluded from the aggregate since it has no bomb-bay doors. In addition, if any airplane[7] of a given type has been converted into a cruise missile carrier, then all airplanes of that type will be considered to be cruise missile carriers (and hence counted in the 1 320 sub-ceiling on MIRVed launchers), unless they have functionally related observable differences which show that they are not equipped for long-range cruise missiles (Fourth Agreed Statement, (b), to II, 3). One major clarification of this rule states that only "observable differences", that is, not necessarily functionally related observable differences, will be required to differentiate *current* types of heavy bombers from heavy bombers equipped for long-range ALCMs. This will allow the USA to convert B-52 bombers into cruise missile carriers without having either to count all B-52s in the 1 320 sub-ceiling on MIRVed systems or to modify all non-cruise missile-carrying B-52s to show that they could not serve as launchers for long-range ALCMs.

It is important to note that only current types of heavy bombers are exempt from the rule calling for functionally related observable differences. If some US FB-111 or Soviet Backfire bombers, none of which are included in the aggregates on strategic delivery vehicles, were to be equipped to carry cruise missiles, then all aircraft of that type would be included in the 2 400/2 250 overall aggregate and in the 1 320 sub-limit, unless the unconverted bombers had functionally related observable differences showing that they could not function as cruise missile carriers. In exchange for the exemption for B-52s, the USA agreed that all Soviet Tu-142 ASW aircraft, which have the same basic airframe (including bomb-bay doors) as the Bear (Tu-95) heavy bomber, will be excluded from the overall aggregate only on the basis of observable differences (instead of functionally related observable differences) (Fifth Agreed Statement to II, 3) [3c].

One additional refinement of the heavy bomber definition concerns the 31 Soviet Bison (Myasishchev) tanker airplanes, whose exteriors are in-

[7] The treaty makes a distinction between "airplane" and "aircraft". The latter term includes vehicles such as helicopters and dirigibles.

distinguishable from those of Bison heavy bombers. Within six months of the entry into force of the treaty, the USSR must provide all Bison tankers with functionally related observable differences (Second Common Understanding to II, 3).

The issue of cruise missiles in the SALT II negotiations was basically a question of what constraints should be placed on US programmes. The USA has a substantial lead in the advanced technologies, including miniaturization of electronic circuits, jet engines, nuclear warheads, and extremely accurate guidance systems, necessary to make cruise missiles effective strategic nuclear delivery vehicles [21–23]. The air-launched cruise missile (ALCM) can be pre-programmed to follow a zig-zag flight path at extremely low altitudes in order to avoid air defences, and to land within tens of metres of its target [5b]. The ALCM, which will probably carry a warhead of changeable yield (maximum 200 kt), will have a nearly 100 per cent ability to destroy any missile silo [23].

The provisions of the SALT II agreements dealing with cruise missiles will have a negligible impact on current US programmes. According to these provisions, the number of long-range ALCMs deployed on cruise missile carriers may not exceed an *average* of 28 per carrier (IV, 14). The USA would be technically capable of deploying up to 60 ALCMs on certain wide-bodied aircraft [1s] and still observe the average limit, but it is doubtful that such a high concentration of weapons on a single delivery vehicle would be militarily desirable. The two powers further agreed that no existing heavy bombers (in effect, B-52s) may be equipped to carry more than 20 long-range ALCMs (Second Agreed Statement to IV, 14), and neither side has plans to deploy during the treaty period an aircraft equipped with more than 20 long-range ALCMs [3d]. The treaty further mandates that only bombers may be converted into cruise missile carriers (VIII, 1). If cruise missile carriers are built from wide-bodied passenger or cargo aircraft types, such carriers must be built from scratch; they cannot be converted from existing airplanes. However, as an exception to this rule, each side will be able to use 16 airplanes, which can be either converted or built from scratch, to test long-range ALCMs. These 16 airplanes are exempt from the treaty's aggregate limitations (Agreed Statement to VIII, 1).

The SALT II provisions concerning cruise missiles focus mainly on the carrier rather than on the missile itself, because cruise missile deployments are extremely difficult to monitor. Two externally indistinguishable cruise missiles could have different types of warheads (conventional or nuclear) and vastly different range capabilities, depending on payload, flight velocity and fuel volume. The range capability of a cruise missile is further complicated by its ability to fly on a zig-zag flight path to avoid air defences. The straight-line distance from launcher to target can be

substantially shorter than the distance actually travelled by the cruise missile. Finally, the multiplicity of possible launch platforms and the cruise missile's small size complicate detection of deployment.

Only the air-launched version of the cruise missile is covered by the treaty. (Sea-launched cruise missiles (SLCMs) and ground-launched cruise missiles (GLCMs) are addressed in the shorter-term protocol.) There is no upper range limit on ALCMs. Compliance with such a restriction would have been difficult to verify: cruise missiles, unlike ballistic missiles, do not have to be tested at full range to produce confidence in their accuracy at full range. Even the very definition of the range of a cruise missile was a thorny negotiating point. It was finally decided to define the range as "the maximum distance which can be covered by the missile in its standard design mode flying until fuel exhaustion, determined by projecting its flight path onto the Earth's sphere from the point of launch to the point of impact" (Second Agreed Statement to II, 8 and Second Agreed Statement to Protocol, II, 3). The distance measured according to this definition would be that measured by the odometer of an automobile driven beneath the missile on a smooth model of the Earth [3e].

The USA plans to equip all 151 operational B-52G bombers with 20 ALCMs each. The first squadron (16 bombers) is planned to be deployed in December 1982, and each of the B-52Gs then deployed would carry 12 externally mounted ALCMs. After all B-52G bombers have been equipped with 12 externally mounted ALCMs, the internal deployment of 8 ALCMs (for a total of 20 ALCMs per B-52G) will begin. Eventually, the USA will replace the B-52Gs with a new type of ALCM carrier. Two possible carrier types will be tested in 1981 and could be deployed by the mid-1980s [1t].

The roughly 200 operational B-52s not converted into ALCM carriers will continue (despite their age of more than 20 years in some cases) as strategic nuclear delivery systems, even after the USA has deployed a large ALCM force. All B-52 bombers, numbering 573 at the time of the signing of the treaty, including 220 non-operational bombers, are covered by the overall aggregate.

The issue of the Soviet Backfire (Tu-22M) bomber is not dealt with in the treaty text. At the 1979 Vienna summit meeting, President Brezhnev handed President Carter a written statement saying that the Backfire is a medium-range bomber and that the USSR does not intend to give it a capability to strike targets on the territory of the USA, by increasing its radius of action or in any other manner, including in-flight refuelling. The USSR also stated that it would not increase the production rate of this airplane. President Brezhnev orally confirmed that the Backfire production rate would not exceed 30 per year [1u], and President Carter

stated that the USA had the right to a SALT II-exempt aircraft comparable to Backfire.

The Backfire issue raised once again the question of what criteria should be used to determine whether a weapon system is a strategic nuclear delivery system, and consequently, whether it should be included in the SALT II overall aggregate. While the Backfire bomber does have the ability to reach the USA on certain (high altitude, low speed) flight profiles, the bomber seems to be designated rather for theatre and anti-ship roles. The US nuclear bombers capable of reaching the USSR from bases in Europe or from aircraft carriers had not been covered at all by SALT II negotiations since the sides had agreed, in 1974 at Vladivostok, to exclude these forward-based systems from consideration. US negotiators claimed that the Backfire bomber was different from US forward-based systems in that it could strike US targets from bases in the USSR, not just from forward bases. In this context it is worth noting that the USA has deployed on its territory 66 FB-111 bombers, assigned to the Strategic Air Command, which are exempt from SALT II even though they could strike targets in the USSR [24a]. These bombers can carry a bomb payload nearly twice that of Backfire [14d, 25a].

According to US sources, by September 1979 the USSR had produced approximately 200 Backfire bombers [1v]. At the current annual production rate of 30 per year, the USSR could deploy nearly 380 Backfires by the end of 1985. If, in future, any Backfire bomber is equipped for long-range ALCMs, all Backfires would become subject to the relevant treaty limitations, namely, the overall aggregate as well as the 1 320 sub-limit on MIRVed launchers, unless non-ALCM-carrying Backfires had functionally related observable differences showing that they could not carry long-range ALCMs.

There are indications that the USA may exercise its right, as stated by President Carter in Vienna, to build an aircraft similar to Backfire. The US Strategic Air Command wants to convert 66 FB-111A medium-range bombers and 89 F-111D fighters into intercontinental bombers by adding the advanced engines and avionics of the cancelled B-1 bomber [25b, 26]. It is not clear, however, whether such bombers would be similar enough to the Backfire to warrant exemption from the treaty's aggregate ceilings.

Reportedly, the USSR is developing three types of aircraft that would be classified as heavy bombers under the SALT II Treaty. One design, the Tu-160, a low-level penetrating bomber, could probably be deployed as early as 1982 [27–29], but it has not yet been flight-tested. According to the treaty, the deployment of each new Soviet heavy bomber must be accompanied by the removal from service of a Soviet strategic nuclear delivery vehicle (an ICBM or SLBM launcher or a heavy bomber) to enable the USSR to stay within the 2 250 overall ceiling.

VI. Other limitations

The deployment of ground-launched cruise missiles (GLCMs) and sea-launched cruise missiles (SLCMs) with ranges greater than 600 km is prohibited in the protocol, which is due to expire on 31 December 1981 (Protocol, II, 1, and IV). The Protocol permits, however, the development and flight-testing of GLCMs and SLCMs *to any range*. No GLCMs or SLCMs with multiple independently targetable warheads may be flight-tested while the Protocol is in force (Protocol II, 2). If allowed to expire at the end of 1981, the protocol will have no impact whatsoever on present cruise missile testing and development schedules; the protocol provisions on cruise missiles were adjusted to US schedules [1c]. The same can be said for the protocol prohibition on the flight-testing and deployment of mobile ICBM launchers. The only other protocol limitation, under which the parties undertake not to flight-test or deploy ASBMs (Protocol, III), pertains to a weapon that neither side apparently intends to deploy [1w]. The very short duration of the protocol may deprive it of any arms control meaning whatsoever.

The USA and the USSR agreed not to include in the treaty's aggregate ceilings ICBM and SLBM test and training launchers or space vehicle launchers (VII, 1). But to prevent this exemption from becoming a loophole which would enable a party to build treaty-exempt ICBM and SLBM launchers beyond its actual needs for testing, the sides agreed that the number of ICBM and SLBM test and training launchers cannot be increased by more than 15 per cent (VII, 2(a) and First Agreed Statement to VII). Furthermore, any new ICBM test and training launchers which replace launchers at test ranges must be located at test ranges. At a negotiating session in 1976, the sides agreed that the number of test and training launchers in existence on the date of entry into force of the treaty would be the base for counting increases in the numbers of such launchers [3f].

The treaty requires each party to notify the other "well in advance" of all launches of ICBMs that are planned to extend beyond national territory and of all planned multiple launches of ICBMs (XVI, 1). A multiple ICBM launch occurs whenever two or more ICBMs are in flight at the same time. The key term "well in advance" is not defined in the treaty; the parties agreed that procedures for implementing the notification provisions will be established in the US–Soviet Standing Consultative Commission (XVI, 2).

The provision for advance notification of certain ICBM flight tests extends the parties' obligations under two existing US–Soviet agreements. The first, the 1971 US–Soviet agreement on measures to reduce the risk of outbreak of nuclear war, requires, *inter alia*, advance notification

of planned missile launches extending beyond the national territory of the launching party in the direction of the other party. The second, the 1972 US–Soviet agreement on the prevention of incidents on and over the high seas, requires, *inter alia*, that notification be given of actions on the high seas (such as missile flight tests) that represent a danger to navigation or to aircraft in flight. According to the SALT II Treaty, advance notification of the relevant activities must take the form of a direct bilateral announcement and not merely a general notice to mariners.

Since every US ICBM flight test extends over the high seas, the USA already gives public notice of all of its ICBM flight tests under the 1972 High Seas Agreement mentioned above. It seems that most Soviet ICBM tests take place entirely within the USSR [1x] and therefore do not require notification under the SALT II provisions (except in the case of multiple ICBM launches).

A separate article (IX) in the treaty prohibits the parties from developing, testing or deploying certain 'unconventional' types of nuclear weapon delivery vehicles, none of which appear to have been under serious consideration for future development by either side. These banned weapons include:

1. Ballistic missiles capable of a range in excess of 600 km deployed on surface ships (IX, 1(a)). This provision does not affect current practices for transporting ballistic missiles on surface ships, nor does it preclude the testing or deployment of *cruise* missiles of any range from launchers on surface ships.
2. Fixed or mobile launchers of ballistic or cruise missiles deployed on the ocean floor and the sea-bed, as well as on the beds of internal waters and inland waters, or missiles for such launchers (IX, 1(b)). (This prohibition does not apply to submarines.) This provision represents an extension, for the USA and the USSR, of the 1971 multilateral Sea-Bed Treaty, which bans the emplacement of nuclear weapons and related systems on the sea-bed beyond a 12-mile coastal zone. The extension covers the territorial waters and inland waters of the parties as well as development and testing in addition to deployment.
3. Fractional orbital ballistic missiles, also known as fractional orbital bombardment systems (FOBS), which are launched into an orbital trajectory but re-enter the atmosphere before completing one full revolution of the Earth (IX, 1(c)). This clause expands the obligations assumed by the parties under the 1967 multilateral Outer Space Treaty, which prohibits, *inter alia*, the placing into Earth orbit of "any objects carrying nuclear weapons or any other kinds of weapons of mass destruction". Since a FOBS is not designed to complete a full orbit, it is not, technically speaking, prohibited by the Outer Space Treaty. In the SALT II

Treaty, the USSR has agreed to remove 12 of its 18 SS-9 launchers that have been used to test a FOBS. These launchers may not be replaced under the terms of the treaty. The six remaining FOBS launchers can be converted to launchers for testing missiles undergoing modernization (Second Common Understanding to VII, 2). The fractional orbital missiles themselves must be destroyed within six months after the entry into force of the treaty (XI, 4).

4. Mobile launchers of heavy ICBMs (IX, 1(d)).
5. Heavy SLBMs or launchers for heavy SLBMs (IX, 1(e)).
6. Heavy air-to-surface ballistic missiles (ASBMs) (IX, 1(f)). (A heavy SLBM or ASBM is one with a launch-weight or throw-weight heavier than that of the Soviet SS-19 ICBM.) The flight-testing of long-range ALCMs equipped with multiple independently targetable warheads is also prohibited (IX, 2).

Both sides agreed not to circumvent the provisions of the treaty through other states or in any other manner (XII). This clause is the result of a controversy between the USA and the USSR over whether the treaty would preclude the transfer of SALT II-limited delivery vehicles, their components or technology to other countries. During the negotiations, the USSR sought a highly restrictive non-transfer clause, which US negotiators rejected in favour of the current, non-circumvention clause. The latter would seem to permit the transfer of numerically limited arms (such as SLBM launchers) by either party to its allies, but would not permit the transfer of prohibited arms (such as long-range ballistic missiles on surface ships). For example, while the treaty is in force, the UK would not be prevented from purchasing Trident I SLBMs from the USA for use on British-made submarines [30]. However, an extension beyond the end of 1981 of the protocol provision banning the deployment of GLCMs and SLCMs would preclude the deployment of US long-range GLCMs on the territory of the European NATO states. Such deployments are not expected to take place before autumn 1983 [31].

VII. Verification

The provisions concerning verification of compliance with the SALT II Treaty can be divided into the following categories: provisions which relate directly to verification practices, including obligations not to interfere with the other side's verification means; provisions which establish specific mechanisms to facilitate verification; and provisions which define restricted systems and practices in such a way as to facilitate the verification tasks (see also chapter 7).

As in the SALT I agreements, each party will use "national technical means" of verification and is obliged to refrain from interfering with the other party's national technical means (XV, 1 and 2). National technical means of verification include photoreconnaissance satellites, ground- and ship-based radars, devices for intercepting radio signals emitted from missiles during flight tests, and other intelligence systems. The ban on interference with permissible means of verification prohibits the use of anti-satellite systems against the other side's satellites used for treaty verification. This will not, however, prevent either side from developing and testing anti-satellite weapons.

The treaty bans deliberate concealment measures which impede verification by national technical means (XV, 3). This clause was also contained in the SALT I ABM Treaty and Interim Agreement, but in the SALT II Treaty the clause is accompanied by several clarifications. Two of these clarifications explicitly state that the ban on deliberate concealment applies to testing. Thus, measures aimed at concealing the association between ICBMs and launchers during testing are banned (First Common Understanding to XV, 3), and the deliberate denial of telemetric information (radio signals normally sent from a missile to ground monitors during a flight test), such as through encryption, is prohibited whenever such denial impedes verification (Second Common Understanding to XV, 3). No shelters which impede verification may be placed over ICBM silo launchers (Third Common Understanding to XV, 3).

The Standing Consultative Commission (SCC), established in 1972 under the SALT I agreements to discuss ambiguous situations and to develop procedures for the implementation of the agreements, is continued under the SALT II régime with expanded responsibilities (XVII). The most significant new duty of the SCC is the maintenance of the agreed data base of each side's weapons that are subject to treaty limitations. The numbers in the data base will be updated semi-annually.

The two powers further agreed on notification provisions that will aid verification. In addition to the requirement for prior notification of certain ICBM flight tests, the treaty requires notification of, among other things: future types of heavy bombers (Second Agreed Statement to II, 3); additional types of MIRVed ballistic missiles (Second Agreed Statement to II, 5); specified test launches of the one permitted new type of ICBM (Second Agreed Statement to IV, 9); and new ICBM test ranges (Second Agreed Statement to VII, 2).

The parties agreed on type rules and counting rules for a large number of the systems limited by the agreement, as well as on criteria for distinguishing between different systems (see the preceding sections). Without these rules, verification of compliance with many provisions of the treaty would have been well-nigh impossible.

VIII. Assessment

The arms control accomplishments of the SALT II agreements can be summarized as follows.

1. An equal aggregate limit on the number of strategic nuclear delivery vehicles as well as equal sub-limits on certain types of these vehicles have been set for the USA and the USSR.

In and by themselves, equal numerical ceilings on strategic launchers cannot determine nuclear parity. Due to differences in geography, technology, strategy and defence arrangements with their allies, the USA and the USSR have placed different emphasis on various components of their forces. The Soviet Union has more land-based ballistic missiles with larger megatonnage, and better air defences, while the USA has more warheads and greater missile accuracy, as well as other advantages in submarines and bomber forces. Nevertheless, the establishment of a quantitative symmetry may help in reaching agreement on future reductions of force levels, by creating an equal basis for such reductions. It is, therefore, a step forward as compared to the 1972 SALT I agreement, which did not provide for such symmetry.

2. It is the first time that an arms control treaty requires the dismantling, without replacement, of nuclear weapon delivery vehicles. The USSR will have to dismantle some 250 operational missile launchers or bombers to comply with the treaty's overall aggregate limit. (This reduction is modest—only 10 per cent of the Soviet total—and will certainly include obsolete weapons.) The USA will have to dismantle 33 strategic nuclear delivery vehicles.

3. Construction of additional launchers of ICBMs as well as any increase in the number of heavy ICBM launchers are prohibited. There are also restrictions on new types of ICBMs and on the modernization of existing types of ICBMs.

The prohibitions are only a carry-over from the SALT I agreement, and the qualitative restrictions will not prevent important improvement of missiles. Nevertheless, any limitations imposed upon the testing and deployment of ICBMs are valuable from the point of view of arms control. For, due to its yield, accuracy, range, short flight time and high readiness, as well as secure and timely command, control and communications, the ICBM is still the most threatening strategic delivery system.

4. The treaty bans such 'unconventional' nuclear weapon delivery systems as: ship-launched strategic ballistic missiles; ballistic or cruise missile launchers emplaced on the sea-bed or on the beds of internal waters; fractional orbital bombardment systems; mobile launchers of heavy ICBMs; heavy SLBMs and their launchers; and heavy ASBMs. (In

effect, however, these prohibitions apply to systems that are not deemed militarily attractive and therefore probably would not be deployed, even without a special agreement banning them.)

5. The USA and the USSR agreed on a data base for weapon systems included in various SALT-limited categories; the parties have also undertaken to update the data base periodically. It is clear that neither side will accept the data provided by the other as proof of compliance; each will continue to rely on its own verification capabilities. Nevertheless, the exchange of information on the numbers of strategic offensive arms is an important advance in the US–Soviet negotiating technique. It aids the uniform interpretation of treaty provisions and assists verification of compliance with the obligations. This regular exchange of data on the most powerful weapons possessed by the parties could become an important confidence-building measure.

6. To facilitate verification of compliance by national technical means, the parties commit themselves not to interfere with such means. The treaty also prohibits deliberate concealment measures which impede verification. For example, denial of telemetric information, through such means as encryption, during missile flight-testing is prohibited, whenever such denial impedes verification. No shelters that impede verification may be placed over ICBM silo launchers. Most definitions of restricted systems have been formulated in such a way as to ease verification. The US–Soviet Standing Consultative Commission will continue to operate and will take on expanded responsibilities.

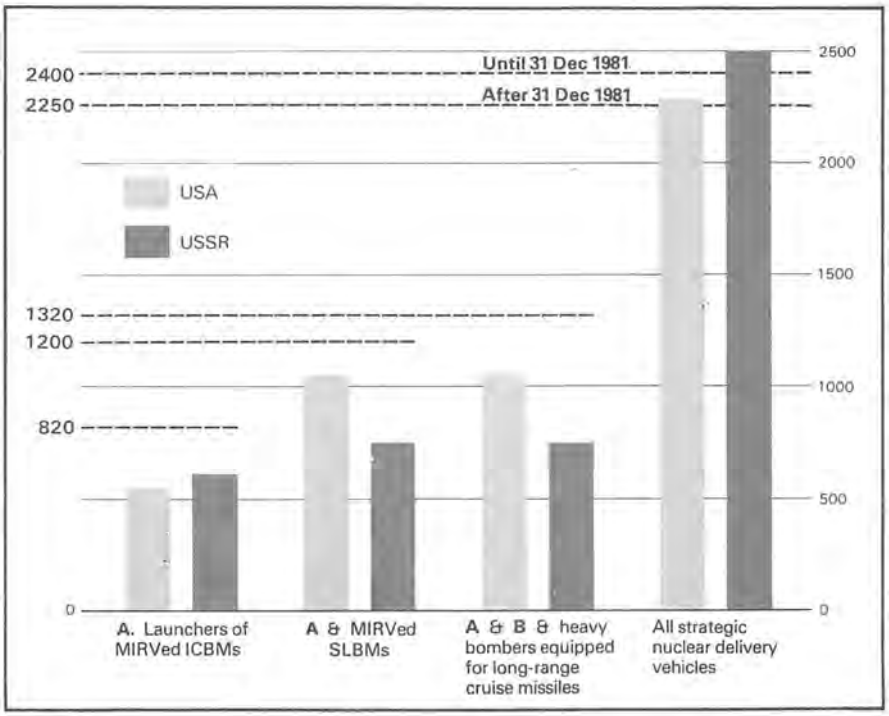
7. The obligations under the SALT II agreements are spelled out in great detail; almost 100 agreed statements and common understandings reduce the chances of divergent interpretations of the provisions of these agreements.

8. The USA and the USSR agreed in the joint statement of principles that in the next round of SALT negotiations (SALT III) they would pursue the objective of reducing significantly the numbers of strategic offensive arms, and that they would also negotiate on further qualitative limitations, including restrictions on new types of offensive arms, and on the modernization of existing arms.

The shortcomings of the SALT II agreements can be summarized as follows.

1. The numerical limits on strategic nuclear forces have been set very high. There is a remarkable compatibility between the treaty limitations and the projected strategic nuclear weapon programmes of both sides. It is especially disturbing that the most destabilizing elements of the strategic nuclear forces, namely, MIRVed ICBMs, have been allowed to increase in numbers. The treaty permits the number of US and Soviet MIRVed

Figure 6.3. US and Soviet strategic weapons in 1979 and the SALT II ceilings



ICBMs, taken together, to increase by more than 40 per cent, from the time of the signing of the treaty through 1985. (Figure 6.3 shows how the treaty's numerical limits permit increases in MIRVed nuclear forces.)

2. With the high number of warheads permitted on ballistic missiles and with the high number of cruise missiles permitted per bomber, the total figure for US and Soviet missile re-entry vehicles and bomber weapons is expected to rise in the period from the signing to the expiration of the treaty by roughly 50–70 per cent, according to US government sources [24b]. Figure 6.4 shows that the total number of missile re-entry vehicles and bomber weapons possessed by the USA and the USSR will probably grow as fast during the lifetime of SALT II, which contains limits on the number of such weapons per delivery vehicle, as it did during SALT I, which contained no such limits. Thus, notwithstanding the SALT II limitations, the strategic nuclear fire-power of both sides will grow considerably. One can, of course, speculate that without the treaty the increases would be even greater. It is unclear, however, whether the USA and the USSR had actually contemplated reaching higher levels within the next six years.

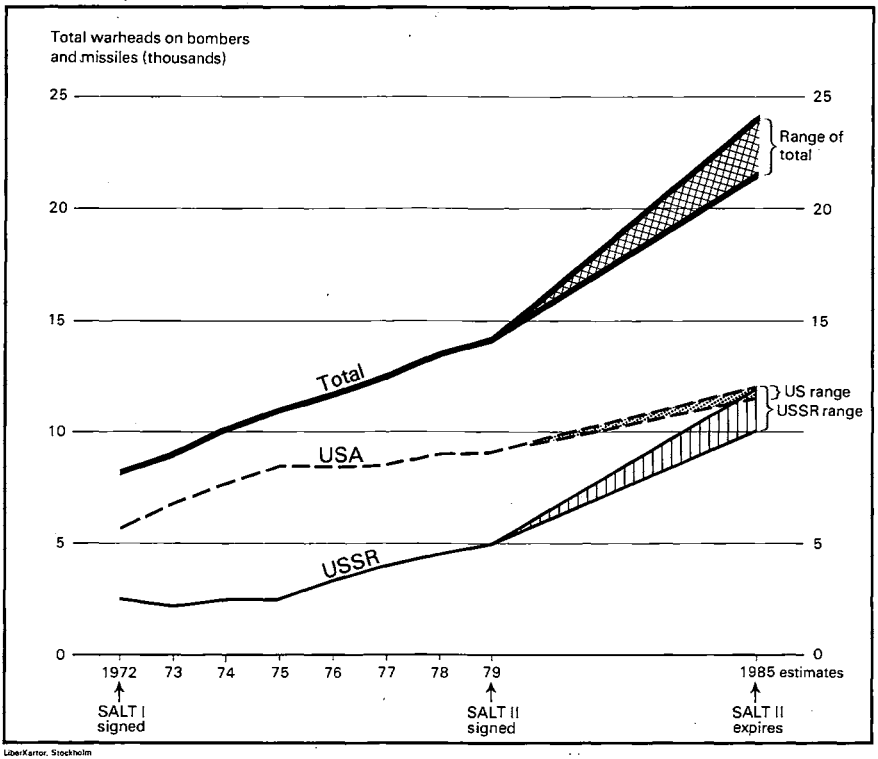
3. Strategic stability, which the SALT II Treaty is purported to strengthen, will probably not be enhanced between now and 1985. The

parties are allowed to increase their counterforce (mostly anti-silo) potential not only by increasing the yield and accuracy of warheads on current ICBMs, but also by introducing a new type of ICBM.

There are no restrictions on new types of SLBMs. The lack of such restrictions may, in time, add to the counterforce capabilities on both sides. Neither are there any restrictions on anti-submarine warfare equipment or operations which could eventually endanger the survivability of missile-launching submarines constituting, at present, the least vulnerable component of strategic nuclear forces.

4. The provision permitting each side to deploy a new type of ICBM seems to be incongruous with the arms limitation purpose of SALT II. Furthermore, should this new missile turn out to be mobile, as it is envisaged by the USA, new stimuli would be provided for the nuclear arms competition. Proliferation of warheads to cover all aim points or sheltered targets would follow, while fears of the survivability of fixed land-based missiles might bring about pressure to terminate or revise the 1972

Figure 6.4. Strategic nuclear warhead inventories, USA and USSR, 1972–85



Sources: The SALT II Treaty, Final Report of the US Senate Foreign Relations Committee, 19 November 1979, pp. 147–48; *SIPRI Yearbook 1979*; p. 423.

ABM Treaty. All these negative effects, combined with enormous difficulties inherent in monitoring mobile systems, may undermine the whole SALT process. Equally dangerous from the arms control perspective would be the deployment of ground- and sea-launched long-range cruise missiles. It is true that the protocol prohibits the deployment of these weapons as well as mobile ICBM launchers. But this prohibition may well be pointless, because the protocol is scheduled to expire at the end of 1981, and before that time neither party will be ready to deploy the weapons in question.

5. Even the restrictions contained in the treaty have a lower value because of their limited duration. Since it takes about 10 years from the initiation of development of a strategic nuclear weapon system until the achievement of full operational capability, certain weapons which are on the drawing-boards now probably will not be ready for deployment until after 31 December 1985, the date of the expiration of the treaty. By replacing one SALT interim agreement, that of 1972, by another, the parties have failed to fulfil their commitment to work out a "permanent" arrangement, as stipulated in the 21 June 1973 US–Soviet Agreement on basic principles of negotiations on the further limitation of strategic offensive arms.

IX. Conclusion

The SALT II agreements will have a relatively small impact on the nuclear forces of the USA and the USSR. For the most part, the ceilings set by the treaty will allow the relevant military programmes on both sides to continue with only minor restrictions. As a result, expenditures on strategic nuclear weapon programmes will continue to rise.[8] Paradoxically, during the SALT II ratification debate in the USA, the treaty was used as a tool for expanding the US military budget.

SALT II, the keystone of US–Soviet efforts to limit nuclear weapons, demonstrates how little progress has been made toward the fulfilment of the two powers' obligations under the 1968 Non-Proliferation Treaty (NPT). Under the NPT, the nuclear weapon powers have undertaken to halt the nuclear arms race and move towards nuclear disarmament to match the other states' renunciation of nuclear weapons. The nuclear arms competition will continue under the SALT II régime, but it will be more predictable, and there will be certain limits on how fast it might proceed. This is not without significance. Since unilateral military con-

[8] US Secretary of Defense Brown has stated that US plans under the SALT II régime will require approximately a 25 per cent *real* increase (above inflation) in spending on strategic programmes through 1985. This means that the USA will probably spend roughly $12.5 thousand million (in 1980 dollars) annually on strategic nuclear weapon programmes during the lifetime of the treaty [1y].

straints of any importance are inconceivable in the present international atmosphere of mistrust, a mutually regulated arms competition, which diminishes the stimulus for 'worst-case' military planning, is safer than an unregulated arms competition. However, the significance of SALT II lies mainly in the promise of more meaningful nuclear arms limitation measures. Therefore, a speedy entry into force of the signed agreements is necessary to maintain the continuity of the SALT negotiating process and to facilitate related arms control talks.

One of the first tasks of SALT III, as stipulated in the SALT II joint statement of principles for future negotiations, will be the resolution of the issues included in the protocol. With regard to two systems covered by the protocol, namely, ground- and sea-launched cruise missiles, it is already clear that the USA would like to link future limitations on these systems with limitations on Soviet medium-range nuclear delivery systems targeted on Europe [1z]. It will be necessary for the protagonists in the SALT talks to give greater consideration to European security interests, which so far have been rather detached from the mutual interests of the USA and the USSR.

Real progress in SALT III will require not only substantial reductions in the number of MIRVed missiles and warheads, but also tight constraints, if not a total prohibition, on the modernization of strategic nuclear delivery systems. This will depend on whether the negotiating parties will actually give up aspirations for military superiority, as stated in the joint US–Soviet communiqué issued at the end of the Vienna summit meeting on 18 June 1979. For such aspirations, considering the size of the forces on both sides, have less to do with strategic deterrence than with pursuit of a nuclear war-fighting, first-strike capability.

Finally, it must be recognized that there exists a link between what is happening in the field of arms control and what is happening in other areas of US–Soviet relations. This means that the overall pattern of international behaviour of each power is bound to affect the survivability of the SALT II agreements and prospects for future arms control agreements. Thus, for example, the entry of Soviet military forces into Afghanistan brought the already unsteady process of SALT II ratification to a halt. On 4 January 1980, President Carter announced that he had asked the Senate to defer further consideration of the SALT II Treaty.

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Appendix 6A

Treaty between the United States of America and the Union of Soviet Socialist Republics on the limitation of strategic offensive arms

Protocol to the Treaty between the United States of America and the Union of Soviet Socialist Republics on the limitation of strategic offensive arms

Agreed statements and common understandings regarding the Treaty between the United States of America and the Union of Soviet Socialist Republics on the limitation of strategic offensive arms

These documents were signed separately and on the same day by the President of the United States of America and the General Secretary of the CPSU, Chairman of the Presidium of the Supreme Soviet of the USSR. For the convenience of the reader, the Treaty and the Protocol are reproduced jointly with the Agreed statements and common understandings, as they pertain to particular Article paragraphs.

Treaty

The United States of America and the Union of Soviet Socialist Republics, hereinafter referred to as the Parties,

Conscious that nuclear war would have devastating consequences for all mankind,

Proceeding from the Basic Principles of Relations Between the United States of America and the Union of Soviet Socialist Republics of 29 May 1972,

Attaching particular significance to the limitation of strategic arms and determined to continue their efforts begun with the Treaty on the Limitation of Anti-Ballistic Missile Systems and the Interim Agreement on Certain Measures with Respect to the Limitation of Strategic Offensive Arms, of 26 May 1972.

Convinced that the additional measures limiting strategic offensive arms provided for in this Treaty will contribute to the improvement of relations between the Parties, help to reduce the risk of outbreak of nuclear war and strengthen international peace and security,

Mindful of their obligations under Article VI of the Treaty on the Non-Proliferation of Nuclear Weapons,

Guided by the principle of equality and equal security,

Recognizing that the strengthening of strategic stability meets the interests of the Parties and the interests of international security,

Reaffirming their desire to take measures for the further limitation and for the further reduction of strategic arms, having in mind the goal of achieving general and complete disarmament,

Declaring their intention to undertake in the near future negotiations further to limit and further to reduce strategic offensive arms,

Have agreed as follows:

Article I

Each Party undertakes, in accordance with the provisions of this Treaty, to limit strategic offensive arms quantitatively and qualitatively, to exercise restraint in the development of new types of strategic offensive arms, and to adopt other measures provided for in this Treaty.

Article II

For the purposes of this Treaty:

1. Intercontinental ballistic missile (ICBM) launchers are land-based launchers of ballistic missiles capable of a range in excess of the shortest distance between the north-eastern border of the continental part of the territory of the United States of America and the northwestern border of the continental part of the territory of the Union of Soviet Socialist Republics, that is, a range in excess of 5,500 kilometres.

Agreed statements and common understandings

To Paragraph 1 of Article II of the Treaty

First Agreed Statement. *The term "intercontinental ballistic missile launchers", as defined in paragraph 1 of Article II of the Treaty, includes all launchers which have been developed and tested for launching ICBMs. If a launcher has been developed and tested for launching an ICBM, all launchers of that type shall be considered to have been developed and tested for launching ICBMs.*

First Common Understanding. *If a launcher contains or launches an ICBM, that launcher shall be considered to have been developed and tested for launching ICBMs.*

Second Common Understanding. *If a launcher has been developed and tested for launching an ICBM, all launchers of that type, except for ICBM test and training launchers, shall be included in the aggregate numbers of strategic offensive arms provided for in Article III of the Treaty, pursuant to the provisions of Article VI of the Treaty.*

Third Common Understanding. *The 177 former Atlas and Titan I ICBM launchers of the United States of America, which are no longer operational and are partially dismantled, shall not be considered as subject to the limitations provided for in the Treaty.*

Second Agreed Statement. *After the date on which the Protocol ceases to be in force, mobile ICBM launchers shall be subject to the relevant limitations provided for in the Treaty which are applicable to ICBM launchers, unless the Parties agree that mobile ICBM launchers shall not be deployed after that date.*

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2. Submarine-launched ballistic missile (SLBM) launchers are launchers of ballistic missiles installed on any nuclear-powered submarine or launchers of modern ballistic missiles installed on any submarine, regardless of its type.

To Paragraph 2 of Article II of the Treaty

Agreed Statement. *Modern submarine-launched ballistic missiles are: for the United States of America, missiles installed in all nuclear-powered submarines; for the Union of Soviet Socialist Republics, missiles of the type installed in nuclear-powered submarines made operational since 1965; and for both Parties, submarine-launched ballistic missiles first flight-tested since 1965 and installed in any submarine, regardless of its type.*

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3. Heavy bombers are considered to be:
   (a) currently, for the United States of America, bombers of the B-52 and B-1 types, and for the Union of Soviet Socialist Republics, bombers of the Tupolev-95 and Myasishchev types;
   (b) in the future, types of bombers which can carry out the mission of a heavy bomber in a manner similar or superior to that of bombers listed in subparagraph (a) above;
   (c) types of bombers equipped for cruise missiles capable of a range in excess of 600 kilometres; and
   (d) types of bombers equipped for ASBMs.

To Paragraph 3 of Article II of the Treaty

First Agreed Statement. *The term "bombers", as used in paragraph 3 of Article II and other provisions of the Treaty, means airplanes of types initially constructed to be equipped for bombs or missiles.*

Second Agreed Statement. *The Parties shall notify each other on a case-by-case basis in the Standing Consultative Commission of inclusion of types of bombers as heavy bombers pursuant to the provisions of paragraph 3 of Article II of the Treaty; in this connexion the Parties shall hold consultations, as appropriate, consistent with the provisions of paragraph 2 of Article XVII of the Treaty.*

Third Agreed Statement. *The criteria the Parties shall use to make case-by-case determinations of which types of bombers in the future can carry out the mission of a heavy bomber in a manner similar or superior to that of current heavy bombers, as referred to in subparagraph 3(b) of Article II of the Treaty, shall be agreed upon in the Standing Consultative Commission.*

Fourth Agreed Statement. *Having agreed that every bomber of a type included in paragraph 3 of Article II of the Treaty is to be considered a heavy bomber, the Parties further agree that:*

(a) airplanes which otherwise would be bombers of a heavy bomber type shall not be considered to be bombers of a heavy bomber type if they have functionally related observable differences which indicate that they cannot perform the mission of a heavy bomber;

(b) airplanes which otherwise would be bombers of a type equipped for cruise missiles capable of a range in excess of 600 kilometres shall not be considered to be bombers of a type equipped for cruise missiles capable of a range in excess of 600 kilometres if they have functionally related observable differences which indicate that they cannot perform the mission of a bomber equipped for cruise missiles capable of a range in excess of 600 kilometres, except that heavy bombers of current types, as designated in subparagraph 3(a) of Article II of the Treaty, which otherwise would be of a type equipped for cruise missiles capable of a range in excess of 600 kilometres shall not be considered to be heavy

bombers of a type equipped for cruise missiles capable of a range in excess of 600 kilometres if they are distinguishable on the basis of externally observable differences from heavy bombers of a type equipped for cruise missiles capable of a range in excess of 600 kilometres; and

(c) airplanes which otherwise would be bombers of a type equipped for ASBMs shall not be considered to be bombers of a type equipped for ASBMs if they have functionally related observable differences which indicate that they cannot perform the mission of a bomber equipped for ASBMs, except that heavy bombers of current types, as designated in subparagraph 3(a) of Article II of the Treaty, which otherwise would be of a type equipped for ASBMs shall not be considered to be heavy bombers of a type equipped for ASBMs if they are distinguishable on the basis of externally observable differences from heavy bombers of a type equipped for ASBMs.

First Common Understanding. *Functionally related observable differences are differences in the observable features of airplanes which indicate whether or not these airplanes can perform the mission of a heavy bomber, or whether or not they can perform the mission of a bomber equipped for cruise missiles capable of a range in excess of 600 kilometres or whether or not they can perform the mission of a bomber equipped for ASBMs. Functionally related observable differenees shall be verifiable by national technical means. To this end, the Parties may take, as appropriate, co-operative measures contributing to the effectiveness of verification by national technical means.*

Fifth Agreed Statement. *Tupolev-142 airplanes in their current configuration, that is, in the configuration for anti-submarine warfare, are considered to be airplanes of a type different from types of heavy bombers referred to in subparagraph 3(a) of Article II of the Treaty and not subject to the Fourth Agreed Statement to paragraph 3 of Article II of the Treaty. This Agreed Statement does not preclude improvement of Tupolev-142 airplanes as an anti-submarine system, and does not prejudice or set a precedent for designation in the future of types of airplanes as heavy bombers pursuant to subparagraph 3(b) of Article II of the Treaty or for application of the Fourth Agreed Statement to paragraph 3 of Article II of the Treaty to such airplanes.*

Second Common Understanding. *Not later than six months after entry into force of the Treaty the Union of Soviet Socialist Republics will give its 31 Myasishchev airplanes used as tankers in existence as of the date of signature of the Treaty functionally related observable differences which indicate that they cannot perform the mission of a heavy bomber.*

Third Common Understanding. *The designations by the United States of America and by the Union of Soviet Socialist Republics for heavy bombers referred to in subparagraph 3(a) of Article II of the Treaty correspond in the following manner:*

Heavy bombers of the types designated by the United States of America as the B-52 and the B-1 are known to the Union of Soviet Socialist Republics by the same designations;

Heavy bombers of the type designated by the Union of Soviet Socialist Republics as the Tupolev-95 are known to the United States of America as heavy bombers of the Bear type; and

Heavy bombers of the type designated by the Union of Soviet Socialist Republics as the Myasishchev are known to the United States of America as heavy bombers of the Bison type.

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4. Air-to-surface ballistic missiles (ASBMs) are any such missiles capable of a range in excess of 600 kilometres and installed in an aircraft or on its external mountings.

5. Launchers of ICBMs and SLBMs equipped with multiple independently targetable re-entry vehicles (MIRVs) are launchers of the types developed and tested for launching ICBMs or SLBMs equipped with MIRVs.

To Paragraph 5 of Article II of the Treaty

First Agreed Statement. *If a launcher has been developed and tested for launching an ICBM or an SLBM equipped with MIRVs, all launchers of that type shall be considered to have been developed and tested for launching ICBMs or SLBMs equipped with MIRVs.*

First Common Understanding. *If a launcher contains or launches an ICBM or an SLBM equipped with MIRVs, that launcher shall be considered to have been developed and tested for launching ICBMs or SLBMs equipped with MIRVs.*

Second Common Understanding. *If a launcher has been developed and tested for launching an ICBM or an SLBM equipped with MIRVs, all launchers of that type, except for ICBM and SLBM test and training launchers, shall be included in the corresponding aggregate numbers provided for in Article V of the Treaty, pursuant to the provisions of Article VI of the Treaty.*

Second Agreed Statement. *ICBMs and SLBMs equipped with MIRVs are ICBMs and SLBMs of the types which have been flight-tested with two or more independently targetable re-entry vehicles, regardless of whether or not they have also been flight-tested with a single re-entry vehicle or with multiple re-entry vehicles which are not independently targetable. As of the date of signature of the Treaty, such ICBMs and SLBMs are: for the United States of America, Minuteman III ICBMs, Poseidon C-3 SLBMs, and Trident C-4 SLBMs; and for the Union of Soviet Socialist Republics, RS-16, RS-18, RS-20 ICBMs and RSM-50 SLBMs.*

Each Party will notify the other Party in the Standing Consultative Commission on a case-by-case basis of the designation of the one new type of light ICBM, if equipped with MIRVs, permitted pursuant to paragraph 9 of Article IV of the Treaty when first flight-tested; of designations of additional types of SLBMs equipped with MIRVs when first installed on a submarine; and of designations of types of ASBMs equipped with MIRVs when first flight-tested.

Third Common Understanding. *The designations by the United States of America and by the Union of Soviet Socialist Republics for ICBMs and SLBMs equipped with MIRVs correspond in the following manner:*

Missiles of the type designated by the United States of America as the Minuteman III and known to the Union of Soviet Socialist Republics by the same designation, a light ICBM that has been flight-tested with multiple independently targetable re-entry vehicles;

Missiles of the type designated by the United States of America as the Poseidon C-3 and known to the Union of Soviet Socialist Republics by the same designation, an SLBM that was first flight-tested in 1968 and that has been flight-tested with multiple independently targetable re-entry vehicles;

Missiles of the type designated by the United States of America as the Trident C-4 and known to the Union of Soviet Socialist Republics by the same designation, an SLBM that was first flight-tested in 1977 and that has been flight-tested with multiple independently targetable re-entry vehicles;

Missiles of the type designated by the Union of Soviet Socialist Republics as the RS-16 and known to the United States of America as the SS-17, a light ICBM that has been flight-tested with a single re-entry vehicle and with multiple independently targetable re-entry vehicles;

Missiles of the type designated by the Union of Soviet Socialist Republics as the RS-18 and known to the United States of America as the SS-19, the heaviest in terms of launch-weight and throw-weight of light ICBMs, which has been flight-tested with a single re-entry vehicle and with multiple independently targetable re-entry vehicles;

Missiles of the type designated by the Union of Soviet Socialist Republics as the RS-20 and known to the United States of America as the SS-18, the heaviest in terms of launch-weight and throw-weight of heavy ICBMs, which has been flight-tested with a single re-entry vehicle and with multiple independently targetable re-entry vehicles;

Missiles of the type designated by the Union of Soviet Socialist Republics as the RSM-50 and known to the United States of America as the SS-N-18, an SLBM that has been flight-tested with a single re-entry vehicle and with multiple independently targetable re-entry vehicles.

Third Agreed Statement. *Re-entry vehicles are independently targetable:*

(a) if, after separation from the booster, manoeuvring and targeting of the re-entry vehicles to separate aim points along trajectories which are unrelated to each other are accomplished by means of devices which are installed in a self-contained dispensing mechanism or on the re-entry vehicles, and which are based on the use of electronic or other computers in combination with devices using jet engines, including rocket engines, or aerodynamic systems;

(b) if manoeuvring and targeting of the re-entry vehicles to separate aim points along trajectories which are unrelated to each other are accomplished by means of other devices which may be developed in the future.

Fourth Common Understanding. *For the purposes of this Treaty, all ICBM launchers in the Derazhnya and Pervomaysk areas in the Union of Soviet Socialist Republics are included in the aggregate numbers provided for in Article V of the Treaty.*

Fifth Common Understanding. *If ICBM or SLBM launchers are converted, constructed or undergo significant changes to their principal observable structural design features after entry into force of the Treaty, any such launchers which are launchers of missiles equipped with MIRVs shall be distinguishable from launchers of missiles not equipped with MIRVs, and any such launchers which are launchers of missiles not equipped with MIRVs shall be distinguishable from launchers of missiles equipped with MIRVs, on the basis of externally observable design features of the launchers. Submarines with launchers of SLBMs equipped with MIRVs shall be distinguishable from submarines with launchers of SLBMs not equipped with MIRVs on the basis of externally observable design features of the submarines.*

This Common Understanding does not require changes to launcher conversion or construction programmes, or to programmes including significant changes to the principal observable structural design features of launchers, under way as of the date of signature of the Treaty.

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6. ASBMs equipped with MIRVs are ASBMs of the types which have been flight-tested with MIRVs.

To Paragraph 6 of Article II of the Treaty

First Agreed Statement. *ASBMs of the types which have been flight-tested with MIRVs are all ASBMs of the types which have been flight-tested with two or more independently targetable re-entry vehicles, regardless of whether or not they have also been flight-tested with a single re-entry vehicle or with multiple re-entry vehicles which are not independently targetable.*

Second Agreed Statement. *Re-entry vehicles are independently targetable:*

(*a*) *if, after separation from the booster, manoeuvring and targeting of the re-entry vehicles to separate aim points along trajectories which are unrelated to each other are accomplished by means of devices which are installed in a self-contained dispensing mechanism or on the re-entry vehicles, and which are based on the use of electronic or other computers in combination with devices using jet engines, including rocket engines, or aerodynamic systems;*

(*b*) *if manoeuvring and targeting of the re-entry vehicles to separate aim points along trajectories which are unrelated to each other are accomplished by means of other devices which may be developed in the future.*

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7. Heavy ICBMs are ICBMs which have a launch-weight greater or a throw-weight greater than that of the heaviest, in terms of either launch-weight or throw-weight, respectively, of the light ICBMs deployed by either Party as of the date of signature of this Treaty.

To Paragraph 7 of Article II of the Treaty

First Agreed Statement. *The launch-weight of an ICBM is the weight of the fully loaded missile itself at the time of launch.*

Second Agreed Statement. *The throw-weight of an ICBM is the sum of the weight of:*

(*a*) *its re-entry vehicle or re-entry vehicles;*

(*b*) *any self-contained dispensing mechanisms or other appropriate devices for targeting one re-entry vehicle, or for releasing or for dispensing and targeting two or more re-entry vehicles; and*

(*c*) *its penetration aids, including devices for their release.*

Common Understanding. *The term "other appropriate devices", as used in the definition of the throw-weight of an ICBM in the Second Agreed Statement to paragraph 7 of Article II of the Treaty, means any devices for dispensing and targeting two or more re-entry vehicles; and any devices for releasing two or more re-entry vehicles or for targeting one re-entry vehicle, which cannot provide their re-entry vehicles or re-entry vehicle with additional velocity of more than 1,000 metres per second.*

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8. Cruise missiles are unmanned, self-propelled, guided, weapon-delivery vehicles which sustain flight through the use of aerodynamic lift over most of their flight path and which are flight-tested from or deployed on aircraft, that is, air-launched cruise missiles, or such vehicles which are referred to as cruise missiles in subparagraph 1 (b) of Article IX.

To Paragraph 8 of Article II of the Treaty

First Agreed Statement. *If a cruise missile is capable of a range in excess of 600 kilometres, all cruise missiles of that type shall be considered to be cruise missiles capable of a range in excess of 600 kilometres.*

First Common Understanding. *If a cruise missile has been flight-tested to a range in excess of 600 kilometres, it shall be considered to be a cruise missile capable of a range in excess of 600 kilometres.*

Second Common Understanding. *Cruise missiles not capable of a range in excess of 600 kilometres shall not be considered to be of a type capable of a range in excess of 600 kilometres if they are distinguishable on the basis of externally observable design features from cruise missiles of types capable of a range in excess of 600 kilometres.*

Second Agreed Statement. *The range of which a cruise missile is capable is the maximum distance which can be covered by the missile in its standard design mode flying until fuel exhaustion, determined by projecting its flight path onto the Earth's sphere from the point of launch to the point of impact.*

Third Agreed Statement. *If an unmanned, self-propelled, guided vehicle which sustains flight through the use of aerodynamic lift over most of its flight path has been flight-tested or deployed for weapon delivery, all vehicles of that type shall be considered to be weapon-delivery vehicles.*

Third Common Understanding. *Unmanned, self-propelled, guided vehicles which sustain flight through the use of aerodynamic lift over most of their flight path and are not weapon-delivering vehicles, that is, unarmed, pilotless, guided vehicles, shall not be considered to be cruise missiles if such vehicles are distinguishable from cruise missiles on the basis of externally observable design features.*

Fourth Common Understanding. *Neither Party shall convert unarmed, pilotless, guided vehicles into cruise missiles capable of a range in excess of 600 kilometres, nor shall either Party convert cruise missiles capable of a range in excess of 600 kilometres into unarmed, pilotless, guided vehicles.*

Fifth Common Understanding. *Neither Party has plans during the term of the Treaty to flight-test from or deploy on aircraft unarmed, pilotless, guided vehicles which are capable of a range in excess of 600 kilometres. In the future, should a Party have such plans, that Party will provide notification thereof to the other Party well in advance of such flight-testing or deployment. This Common Understanding does not apply to target drones.*

Article III

1. Upon entry into force of this Treaty, each Party undertakes to limit ICBM launchers, SLBM launchers, heavy bombers, and ASBMs to an aggregate number not to exceed 2,400.

2. Each Party undertakes to limit, from 1 January 1981, strategic offensive arms referred to in paragraph 1 of this Article to an aggregate number not to exceed 2,250, and to initiate reductions of those arms which as of that date would be in excess of this aggregate number.

3. Within the aggregate numbers provided for in paragraphs 1 and 2 of this Article and subject to the provisions of this Treaty, each Party has the right to determine the composition of these aggregates.

4. For each bomber of a type equipped for ASBMs, the aggregate numbers provided for in paragraphs 1 and 2 of this Article shall include the maximum number of such missiles for which a bomber of that type is equipped for one operational mission.

5. A heavy bomber equipped only for ASBMs shall not itself be included in the aggregate numbers provided for in paragraphs 1 and 2 of this Article.

6. Reductions of the numbers of strategic offensive arms required to comply with the provisions of paragraphs 1 and 2 of this Article shall be carried out as provided for in Article XI.

Article IV

1. Each Party undertakes not to start construction of additional fixed ICBM launchers.

2. Each Party undertakes not to relocate fixed ICBM launchers.

3. Each Party undertakes not to convert launchers of light ICBMs, or of ICBMs of older types deployed prior to 1964, into launchers of heavy ICBMs of types deployed after that time.

4. Each Party undertakes in the process of modernization and replacement of ICBM silo launchers not to increase the original internal volume of an ICBM silo launcher by more than thirty-two per cent. Within this limit each Party has the right to determine whether such an increase will be made through an increase in the original diameter or in the original depth of an ICBM silo launcher, or in both of these dimensions.

To Paragraph 4 of Article IV of the Treaty

Agreed Statement. *The word "original" in paragraph 4 of Article IV of the Treaty refers to the internal dimensions of an ICBM silo launcher, including its internal volume, as of 26 May 1972, or as of the date on which such launcher becomes operational, whichever is later.*

Common Understanding. *The obligations provided for in paragraph 4 of Article IV of the Treaty and in the Agreed Statement thereto mean that the original diameter or the original depth of an ICBM silo launcher may not be increased by an amount greater than that which would result in an increase in the original internal volume of the ICBM silo launcher by 32 per cent solely through an increase in one of these dimensions.*

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5. Each Party undertakes:

(a) not to supply ICBM launcher deployment areas with intercontinental ballistic missiles in excess of a number consistent with normal deployment, maintenance, training, and replacement requirements;

(b) not to provide storage facilities for or to store ICBMs in excess of normal deployment requirements at launch sites of ICBM launchers;

(c) not to develop, test, or deploy systems for rapid reload of ICBM launchers.

To Paragraph 5 of Article IV of the Treaty

Agreed Statement. *The term "normal deployment requirements", as used in paragraph 5 of Article IV of the Treaty, means the deployment of one missile at each ICBM launcher.*

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6. Subject to the provisions of this Treaty, each Party undertakes not to have under construction at any time strategic offensive arms referred to in paragraph 1 of Article III in excess of numbers consistent with a normal construction schedule.

To Paragraph 6 of Article IV of the Treaty

Common Understanding. *A normal construction schedule, in paragraph 6 of Article IV of the Treaty, is understood to be one consistent with the past or present construction practices of each Party.*

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7. Each Party undertakes not to develop, test, or deploy ICBMs which have a launch-weight greater or a throw-weight greater than that of the heaviest, in terms of either launch-weight or throw-weight, respectively, of the heavy ICBMs deployed by either Party as of the date of signature of this Treaty.

To Paragraph 7 of Article IV of the Treaty

First Agreed Statement. *The launch-weight of an ICBM is the weight of the fully loaded missile itself at the time of launch.*

Second Agreed Statement. *The throw-weight of an ICBM is the sum of the weight of:*

(*a*) *its re-entry vehicle or re-entry vehicles;*

(*b*) *any self-contained dispensing mechanisms or other appropriate devices for targeting one re-entry vehicle, or for releasing or for dispensing and targeting two or more re-entry vehicles; and*

(*c*) *its penetration aids, including devices for their release.*

Common Understanding. *The term "other appropriate devices", as used in the definition of the throw-weight of an ICBM in the Second Agreed Statement to paragraph 7 of Article IV of the Treaty, means any devices for dispensing and targeting two or more re-entry vehicles; and any devices for releasing two or more re-entry vehicles or for targeting one re-entry vehicle, which cannot provide their re-entry vehicles or re-entry vehicle with additional velocity of more than 1,000 metres per second.*

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8. Each Party undertakes not to convert land-based launchers of ballistic missiles which are not ICBMs into launchers for launching ICBMs, and not to test them for this purpose.

To Paragraph 8 of Article IV of the Treaty

Common Understanding. *During the term of the Treaty, the Union of Soviet Socialist Republics will not produce, test, or deploy ICBMs of the type designated by the Union of Soviet Socialist Republics as the RS-14 and known to the United States of America as the SS-16, a light ICBM first flight-tested after 1970 and flight-tested only with a single re-entry vehicle; this Common Understanding also means that the Union of Soviet Socialist Republics will not produce the third stage of that missile, the re-entry vehicle of that missile, or the appropriate device for targeting the re-entry vehicle of that missile.*

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9. Each Party undertakes not to flight-test or deploy new types of ICBMs, that is, types of ICBMs not flight-tested as of 1 May 1979, except that each Party may flight-test and deploy one new type of light ICBM.

To Paragraph 9 of Article IV of the Treaty

First Agreed Statement. *The term "new types of ICBMs", as used in paragraph 9. of Article IV of the Treaty, refers to any ICBM which is different from those ICBMs flight-tested as of 1 May 1979 in any one or more of the following respects:*

(a) the number of stages, the length, the largest diameter, the launch-weight, or the throw-weight, of the missile;

(b) the type of propellant (that is, liquid or solid) of any of its stages.

First Common Understanding. *As used in the First Agreed Statement to paragraph 9 of Article IV of the Treaty, the term "different", referring to the length, the diameter, the launch-weight, and the throw-weight, of the missile, means a difference in excess of 5 per cent.*

Second Agreed Statement. *Every ICBM of the one new type of light ICBM permitted to each Party pursuant to paragraph 9 of Article IV of the Treaty shall have the same number of stages and the same type of propellant (that is, liquid or solid) of each stage as the first ICBM of the one new type of light ICBM launched by that Party. In addition, after the twenty-fifth launch of an ICBM of that type, or after the last launch before deployment begins of ICBMs of that type, whichever occurs earlier, ICBMs of the one new type of light ICBM permitted to that Party shall not be different in any one or more of the following respects: the length, the largest diameter, the launch-weight, or the throw-weight, of the missile.*

A Party which launches ICBMs of the one new type of light ICBM permitted pursuant to paragraph 9 of Article IV of the Treaty shall promptly notify the other Party of the date of the first launch and of the date of either the twenty-fifth or the last launch before deployment begins of ICBMs of that type, whichever occurs earlier.

Second Common Understanding. *As used in the Second Agreed Statement to paragraph 9 of Article IV of the Treaty, the term "different", referring to the length, the diameter, the launch-weight, and the throw-weight, of the missile, means a difference in excess of 5 per cent from the value established for each of the above parameters as of the twenty-fifth launch or as of the last launch before deployment begins, whichever occurs earlier. The values demonstrated in each of the above parameters during the last 12 of the 25 launches or during the last 12 launches before deployment begins, whichever 12 launches occur earlier, shall not vary by more than 10 per cent from any other of the corresponding values demonstrated during those 12 launches.*

Third Common Understanding. *The limitations with respect to launch-weight and throw-weight, provided for in the First Agreed Statement and the First Common Understanding to paragraph 9 of Article IV of the Treaty, do not preclude the flight-testing or the deployment of ICBMs with fewer re-entry vehicles, or fewer penetration aids, or both, than the maximum number of re-entry vehicles and the maximum number of penetration aids with which ICBMs of that type have been flight-tested as of 1 May 1979, even if this results in a decrease in launch-weight or in throw-weight in excess of 5 per cent.*

In addition to the aforementioned cases, those limitations do not preclude a decrease in launch-weight or in throw-weight in excess of 5 per cent, in the case of the flight-testing or the deployment of ICBMs with a lesser quantity of propellant, including the propellant of a self-contained dispensing mechanism or other appropriate device, than the maximum

quantity of propellant, including the propellant of a self-contained dispensing mechanism or other appropriate device, with which ICBMs of that type have been flight-tested as of 1 May 1979, provided that such an ICBM is at the same time flight-tested or deployed with fewer re-entry vehicles, or fewer penetration aids, or both, than the maximum number of re-entry vehicles and the maximum number of penetration aids with which ICBMs of that type have been flight-tested as of 1 May 1979, and the decrease in launch-weight and throw-weight in such cases results only from the reduction in the number of re-entry vehicles, or penetration aids, or both, and the reduction in the quantity of propellant.

Fourth Common Understanding. *The limitations with respect to launch-weight and throw-weight, provided for in the Second Agreed Statement and the Second Common Understanding to paragraph 9 of Article IV of the Treaty, do not preclude the flight-testing or the deployment of ICBMs of the one new type of light ICBM permitted to each Party pursuant to paragraph 9 of Article IV of the Treaty with fewer re-entry vehicles, or fewer penetration aids, or both, than the maximum number of re-entry vehicles and the maximum number of penetration aids with which ICBMs of that type have been flight-tested, even if this results in a decrease in launch-weight or in throw-weight in excess of 5 per cent.*

In addition to the aforementioned cases, those limitations do not preclude a decrease in launch-weight or in throw-weight in excess of 5 per cent, in the case of the flight-testing or the deployment of ICBMs of that type with a lesser quantity of propellant, including the propellant of a self-contained dispensing mechanism or other appropriate device, than the maximum quantity of propellant, including the propellant of a self-contained dispensing mechanism or other appropriate device, with which ICBMs of that type have been flight-tested, provided that such an ICBM is at the same time flight-tested or deployed with fewer re-entry vehicles, or fewer penetration aids, or both, than the maximum number of re-entry vehicles and the maximum number of penetration aids with which ICBMs of that type have been flight-tested, and the decrease in launch-weight and throw-weight in such cases results only from the reduction in the number of re-entry vehicles, or penetration aids, or both, and the reduction in the quantity of propellant.

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10. Each Party undertakes not to flight-test or deploy ICBMs of a type flight-tested as of 1 May 1979, with a number of re-entry vehicles greater than the maximum number of re-entry vehicles with which an ICBM of that type has been flight-tested as of that date.

To Paragraph 10 of Article IV of the Treaty

First Agreed Statement. *The following types of ICBMs and SLBMs equipped with MIRVs have been flight-tested with the maximum number of re-entry vehicles set forth below:*

For the United States of America

ICBMs of the Minuteman III type	—	*7 re-entry vehicles;*
SLBMs of the Poseidon C-3 type	—	*14 re-entry vehicles;*
SLBMs of the Trident C-4 type	—	*7 re-entry vehicles;*

For the Union of Soviet Socialist Republics

ICBMs of the RS-16 type	—	*4 re-entry vehicles;*
ICBMs of the RS-18 type	—	*6 re-entry vehicles;*
ICBMs of the RS-20 type	—	*10 re-entry vehicles;*
SLBMs of the RSM-50 type	—	*7 re-entry vehicles.*

Common Understanding. *Minuteman III ICBMs of the United States of America have been deployed with no more than three re-entry vehicles. During the term of the Treaty, the United States of America has no plans to and will not flight-test or deploy missiles of this type with more than three re-entry vehicles.*

Second Agreed Statement. *During the flight-testing of any ICBM, SLBM, or ASBM after 1 May 1979 the number of procedures for releasing or for dispensing may not exceed the maximum number of re-entry vehicles established for missiles of corresponding types as provided for in paragraphs 10, 11, 12, and 13 of Article IV of the Treaty. In this Agreed Statement "procedures for releasing or for dispensing" are understood to mean manoeuvres of a missile associated with targeting and releasing or dispensing its re-entry vehicles to aim points, whether or not a re-entry vehicle is actually released or dispensed. Procedures for releasing anti-missile defence penetration aids will not be considered to be procedures for releasing or for dispensing a re-entry vehicle so long as the procedures for releasing anti-missile defence penetration aids differ from those for releasing or for dispensing re-entry vehicles.*

Third Agreed Statement. *Each Party undertakes:*

(*a*) *not to flight-test or deploy ICBMs equipped with multiple re-entry vehicles, of a type flight-tested as of 1 May 1979, with re-entry vehicles the weight of any of which is less than the weight of the lightest of those re-entry vehicles with which an ICBM of that type has been flight-tested as of that date;*

(*b*) *not to flight-test or deploy ICBMs equipped with a single re-entry vehicle and without an appropriate device for targeting a re-entry vehicle, of a type flight-tested as of 1 May 1979, with a re-entry vehicle the weight of which is less than the weight of the lightest re-entry vehicle on an ICBM of a type equipped with MIRVs and flight-tested by that Party as of 1 May 1979; and*

(*c*) *not to flight-test or deploy ICBMs equipped with a single re-entry vehicle and with an appropriate device for targeting a re-entry vehicle, of a type flight-tested as of 1 May 1979, with a re-entry vehicle the weight of which is less than 50 per cent of the throw-weight of that ICBM.*

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11. Each Party undertakes not to flight-test or deploy ICBMs of the one new type permitted pursuant to paragraph 9 of this Article with a number of re-entry vehicles greater than the maximum number of re-entry vehicles with which an ICBM of either Party has been flight-tested as of 1 May 1979, that is, ten.

To Paragraph 11 of Article IV of the Treaty

First Agreed Statement. *Each Party undertakes not to flight-test or deploy the one new type of light ICBM permitted to each Party pursuant to paragraph 9 of Article IV of the Treaty with a number of re-entry vehicles greater than the maximum number of re-entry vehicles with which an ICBM of that type has been flight-tested as of the twenty-fifth launch or the last launch before deployment begins of ICBMs of that type, whichever occurs earlier.*

Second Agreed Statement. *During the flight-testing of any ICBM, SLBM, or ASBM after 1 May 1979 the number of procedures for releasing or for dispensing may not exceed the maximum number of re-entry vehicles established for missiles of corresponding types as provided for in paragraphs 10, 11, 12 and 13 of Article IV of the Treaty. In this Agreed Statement "procedures for releasing or for dispensing" are understood to mean manoeuvres of a missile associated with targeting and releasing or dispensing its re-entry vehicles to*

aim points, whether or not a re-entry vehicle is actually released or dispensed. Procedures for releasing anti-missile defence penetration aids will not be considered to be procedures for releasing or for dispensing a re-entry vehicle so long as the procedures for releasing anti-missile defence penetration aids differ from those for releasing or for dispensing re-entry vehicles.

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12. Each Party undertakes not to flight-test or deploy SLBMs with a number of re-entry vehicles greater than the maximum number of re-entry vehicles with which an SLBM of either Party has been flight-tested as of 1 May 1979, that is, 14.

To Paragraph 12 of Article IV of the Treaty

First Agreed Statement. *The following types of ICBMs and SLBMs equipped with MIRVs have been flight-tested with the maximum number of re-entry vehicles set forth below:*

For the United States of America

ICBMs of the Minuteman III type	—	*7 re-entry vehicles;*
SLBMs of the Poseidon C-3 type	—	*14 re-entry vehicles;*
SLBMs of the Trident C-4 type	—	*7 re-entry vehicles;*

For the Union of Soviet Socialist Republics

ICBMs of the RS-16 type	—	*4 re-entry vehicles;*
ICBMs of the RS-18 type	—	*6 re-entry vehicles;*
ICBMs of the RS-20 type	—	*10 re-entry vehicles;*
SLBMs of the RSM-50 type	—	*7 re-entry vehicles.*

Second Agreed Statement. *During the flight-testing of any ICBM, SLBM, or ASBM after 1 May 1979 the number of procedures for releasing or for dispensing may not exceed the maximum number of re-entry vehicles established for missiles of corresponding types as provided for in paragraphs 10, 11, 12 and 13 of Article IV of the Treaty. In this Agreed Statement "procedures for releasing or for dispensing" are understood to mean manoeuvres of a missile associated with targeting and releasing or dispensing its re-entry vehicles to aim points, whether or not a re-entry vehicle is actually released or dispensed. Procedures for releasing anti-missile defence penetration aids will not be considered to be procedures for releasing or for dispensing a re-entry vehicle so long as the procedures for releasing anti-missile defence penetration aids differ from those for releasing or for dispensing re-entry vehicles.*

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13. Each Party undertakes not to flight-test or deploy ASBMs with a number of re-entry vehicles greater than the maximum number of re-entry vehicles with which an ICBM of either Party has been flight-tested as of 1 May 1979, that is, ten.

To Paragraph 13 of Article IV of the Treaty

Agreed Statement. *During the flight-testing of any ICBM, SLBM, or ASBM after 1 May 1979 the number of procedures for releasing or for dispensing may not exceed the maximum number of re-entry vehicles established for missiles of corresponding types as provided for in paragraphs 10, 11, 12 and 13 of Article IV of the Treaty. In this Agreed*

Statement "procedures for releasing or for dispensing" are understood to mean manoeuvres of a missile associated with targeting and releasing or dispensing its re-entry vehicles to aim points, whether or not a re-entry vehicle is actually released or dispensed. Procedures for releasing anti-missile defence penetration aids will not be considered to be procedures for releasing or for dispensing a re-entry vehicle so long as the procedures for releasing anti-missile defence penetration aids differ from those for releasing or for dispensing re-entry vehicles.

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14. Each Party undertakes not to deploy at any one time on heavy bombers equipped for cruise missiles capable of a range in excess of 600 kilometres a number of such cruise missiles which exceeds the product of 28 and the number of such heavy bombers.

To Paragraph 14 of Article IV of the Treaty

First Agreed Statement. *For the purposes of the limitation provided for in paragraph 14 of Article IV of the Treaty, there shall be considered to be deployed on each heavy bomber of a type equipped for cruise missiles capable of a range in excess of 600 kilometres the maximum number of such missiles for which any bomber of that type is equipped for one operational mission.*

Second Agreed Statement. *During the term of the Treaty no bomber of the B-52 or B-1 types of the United States of America and no bomber of the Tupolev-95 or Myasishchev types of the Union of Soviet Socialist Republics will be equipped for more than 20 cruise missiles capable of a range in excess of 600 kilometres.*

Article V

1. Within the aggregate numbers provided for in paragraphs 1 and 2 of Article III, each Party undertakes to limit launchers of ICBMs and SLBMs equipped with MIRVs, ASBMs equipped with MIRVs, and heavy bombers equipped for cruise missiles capable of a range in excess of 600 kilometres to an aggregate number not to exceed 1,320.

2. Within the aggregate number provided for in paragraph 1 of this Article, each Party undertakes to limit launchers of ICBMs and SLBMs equipped with MIRVs, and ASBMs equipped with MIRVs to an aggregate number not to exceed 1,200.

3. Within the aggregate number provided for in paragraph 2 of this Article, each Party undertakes to limit launchers of ICBMs equipped with MIRVs to an aggregate number not to exceed 820.

4. For each bomber of a type equipped for ASBMs equipped with MIRVs, the aggregate numbers provided for in paragraphs 1 and 2 of this Article shall include the maximum number of ASBMs for which a bomber of that type is equipped for one operational mission.

To Paragraph 4 of Article V of the Treaty

Agreed Statement. *If a bomber is equipped for ASBMs equipped with MIRVs, all bombers of that type shall be considered to be equipped for ASBMs equipped with MIRVs.*

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5. Within the aggregate numbers provided for in paragraphs 1, 2, and 3 of this Article and subject to the provisions of this Treaty, each Party has the right to determine the composition of these aggregates.

Article VI

1. The limitations provided for in this Treaty shall apply to those arms which are:
   (a) operational;
   (b) in the final stage of construction;
   (c) in reserve, in storage, or mothballed;
   (d) undergoing overhaul, repair, modernization, or conversion.
2. Those arms in the final stage of construction are:
   (a) SLBM launchers on submarines which have begun sea trials;
   (b) ASBMs after a bomber of a type equipped for such missiles has been brought out of the shop, plant, or other facility where its final assembly or conversion for the purpose of equipping it for such missiles has been performed;
   (c) other strategic offensive arms which are finally assembled in a shop, plant, or other facility after they have been brought out of the shop, plant, or other facility where their final assembly has been performed.

3. ICBM and SLBM launchers of a type not subject to the limitation provided for in Article V, which undergo conversion into launchers of a type subject to that limitation, shall become subject to that limitation as follows:
   (a) fixed ICBM launchers when work on their conversion reaches the stage which first definitely indicates that they are being so converted;
   (b) SLBM launchers on a submarine when that submarine first goes to sea after their conversion has been performed.

To Paragraph 3 of Article VI of the Treaty

Agreed Statement. *The procedures referred to in paragraph 7 of Article VI of the Treaty shall include procedures determining the manner in which mobile ICBM launchers of a type not subject to the limitation provided for in Article V of the Treaty, which undergo conversion into launchers of a type subject to that limitation, shall become subject to that limitation, unless the Parties agree that mobile ICBM launchers shall not be deployed after the date on which the Protocol ceases to be in force.*

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4. ASBMs on a bomber which undergoes conversion from a bomber of a type equipped for ASBMs which are not subject to the limitation provided for in Article V into a bomber of a type equipped for ASBMs which are subject to that limitation shall become subject to that limitation when the bomber is brought out of the shop, plant, or other facility where such conversion has been performed.

5. A heavy bomber of a type not subject to the limitation provided for in paragraph 1 of Article V shall become subject to that limitation when it is brought out of the shop, plant, or other facility where it has been converted into a heavy bomber of a type equipped for cruise missiles capable of a range in excess of 600 kilometres. A bomber of a type not subject to the limitation provided for in paragraph 1 or 2 of Article III shall become subject to that limitation and to the limitation provided for in paragraph 1 of Article V when it is brought out of the shop, plant, or other facility where it has been converted into a bomber of a type equipped for cruise missiles capable of a range in excess of 600 kilometres.

6. The arms subject to the limitations provided for in this Treaty shall continue to be subject to these limitations until they are dismantled, are destroyed, or otherwise cease to be subject to these limitations under procedures to be agreed upon.

To Paragraph 6 of Article VI of the Treaty

Agreed Statement. *The procedures for removal of strategic offensive arms from the aggregate numbers provided for in the Treaty, which are referred to in paragraph 6 of Article VI of the Treaty, and which are to be agreed upon in the Standing Consultative Commission, shall include:*

(a) procedures for removal from the aggregate numbers, provided for in Article V of the Treaty, of ICBM and SLBM launchers which are being converted from launchers of a type subject to the limitation provided for in Article V of the Treaty, into launchers of a type not subject to that limitation;

(b) procedures for removal from the aggregate numbers, provided for in Articles III and V of the Treaty, of bombers which are being converted from bombers of a type subject to the limitations provided for in Article III of the Treaty or in Articles III and V of the Treaty into airplanes or bombers of a type not so subject.

Common Understanding. *The procedures referred to in subparagraph (b) of the Agreed Statement to paragraph 6 of Article VI of the Treaty for removal of bombers from the aggregate numbers provided for in Articles III and V of the Treaty shall be based upon the existence of functionally related observable differences which indicate whether or not they can perform the mission of a heavy bomber, or whether or not they can perform the mission of a bomber equipped for cruise missiles capable of a range in excess of 600 kilometres.*

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7. In accordance with the provisions of Article XVII, the Parties will agree in the Standing Consultative Commission upon procedures to implement the provisions of this Article.

Article VII

1. The limitations provided for in Article III shall not apply to ICBM and SLBM test and training launchers or to space vehicle launchers for exploration and use of outer space. ICBM and SLBM test and training launchers are ICBM and SLBM launchers used only for testing or training.

To Paragraph 1 of Article VII of the Treaty

Common Understanding. *The term "testing", as used in Article VII of the Treaty, includes research and development.*

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2. The Parties agree that:
   (a) there shall be no significant increase in the number of ICBM or SLBM test and training launchers or in the number of such launchers of heavy ICBMs;
   (b) construction or conversion of ICBM launchers at test ranges shall be undertaken only for purposes of testing and training;
   (c) there shall be no conversion of ICBM test and training launchers or of space vehicle launchers into ICBM launchers subject to the limitations provided for in Article III.

To Paragraph 2 of Article VII of the Treaty

First Agreed Statement. *The term "significant increase", as used in subparagraph 2(a) of Article VII of the Treaty, means an increase of 15 per cent or more. Any new ICBM test*

and training launchers which replace ICBM test and training launchers at test ranges will be located only at test ranges.

Second Agreed Statement. *Current test ranges where ICBMs are tested are located: for the United States of America, near Santa Maria, California, and at Cape Canaveral, Florida; and for the Union of Soviet Socialist Republics, in the areas of Tyura-Tam and Plesetskaya. In the future, each Party shall provide notification in the Standing Consultative Commission of the location of any other test range used by that Party to test ICBMs.*

First Common Understanding. *At test ranges where ICBMs are tested, other arms, including those not limited by the Treaty, may also be tested.*

Second Common Understanding. *Of the 18 launchers of fractional orbital missiles at the test range where ICBMs are tested in the area of Tyura-Tam, 12 launchers shall be dismantled or destroyed and six launchers may be converted to launchers for testing missiles undergoing modernization.*

Dismantling or destruction of the 12 launchers shall begin upon entry into force of the Treaty and shall be completed within eight months, under procedures for dismantling or destruction of these launchers to be agreed upon in the Standing Consultative Commission. These 12 launchers shall not be replaced.

Conversion of the six launchers may be carried out after entry into force of the Treaty. After entry into force of the Treaty, fractional orbital missiles shall be removed and shall be destroyed pursuant to the provisions of subparagraph I(c) of Article IX and of Article XI of the Treaty and shall not be replaced by other missiles, except in the case of conversion of these six launchers for testing missiles undergoing modernization. After removal of the fractional orbital missiles, and prior to such conversion, any activities associated with these launchers shall be limited to normal maintenance requirements for launchers in which missiles are not deployed. These six launchers shall be subject to the provisions of Article VII of the Treaty and, if converted, to the provisions of the Fifth Common Understanding to paragraph 5 of Article II of the Treaty.

Article VIII

1. Each Party undertakes not to flight-test cruise missiles capable of a range in excess of 600 kilometres or ASBMs from aircraft other than bombers or to convert such aircraft into aircraft equipped for such missiles.

To Paragraph 1 of Article VIII of the Treaty

Agreed Statement. *For purposes of testing only, each Party has the right, through initial construction or, as an exception to the provisions of paragraph 1 of Article VIII of the Treaty, by conversion, to equip for cruise missiles, capable of a range in excess of 600 kilometres or for ASBMs no more than 16 airplanes, including airplanes which are prototypes of bombers equipped for such missiles. Each Party also has the right, as an exception to the provisions of paragraph 1 of Article VIII of the Treaty, to flight-test from such airplanes cruise missiles capable of a range in excess of 600 kilometres and, after the date on which the Protocol ceases to be in force, to flight-test ASBMs from such airplanes as well, unless the Parties agree that they will not flight-test ASBMs after that date. The limitations provided for in Article III of the Treaty shall not apply to such airplanes.*

The aforementioned airplanes may include only:

(a) airplanes other than bombers which, as an exception to the provisions of paragraph 1 of Article VIII of the Treaty, have been converted into airplanes equipped for cruise missiles capable of a range in excess of 600 kilometres or for ASBMs;

(b) airplanes considered to be heavy bombers pursuant to subparagraphs 3(c) or 3(d) of Article II of the Treaty; and

(c) airplanes other than heavy bombers which, prior to 7 March 1979 were used for testing cruise missiles capable of a range in excess of 600 kilometres.

The airplanes referred to in subparagraphs (a) and (b) of this Agreed Statement shall be distinguishable on the basis of functionally related observable differences from airplanes which otherwise would be of the same type but cannot perform the mission of a bomber equipped for cruise missiles capable of a range in excess of 600 kilometres or for ASBMs.

The airplanes referred to in subparagraph (c) of this Agreed Statement shall not be used for testing cruise missiles capable of a range in excess of 600 kilometres after the expiration of a six-month period from the date of entry into force of the Treaty, unless by the expiration of that period they are distinguishable on the basis of functionally related observable differences from airplanes which otherwise would be of the same type but cannot perform the mission of a bomber equipped for cruise missiles capable of a range in excess of 600 kilometres.

First Common Understanding. *The term "testing", as used in the Agreed Statement to paragraph 1 of Article VIII of the Treaty, includes research and development.*

Second Common Understanding. *The Parties shall notify each other in the Standing Consultative Commission of the number of airplanes, according to type, used for testing pursuant to the Agreed Statement to paragraph 1 of Article VIII of the Treaty. Such notification shall be provided at the first regular session of the Standing Consultative Commission held after an airplane has been used for such testing.*

Third Common Understanding. *None of the 16 airplanes referred to in the Agreed Statement to paragraph 1 of Article VIII of the Treaty may be replaced, except in the event of the involuntary destruction of any such airplane or in the case of the dismantling or destruction of any such airplane. The procedures for such replacement and for removal of any such airplane from that number, in case of its conversion, shall be agreed upon in the Standing Consultative Commission.*

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2. Each Party undertakes not to convert aircraft other than bombers into aircraft which can carry out the mission of a heavy bomber as referred to in subparagraph 3 (b) of Article II.

Article IX

1. Each Party undertakes not to develop, test, or deploy:
   (a) ballistic missiles capable of a range in excess of 600 kilometres for installation on waterborne vehicles other than submarines, or launchers of such missiles;
   (b) fixed ballistic or cruise missile launchers for emplacement on the ocean floor, on the seabed, 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 seabed, or the beds of internal waters and inland waters, or missiles for such launchers;
   (c) systems for placing into Earth orbit nuclear weapons or any other kind of weapons of mass destruction, including fractional orbital missiles;
   (d) mobile launchers of heavy ICBMs;
   (e) SLBMs which have a launch-weight greater or a throw-weight greater than that of the heaviest, in terms of either launch-weight or throw-weight, respectively, of the light ICBMs deployed by either Party as of the date of signature of this Treaty, or launchers of such SLBMs; or

(f) ASBMs which have a launch-weight greater or a throw-weight greater than that of the heaviest, in terms of either launch-weight or throw-weight, respectively, of the light ICBMs deployed by either Party as of the date of signature of this Treaty.

To Paragraph 1 of Article IX of the Treaty

Common Understanding to subparagraph (a). *The obligations provided for in subparagraph 1(a) of Article IX of the Treaty do not affect current practices for transporting ballistic missiles.*

Agreed Statement to subparagraph (b). *The obligations provided for in subparagraph 1(b) of Article IX of the Treaty shall apply to all areas of the ocean floor and the seabed, including the seabed zone referred to in Articles I and II of the 1971 Treaty on the Prohibition of the Emplacement of Nuclear Weapons and Other Weapons of Mass Destruction on the Seabed and the Ocean Floor and in the Subsoil Thereof.*

Common Understanding to subparagraph (c). *The provisions of subparagraph 1(c) of Article IX of the Treaty do not require the dismantling or destruction of any existing launchers of either Party.*

First Agreed Statement to subparagraphs (e) and (f). *The launch-weight of an SLBM or of an ASBM is the weight of the fully loaded missile itself at the time of launch.*

Second Agreed Statement to subparagraphs (e) and (f). *The throw-weight of an SLBM or of an ASBM is the sum of the weight of:*

(a) its re-entry vehicle or re-entry vehicles;

(b) any self-contained dispensing mechanisms or other appropriate devices for targeting one re-entry vehicle, or for releasing or for dispensing and targeting two or more re-entry vehicles; and

(c) its penetration aids, including devices for their release.

Common Understanding to subparagraphs (e) and (f). *The term "other appropriate devices", as used in the definition of the throw-weight of an SLBM or of an ASBM in the Second Agreed Statement to subparagraphs 1(e) and 1(f) of Article IX of the Treaty, means any devices for dispensing and targeting two or more re-entry vehicles; and any devices for releasing two or more re-entry vehicles or for targeting one re-entry vehicle, which cannot provide their re-entry vehicles or re-entry vehicle with additional velocity of more than 1,000 metres per second.*

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2. Each Party undertakes not to flight-test from aircraft cruise missiles capable of a range in excess of 600 kilometres which are equipped with multiple independently targetable warheads and not to deploy such cruise missiles on aircraft.

To Paragraph 2 of Article IX of the Treaty

Agreed Statement. *Warheads of a cruise missile are independently targetable if manoeuvring or targeting of the warheads to separate aim points along ballistic trajectories or any other flight paths, which are unrelated to each other, is accomplished during a flight of a cruise missile.*

Article X

Subject to the provisions of this Treaty, modernization and replacement of strategic offensive arms may be carried out.

Article XI

1. Strategic offensive arms which would be in excess of the aggregate numbers provided for in this Treaty as well as strategic offensive arms prohibited by this Treaty shall be dismantled or destroyed under procedures to be agreed upon in the Standing Consultative Commission.

2. Dismantling or destruction of strategic offensive arms which would be in excess of the aggregate number provided for in paragraph 1 of Article III shall begin on the date of the entry into force of this Treaty and shall be completed within the following periods from that date: four months for ICBM launchers; six months for SLBM launchers; and three months for heavy bombers.

3. Dismantling or destruction of strategic offensive arms which would be in excess of the aggregate number provided for in paragraph 2 of Article III shall be initiated no later than 1 January 1981, shall be carried out throughout the ensuing twelve-month period, and shall be completed no later than 31 December 1981.

4. Dismantling or destruction of strategic offensive arms prohibited by this Treaty shall be completed within the shortest possible agreed period of time, but not later than six months after the entry into force of this Treaty.

Article XII

In order to ensure the viability and effectiveness of this Treaty, each Party undertakes not to circumvent the provisions of this Treaty, through any other state or states, or in any other manner.

Article XIII

Each Party undertakes not to assume any international obligations which would conflict with this Treaty.

Article XIV

The Parties undertake to begin, promptly after the entry into force of this Treaty, active negotiations with the objective of achieving, as soon as possible, agreement on further measures for the limitation and reduction of strategic arms. It is also the objective of the Parties to conclude well in advance of 1985 an agreement limiting strategic offensive arms to replace this Treaty upon its expiration.

Article XV

1. For the purpose of providing assurance of compliance with the provisions of this Treaty, each Party shall use national technical means of verification at its disposal in a manner consistent with generally recognized principles of international law.

2. Each Party undertakes not to interfere with the national technical means of verification of the other Party operating in accordance with paragraph 1 of this Article.

3. Each Party undertakes not to use deliberate concealment measures which impede verification by national technical means of compliance with the provisions of this Treaty. This obligation shall not require changes in current construction, assembly, conversion, or overhaul practices.

To Paragraph 3 of Article XV of the Treaty

First Agreed Statement. *Deliberate concealment measures, as referred to in paragraph 3 of Article XV of the Treaty, are measures carried out deliberately to hinder or deliberately to impede verification by national technical means of compliance with the provisions of the Treaty.*

Second Agreed Statement. *The obligation not to use deliberate concealment measures, provided for in paragraph 3 of Article XV of the Treaty, does not preclude the testing of anti-missile defence penetration aids.*

First Common Understanding. *The provisions of paragraph 3 of Article XV of the Treaty and the First Agreed Statement thereto apply to all provisions of the Treaty, including provisions associated with testing. In this connexion, the obligation not to use deliberate concealment measures includes the obligation not to use deliberate concealment measures associated with testing, including those measures aimed at concealing the association between ICBMs and launchers during testing.*

Second Common Understanding. *Each Party is free to use various methods of transmitting telemetric information during testing, including its encryption, except that, in accordance with the provisions of paragraph 3 of Article XV of the Treaty, neither Party shall engage in deliberate denial of telemetric information, such as through the use of telemetry encryption, whenever such denial impedes verification of compliance with the provisions of the Treaty.*

Third Common Understanding. *In addition to the obligations provided for in paragraph 3 of Article XV of the Treaty, no shelters which impede verification by national technical means of compliance with the provisions of the Treaty shall be used over ICBM silo launchers.*

Article XVI

1. Each Party undertakes, before conducting each planned ICBM launch, to notify the other Party well in advance on a case-by-case basis that such a launch will occur, except for single ICBM launches from test ranges or from ICBM launcher deployment areas, which are not planned to extend beyond its national territory.

To Paragraph 1 of Article XVI of the Treaty

First Common Understanding. *ICBM launches to which the obligations provided for in Article XVI of the Treaty apply, include, among others, those ICBM launches for which advance notification is required pursuant to the provisions of the Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War Between the United States of America and the Union of Soviet Socialist Republics, signed 30 September 1971, and the Agreement Between the Government of the United States of America and the Government of the Union of Soviet Socialist Republics on the Prevention of Incidents On and Over the High Seas, signed 25 May 1972. Nothing in Article XVI of the Treaty is intended to inhibit advance notification, on a voluntary basis, of any ICBM launches not subject to its provisions, the advance notification of which would enhance confidence between the Parties.*

Second Common Understanding. *A multiple ICBM launch conducted by a Party, as distinct from single ICBM launches referred to in Article XVI of the Treaty, is a launch which would result in two or more of its ICBMs being in flight at the same time.*

Third Common Understanding. *The test ranges referred to in Article XVI of the Treaty are those covered by the Second Agreed Statement to paragraph 2 of Article VII of the Treaty.*

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2. The Parties shall agree in the Standing Consultative Commission upon procedures to implement the provisions of this Article.

Article XVII

1. To promote the objectives and implementation of the provisions of this Treaty, the Parties shall use the Standing Consultative Commission established by the Memorandum of Understanding Between the Government of the United States of America and the Government of the Union of Soviet Socialist Republics Regarding the Establishment of a Standing Consultative Commission of 21 December 1972.

2. Within the framework of the Standing Consultative Commission, with respect to this Treaty, the Parties will:

(a) consider questions concerning compliance with the obligations assumed and related situations which may be considered ambiguous;
(b) provide on a voluntary basis such information as either Party considers necessary to assure confidence in compliance with the obligation assumed;
(c) consider questions involving unintended interference with national technical means of verification, and questions involving unintended impeding of verification by national technical means of compliance with the provisions of this Treaty;
(d) consider possible changes in the strategic situation which have a bearing on the provisions of this Treaty;
(e) agree upon procedures for replacement, conversion, and dismantling or destruction, of strategic offensive arms in cases provided for in the provisions of this Treaty and upon procedures for removal of such arms from the aggregate numbers when they otherwise cease to be subject to the limitations provided for in this Treaty, and at regular sessions of the Standing Consultative Commission, notify each other in accordance with the aforementioned procedures, at least twice annually, of actions completed and those in process;
(f) consider, as appropriate, possible proposals for further increasing the viability of this Treaty, including proposals for amendments in accordance with the provisions of this Treaty;
(g) consider, as appropriate, proposals for further measures limiting strategic offensive arms.

3. In the Standing Consultative Commission the Parties shall maintain by category the agreed data base on the numbers of strategic offensive arms established by the Memorandum of Understanding Between the United States of America and the Union of Soviet Socialist Republics Regarding the Establishment of a Data Base on the Numbers of Strategic Offensive Arms of 18 June 1979.

To Paragraph 3 of Article XVII of the Treaty

Agreed Statement. *In order to maintain the agreed data base on the numbers of strategic offensive arms subject to the limitations provided for in the Treaty in accordance with paragraph 3 of Article XVII of the Treaty, at each regular session of the Standing Con-*

sultative Commission the Parties will notify each other of and consider changes in those numbers in the following categories: launchers of ICBMs; fixed launchers of ICBMs; launchers of ICBMs equipped with MIRVs; launchers of SLBMs; launchers of SLBMs equipped with MIRVs; heavy bombers; heavy bombers equipped for cruise missiles capable of a range in excess of 600 kilometres; heavy bombers equipped only for ASBMs; ASBMs; and ASBMs equipped with MIRVs.

Article XVIII

Each Party may propose amendments to this Treaty. Agreed amendments shall enter into force in accordance with the procedures governing the entry into force of this Treaty.

Article XIX

1. This Treaty shall be subject to ratification in accordance with the constitutional procedures of each Party. This Treaty shall enter into force on the day of the exchange of instruments of ratification and shall remain in force through 31 December 1985, unless replaced earlier by an agreement further limiting strategic offensive arms.

2. This Treaty shall be registered pursuant to Article 102 of the Charter of the United Nations.

3. Each Party shall, in exercising its national sovereignty, have the right to withdraw from this Treaty if it decides that extraordinary events related to the subject matter of this Treaty have jeopardized its supreme interests. It shall give notice of its decision to the other Party six months prior to withdrawal from the Treaty. Such notice shall include a statement of the extraordinary events the notifying Party regards as having jeopardized its supreme interests.

Done at Vienna on 18 June 1979, in two copies, each in the English and Russian languages, both texts being equally authentic.

Protocol

The United States of America and the Union of Soviet Socialist Republics, hereinafter referred to as the Parties,

Having agreed on limitations on strategic offensive arms in the Treaty,

Have agreed on additional limitations for the period during which this Protocol remains in force, as follows:

Article I

Each Party undertakes not to deploy mobile ICBM launchers or to flight-test ICBMs from such launchers.

Article II

1. Each Party undertakes not to deploy cruise missiles capable of a range in excess of 600 kilometers on sea-based launchers or on land-based launchers.

2. Each Party undertakes not to flight-test cruise missiles capable of a range in excess of 600 kilometers which are equipped with multiple independently targetable warheads from sea-based launchers or from land-based launchers.

To Paragraph 2 of Article II of the Protocol

Agreed Statement. *Warheads of a cruise missile are independently targetable if manoeuvring or targeting of the warheads to separate aim points along ballistic trajectories or any other flight paths, which are unrelated to each other, is accomplished during a flight of a cruise missile.*

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3. For the purposes of this Protocol, cruise missiles are unmanned, self-propelled, guided, weapon-delivery vehicles which sustain flight through the use of aerodynamic lift over most of their flight path and which are flight-tested from or deployed on sea-based or land-based launchers, that is, sea-launched cruise missiles and ground-launched cruise missiles, respectively.

To Paragraph 3 of Article II of the Protocol

First Agreed Statement. *If a cruise missile is capable of a range in excess of 600 kilometres, all cruise missiles of that type shall be considered to be cruise missiles capable of a range in excess of 600 kilometres.*

First Common Understanding. *If a cruise missile has been flight-tested to a range in excess of 600 kilometres, it shall be considered to be a cruise missile capable of a range in excess of 600 kilometres.*

Second Common Understanding. *Cruise missiles not capable of a range in excess of 600 kilometres shall not be considered to be of a type capable of a range in excess of 600 kilometres if they are distinguishable on the basis of externally observable design features from cruise missiles of types capable of a range in excess of 600 kilometres.*

Second Agreed Statement. *The range of which a cruise missile is capable is the maximum distance which can be covered by the missile in its standard design mode flying until fuel exhaustion, determined by projecting its flight path onto the Earth's sphere from the point of launch to the point of impact.*

Third Agreed Statement. *If an unmanned, self-propelled, guided vehicle which sustains flight through the use of aerodynamic lift over most of its flight path has been flight-tested or deployed for weapon delivery, all vehicles of that type shall be considered to be weapon-delivery vehicles.*

Third Common Understanding. *Unmanned, self-propelled, guided vehicles which sustain flight through the use of aerodynamic lift over most of their flight path and are not weapon-delivery vehicles, that is, unarmed, pilotless, guided vehicles, shall not be considered to be cruise missiles if such vehicles are distinguishable from cruise missiles on the basis of externally observable design features.*

Fourth Common Understanding. *Neither Party shall convert unarmed, pilotless, guided vehicles into cruise missiles capable of a range in excess of 600 kilometres, nor shall either Party convert cruise missiles capable of a range in excess of 600 kilometres into unarmed, pilotless, guided vehicles.*

Fifth Common Understanding. *Neither Party has plans during the term of the Protocol to flight-test from or deploy on sea-based or land-based launchers unarmed, pilotless, guided vehicles which are capable of a range in excess of 600 kilometres. In the future, should a Party have such plans, that Party will provide notification thereof to the other Party well in advance of such flight-testing or deployment. This Common Understanding does not apply to target drones.*

Article III

Each Party undertakes not to flight-test or deploy ASBMs.

Article IV

This Protocol shall be considered an integral part of the Treaty. It shall enter into force on the day of the entry into force of the Treaty and shall remain in force through 31 December 1981, unless replaced earlier by an agreement on further measures limiting strategic offensive arms.

Done at Vienna on 18 June 1979, in two copies, each in the English and Russian languages, both texts being equally authentic.

Sources: Committee on Disarmament documents CD/28, 27 June 1979 and CD/29, 2 July 1979.

Appendix 6B

Memorandum of understanding between the United States of America and the Union of Soviet Socialist Republics regarding the establishment of a data base on the numbers of strategic offensive arms

For the purposes of the Treaty Between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Strategic Offensive Arms, the Parties have considered data on numbers of strategic offensive arms and agree that as of 1 November 1978 there existed the following numbers of strategic offensive arms subject to the limitations provided for in the Treaty which is being signed today.

	United States	*USSR*
Launchers of ICBMs	1 054	1 398
Fixed launchers of ICBMs	1 054	1 398
Launchers of ICBMs equipped with MIRVs	550	576
Launchers of SLBMs	656	950
Launchers of SLBMs equipped with MIRVs	496	128
Heavy bombers	574	156
Heavy bombers equipped for cruise missiles capable of a range in excess of 600 kilometres	0	0
Heavy bombers equipped only for ASBMs	0	0
ASBMs	0	0
ASBMs equipped with MIRVs	0	0

At the time of entry into force of the Treaty the Parties will update the above agreed data in the categories listed in this Memorandum.

Done at Vienna on 18 June 1979 in two copies, each in the English and Russian languages, both texts being equally authentic.

FOR THE
UNITED STATES OF AMERICA

CHIEF OF THE
UNITED STATES DELEGATION
TO THE STRATEGIC ARMS
LIMITATION TALKS

FOR THE
UNION OF
SOVIET SOCIALIST REPUBLICS

CHIEF OF THE
USSR DELEGATION
TO THE STRATEGIC ARMS
LIMITATION TALKS

Source: Committee on Disarmament document CD/29, 2 July 1979.

Appendix 6C

Statement of data on the numbers of strategic offensive arms as of the date of signature of the Treaty

The United States of America declares that as of 18 June 1979, it possesses the following numbers of strategic offensive arms subject to the limitations provided for in the Treaty which is being signed today:

Launchers of ICBMs	1 054
Fixed launchers of ICBMs	1 054
Launchers of ICBMs equipped with MIRVs	550
Launchers of SLBMs	656
Launchers of SLBMs equipped with MIRVs	496
Heavy bombers	573
Heavy bombers equipped for cruise missiles capable of a range in excess of 600 kilometres	3
Heavy bombers equipped only for ASBMs	0
ASBMs	0
ASBMs equipped with MIRVs	0

18 June 1979

CHIEF OF THE
UNITED STATES DELEGATION
TO THE STRATEGIC ARMS
LIMITATION TALKS

Source: Committee on Disarmament document CD/29, 2 July 1979.

Appendix 6D

Statement of data on the numbers of strategic offensive arms as of the date of signature of the Treaty

The Union of Soviet Socialist Republics declares that as of 18 June 1979 it possesses the following numbers of strategic offensive arms subject to the limitations provided for in the Treaty which is being signed today:

Launchers of ICBMs	1 398
Fixed launchers of ICBMs	1 398
Launchers of ICBMs equipped with MIRVs	608
Launchers of SLBMs	950
Launchers of SLBMs equipped with MIRVs	144
Heavy bombers	156
Heavy bombers equipped for cruise missiles capable of a range in excess of 600 kilometres	0
Heavy bombers equipped only for ASBMs	0
ASBMs	0
ASBMs equipped with MIRVs	0

18 June 1979

CHIEF OF THE
USSR DELEGATION
TO THE STRATEGIC ARMS
LIMITATION TALKS

Source: Committee on Disarmament document CD/29, 2 July 1979.

Appendix 6E

Soviet Backfire statement

On 16 June 1979, President Brezhnev handed President Carter the following written statement:

"The Soviet side informs the United States side that the Soviet 'Tu-22M' airplane, called 'Backfire' in the United States, is a medium-range bomber and that it does not intend to give this airplane the capability of operating at intercontinental distances. In this connexion, the Soviet side states that it will not increase the radius of action of this airplane in such a way as to enable it to strike targets on the territory of the United States. Nor does it intend to give it such a capability in any other manner, including by in-flight refuelling. At the same time, the Soviet side states that it will not increase the production rate of this airplane as compared to the present rate."

President Brezhnev confirmed that the Soviet Backfire production rate would not exceed 30 per year.

President Carter stated that the United States enters into the SALT II agreement on the basis of the commitments contained in the Soviet statement and that it considers the carrying out of these commitments to be essential to the obligations assumed under the Treaty.

Source: Committee on Disarmament document CD/29, 2 July 1979.

Appendix 6F

Joint statement of principles and basic guidelines for subsequent negotiations on the limitation of strategic arms

The United States of America and the Union of Soviet Socialist Republics, hereinafter referrred to as the Parties,

Having concluded the Treaty on the Limitation of Strategic Offensive Arms,

Reaffirming that the strengthening of strategic stability meets the interests of the Parties and the interests of international security,

Convinced that early agreement on the further limitation and further reduction of strategic arms would serve to strengthen international peace and security and to reduce the risk of outbreak of nuclear war,

Have agreed as follows:

First. The Parties will continue to pursue negotiations, in accordance with the principle of equality and equal security, on measures for the further limitation and reduction in the numbers of strategic arms, as well as for their further qualitative limitation.

In furtherance of existing agreements between the Parties on the limitation and reduction of strategic arms, the Parties will continue, for the purposes of reducing and averting the risk of outbreak of nuclear war, to seek measures to strengthen strategic stability by, among other things, limitations on strategic offensive arms most destabilizing to the strategic balance and by measures to reduce and to avert the risk of surprise attack.

Second. Further limitations and reductions of strategic arms must be subject to adequate verification by national technical means, using additionally, as appropriate, co-operative measures contributing to the effectiveness of verification by national technical means. The Parties will seek to strengthen verification and to perfect the operation of the Standing Consultative Commission in order to promote assurance of compliance with the obligations assumed by the Parties.

Third. The Parties shall pursue in the course of these negotiations, taking into consideration factors that determine the strategic situation, the following objectives:

(1) significant and substantial reductions in the numbers of strategic offensive arms;

(2) qualitative limitations on strategic offensive arms, including restrictions on the development, testing, and deployment of new types of strategic offensive arms and on the modernization of existing strategic offensive arms;

(3) resolution of the issues included in the Protocol to the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Limitation of Strategic Offensive Arms in the context of the negotiations relating to the implementation of the principles and objectives set out herein.

Fourth. The Parties will consider other steps to ensure and enhance strategic stability, to ensure the equality and equal security of the Parties, and to implement the above principles and objectives. Each Party will be free to raise any issue relative to the further limitation of strategic arms. The Parties will also consider further joint measures, as appropriate, to strengthen international peace and security and to reduce the risk of outbreak of nuclear war.

Vienna, 18 June 1979

FOR THE UNITED STATES OF AMERICA	FOR THE UNION OF SOVIET SOCIALIST REPUBLICS
PRESIDENT OF THE UNITED STATES OF AMERICA	GENERAL SECRETARY OF THE CPSU, CHAIRMAN OF THE PRESIDIUM OF THE SUPREME SOVIET OF THE USSR

Source: Committee on Disarmament document CD/28, 27 June 1979.

Appendix 6G

Index to the SALT II Treaty[1]

In this index, articles of the treaty and protocol are referred to by their Roman numerals; paragraphs of those articles are indicated by Arabic numerals. References to articles of the protocol contain that designation (e.g., "protocol II.2"). References to articles of the treaty contain no additional designation (e.g., "IV.14"). The following abbreviations are used:

MOU—Memorandum of Understanding Between the United States of America and the Union of Soviet Socialist Republics Regarding the Establishment of a Data Base on the Numbers of Strategic Offensive Arms
JSP—Joint Statement of Principles and Basic Guidelines for Subsequent Negotiations on the Limitation of Strategic Arms
SBS—Soviet Backfire Statement
AS—Agreed Statement
CU—Common Understanding

[1] This is an abridged version of the index found in *SALT II Agreement*, US Department of State, Selected Documents No. 12B, July 1979.

7. Verification of the SALT II Treaty

Square-bracketed numbers, thus [1], *refer to the list of references on page 312.*

I. Introduction

All accounts of the SALT II negotiations indicate that problems of verification of compliance with the treaty were of major political and technical concern throughout the negotiations. These concerns are clearly reflected in the provisions of the treaty. This particular interest in the verification provisions and in the verifiability of the treaty itself can be attributed to a number of factors. First, it should be remembered that problems of verification served as a major impediment to progress in nearly all post-World War II disarmament negotiations. Although the underlying problem in many cases has been a lack of political will to agree on disarmament measures, verification difficulties provided the excuses for disagreement. The second factor contributing to the importance of the verification issue in SALT II is that the treaty is seen as having great importance for the national security of both the USA and the USSR. Indeed, the treaty deals with the most powerful weapons in the US and Soviet strategic arsenals, and since there is negligible trust between the two powers, measures providing for the assured fulfilment of the obligations assumed in the treaty are considered to be vital. Some people, who for various reasons opposed the treaty, tried to use the verification issue as a basis for proving the inadequacy or dangerous character of the whole endeavour. Also, the revolution in Iran, which resulted in the USA losing access to monitoring facilities there, created additional concerns about US ability to verify Soviet compliance with the SALT II agreement.

Still more US doubts were raised by the sale of a manual for the US photo-reconnaissance satellite KH-11 to the Soviet Union [1, 2]. However, it should be noted that the USA has never relied on the Iranian sites as the unique or most important source of military intelligence about the Soviet Union. Quite to the contrary, there are great numbers of independent, yet complementary, channels providing this intelligence, all of them cross-checking information obtained. The Iranian collectors were only one element in the US intelligence-gathering structure. They permitted the monitoring of the initial portion of the flight path of Soviet missiles during testing. The US monitoring capability lost in Iran has been recovered to some extent by the re-opening of US monitoring sites located in Turkey [3–5]. Moreover, it seems that it will be possible for the USA to establish or re-establish its monitoring stations in other countries along the southern border of the USSR.

The SALT II Treaty retains a number of verification provisions from the SALT I agreement. In addition, the SALT II Treaty was negotiated against the background of experience gained by the two parties during the existence of the SALT I agreements. During the period, the US–Soviet Standing Consultative Commission (SCC) considered altogether some 14 controversial issues of compliance raised by both sides [6, 7]. All these issues were resolved to the satisfaction of both sides. One indication of the efficacy of the SCC and of the satisfaction of both parties with its record is the increased responsibilities accorded to it by SALT II.

II. Verification procedures

Many SALT II provisions, agreed statements and common understandings facilitate the verification of compliance.[1] These are all listed here as "procedures", despite their different formal character. These procedures include:

1. National technical means (NTMs) as the agreed means for verification (these are discussed in the next section).
2. Rule of non-interference with NTMs and of non-concealment. As was the case with the SALT I agreements, the SALT II Treaty prohibits both the interference with NTMs used for verification and the deliberate concealment of objects or activities so as to impede verification. Since monitoring of both developmental and operational missile flight tests is essential for verification, the treaty contains additional verification stipulations about these activities. Neither side may employ such deliberate concealment measures as concealing the association between an intercontinental ballistic missile (ICBM) and its launcher during testing, or the deliberate denial of access to flight-test telemetry needed for verification of compliance. This controversial provision does not state that all encryption is banned. Either side may encrypt telemetry concerning, for example, guidance and control systems which are not limited by the treaty.

SALT II explicitly prohibits the placing of covers which impede verification over ICBM silos. Such shelters had been an issue under SALT I in SCC discussions.

3. Agreed data base. Both sides have provided, for the record, exact numbers of ICBM and submarine-launched ballistic missile (SLBM) launchers, of MIRVed ICBM and SLBM launchers, and of heavy bombers in 10 categories subject to treaty limitations. This data base, to be updated

[1] Specific articles, common understandings and agreed statements are not cited in this analysis, nor are they discussed in their original publication order. They can be found in the text of the treaty in appendix 6A and are discussed in chapter 6.

semi-annually, helps to indicate whether the parties are interpreting the treaty's stipulations in a similar way, and allows each party to check the accuracy of its monitoring system. These checks will enhance confidence in both sides' intelligence capabilities.

4. Definitions, type rules and counting rules. The verification process in the SALT II Treaty is facilitated by the careful definition of weapon categories. Most definitions specify an identifying characteristic which is observable by NTMs. Only the basic elements of these definitions and the weapon type rules which are crucial from the verification point of view are specified here. (For a more detailed discussion of the definitions, type rules and counting rules, see chapter 6.) Specific weapons were defined in the following way: (*a*) ICBMs, by range and land-based launcher; (*b*) SLBMs, by their deployment on 'modern' submarines and, in the case of Soviet SLBMs, by the date of initial flight tests; (*c*) heavy bombers, by their mission capabilities, including the capability to carry long-range cruise missiles (CMs), with specific exceptions to this definition; and (*d*) CMs by their mode of launch, weapon delivery mission, and by use of aerodynamic lift.

The ICBM launcher type rule provides that if a launcher is a launcher of ICBMs, all launchers of that type shall be considered ICBM launchers. This rule facilitates distinguishing between treaty-limited ICBM launchers and launchers of non-limited medium- and intermediate-range ballistic missiles.

The MIRVed missile type rule provides that if a missile has been flight-tested with MIRVs, all missiles of that type will be considered MIRVed, even if in some cases they were also tested without MIRVs. Similarly, an additional type rule states that if a launcher has contained or launched a MIRVed missile, all launchers of that type will be considered MIRVed missile launchers, regardless of the type of missile that the launcher actually contains. (Some ICBM fields contain MIRVed and unMIRVed versions of the same missile.) These rules were established because of the intractable difficulty of determining by external evidence whether a particular missile is fitted with a MIRVed or unMIRVed payload.

Two CM type rules help to distinguish, first, between CMs and remotely piloted vehicles (RPVs) and, second, between CMs that are capable of a range in excess of 600 km and those that are not. Thus, in the first case, if an unmanned aerodynamic vehicle has been flight-tested or deployed for a weapon delivery, all vehicles of that type shall be considered to be CMs. In the second case, if a given CM is capable of a range in excess of 600 km, all CMs of that type shall be considered capable of such a range. In both cases, the rules stipulate that specific externally observable design features (EODFs) (see below) be fitted on CMs in order to assist in distinguishing between the different categories of vehicles mentioned above.

5. The Standing Consultative Commission. The responsibilities of the SCC have been expanded considerably under the SALT II Treaty. In addition to its broad authority established in SALT I to handle any question connected with compliance, the SCC has been assigned several specific functions in connection with verification.

The scope of responsibilities of the SCC indicates the degree to which co-operation between the two sides is possible on issues as deeply intertwined with secrecy and national security as the verification of compliance with a strategic arms limitation agreement.

In the SCC, the parties may voluntarily provide information which they consider necessary to assure confidence in the fulfilment of their treaty obligations. The parties may also raise questions regarding the non-concealment rule, including questions about unintentional concealment which impedes verification. The SCC shall update at least twice a year the agreed data base by notifying the other party about any changes in the numbers of arms limited by the treaty. The treaty also requires notification in the SCC of reductions and conversions completed, under way or envisaged. The SCC is further mandated to establish procedures for replacement, conversion, dismantling and destruction of strategic arms, as well as procedures for the removal of such weapons from the treaty's aggregate limits when the weapons cease, in any other way, to be subject to the treaty's provisions. More specifically, the SCC will decide upon criteria for the determination of which future types of bombers will be considered heavy bombers and thereby included in the aggregate limits. It will, furthermore, settle upon procedures for: the removal from the aggregate limitations of bombers converted to airplanes not subject to treaty limitations; the replacement or conversion of CM test airplanes; the dismantling of fractional orbital bombardment system (FOBS) launchers; and the removal from sublimits of launchers of MIRVed ICBMs and SLBMs converted to launchers of non-MIRVed missiles. In the case of a mobile ICBM launcher being deployed, the SCC shall establish procedures for determining when a launcher for non-MIRVed missiles, which has been converted into a MIRVed missile launcher, should become subject to MIRVed missile launcher ceilings. The SCC will decide upon procedures for the prior notification of certain planned ICBM test launches.

6. Notification provisions. Another category of "procedures" to enhance verification ability are the several specific notification requirements. Each party must notify the other of:

(*a*) The replacement, conversion, dismantling, or destruction of arms in cases mandated by the treaty. In each case the information provided will undoubtedly be checked against the data gathered by NTMs.

(*b*) Designations of: new types of light ICBM, if equipped with MIRVs,

when first flight-tested; new types of SLBMs equipped with MIRVs, when first installed on a submarine.

(*c*) Any flight test of an ICBM which extends beyond national territory; and any launch of more than one ICBM at a time. Parties may voluntarily provide prior notification for other launches as well. The notification must be made "well in advance", a phrase to be defined by the SCC. This provision enables the parties to place appropriate NTMs on alert for impending test launches.

(*d*) The establishment of new test ranges for ICBMs.

(*e*) Date of the first test launch of the permitted new type of ICBM, and the date of either the twenty-fifth launch or the last launch before deployment begins, whichever occurs earlier. Both notifications must be made "promptly" after the test and are relevant to the monitoring of the provisions concerning certain qualitative characteristics of the new missile, especially the "5 per cent rule" on permitted variations in these characteristics (see chapter 6).

(*f*) The number of airplanes (not to exceed 16), according to type, used for testing CMs.

(*g*) The inclusion of future types of bombers within the heavy bomber category.

(*h*) Plans to flight-test and deploy on aircraft *unarmed*, guided vehicles of range greater than 600 kilometres which might otherwise be confused with CMs.

7. Standards and criteria for comparisons between weapons. Several types of strategic weapons that have similar external characteristics can have different capabilities and/or missions. Since certain types of such weapons are not covered by the treaty, or belong to different treaty sublimits, they must, therefore, be distinguishable on the basis of external characteristics observable by NTMs.

The treaty establishes two basic categories of external standards to be used to distinguish between similar types of weapons. Functionally related observable differences (FRODs) are differences in the observable features of airplanes which indicate whether or not they can perform a given mission. Where there is no functional relation between the observable differences and the weapon's mission, similar weapons will be differentiated on the basis of externally observable design features (EODFs).

Various categories of airplanes are externally quite similar or even identical to those falling under the treaty limits, but they are not, however, heavy bombers or CM carriers. FRODs are supposed to distinguish between these various groups of aircraft. In most cases, the FROD rule will entail the removal of, or restrictions on, certain equipment like bomb-bay doors or external pylons for carrying CMs. Whether FRODs will be easily discernible by NTMs in any given case is hard to evaluate in advance.

The second category of external criteria for distinguishing between similar types of weapons includes EODFs as well as externally observable features not necessarily related to the weapon's design. These criteria apply to:

(*a*) Current heavy bombers not equipped to carry long-range CMs, in order to distinguish them from those which are so equipped. For instance, B-52 bombers equipped to carry long-range CMs will be distinguished by "strakelets", that is, special fairings attached where a wing meets the fuselage [8].

(*b*) Certain Soviet ASW aircraft will be distinguished from otherwise similar bombers by radomes and other features [9a].

(*c*) Launchers of MIRVed ICBMs and MIRVed SLBMs which must be externally different from launchers of un-MIRVed missiles; this rule applies also to launchers which underwent structural design changes permitted under the treaty and to the six SS-9 FOBS launchers if they are converted into testing launchers.

(*d*) CMs to be differentiated from RPVs.

(*e*) Long-range CMs (those capable of a range in excess of 600 km) to be distinguished from short-range CMs.

The only readily observable differences between CMs and RPVs could be the external dimensions of the majority of tactical RPVs and CMs. However, there are RPVs in development whose dimensions are comparable to those of long-range CMs. These RPVs are being prepared for weapon delivery missions such as air defence suppression and battlefield interdiction [10, 11]. Moreover, some versions of the US CMs were originally planned to perform the function of RPVs, as sensor platforms for over-the-horizon reconnaissance and for targeting in naval warfare [12]. The SALT II Treaty specifically forbids the conversion of RPVs into CMs or of CMs into RPVs. However, in view of the external similarity of some of these vehicles, the fulfilment of this provision will be difficult to verify.

Distinguishing between CMs of various ranges on the basis of appearance is also extremely questionable. The range of a CM depends on factors such as payload, type of fuel, type of engine, air speed, altitude and path, none of which need find expression in the external dimensions, which could be identical for different types of CMs, whether tactical or strategic, air- or ground-launched, or carrying a conventional or nuclear warhead. The external features of CMs, which might serve as EODFs, are the air intakes, fins, antennas, and warhead attachment points. All of the above are not very conspicuous features and are visible only from a close distance. In practice, two externally identical vehicles may have widely different payloads and operational capabilities.

The idea of distinguishing between various types of weapons on the

basis of EODFs thus seems dubious in some cases and is certainly inadequate in the case of CMs because these differences are not functionally related. Hence, it would be possible to deploy "deceptive EODFs", which could confuse the verification means of the other side.

The verification of compliance with other treaty provisions will also depend on 'externally observable features', although not so named in the treaty. Such features include the dimensions of silos of specific types of missiles, the dimensions of the boosters of these missiles, the weight of re-entry vehicles and post-boost vehicles carried by the particular missiles, as well as the throw- and launch-weight of these missiles.

Thus, NTMs must check that modifications to existing silos do not exceed 32 per cent of the "original" internal volume. The 32 per cent limit could be reached by increasing the diameter of a 4-metre silo by 60 cm. Thus, NTMs need resolution of considerably better than 60 cm to carry out this task.

The dimensions of existing types of missiles and of the new type of ICBM after its twenty-fifth flight are not to be changed by more than 5 per cent. Thus, a missile with a diameter of three metres and a length of 30 metres could not be changed by more than 15 and 450 cm, respectively, in these dimensions. Existing reconnaissance satellites are presumed to have 15-cm or better ground resolution.

Throw- and launch-weights of a missile, limited to the permissible changes of less than 5 per cent, are to be monitored either by physical observation or by monitoring the telemetry during tests [13–15]. It is uncertain, however, whether NTMs are in fact able to monitor these 5 per cent limits.

Another set of standards is based on well-established knowledge, enjoyed by each party, about the other party's arsenal. The familiarity with the characteristics of the opposing weapon systems and the established practices for their construction, testing and operation must be extensive if the parties deemed it appropriate to agree on the following criteria, to be used for verification purposes:

(*a*) "Mission capabilities" of existing types of heavy bombers. These capabilities, probably including range, load, speed and other similar characteristics, will serve as the basis for the identification of future types of heavy bombers.

(*b*) "Current configuration", applied to the case of Tu-142 ASW airplanes, serving as the basis for their exclusion from treaty limits.

(*c*) "One operational mission load" as a measure of the maximum number of CMs carried on heavy bombers: this counting rule, similar in its logic to the MIRVed missile counting rule, permits the sides to avoid having to count the actual number of CMs carried on and within individual airplanes.

(*d*) "Heavy ICBM", defined to be any missile which has a launch-weight or a throw-weight greater than those of the Soviet SS-19 ICBM, which is the heaviest of the light ICBMs deployed by either party and is believed to have a launch-weight of 90 000 kg and a throw-weight of 3 600 kg [9b]. The line drawn between heavy and light missiles is essential for the provisions concerning: the freeze on the number of fixed launchers of modern heavy ICBMs; the limit on the throw- and launch-weights of the one permitted new type of ICBM, which must be a light ICBM; the ban on mobile launchers of heavy ICBMs; and the ban on heavy SLBMs and heavy ASBMs.

(*e*) "Normal construction schedule" for strategic offensive arms. The requirement to follow the "normal" construction schedule is designed to prevent either side from acquiring a "breakout" potential (see below).

(*f*) "Final stage of construction" as the moment from which a weapon begins to be counted under the treaty limits: for SLBMs launchers, this moment comes when the submarine on which the launcher is deployed begins sea trials. (The same applies to submarines after conversions.) For ICBMs and for heavy bombers, this stage begins after they emerge from their final assembly facility and, in case of bombers being converted to CM carriers, after they are first brought out of the facility where they have been equipped to carry long-range CMs. The set of "standards" for verification connected with the weapons' production activities are tantamount to requiring the constant observation of the production facilities.

(*g*) "Normal deployment requirements" for the storage of ICBMs at launch sites (one missile per launcher), in order to hinder the rapid re-load capability of ICBM silos.

(*h*) "Standard design mode" for CMs, that is, the design under which they fly their typical operational profile, as far as speed and altitude are concerned, flying until total exhaustion of the missiles' fuel. These parameters seem to be of little help for verification purposes. In addition to the verification ambiguities inherent in CMs (explained above), the flying profile of a CM is highly variable and flight tests need not be carried out each time to full fuel consumption or with the same kind of fuel.

(*i*) "Original internal diameter" and "original internal depth" of ICBMs silo launchers, as a basis for the limits imposed on the permitted changes in the silos' dimensions during their modernization.

(*j*) "Normal" procedures for the release of re-entry vehicles, to be visibly different from the ejection of penetration aids during flight tests.

(*k*) Trajectories of the released re-entry vehicles to be "unrelated" in flight, if these re-entry vehicles are to be counted as MIRVs and not as MRVs.

(*l*) Ground support facilities at ICBM launching sites as additional evidence to help in distinguishing between launchers for MIRVed and un-MIRVed ICBMs, in addition to the launcher's EODFs.

The treaty fixes the locations of certain activities or of particular weapons, which enable NTMs to be concentrated on these locations. Such is the case with the prescribed ("existing") deployment areas for ICBM silos, ICBM test ranges, and in the case of the prohibition on the conversion of testing launchers into operational ones. Presumably, both parties know of all existing facilities for the production of strategic arms and all possible deployment areas for strategic bombers [16], although these details are not mentioned by the treaty.

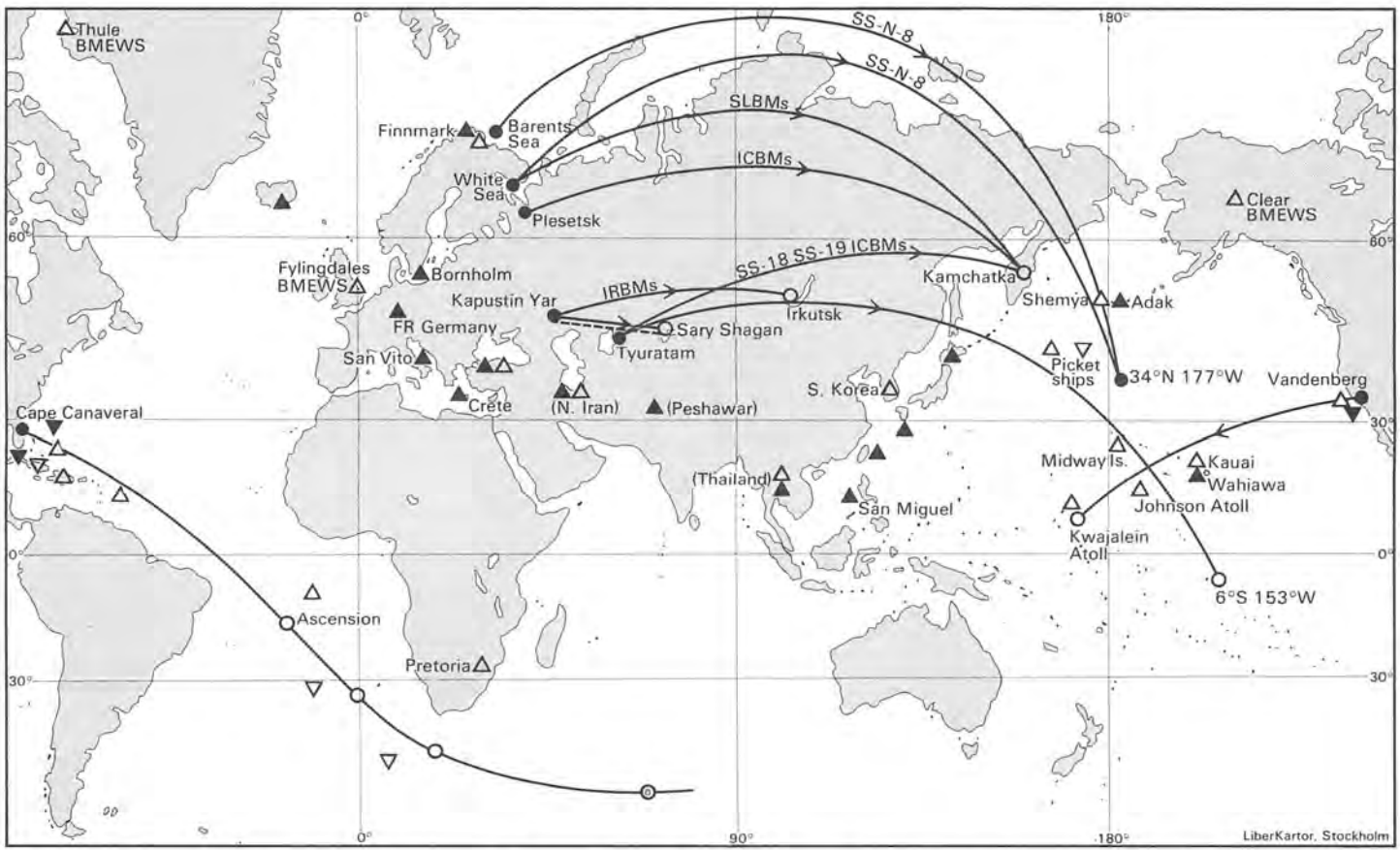
III. The technology for monitoring compliance with SALT II

NTMs are basically concerned with obtaining two kinds of data about the other side's strategic arsenal. Qualitative data are needed to learn of the characteristics of various weapons, while quantitative data—numbers of particular weapons—are needed to verify that numerical limits are not exceeded.

Monitoring ballistic missile tests

The principal activity which needs to be monitored is that of flight-testing ballistic missiles, since most of the qualitative factors limited in SALT II can be observed only during testing. Typical ground tracks for missile tests are shown in figure 7.1. On this map, the ground tracks appear to trace curves, an effect due to the use of a mercator projection: in fact, the tracks are great circle paths. The USA has two missile test ranges. Missiles are launched on the Eastern Test Range from Cape Canaveral, travel south-east, and splash down in the South Atlantic, or, for the longest flights, in the South Indian Ocean. The USA has down-range tracking stations on several Caribbean Islands, on Ascension Island, and at Pretoria, South Africa, as well as tracking ships. The second and more important range, the Western Test Range, runs westward across the Pacific, and is composed of three subsidiary ranges. First, there is the Pacific Missile Range, for testing short-range guided missiles from Point Mugu, California, out into the Pacific. Currently these facilities and others located inland are being used to test Tomahawk cruise missiles. The Western Test Range proper runs from Vandenberg right across the Pacific to Kwajalein Atoll in the United States Trust Territory of Micronesia. Tracking radars for this range are located on Hawaii and several other islands. Trident I missiles are being tested here, and Minuteman and SLBM operational launches are carried out. On Kwajalein itself is the Kwajalein Test Range, used mainly for the testing of anti-ballistic missiles (ABMs). Incoming Minuteman and other missiles were formerly used as test targets for ABMs and are currently used as targets for testing ABM radar, optical detection and laser tracking techniques.

Figure 7.1. Ballistic missile test ranges and important monitoring sites [a)]



The Soviet Union has more possibilities for testing missiles. The oldest range used for testing medium- and intermediate-range missiles begins at Kapustin Yar and terminates at Sary Shagan and near Lake Baikal. More important is Tyuratam, used for ICBM tests, with impact areas on Kamchatka Peninsula, and for the longest-range tests, in the South Pacific north of Fiji. A 65-km radius danger zone was proclaimed in this area in March 1975, with tests held daily for a two-week period.

Plesetsk is mainly a satellite launch site but has also been used recently for solid-fuel missile tests. Operational SLBM tests are held in the White Sea, or occasionally in the Barents Sea, with impact on or near the Kamchatka Peninsula, or, for longer-range tests, in the North Pacific.

The Soviet Union appears to put relatively little effort into monitoring US tests. During the 1979 controversy about the presence of a Soviet combat brigade on Cuba, a Soviet electronic facility at Torrens, Cuba, was described as capable of intercepting count-down communications and launch telemetry from Cape Canaveral [17]. To monitor the Western Test Range, the Soviet Union is known to deploy electronic intercept vessels near Mugu and Vandenberg, as during the current CM tests, and deploys tracking vessels down-range.

The USA has considerably more elaborate facilities for monitoring Soviet tests. This is in part because of geographic restrictions which follow from Soviet tests being mostly over Soviet territory, and partly because more comprehensive Soviet secrecy makes more thorough monitoring necessary to achieve an equivalent level of confidence. The more important US monitoring resources are listed in table 7.1.

Monitoring a typical Soviet missile test requires co-ordination among a variety of sensors. First, high-frequency intercept facilities monitor the flurry of radio communications associated with preparations for a test, allowing launch time to be predicted and other sensors to be put on alert. The launch itself is most reliably detected by geosynchronous early warning satellites, which sense the thermal infra-red emission of the missile booster and can track for as long as the booster is burning—for the first 100 km or more [19]. Launch can also be detected from some distance by over-the-horizon (OTH) radar. The USA formerly had a forward-scatter OTH radar system with transmitters in east Asia, which bounced a signal between the ionosphere and the Earth's surface across the Soviet Union to receivers in Europe. This system was, however, capable only of detecting missiles as they passed through the ionosphere, and was shut down in 1975 [20a]. It seems that there is now a backscatter OTH radar performing a more effective job. This is located, according to unsubstantiated reports, in Cyprus—a location that would appear to be ideal for such a sensor, which needs an over-water propagation path, and which must be located between 1 500 and 3 000 km from the activity to be

Table 7.1. US monitoring of Soviet ballistic missile tests: major known and assumed resources (not including satellites)

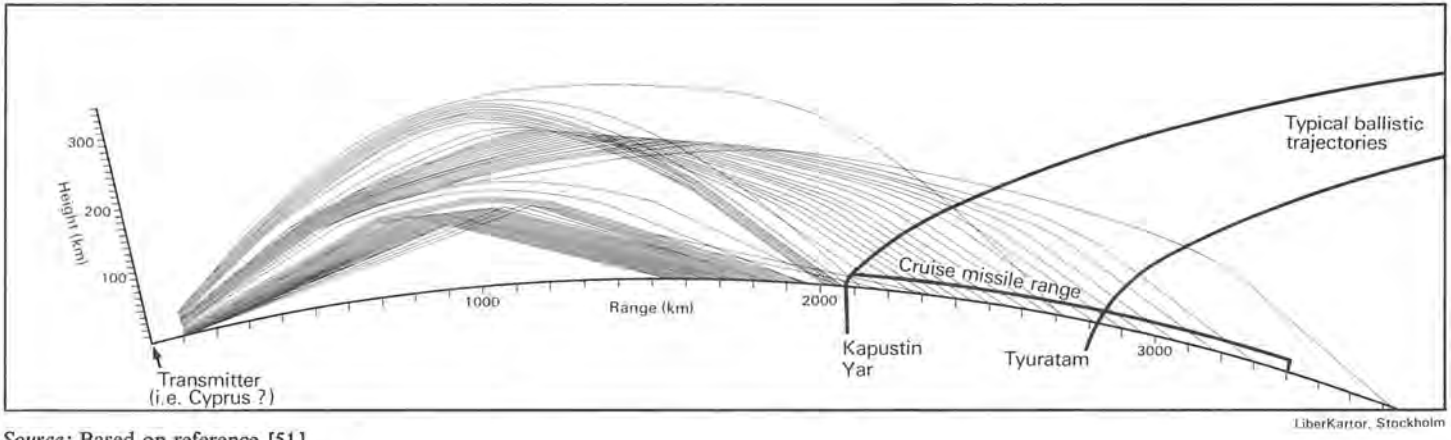
Location	Sensors	Monitoring function
Diyarbakir, Turkey	FPS-17 detection radar FPS-79 tracking radar	Detect, track missiles from Kapustin Yar, Tyuratam, record radar signatures
Karamursel, Turkey Samsun, Turkey	VHF-UHF-SHF[a] receivers	Record telemetry of missiles from Kapustin Yar, Tyuratam
Sinop, Turkey	High frequency receivers	Record count-down communications from Kapustin Yar, Tyuratam
Belbasi, Turkey	Seismographic microbarograph	Back-up detection of launches from Kapustin Yar, Tyuratam; record acoustic signatures
Behshahr, Iran (now inactive)	VHF-UHF-SHF receiver precision tracking radar	Record telemetry, track missiles from Kapustin Yar, Tyuratam
Kabkhan, Iran (now inactive)	VHF-UHF-SHF receivers	Record telemetry from Kapustin Yar, Tyuratam
Klarabad, Iran (now inactive)	?	Record telemetry?
Iraklion, Greece	VHF-UHF-SHF receivers?	Telemetry intercept, Kapustin Yar, Tyuratam?
Mt Olympus, Cyprus	Radars (British operated)	Track ballistic missiles from Kapustin Yar, Tyuratam?
Cape Greco, Cyprus	Over-the-horizon backscatter radar?	Detect, track ballistic missiles from Kapustin Yar, Tyuratam?
Viksjofjell, Norway Vardø, Norway	VHF-UHF-SHF receivers (Norwegian operated)	Telemetry intercept of launches from Barents Sea, White Sea, Plesetsk
Vadsø, Norway	High frequency receivers (Norwegian operated)	Record count-down communications from Barents Sea, White Sea, Plesetsk
Barents Sea	Tracking vessels, reconnaissance aircraft from Thule, Greenland	Monitor launches from Barents Sea, White Sea

Bornholm, Denmark	VHF-UHF-SHF receivers (Danish operated)	Monitor launches from Plesetsk?
Thule, Greenland	BMEWS radar	Mid-course tracking
Clear, Alaska	BMEWS radar	Mid-course tracking
Shemya Island, Alaska	Cobra Dane phased array radar	Precision down-range tracking of re-entry vehicles, determine radar signatures
Shemya Island, Alaska	Cobra Ball reconnaissance aircraft	Laser radar tracking, determine optical re-entry signatures
North Pacific	Cobra Judy ship-board phased array radar	Precision tracking of final stages of re-entry
Adak Island, Alaska	High frequency receivers	Intercept Soviet down-range communications
Midway Island, Kauai, Hawaii Johnston Atoll, Kwajalein	Western Test Range tracking radars, Kwajalein range optical, laser and radar sensors	Tracking, determine optical, laser, radar signatures

[a] VHF-UHF-SHF: very high frequency, ultra high frequency, super-high frequency.

Sources: SIPRI work files on foreign military presence, and references [18, 23].

Figure 7.2. Backscatter over-the-horizon (OTH) radar. Radio beams from the transmitter are reflected back down to Earth by the ionosphere. Scattered radio energy is reflected back to the transmitter by the same paths. Objects such as missiles reflect a signal detectable at the transmitter site. The figure shows trajectories of missiles from Kapustin Yar and Tyuratam superimposed on the ray paths of a typical OTH radar.

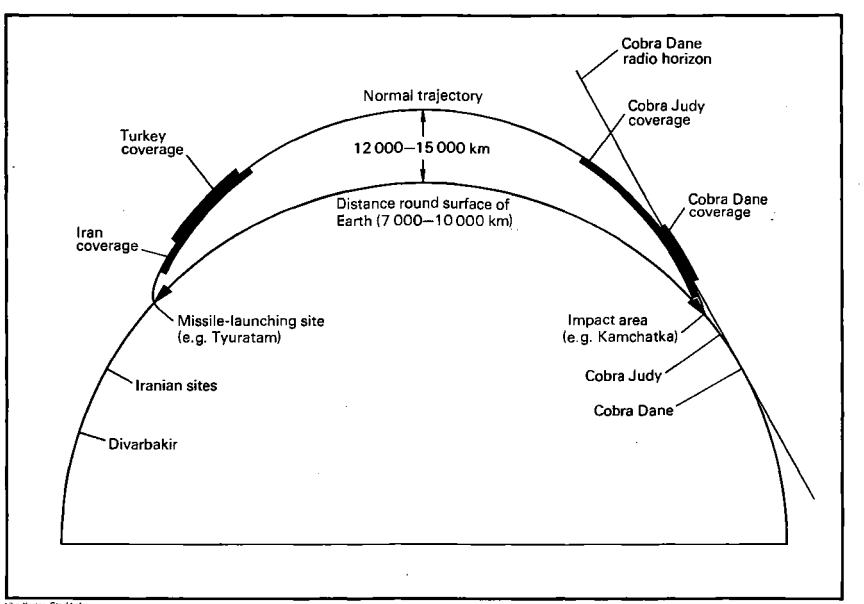


Source: Based on reference [51].

monitored to take advantage of the ionospheric bending of radio waves, which allows the radar to 'see' around the curvature of the Earth (see figure 7.2). Such a radar can detect, track and measure the velocity of quite small objects.

When the missile has reached a certain altitude, it comes within reach of other sensors that operate by line-of-sight. The US sites in Iran, before they were shut down in early 1979, were able to monitor missiles after they had reached an altitude of about 100 km. The Turkish sensors, less favourably located, can begin monitoring when the missile has reached 400 km altitude [21]. Launches from Plesetsk and the White Sea can probably be monitored from sites in Norway and Denmark after they have reached about 150 km. Tracking ships in the Barents Sea could acquire telemetry from lift-off in the case of SLBM launchers from the Barents Sea. Under certain atmospheric conditions, when 'ducting' occurs (that is, when temperature inversion funnels radio waves back to the Earth), it may be possible to pick up telemetry from much lower missile altitudes. Good ducting to the Turkish sites is said to occur 35 per cent of the time [22], which would imply that for one test in every three, the USA was able to collect telemetry virtually from take-off. Figure 7.3 illustrates the geometrical relationships between trajectories and sensors.

Figure 7.3. Geometric relationships of a ballistic trajectory and monitoring sensors



Acoustic detectors are extremely sensitive [23]. Liquid-fuelled motors emit a multitude of different noises which allow the functioning of pumps and valves to be monitored [24]. Acoustic signals propagate along the Earth's surface and thus do not require line-of-sight observation.

It seems that test missile telemetry can also be intercepted by satellites. Several reports have described a US series of satellites called Rhyolite, which occupy geosynchronous orbits similar to the better-known early warning satellite, and which intercept large volumes of microwave communications traffic, including missile telemetry [15].

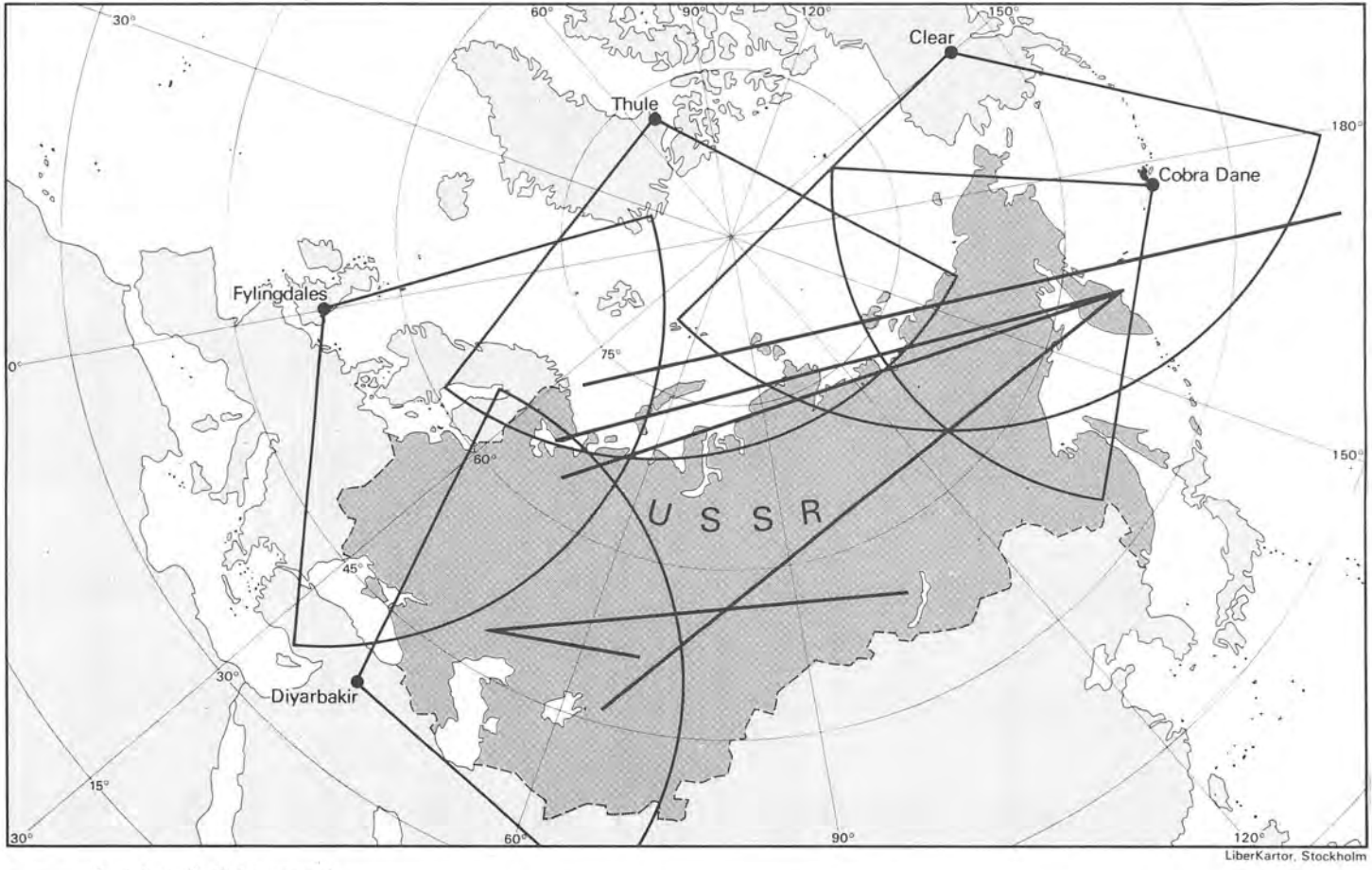
Soviet missiles launched from the northern sites can probably be tracked over their whole trajectory by the Ballistic Missile Early Warning System (BMEWS) radars located in Greenland and Alaska. This is seen in figure 7.4, which shows the coverage of the various long-range line-of-sight radars. In the figure, the missile trajectories approximate to straight lines because of the pole-centred projection used.

At some point in mid-course, the missile, if MIRVed, undergoes a series of manoeuvres in which the MIRVs are launched along their individual trajectories. As the re-entry vehicles approach the Earth again, they come within range of the most sophisticated sensor in the entire US system—the Cobra Dane radar on Shemya Island in the Aleutians, operational since 1976 [24]. This radar is capable of simultaneously tracking up to 100 re-entry vehicles, decoys and other objects. Re-entry vehicles can be tracked at distances of over 3 000 km, while an object the size of a missile can be tracked several Earth diameters away—in effect, this radar is limited only by the curvature of the Earth. Under worst conditions, the radar measures angles to within 0.05 degrees, and range to within five metres. Complementing Cobra Dane is a similar but less powerful radar called Cobra Judy, mounted on board a ship to enable it to get much closer to the impact point and thus to monitor the final stage of re-entry. It is worth noting that the only 'window' through which the Soviet Union can shoot its missiles to their full ranges without the risks associated with passing over other nations' territories results in re-entries taking place within range of a large number of sensors which the USA has already deployed for monitoring its own missiles. Since the Soviet Union has to rely on tracking ships for down-range monitoring of its own Pacific re-entries, it might even be suggested that the United States can monitor Soviet tests better than the Soviet Union can.

Monitoring cruise missile tests

CM tests appear to pose more of a monitoring problem than do ballistic missile tests. The test range used by the Soviet Union to develop its CMs is shown in figure 7.1, above (based on [27]). This would appear to be

Figure 7.4. Coverage of Soviet missile tests by US long-range radars



——— Soviet missile flight-test paths

outside the range of US sensors. However, it has been reported that at least one of the intelligence sites in Iran, in the Talish Mountains to the West of the Caspian Sea, was capable of monitoring CM flights. Of course, CMs, which fly at very low altitudes, would not be visible to line-of-sight sensors in Turkey.

Interestingly, however, the backscatter OTH radar currently being built in the United States to provide coverage of the North Atlantic will, according to General Anderson, the Deputy Chief of Staff for Plans and Operations, USAF, be able to track cruise missiles of the AS-3 and AS-4 types [20b]. If this is possible for this radar, then it seems probable that any backscatter OTH radar used to monitor Tyuratam might also monitor CM tests. Figure 7.2 shows how the presumed test range lies well within the optimum range for detection by an OTH radar located in the vicinity of Cyprus.

Monitoring deployed weapon systems

Monitoring the testing of new weapons, as described above, establishes the characteristics of the various systems. The other aspect of SALT II monitoring is counting the numbers of various weapons deployed, and ascertaining that banned weapons are not being tested or deployed. Medium-resolution 'area surveillance' satellite sensors are used to select geographic areas of high interest. These areas are then inspected in greater detail using 'close-look' high-resolution satellite sensors, believed currently to have a ground resolution of better than 30 cm and probably as good as 15 cm. (These satellites have been described in other SIPRI publications [29, 30] and will not be described in detail here.) If resolution is visualized as the width of the finest line (i.e., 15 cm) on the ground distinguishable on a satellite image, then, as a rule of thumb, it requires two line-widths across an object on the ground to allow it to be detected, about five lines to allow determination of its long- and short-axes, eight to recognize it (as a truck or an aircraft, for example), and 15 to identify it (as a particular kind of military or civilian aircraft, for example).

Satellites' imaging sensors can record data at a variety of discrete wavelengths. These sensors can be sensitive to any or all visible wavelengths. With poorer resolution, they can be sensitive to infra-red wavelengths, either in the 'thermal' bands—to measure heat from an engine—or in the 'photographic' bands to record reflected solar radiation, which is an aid in penetrating camouflage. Suitably chosen wavelengths can help to penetrate atmospheric turbidity and cloud, and with image intensifiers monitoring can proceed by moonlight or even starlight nearly as effectively as in daytime. Measurement of shadow lengths and densities allows the height of structures and the depth of holes to be calculated, and military satellites

yield stereoscopic images such that both relative and absolute elevation differences can be measured. Imaging satellites are incapable of seeing through heavy cloud, and they suffer the disadvantage of being confined to relatively inflexible overflight schedules by the laws of orbital dynamics. Thus, activities which a violator wishes to hide can perhaps be carried out between consecutive satellite overflights. Satellites cannot see what is happening under roofs, but with time they can collect a lot of data about the traffic entering and leaving any large building. Immovable structures, such as missile silos, will, with the passage of a little time, be discovered and counted. Satellite sensor optics is a field in which considerable progress can still be made. Resolving power is currently limited by such effects as shimmering and twinkling, caused by the atmosphere. Adaptive optics, using flexible focusing (or 'rubber') mirrors to make real-time corrections for atmospheric effects, are under development. More important, but slightly farther in the future, optical systems of greater resolving power will allow satellite sensors at geosynchronous altitude to have ground resolution similar to that of today's low-altitude satellites. Thus, a satellite will be able to 'hover' over an area of interest, and maintain continuous rather than periodic surveillance of activity at, for example, missile test sites. The technology for long-wavelength infra-red imaging is also being developed, which will allow an aircraft or missile in flight to be distinguished against the Earth background.

Adequacy of monitoring resources

Table 7.2 gives an overview of the verification tasks posed by the treaty and of the technical resources available to carry out these tasks.

As may be seen from the table, there is at least one monitoring resource covering virtually every monitoring requirement. Most monitoring concern has been directed to the question of ballistic missile tests. As the survey shows, the USA has excellent resources for down-range, or terminal, monitoring of the Soviet flight tests. Since it is this terminal phase in which the missiles' payload characteristics are revealed, and since these characteristics are far more important than the data obtained from the monitoring of the initial phase of the flights, the excellent US capabilities for observation of the terminal phase assure that the most important stipulations of the treaty are effectively verified. Moreover, any launch monitoring inadequacies, in connection with launches from Tyuratam, are to a large degree made up by excellent monitoring conditions for the northern launches [25, 26], and reportedly by the accelerated development of a space-based sensor called Chalet.

Table 7.2. SALT II monitoring tasks and US monitoring resources

Monitoring tasks \ Existing monitoring resources	Human intelligence	Imaging satellites	Communications intercept	Launch monitoring	Mid-course monitoring	Down-range monitoring	Early warning satellite	Low-orbit ferret	"Rhyolite" satellite	Ocean surveillance satellite	Space tracking systems	Conv. naval intelligence	Airborne naval reconn.	Sea-bottom sonar, etc.	Air surveillance radar	AWACS	Ferret aircraft	Visual observation
A. Bans on ICBMs, SLBMs, launchers																		
Identify testing, deployment of mobile launchers and ICBMs	×	×	×	×			×	×	×									
Detect conversion of light to heavy launchers	×	×																
Detect production, testing, deployment of SS-16	×	×	×					×	×									
Detect additional silo construction or re-location	×	×																
Detect rapidly re-loadable launchers	×	×																
Detect conversion of test, training launchers to operational	×	×	×					×	×									
Detect BMs > 600 km range on vessels not subs	×											×	×					
Detect launchers on sea-bed, etc.		×												×				
B. Ballistic missile throw-weight, launch-weight, etc.																		
Light ICBMs > SS-19		×		×	×	×	×	×										
Heavy ICBMs > SS-18		×		×	×	×	×	×										
SLBMs ASBMs > SS-19		×		×	×	×	×	×					×	×	×	×	×	×
Exempted 'new' ICBM > SS-19		×		×	×	×	×	×										
C. Changes to existing ICBMs																		
Length > 5%		?		×	×		×											
Largest diameter > 5%		?		×	×		×											
Number of booster stages	×	×		×	×		×	×	×									
Propellant solid to liquid or *vice versa*	×	×		×				×	×									
Re-entry vehicle weight (no decrease)	×					×												
Launch weight > 5%				×	×		×	×										
Throw weight > 5%					×	×												
Silo volume increase > 32%	×	×																

D. Numbers of ballistic missiles																			
Identify ICBM types (i.e. of range >5 500 km)	×	×		×	×	×	×	×	×										
Count fixed and mobile ICBM launchers	×	×	×																
Distinguish strategic from tactical SLBMs	×	×	×	×	×	×	×	×	×	×		×	×	×					
Count SLBM launchers	×	×								×		×	×	×					
Detect >15% increase in test, training launchers	×		×	×			×	×	×										
E. Numbers of MIRVed ballistic missiles																			
Monitor MIRV testing			×		×	×		×	×	×		×	×	×			×		
Determine launcher types associated with MIRV		×	×	×	×	×	×	×	×					×					
Count MIRVable ICBMs, SLBMs, ASBMs		×										×	×	×	×	×	×	×	
F. Number of MIRV per missile																			
Exempted 'new' missile (≤10)		×			×	×								×					
Existing ICBMs (no increase)		×												×					
SLBMs (≤14)		×										×	×	×					
ASBMs (≤10)		×												×	×	×	×	×	
G. 'Space-based' weapons																			
Detect FOBS activity		×		×	×	×	×				×			×					
Monitor destruction of FOBS missiles	×	×																	
Detect weapons of mass destruction in orbit											×								
H. Air-to-surface ballistic missiles (ASBMs)																			
Determine ASBM ranges				×	×	×	×												
Count ASBM mounts on heavy bombers	×							×	×								×	×	
Count bombers equipped only for ASBM	×		×												×	×	×	×	
I. Cruise missiles (CMs)																			
Identify CMs with range >600 km	×		×					?	?								?	?	
Detect deployment on land or sea	×	×			×			×	×			×	×	×				×	×
Determine aircraft associated with ALCM	×		×					×	×						×	×	×	×	×
Count ALCM-carriers	×	×	×					×	×						×	×	×	×	×
Determine that ≤20 ALCMs on existing carriers	×							×	×									×	×
Detect test and deployment on non-bomber aircraft	×		×					×	×									×	×
Detect CMs with multiple independently targetable warheads								×	×										

Monitoring tasks \ Existing monitoring resources	Human intelligence	Imaging satellites	Communications intercept	Launch monitoring	Mid-course monitoring	Down-range monitoring	Early warning satellite	Low-orbit ferret	"Rhyolite" satellite	Ocean surveillance satellite	Space tracking systems	Conv. naval intelligence	Airborne naval reconn.	Sea-bottom sonar, etc.	Air surveillance radar	AWACS	Ferret aircraft	Visual observation
J. Numbers of bombers																		
Identify heavy bombers (i.e. long-range)		×	×												×	×	×	×
Count heavy bombers		×	×												×	×	×	×
Detect increase in Backfire production rate		×													×	×	×	×
Detect Backfire range/payload upgrade															×	×	×	×
Monitor in-flight re-fuelling	×		×					×	×						×	×	×	×
K. Miscellaneous monitoring requirements																		
Monitor dismantling of over-limit systems	×	×																
Detect system construction rates > usual																		
Detect interference with NTMV	×	×	×								×							
Detect ICBM tests violating notification criteria				×			×											
Detect circumvention of SALT II	×	×	×			×	×											

Table 7.2 summarizes various limits, prescriptions and prohibitions embodied in the SALT II Treaty, together with the monitoring resources that probably contribute to verification. The first column, for human intelligence (HUMINT) or, in other words, observation by humans, is only speculative, and it should be remembered that HUMINT is not recognized as an NTM. The second column indicates only the fields in which surveillance satellites are particularly useful, since they probably contribute in some way to verifying all aspects of SALT II Treaty compliance. The third column indicates the ways in which interception of electronic communications, in general, rather than interception specifically directed at missile tests, can contribute. Columns four, five and six describe the respective contributions of launch, mid-course and terminal monitoring of missile tests. Each column includes optical, telemetry-intercept, radar and laser sensors. The remaining columns summarize the contributions of more specialized sensing systems. The following paragraphs comment on the various monitoring resources in verifying the SALT II limitations.

A. Bans on ICBMs, SLBMs, launchers. Testing of relevant launchers and missiles will be detected by the various missile-test sensors. Production and deployment will basically be followed with surveillance satellites. Human intelligence, if available, would be very valuable. One case, evidence on deployment of the SS-16 missile, came to the USA from "sensitive human intelligence sources on the ground" [31].

B. Ballistic missile throw-weight and launch-weight. These limitations are not expressed in absolute units, but only relative to pre-existing missiles, a factor which considerably eases the monitoring task. By comparing the intensity of radar signatures, for example, it is possible to demonstrate that a new missile is bigger or smaller than an already well-tested and therefore well-monitored one, even if the country monitoring these missiles does not know the actual size of either. Relative launch-weight might be estimated from determination of (*a*) booster thrust based on satellite infra-red radiometry and spectrometry, and (*b*) acceleration measurements based on OTH radar doppler-shift. Throw-weight can be found by adding up the weight of all the re-entry vehicles (including post-boost vehicle and penetration aids) (see *C* below).

C. Changes to existing ICBMs. Here again the quantities are all relative. Absolute dimensions will be obtained from satellite images, although measuring a 5 per cent change in a missile diameter could be only marginally possible with 15-cm sensor resolution, unless data can be integrated from a large number of measurements. Re-entry vehicle relative weight can be found by comparing the re-entry deceleration due to atmospheric drag with the aerodynamic form of the re-entry vehicle as determined from radar and optical signatures. Measuring silo volumes would be easiest if depth were measured during construction and radius afterward.

D. Numbers of ballistic missiles. This requires the use of satellite photographs to associate particular missile types with particular launcher types, and then counting the various types of launcher. Counting SLBM launchers can be done with a high degree of confidence, using satellite imagery of submarines in port and under construction, and is facilitated by conventional ASW sensors monitoring submarines at sea [32].

E. and F. Numbers of MIRVed missiles and number of MIRVs per missile. Numbers of MIRVs per missile can be established with a high degree of confidence using terminal test-area sensors, in particular Cobra Dane. Counting numbers of MIRVed missiles is no more difficult than the counts for *D* above.

G. Space-based weapons. This task is carried out by existing systems for monitoring military activity in space [33]. Destruction of FOBS missiles is verifiable by satellite-based optical sensors.

H. Air-to-surface ballistic missiles. This is a relatively trivial issue, since ASBMs are not likely to be developed within the lifetime of the treaty. The verification techniques are similar to those of ICBM test monitoring and satellite observation of bombers (see *J* below).

I. Cruise missiles. It is doubtful whether either side could establish conclusively that the other was not deploying missiles of longer range than 600 km. However, the USA seems quite confident that the existing Soviet missiles, test flown in 1965 before backscatter OTH radar was operational, were of less than 600 km range, so perhaps there are techniques of which we are not aware. Verifying limits on cruise missile carriers is similar to verifying bomber limitations.

J. Bombers. Monitoring production of bombers would be carried out using satellite imagery of the relatively limited number of airfields (said to be 10 in the Soviet Union [16]) used by heavy bombers. In-flight refuelling, range payload upgrades, etc., could be monitored by a combination of satellite imagery, surveillance by nearby air defence radars such as the NATO NADGE system in Europe, and electronic intercept of air-to-surface radio traffic. In-flight refuelling requires extended training which would almost certainly be detectable. NADGE radars (of 500 km range) in northern Norway, for example, can monitor movements of aircraft soon after take-off from airfields 200 km within the Soviet border near Murmansk [34]. Similar air-surveillance radars surround much of the Soviet Union. AWACS aircraft based in Europe and East Asia will considerably enhance NADGE's capability to follow aircraft deep within the Soviet Union. At still greater ranges, passive methods of tracking are still possible, based on high-frequency air-to-ground transmissions from the aircraft being monitored [35]. If bombers and/or cruise-missile carrier monitoring were to become an acute problem, one solution would be to extend backscatter OTH radar coverage over the relevant areas of the Soviet Union.

It seems doubtful that FRODS, thought to help in distinguishing among various aircraft, would be observable by satellite (for example, presence or absence of bomb-bay doors in the belly of the aircraft). It must be assumed that such techniques as ground- or sea-level observation, together with air-borne inspection from interceptor aircraft over international waters, will be sufficient.

K. Miscellaneous. These items do not need particular comment. They are well taken care of, as are many of the above items, by the ordinary strategic intelligence gathering that goes on all the time, whether SALT agreements are ratified or not.

IV. Possible challenges for SALT II verification

One of the notions often raised in connection with the possible failure of the SALT verification system is that it would not be able to discover in time a large quantity of clandestinely stockpiled strategic weapons which could be quickly prepared for operational use. This scenario has been baptized as strategic "breakout".

On the Soviet side, such a "breakout" scenario is usually based on the existence of several hundred de-activated and presumably stockpiled old Soviet ICBMs, mainly of SS-7 and SS-8 types, and on a great number of spares and replacements, from which hundreds of operational missiles could be surreptitiously constructed. The existence of these stockpiles is considered dangerous, especially because the so-called pop-up ("cold-launch") technique for an ICBM launch could be used and because there exist in the USSR about 150 empty silos, utilized as command and control facilities [36–39]. These silos are supposed to be convertible into launchers. Moreover, "soft-site" (above-ground) ICBM launchings are considered possible. As proof of this, a US Minuteman missile has been test-launched from a canister [40]. Such a soft site could, according to one such scenario, be set up inside large buildings, being completely hidden under the roof [41].

The scenario of ICBM "breakout" is, however, concerned with very large objects, all easily discernible when in the open. At present, extra Soviet ICBMs are said to be stored more than 50 miles away from silos and, when moved close to them, are easily observable [42]. Additionally, the re-loading of a silo requires a number of huge cranes and other equipment which would be visible. Moreover, it is known that liquid-fuel ICBMs, like those deployed at present in the Soviet Union, once filled with fuel, must stand erect, a factor further complicating any possible clandestine preparations. A scenario in which ICBMs are loaded into command and control silos is even more doubtful: not only would a missile have to be loaded into it, but the silos would have to undergo substantial internal and external modifications. As far as soft-site launching is concerned, one should visualize a huge missile, erected in a canister, with all appropriate facilities surrounding it, including (at least temporarily) a number of tank vehicles necessary for the quick pumping of large amounts of various liquid fuels [24]. To be of any strategic significance, such an action would have to be carried out on a large scale in a covert manner. It is quite a different task to arrange a show-launch of one Minuteman missile, a relatively compact, solid-fuel vehicle which had been prepared for its launch without any restrictions.

Other actions which could be included in a breakout scenario are: the possibility of covert preparation of lighter re-entry vehicles to be put on

top of ICBMs to replace heavier and therefore less numerous vehicles, in this way multiplying the number of targets that an ICBM could be aimed at; upgrading of mobile SS-20 IRBMs into SS-16 ICBMs by adding the third stage and an appropriate warhead to the SS-20; and clandestine training of Backfire bomber crews for in-flight refuelling and increasing the sophistication of these bombers to give them intercontinental capability. These contingencies are discussed below.

It is worth mentioning that breakout scenarios can be conceived by either party. There is, however, less familiarity with such worries on the Soviet side. Some probable concerns on the Soviet side might be: the loading of great numbers of CMs (in excess of treaty limits) on aircraft; and the possible deployment of more than one MX mobile missile in its closed-loop deployment area, after partially assembling them away from the site and then introducing them into a loop through the rather meagre obstacle provided by earth barriers, which are supposed to block the access to the loop. In a scenario analogous to the one developed for the Backfire bomber, US FB-111 bombers and future medium-range US bombers could also be upgraded clandestinely for intercontinental missions. Moreover, the USA could replace its Minuteman II unMIRVed missiles with Minuteman III MIRVed missiles (most notably at the Malmstrom, Montana, missile site where they are deployed together), especially since launch facilities for Minuteman II and III ICBMs are virtually indistinguishable [43]. The cheating scenario can be stretched further by including the 177 former Titan I and Atlas ICBM launchers which have been only partially dismantled [9c]. The point here is that uncertainties of a hypothetical nature may exist on both sides. However, it should be noted that the availability of large amounts of information about US strategic programmes substantially facilitates Soviet verification of US compliance.

US worries about Soviet breakout potential have been partially assuaged by the SALT II ban on the development, testing and deployment of the SS-16 missile. Thus, it may be assumed that there is no other mobile ballistic missile on Soviet territory than the SS-20 IRBM. It appears that only about 50 SS-16s were produced as complete units, and 40 or less were deployed in fixed silos previously containing the older SS-13 missiles [16, 44, 45]. Tests of the SS-16 were halted, probably in 1977, after several failures occurred. If the missiles were to be assembled surreptitiously for launch from SS-20 launchers, the SS-16's operational qualities, like accuracy and reliability, would be uncertain. Moreover, to be strategically meaningful, such a conversion would have to be massive, and hence almost surely detectable, and the SS-20 missiles would have to be withdrawn from their normal assignments.

A more difficult case is represented by the possibility of converting

medium-range bombers into intercontinental bombers, and with aerial refuelling of medium bombers. As a hedge against such a possibility in the case of the Backfire bomber, the USA obtained from the USSR a pledge to restrict the rate of production of these bombers, a pledge more easily verifiable than the qualitative restrictions also contained in the Soviet Backfire statement. Additionally, the Backfire bombers are believed to be more important in the maritime and peripheral missions, so that the utilization of these bombers for intercontinental missions is rather doubtful.

The impact of hypothetical violations depends on whether the weapon in question has a potential first-strike role (like fixed and mobile ICBMs) or if it is an arguably second-strike weapon (like bombers and current CMs). In the second case, the impact upon the other state's strategic security would be considerably smaller than in the first case. It seems that the most serious challenges for verification systems may be the monitoring of ICBM modernization programmes, together with the development of the permitted new type of ICBM. Both types of programmes are to be verified mainly through the surveillance of missile flight tests. The requirements of this task are known to be at the brink of the technical capabilities of existing verification systems. One additional complication is that the main source of data about the missiles is the radio communications transmitted during the entire flight test from the missile to ground control stations. Soviet missile tests appear to utilize about 50 telemetry channels [2]. Both countries are able to conceal transmissions completely or in part by encrypting them [46]. Telemetry may be denied to NTMs by using low-power directional transmitters, or by taping the data in capsules that can be recovered [47]. The treaty does not specify which transmissions may not be encrypted, but merely prohibits the concealment of data which are needed for monitoring those missile characteristics which are limited by the treaty. The encryption of telemetry has been much publicized in the US media as one of the most serious "loopholes" for a determined violator. In practice, however, this problem will probably not be serious. All ICBM tests are closely watched, and it is readily apparent whether any telemetry was encrypted or concealed. The encryption of data concerning parameters limited by the treaty would constitute grounds for raising the issue in the SCC, although the discussion would be tightly circumscribed by a desire not to reveal intelligence sources and methods. Again, as in other scenarios, any meaningful programme of abrogation of treaty provisions regarding modifications of missiles cannot be restricted to a few instances. A complete testing programme for an ICBM consists of some 20 or 30 tests, carried out over several years. The attempted concealment of treaty-related data throughout such a testing programme could hardly escape detection.

The telemetry issue has also been mentioned in reference to the limitations on the maximum number of re-entry vehicles per missile. Some tests of the Soviet SS-18 [38, 48, 49] appeared to demonstrate an ability of the missile to carry more than its permitted number of re-entry vehicles [10].

V. Conclusions

No absolute statement about the verifiability of the SALT II Treaty is either possible or needed. What is necessary and sufficient is the confidence of both parties that their verification capabilities are good enough to give them an assurance that any possible violation will be disclosed before it could pose a serious military risk or adversely affect the strategic balance between them.

Certain treaty-limited activities are easily and accurately monitored, while others require more effort and may not be observable in every detail at any time. Thus, confidence in the detection of a potential violation varies with the kind of weapon or activity being monitored. This confidence may be expressed either as the accuracy with which a given quantity can be measured, or as the degree of certainty in detecting the activity limited by the treaty. There are various levels of confidence that a violation will be discovered [50a]. It is important to realize that what represents a moderate level of confidence in a discovery of a violation, thus, say, a 50 per cent chance of detection, for a prospective violator represents an unacceptably high risk of discovery. In a treaty of great political importance, such as the SALT II Treaty, a decision clandestinely to violate agreed limitations, knowing the risks were so high, would be tantamount to an open breach. According to Administration testimony in US Congressional hearings, most of the treaty's provisions could be verifiable with a 'high' or 'high-moderate' (that is, greater than 75 per cent) detection confidence. Only with respect to some provisions, notably those concerning cruise missiles, mobile ICBM systems, the parameters of a permitted new type of ICBM and modernized old ICBMs, has the level of confidence been termed 'moderate' (that is, between 50 and 75 per cent).

Those provisions which are verifiable at only relatively low levels of confidence are in most cases those which the United States wanted in order to preserve flexibility in weapon development [50b]. In most cases when the Soviet Union wanted similar flexibility that could only have been achieved at the expense of verification confidence, the United States claimed the arrangement to be unacceptable. This US approach is evidenced in treaty terms concerning such programmes as cruise missiles and the mobile MX ICBM on the one hand, and the SS-16 missile and the Derazhnya and Pervomaysk ICBM launching areas on the other. This

inconsistency in the US attitude towards verification may eventually harm US interests if the Soviet Union decides to follow the US lead and deploy mobile ICBMs and long-range CMs.

It should be noted that whether or not the treaty enters into force, the intelligence-gathering systems of both of the great nuclear powers will continue closely to monitor all military programmes. The verification requirements of the SALT II Treaty represent only a fraction of the tasks carried out by these monitoring systems. Moreover, the requirements of military intelligence are generally more stringent, as far as the level of detail and confidence are concerned, than the requirements of treaty verification, since the states' security depends on the former to a far greater degree. One of the most valuable qualities of the SALT II Treaty is that it actually facilitates monitoring tasks already undertaken, rather than imposing extra monitoring tasks. The entire range of agreed procedures, entailing a large deal of co-operation between the parties, enhances the effectiveness of strategic intelligence and thereby can provide the parties with greater certainty about the other side's military programmes. This should help to reduce tension and mistrust between them.

The parties appear to have confidence in their abilities to verify compliance with the treaty, at least as far as the fixed ICBMs, SLBMs and heavy bombers are concerned [50c]. The real value of this positive assessment is, however, to a large extent compromised, because at the high numerical levels of strategic weapons permitted under the treaty, any strategically significant clandestine changes would have to involve large-scale programmes over long stretches of time. In such a situation, all sophisticated analyses of verifiability have a somewhat legalistic character, and discussions of the impact of this verifiability on the great powers' strategic security can in part be seen as a political game rather than a rational, objective concern.

The verification provisions of the SALT II Treaty can serve as proof of the willingness of both parties to accommodate their positions to the demands posed by the verification requirements. The meagre arms control achievements of SALT II can be attributed more to a lack of political will to control nuclear arms than to an inability of the sides to agree to supportive verification provisions.

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8. The Non-Proliferation Treaty

Article VIII of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) provides for periodic conferences of the parties to review the operation of the treaty with a view to assuring that its purposes and provisions are being realized. The first review conference was held on 5–30 May 1975. The second will be held in Geneva in August–September 1980.

The first review conference concluded its work with the adoption, by consensus (that is, without a vote being taken), of a final declaration. However, in spite of the formal acceptance of the declaration, a number of delegations expressed dissatisfaction about the outcome of the conference, made interpretative statements contradicting the consensus, or objected outright to various formulations. Proposals for additional protocols to the NPT, as well as resolutions dealing with various matters related to the implementation of the NPT, were submitted by several participants but did not obtain sufficient support.

I. Non-transfer and non-acquisition of nuclear weapons

The first two articles of the NPT contain the essence of the non-proliferation undertakings: the nuclear weapon states are committed not to transfer to any recipient, while the non-nuclear weapon states are under the obligation not to receive, manufacture or otherwise acquire, nuclear weapons or other nuclear explosive devices, or control over them.

These provisions seem to have been complied with. No complaints have been made about the transfer of nuclear weapons or other nuclear explosive devices, or of control over them, by the nuclear weapon powers; neither has any non-nuclear weapon party to the NPT been formally accused of manufacturing these weapons or devices or acquiring them by other means. In spite of this, it would be wrong to conclude that the very purpose of the NPT has been achieved.

As long as nuclear weapons remain deployed on the territories of non-nuclear weapon states, there will be a danger of sudden change in the control over these weapons in times of severe international crisis. Furthermore, since the NPT has not been universally subscribed to, its observance by the parties alone cannot guarantee that other states will abstain from

acquiring nuclear weapons. In fact, the number of states known to have come into possession of nuclear weapons or other nuclear explosive devices, which the treaty was intended to restrict to five, increased in 1974, when India carried out a nuclear explosion. Moreover, Israel has been reported to possess several untested nuclear bombs, South Africa is rumoured to have tested a nuclear device, and Pakistan is said to be working toward the manufacture of a nuclear explosive device. But these countries cannot be charged with a breach of the NPT which they never signed. If anyone is to account for the further proliferation that occurred, it is, in the first place, the parties to the treaty themselves. For it seems unlikely that India, or other countries, would have been in a position to manufacture a nuclear explosive device, certainly not that soon, if the undertaking under Article I not "in any way" to assist any non-nuclear weapon state to manufacture nuclear weapons or other nuclear explosive devices, had been fully respected. Indeed, by providing nuclear material, equipment and know-how to countries which refuse to adhere to the NPT and to renounce thereby, formally, the nuclear weapon option, the suppliers party to the NPT (including France which, while not being party to the treaty, stated that it would behave as if it were one) have perforce contributed to the building of new nuclear weapon capabilities. Thus, the fissile material for the Indian explosive device was obtained in a Canadian-supplied reactor, with the use of US-supplied heavy water.[1]

Nevertheless, a year after the Indian nuclear explosion, and just a few weeks after the conclusion of the first NPT review conference, an agreement on nuclear supplies was signed between the Federal Republic of Germany, a party to the NPT, and Brazil, a non-party. Under the terms of this agreement Brazil is buying a complete nuclear fuel cycle from FR Germany. The cycle will cover prospecting, mining and processing uranium ores in Brazil, as well as production of uranium compounds; uranium enrichment; construction of nuclear power stations; manufacture of fuel elements; and reprocessing of irradiated fuels. The co-operation includes exchanges of technological information, and several joint enterprises are envisaged. No such comprehensive nuclear deal has ever before been concluded.

There is a special concern about the sale to Brazil of a uranium enrichment facility—a novel item on the nuclear shopping list. This concern has been enhanced by reports that Pakistan is building a small enrichment plant to obtain highly enriched uranium.

The acquisition of plutonium-reprocessing technology (without any evident commercial need) might in itself be enough for Brazil to secure a

[1] In the pre-NPT period, it was the transfer of nuclear equipment and technology by the USSR to China, in the late 1950s, that enabled the latter power to manufacture its own bomb and test it as early as 1964.

nuclear military potential. Assurances that the plants for enrichment and reprocessing will be used exclusively to make reactor fuel, and the envisaged IAEA safeguards to prevent diversion, though unaffected by the termination of the co-operation agreement, apply only to the equipment, installations and materials supplied by the Federal Republic of Germany. Brazil is under no legal obligation that would prevent it from constructing an unsafeguarded fuel cycle.

Brazil undertook not to use the technological information received, including that on plutonium reprocessing, for the manufacture of nuclear weapons, and appropriate international safeguards have been devised to ensure compliance with this undertaking. But restrictions on the use of transferred technology may be difficult to enforce, and since they are also limited in time,[2] replication of facilities will eventually become a possibility. Once Brazil achieves nuclear self-sufficiency and starts operating its own, indigenously built plants, it will be able to manufacture nuclear weapons. This may not be imminent, in view of the size of the required investments. Nonetheless, the West German supplies of sensitive elements of the fuel cycle, which will enable Brazil to keep the nuclear weapon option open, are at variance with the 'non-assistance' clause of the NPT.

It is true that there is no express prohibition for a non-nuclear weapon state, party to the NPT, to provide assistance, encouragement or inducement to manufacture nuclear explosive devices to another non-nuclear weapon state, which is not party to the NPT. But, as early as 1968, in response to a proposal to close this apparent loophole in the NPT, the Soviet Union made it clear that "if a non-nuclear-weapon State Party to the Treaty were to assist another non-nuclear State to manufacture and acquire nuclear weapons, such a case would be regarded as a violation of the Treaty". (This understanding was reiterated during the 1975 NPT review conference.) The USA then argued that "it seems clear that a non-nuclear-weapon State which accepts the Treaty's restrictions on itself would have no reason to assist another country not accepting the same restrictions to gain advantage from this fact in the field of nuclear weapon development". But it also stated that "if a non-nuclear-weapon Party did nevertheless attempt to provide such assistance in the territory of a non-party, the presumption would immediately arise that these acts had the purpose of developing nuclear weapons for itself, in violation of the Treaty". This interpretation given by the powers responsible for the formulation of the relevant provisions of the NPT has not been contested

[2] Any nuclear facility or specified equipment designed, constructed or operated "within a period of twenty years" will be deemed to be designed, constructed or operated on the basis of or by the use of transferred relevant technological information if its design, construction or operation is based on the "same or essentially the same" physical and chemical processes as those specified and communicated to the IAEA by the transferor of the relevant technological information which does not include information available to the public.

by any state. Consequently, in supplying Brazil with nuclear equipment, FR Germany also runs the risk of weakening, in the long run, its own non-proliferation 'credentials'.

Because of the link between the peaceful and military aspects of nuclear energy, it can be argued that any supplies destined for nuclear power programmes facilitate the acquisition of nuclear weapon capabilities. This may be so, but the risk is considerably greater when the recipient countries are unhampered by a legally binding commitment not to manufacture nuclear weapons and, especially, when they claim the right to conduct nuclear explosions, as in the case of Brazil or Argentina and, until recently, India.[3] The reactor power cycle may be a more complicated way towards a nuclear weapon capability, both technically and economically, than constructing specialized plants for the production of nuclear explosives, but it is a convenient way in the sense that the intention to produce a bomb is not visible in a civilian nuclear programme, and untoward international repercussions can be avoided while the nuclear weapon potential is being built. There may, of course, be cases when even parties to the NPT plan clandestinely to acquire nuclear weapons. But it must be assumed that nations which adhere to the treaty do so in good faith, unless and until firm evidence to the contrary has been provided.

It can also be argued that certain non-nuclear weapon states, not party to the NPT, might acquire a nuclear weapon capability independently, using their own domestic resources, or in co-operation with other non-parties. This is possible,[4] and, as yet, there exists no international mechanism which could prevent this from happening; a similar situation might arise with other arms control agreements. But if the parties to the NPT speed up proliferation by making it easier and less costly for non-parties to traverse the route towards a nuclear bomb, they undermine the very foundation of the treaty they have themselves constructed.

The most immediate threat to the non-proliferation régime is posed by the spread of reactor-grade plutonium, which is readily convertible into an explosive device, the manufacture of the device itself being no longer a very difficult task (see table 8.1). Some non-nuclear weapon states have probably designed nuclear weapons and perhaps even developed their non-nuclear components, or may do so in the future, since there is nothing in the NPT or in agreements on nuclear transfers to forbid this kind of activity. For such states, access to plutonium is all that is needed to cross the nuclear weapon threshold at any time, just a few kilograms of plutonium being enough to make a bomb. To minimize the availability of this

[3] In 1978, the Indian Prime Minister stated that India would not conduct nuclear explosions even for peaceful purposes, but it still refused to sign the NPT.

[4] It will be noted that components of uranium enrichment installations, as well as materials and equipment for the separation of plutonium, are now commercially available.

material, states should refrain from supplying plutonium-separation equipment, or such separation services as would result in the plutonium being stored under national control of non-nuclear weapon states.

Table 8.1. Fuel reprocessing capabilities

Country	Facility	Type of fuel		Design capacity (tonnes of U per year)
Existing capabilities, commercial scale				
France	La Hague	Either metal, natural; or UO_2		800
	Marcoule	Metal, natural		1 000
FR Germany	Karlsruhe	Breeder, UO_2		40
India	Trombay	Metal, natural		50
	Tarapur	Metal and UO_2		125
Japan	Tokai Mura	UO_2		210
UK	Windscale Works	Metal, natural		2 500
Planned capabilities, commercial scale				
France	La Hague	UO_2	1985	800
	La Hague	UO_2	1989	800
UK	Windscale	UO_2	1984	1 000
	Windscale	UO_2	1987	1 000

The most radical solution would be to renounce reprocessing of spent fuels and to avoid, thereby, the separation of plutonium. This solution may imply giving up the energy potential that fast breeders needing large quantities of plutonium would offer, if breeders ever became an economically attractive proposition for stretching uranium resources or a way to secure independent fuel supplies. But this is a question of priorities, and, in signing the NPT, states have already accepted significant restrictions on their national sovereign rights, and have implicitly agreed that the interest of the international community in halting the spread of nuclear weapons must have precedence over other considerations.

In a 'plutonium economy', it might be well-nigh impossible to preserve a firebreak between nuclear power technology and nuclear weapon capability (not to mention environmental risks as well as the increased danger of plutonium being stolen by sub-national groups and used for terrorist purposes), irrespective of International Atomic Energy Agency (IAEA) safeguards. These safeguards cannot be made fool-proof; moreover, their function is not to avert abuses, but merely to detect diversion of

a significant quantity of weapon-grade material in time for some kind of response. In the case of plutonium, it may require no more than a few days for diverted material to be transformed into an explosive, which is too short a period for effective international action to be mounted. Furthermore, safeguards agreements can be abrogated at short notice, and even withdrawal from the NPT by a country claiming that its "supreme interests" have been jeopardized (Article X) should not be ruled out, notwithstanding the political risks involved in such a drastic step. Emergence of yet another nuclear weapon state would probably be considered reprehensible by most nations, but a stage has not yet been reached where such an event would be regarded as a threat to peace, as defined by the UN Charter, requiring coercive measures to be taken by the UN Security Council against the new proliferator. The defaulting state could, of course, be penalized by a denial of further nuclear material and equipment deliveries by the suppliers, as foreseen in the IAEA Statute. But such a belated sanction will probably not be sufficient to prevent a state, which already possesses the wherewithal, from 'going nuclear'.

II. Nuclear safeguards

Under Article III of the NPT, the non-nuclear weapon states undertook to conclude safeguards agreements with the IAEA covering all their peaceful nuclear activities, within the prescribed time limits of 24 months for the original parties, and 18 months for states acceding later. The stated purpose of these safeguards is to verify the fulfilment of the treaty obligations with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices.[5]

Although the control clauses constitute an inseparable part of the NPT commitments, by 31 December 1979, only 67 out of 108 non-nuclear weapon parties had concluded the required agreements. Many of the defaulting parties are states which as yet have no significant nuclear activities, and there may be nothing to safeguard on their territories. Nevertheless, from the point of view of observance of the treaty provisions, this is an unsatisfactory state of affairs. The first review conference's recommendation, that states party to the NPT that have not yet done so should conclude safeguards agreements with the IAEA "as soon as possible", has still not been implemented.

The 1975 conference declaration attached considerable importance to the continued application of safeguards to the nuclear activities of the non-

[5] Military uses of nuclear energy for non-explosive purposes, for example, for the propulsion of warships or submarines, are not to be covered by controls performed in accordance with the NPT.

nuclear weapon parties to the NPT, "on a non-discriminatory basis". However, the problem of discriminatory treatment of the parties to the NPT as compared with non-parties has not been settled. The latter, as distinct from the former, are still not subject to safeguards comprehensively covering their nuclear activities: safeguards applied in their territories continue to be facility-oriented, which means that they may place nuclear material under IAEA safeguards only in certain facilities, and retain unsafeguarded all or part of a nuclear fuel cycle.

The conference further recommended that "more attention and fuller support" should be given to the improvement of safeguards techniques. As a matter of fact, during the past few years IAEA safeguards techniques have developed considerably, reaching a high degree of sophistication in surveillance and containment. The number of IAEA inspectors has increased parallel with the increased number of nuclear plants placed under safeguards. However, all these measures remain of limited significance, since they apply only to states which have already forsaken the nuclear weapon option by becoming party to the NPT, while significant and sensitive parts of the nuclear programmes of certain states not parties to the NPT remain outside international safeguards. The latter states have little incentive to join the NPT and accept safeguards on all their nuclear activities as long as they are assured of continued nuclear supplies; they may have nothing tangible to gain from abandoning their freedom of action. In other words, for non-proliferation purposes, improving safeguards which apply merely to the nuclear material supplied is inadequate.

In 1977, realizing that commercial competition hampers the pursuance of non-proliferation objectives, a group of 15 supplier states, members of the so-called London Club, adopted guidelines for nuclear transfers, streamlining the terms for transfer of nuclear items and technology. In particular, they drew up a so-called trigger list, that is, a list of goods which, when exported, 'trigger' the application of safeguards in the recipient countries. But no agreement has been reached on the question of full-scope safeguards to be required as a condition for nuclear supplies, and exports of highly sensitive nuclear facilities have not been prohibited. Since then, certain supplier countries have unilaterally adopted more restrictive export policies than those required by the London guidelines, with or without special national legislative acts, but supplies of nuclear materials, plants or know-how, without safeguards on the full fuel cycle, have not been brought to a halt. Thus, after a period of hesitation following the adoption in 1978 of the Nuclear Non-Proliferation Act, which specifically requires IAEA safeguards for all nuclear materials in all peaceful activities of the recipient states, the USA resumed its shipments of enriched uranium to India, in spite of the latter country's reiterated

categorical rejection of full-scope safeguards. In addition, the USSR shipped a large amount of heavy water to India, in spite of its advocacy of full-scope safeguards in non-nuclear weapon states.

NPT safeguards are applied in many countries without hampering their economic, scientific or technological development. A concerted denial of nuclear material deliveries to states unwilling to accept NPT safeguards would not, therefore, be a measure promoting particular political or commercial interests, as was the case with the oil embargo. At any rate, nuclear items are not ordinary items of international trade; they demand special policies, even if such policies are seen as discriminatory. Isolation from international co-operation in the peaceful uses of nuclear energy can provide considerable leverage: a few countries have already been pressured into acceding to the NPT in order to qualify as nuclear material importers.[6] If, in addition to these restrictions, the parties to the NPT undertook to import nuclear material or equipment only from other parties, pressure would be put on the exporting countries to observe the non-proliferation rule, with the result that the quantities of nuclear material entering the world market outside the framework of the NPT would be further reduced. The suggested restrictions would apply only to the provision of elements of the nuclear fuel cycle, bearing in mind that for the majority of nations nuclear power is still a rather distant prospect. For them, the use of nuclear science and nuclear techniques in food preservation and production, in agricultural research, in medicine, in water resources development and in geological and industrial applications, is of more immediate concern. International co-operation in these fields should continue under all circumstances.

Ever since the signing of the NPT, a number of countries, especially in the industrialized world, have insisted that all nuclear weapon powers party to the treaty should agree to apply IAEA safeguards to their peaceful nuclear activities, even though they are not obliged to do so under the treaty. Since the first review conference, the UK has voluntarily submitted its non-military nuclear installations to safeguards under IAEA supervision, and the United States has negotiated a similar agreement. Also France, a non-party to the NPT, signed an agreement under which part of its nuclear facilities will be placed under IAEA safeguards. However, the right of these states to withdraw nuclear material from civilian activities and to use it for military purposes has remained unaffected.

Wider openness of nuclear weapon states to verification may somewhat reduce the sense of discrimination of non-nuclear weapon states and satisfy the commercial interests of the nuclear industry. But, as far as non-

[6] Recently, the USA has gone even further in this respect by deciding to wind down its economic assistance to Pakistan, which refused to place under international safeguards the uranium enrichment plant it was building.

proliferation of nuclear weapons is concerned, safeguarding peaceful activities in countries unrestricted in their military nuclear programmes seems pointless: it amounts to verifying the fulfilment of non-existing obligations. On the other hand, it would appear useful to safeguard nuclear items imported by nuclear weapon powers, in order to ensure that these items do not contribute to a further build-up of nuclear weapon arsenals.

III. Physical protection of nuclear materials

The first review conference recognized the need for physical protection of nuclear materials in storage, use or transit. It called upon all states engaging in peaceful nuclear activities to enter into such international agreements and arrangements as may be necessary to ensure this protection.

In 1977, the IAEA published recommendations for the physical protection of nuclear materials (a modified and extended version of recommendations issued first in 1972, and revised in 1975), which were accepted by the London Club as a basis for guiding recipient countries in designing a system of physical protection measures and procedures.

On 26 October 1979, the negotiation of a Convention on the Physical Protection of Nuclear Material was concluded at the IAEA in Vienna. The convention, which took two years to negotiate, is the first international treaty on physical protection of nuclear materials. (For the text of this convention, see appendix 8A.)

Fifty-eight countries and the European Atomic Energy Community participated in the negotiations. The 23-article convention establishes standard measures of physical protection to apply to nuclear material[7] when transported from country to country.

The novelty of the convention lies in its definition of nuclear crimes which each state is committed to punish (as grave offences) under its national law. These include: an act without lawful authority which constitutes the receipt, possession, use, transfer, alteration, disposal, or dispersal of nuclear material and which causes or is likely to cause death or serious injury to any person or substantial property damage; the theft or embezzlement of nuclear material; the demand for nuclear material by threat or use of force or any other form of intimidation; and the threat to use nuclear material to cause death or serious injury to any person or

[7] 'Nuclear material' means plutonium, except that with isotopic concentration exceeding 80 per cent in plutonium-238; uranium-233; uranium enriched in the isotopes 235 or 233; uranium containing the mixture of isotopes as occurring in nature other than in the form of ore or ore residue; or any material containing one or more of the aforementioned.

substantial property damage. Parties that have agreed to co-operate in preventive measures will exchange information about thefts, sabotage, and extortion involving nuclear material; will regard the defined crimes as extraditable; and will assist each other in nuclear criminal proceedings, including the supply of any evidence they may have.

Under the convention, nuclear material must be protected during transport to a specified level, depending on the amount and type of material involved. For example, the transport of two or more kilograms of plutonium or five or more kilograms of uranium enriched to above 20 per cent uranium-235, must take place "under constant surveillance of escorts and under conditions which assure close communication with appropriate response forces". Storage of nuclear material during international transport must be within an area under constant surveillance by guards or electronic devices and surrounded by a physical barrier.

The number of shipments each year of various items in the nuclear fuel cycle, already large, will become huge. According to the IAEA, in 1980 there will be about 670 shipments of fresh reactor fuel elements, 2 000 shipments of spent reactor fuel, 20 shipments of plutonium, and 630 shipments of radioactive waste and fission products. The IAEA predicts that by the year 1990 there will be 2 500 shipments of fresh fuel, 6 400 shipments of spent fuel, 143 shipments of plutonium, and 2 450 shipments of waste and fission products.

Nuclear material is very vulnerable to theft or sabotage while being transported. In fact, transport is the weakest link in the nuclear chain. International regulations are, therefore, essential.

Strictly speaking, the physical protection of nuclear materials lies outside the framework of the NPT. Nevertheless, unlawful seizure of nuclear material might have serious repercussions for the durability of the NPT and for the security of nations in general. To reduce further the risk of such occurrence, there should be internationally binding rules for the protection of nuclear material in domestic use and storage. Even without formal treaties, observance of the minimum standards, as have already been agreed to, should be a condition for supplying nuclear material and equipment. It is, of course, essential that the nuclear weapon powers take all the necessary measures to protect their stockpiles of nuclear weapons against theft or other abuse.

IV. Peaceful uses of nuclear energy

Article IV of the NPT deals with the contribution by states in a position to do so to the development of the applications of nuclear energy for peaceful purposes, "especially in the territories of non-nuclear-weapon

States Party to the Treaty, with due consideration for the needs of the developing areas of the world".

The above provision has made little impact on international nuclear collaboration, and its implementation was seriously questioned by many participants at the 1975 review conference when statistics showed that non-parties to the NPT had benefited considerably more from international exchanges in the field of peaceful uses of nuclear energy than had the parties to the treaty. This anomaly was recognized in the final declaration of the conference which recommended, *inter alia*, that in reaching decisions on the provision of equipment, materials, services, and scientific and technological information for the peaceful uses of nuclear energy, on concessional and other appropriate financial arrangements, and on the furnishing of technical assistance in the nuclear field, including co-operation related to the continuous operation of peaceful nuclear facilities, states party to the treaty "should give weight" to adherence to the NPT by recipient states.

During the past years, a few states have voluntarily contributed funds or grants in kind to the IAEA, especially earmarked for technical assistance to the NPT parties.[8] As far as supply of nuclear material and equipment on a bilateral basis is concerned, it is difficult to assess whether the recommendation to accord preferential treatment to parties has actually been carried out. In any event, the NPT is primarily an arms control treaty, its provision for international co-operation in the application of nuclear energy for peaceful purposes being subordinated to the non-proliferation obligations.

V. Internationalization of sensitive elements in the nuclear fuel cycle

US nuclear policy of deferring the reprocessing of nuclear fuel and the commercial use of nuclear reactors, first announced in April 1977, is exceedingly unpopular—particularly in France, FR Germany, the UK and Japan, the countries intent on developing fast breeder reactors (see table 8.2). To defuse the issue and gain a breathing spell, the President sponsored in October 1977 the International Nuclear Fuel Cycle Evaluation (INFCE), a technical and analytical study of how "the skills, facilities or materials used in the nuclear fuel cycle might be abused for purposes of weapons production". INFCE's work was divided among eight groups dealing with: fuel and heavy water availability; enrichment availability;

[8] Under its Statute, the IAEA is to give due consideration to the needs of the underdeveloped areas of the world, but it is not authorized, on its own, to differentiate between parties and non-parties to other international treaties, such as the NPT.

assurances of long-term supply of technology, fuel and heavy water, and services in the interest of national needs consistent with non-proliferation; reprocessing, plutonium handling and recycle; fast breeders; spent fuel management; waste management and disposal; and advanced fuel cycle and reactor concepts.

Table 8.2. Fast breeder reactors with power output greater than 150 MW(e)

Country	Reactor	Power output (MW(e))	Expected date of operation
France	Phénix	250	Operating
	Super Phénix	1 200	1983
FR Germany	Kalkar SNR1	292	1983–88
	Kalkar SNR2	1 300	1989
Japan	Monju	250	1985
UK	Dounreay	230	Operating
USA	Clinch River	350	1983
USSR	Beloyarsk	600	1980

The working groups held 61 meetings on 174 days, were attended by 519 participants from 46 countries, and produced some 20 000 pages of documents.

Given the enthusiasm of some countries for breeder reactors and of others for plutonium recycle, INFCE implies that reprocessing plants may spread. For economic reasons, most will be of large size.

At present, 28 countries are operating 234 power reactors (of output greater than 100 MW(e)), generating a total of about 120 GW(e) (see table 8.3). About another 250 power reactors are under construction.

According to INFCE data—and the establishment of a data base is a useful outcome of the evaluation—nuclear generating capacity in the non-socialist world will be between 245 and 274 gigawatts of electricity by 1986, between 550 and 770 GW(e) by 1996, between 1 100 and 1 650 GW(e) by 2006, and between 1 800 and 3 900 GW(e) by 2026. Even though some socialist countries participated in INFCE (the USSR was a co-chairman of a working group), they refused to give details of their nuclear programmes. (Probably about 10 per cent should be added to the above figures for these countries.)

Uranium requirements may range from 85 000 to 200 000 tons a year in the year 2000. A production rate of about 100 000 tons of uranium a year is feasible in the last few years of this century. New sources of production supported by new discoveries of uranium will, therefore, probably be needed by 2000. But, if the necessary exploration and financial investments are made, the uranium industry should be able to meet demand for the rest of the century. The situation after that is very speculative.

Table 8.3. Power reactors in the world, as of 31 December 1979[a]

Country	Operating reactors		Reactors under construction	
	Number of units	Total MW(e)	Number of units	Total MW(e)
Argentina	1	345	1	600
Belgium	4	1 676	4	3 811
Brazil	–	–	3	3 116
Bulgaria	2	816	2	828
Canada	10	5 245	14	9 751
Cuba	–	–	1	408
Czechoslovakia	2	491	3	1 142
Finland	2	1 080	2	1 080
France	16	8 163	21	20 290
German DR	4	1 287	5	2 040
FR Germany	15	8 782	10	10 638
Hungary	–	–	2	816
India	3	602	5	1 087
Italy	4	1 382	3	1 996
Japan	21	13 249	11	9 408
Korea, Republic of	1	564	6	5 137
Mexico	–	–	2	1 308
Netherlands	2	499	–	–
Pakistan	1	125	–	–
Philippines	–	–	1	621
South Africa	–	–	2	1 843
Spain	3	1 073	7	6 302
Sweden	6	3 700	6	5 682
Switzerland	4	1 926	1	942
Taiwan	2	1 208	2	1 902
UK	32	6 890	6	3 714
USA	69	50 644	88	96 408
USSR	30	10 616	18	15 200
Yugoslavia	–	–	1	632
Total	**234**	**120 363**	**227**	**206 702**

[a] Reactors in the power ascension phase are included in operating plants. Gentilly-1, Winfrith SG HWR, Fugen ATR and Indian Point-1 are not included. Construction in Austria and in Iran has been interrupted, so the plants are not included.

Source: *Based on Power Reactors in Member States* (IAEA, Vienna, 1979).

The amounts of plutonium which will be produced by the nuclear capacities foreseen by INFCE are huge. By the year 2000, about 250 000 kg of plutonium will be produced annually, theoretically enough to make roughly 50 000 atomic bombs of the Nagasaki type. So far, a total of 100 000 kg of plutonium has been accumulated from nuclear reactors.

INFCE makes it crystal clear that there is no technological solution to the nuclear weapon proliferation problem. If there is to be a solution, it must be a political one.

Internationalization of the sensitive parts of the nuclear fuel cycle would be a way to establish some control over the materials and processes of peaceful energy programmes which now threaten to escape safeguards

and bring nuclear weapons within easy reach of many additional countries. It is especially aimed at ensuring the operation of enrichment and reprocessing plants in the interests of international security.

A variety of international measures presently under consideration could provide a starting-point for the internationalization process. Yet none of these measures in isolation would suffice to prevent the misuse of fissile materials. Multinational arrangements for enrichment and reprocessing plants might offer some assurances regarding security objectives, while providing efficient operations and satisfying economic interests as well. A more effective approach, however, would be to establish one international authority to operate all the sensitive facilities and release fissile materials only in the form of reactor fuel elements.

It is true that internationalization could only block some of the channels to nuclear proliferation. It could not deal with those countries which might seek nuclear weapons for political reasons, nor with countries which might stay outside an international system precisely in order to foster the uncertainty about their nuclear status. Internationalization could primarily relieve increasingly pervasive fears that any country with a peaceful nuclear energy programme could develop nuclear weapons.

The mutual interests of many countries in finding solutions to these problems, clearly manifested during INFCE, must not be allowed to flag. Despite the recent slowdown in nuclear power development, the next 20 years will witness a significant increase in the number of new reactors as well as an increase in the number of countries coming into the nuclear energy business. What is needed now is a concerted effort on the part of the political leaders in nuclear supplier and recipient states to co-operate on these crucial international issues of the future and accept the responsibilities incumbent on users of this highly dangerous energy source.

VI. Disarmament obligations

Article VI of the NPT contains a commitment to pursue negotiations "in good faith" on effective measures relating to the cessation of the nuclear arms race and to nuclear disarmament, as well as on a treaty on general and complete disarmament under strict and effective international control.

Although, formally, all parties undertook the above obligation, and the depositary states are usually keen to stress this point, it is clear that nuclear disarmament, which is of paramount importance in a treaty dealing with nuclear proliferation, can be effected only by the nuclear powers. It is therefore these powers, parties to the NPT, that were subjected to criticism at the first review conference for not fulfilling the relevant undertakings. The non-nuclear weapon participants at the review conference, in parti-

cular representatives of the non-aligned countries, drew attention to and showed concern about the continuing nuclear weapon test programmes and the steady increase of nuclear arsenals in spite of the negotiations on their limitation. In response to the Soviet contention that the basic problems of nuclear disarmament can be solved only with the participation of all nuclear weapon powers, two of which had not adhered to the NPT, opinion was expressed that the USA and the USSR, being by far the most powerful nations, should take the lead in the disarmament process, thereby encouraging other states to join. Various proposals were put forward with a view to speeding up the conclusion of arms control agreements which would substantially reduce the levels of nuclear armaments and halt their qualitative development. All these proposals proved unacceptable to the nuclear weapon states. They refused to discuss any timetable for nuclear arms control measures, even though, according to the NPT, such measures should be carried out "at an early date". They contended that the review conference was not competent to deal with a matter which was their exclusive concern, and that it was up to the SALT negotiators to determine the pace of progress in nuclear arms limitation. And yet the review conference recognized that it is essential to maintain in the implementation of the NPT an acceptable balance of mutual responsibilities and obligations of all the parties to the treaty. The proposals presented at the conference were intended precisely to redress the balance by matching the cessation of 'horizontal' proliferation with a halt to 'vertical' proliferation.

Doubts are sometimes expressed as to whether there exists a relationship between the two types of proliferation. Indeed, if at this stage any new country acquires nuclear weapons, it will do so presumably in order to intimidate or impress its immediate neighbours, or to enhance its international standing and gain more political prestige, influence and consideration in world councils, rather than to compete militarily with the present nuclear weapon powers, especially the USA and the USSR. Whether or not nuclear weapons will spread any further will also depend on the resolution of the most acute regional conflicts. Be that as it may, a treaty denying a powerful weapon to most nations in order to preserve a firebreak between the 'haves' and 'have-nots' is not likely to withstand the pressures of a continued arms race. Since nuclear weapons appear to have political and military usefulness for the nuclear powers, the non-nuclear weapon countries may feel that they too must obtain these advantages. A dynamic process of nuclear disarmament is therefore necessary to de-emphasize the role and utility of nuclear weaponry in world diplomacy and military strategy and to generate political and moral inhibitions dampening the nuclear ambitions of certain non-nuclear weapon states.

Consequently, the first review conference appealed to the nuclear weapon parties to the NPT to make every effort to reach agreement on the

conclusion of an effective comprehensive test ban. It also called upon the USA and the USSR meanwhile to limit the number of their underground nuclear weapon tests to a minimum. Furthermore, the conference appealed to the two major powers to endeavour to conclude at the earliest possible date an agreement on the limitation of strategic arms outlined by their leaders in November 1974, and stated that it was looking forward to the commencement of follow-up negotiations on "further limitations of, and significant reductions in, their nuclear weapons systems" as soon as possible following the conclusion of such an agreement. Also the CCD was urged to increase its efforts to achieve effective disarmament agreements on all subjects on its agenda. These recommendations and appeals have not been fulfilled.

The treaty on the cessation of all nuclear weapon tests has not materialized and the rate of testing has not decreased. In fact, the number of nuclear explosions conducted by the USA and the USSR in 1979 was nearly 40 per cent higher than that in 1975. Moreover, there has been a significant increase in the size of the nuclear arsenals. Since 1975, the total number of nuclear warheads on US and Soviet strategic bombers and missiles has grown by 30 per cent.

The second round of the US–Soviet strategic arms limitation talks (SALT II) will introduce new rules in the nuclear competition between the two powers. It will result in a modest reduction of obsolete nuclear delivery vehicles over the next few years, in some restructuring of the strategic forces, and in a few temporary restraints on the qualitative improvement of the nuclear weapon systems. But certain important missile deployments will still be carried out, as planned, thus further increasing the destructive power of the US and Soviet strategic arsenals, while non-strategic nuclear weapons are subject to no restrictions whatsoever (see chapter 6).

The UN Special Session on Disarmament, held in 1978, called for negotiations on the cessation of the production of fissionable material for weapon purposes. Considering that such a cut-off measure would contribute towards the efforts to promote non-proliferation, limit the production of nuclear weapons and facilitate nuclear disarmament, the 33rd UN General Assembly decided to transmit the matter to the Disarmament Committee. However, there are no prospects for an early agreement halting the production of weapon-grade fissionable material. In any case, the arms control effect of such an agreement would not be significant: the amounts of weapon-grade material already accumulated by the nuclear weapon states make it possible for them to continue the manufacture of arms for the foreseeable future. Nevertheless, the introduction of international safeguards on all the relevant activities of the nuclear weapon states, which an effective cut-off treaty would require, might rectify one of

the unbalanced provisions of the NPT: that which imposes control only on non-nuclear weapon states.

The final declaration of the review conference contains a reference to Article VII of the NPT, which re-affirms the right of any group of states to conclude regional treaties in order to assure the absence of nuclear weapons in their respective territories. The declaration expresses the conviction that the establishment of nuclear weapon-free zones is an effective means of curbing the spread of nuclear weapons. At present, there exists only one such zone in the populated part of the world, namely, in Latin America. Since the 1975 NPT review conference, the number of parties to the Treaty of Tlatelolco, which set up the zone, has increased, but its principal goal has not yet been achieved: Argentina and Brazil, the only countries in the area with any nuclear potential and aspirations, are still not bound by its provisions. Proposals for creating nuclear weapon-free zones in Africa, the Middle East or South Asia were amply discussed, but no steps have been taken towards their realization. Equally, no progress has been made in the work of the Disarmament Committee. Since 1975, this Committee has been unable to work out any new agreement, with the exception of the convention prohibiting the use of environmental modification techniques for hostile purposes, which is of doubtful arms control value.

Nevertheless, a big-power nuclear rivalry and lack of progress in disarmament negotiations should not be used as justification for other nations to acquire or seek to acquire nuclear weapons. The NPT serves the interests of all, and the emergence of more new nuclear weapon powers would jeopardize international security in general.

VII. The second review conference

By the end of 1979, the number of parties to the NPT had reached 111. This number, which includes three nuclear weapon powers—the UK, the USA and the USSR—as well as many highly developed countries not possessing nuclear weapons, may be taken as evidence that the non-proliferation idea has been accepted by a substantial portion of the international community. However, the non-proliferation régime will be in constant danger as long as the NPT has not been subscribed to by all states having significant nuclear activities, and there are now about a dozen states belonging to this category which remain outside the treaty. Only such universal adherence to the NPT could reinforce the legal barrier against further nuclear weapon dissemination. The second review conference provides an opportunity to promote this goal through concrete measures directed at both parties and non-parties to the NPT:

1. The nuclear weapon powers should clearly commit themselves to reversing the arms race; they could start by halting permanently all nuclear weapon tests and undertaking to reduce significantly their strategic and tactical nuclear armaments.
2. Participation in the treaty should be made more attractive by the provision of internationally agreed, legally binding security assurances to non-nuclear weapon parties (see chapter 9).
3. Pressure should be brought to bear upon non-parties by denial of supplies of nuclear materials and equipment, while outright defiance of the treaty should be met with more stringent measures.
4. The obligation not to assist others to manufacture nuclear weapons should apply to all states without exception and, consequently, all exports of nuclear material and equipment to nuclear weapon powers should be subject to IAEA safeguards so as to avoid their use for weapon purposes.
5. Safeguards procedures should be improved, and IAEA authority strengthened, to enable both rapid detection of any diversion of fissionable material for weapon purposes and quick subsequent action.

Insofar as the peaceful use of nuclear energy is concerned, the cause of non-proliferation would best be served if the following conditions were met.

1. The sensitive parts of the nuclear fuel cycle, that is, uranium enrichment, fuel fabrication and reprocessing, should be managed on an international scale and operated only under the authority of an international agency with full responsibility for the security of the plants and their sites.
2. An international repository of spent fuels and a bank of fresh fuels should be established.
3. Encouragement, including financial support, should be given to countries wishing to rely on non-nuclear sources of energy. This might be best achieved by the setting up of a specialized international body to deal with energy matters.

Of the measures suggested above, those dealing with political aspects of the problem of non-proliferation are of primary importance, because the problem itself is basically political. But they ought to be accompanied by technical measures of control to assure a clear distinction between nuclear power and nuclear weapons. All this can be achieved through agreed statements of understanding of the NPT provisions and/or international instruments complementary to the treaty. The NPT is the main tool in stemming the dangerous proliferation drift, and no efforts must be spared to avert its collapse. It is, however, essential for the next review conference formally to recognize that the NPT is not an end in itself, but merely a transitional stage in the process of nuclear disarmament.

Appendix 8A

Convention on the physical protection of nuclear material

The convention was opened for signature on 3 March 1980 simultaneously at the Headquarters of the IAEA in Vienna and at the Headquarters of the United Nations in New York.

THE STATES PARTIES TO THIS CONVENTION,

RECOGNIZING the right of all States to develop and apply nuclear energy for peaceful purposes and their legitimate interests in the potential benefits to be derived from the peaceful application of nuclear energy,

CONVINCED of the need for facilitating international co-operation in the peaceful application of nuclear energy,

DESIRING to avert the potential dangers posed by the unlawful taking and use of nuclear material,

CONVINCED that offences relating to nuclear material are a matter of grave concern and that there is an urgent need to adopt appropriate and effective measures to ensure the prevention, detection and punishment of such offences,

AWARE OF THE NEED FOR international co-operation to establish, in conformity with the national law of each State Party and with this Convention, effective measures for the physical protection of nuclear material,

CONVINCED that this Convention should facilitate the safe transfer of nuclear material,

STRESSING also the importance of the physical protection of nuclear material in domestic use, storage and transport,

RECOGNIZING the importance of effective physical protection of nuclear material used for military purposes, and understanding that such material is and will continue to be accorded stringent physical protection,

HAVE AGREED as follows:

ARTICLE 1

For the purposes of this Convention:

(a) "nuclear material" means plutonium except that with isotopic concentration exceeding 80% in plutonium-238; uranium-233; uranium enriched in the isotopes 235 or 233; uranium containing the mixture of isotopes as occurring in nature other than in the form of ore or ore-residue; any material containing one or more of the foregoing;

(b) "uranium enriched in the isotope 235 or 233" means uranium containing the isotopes 235 or 233 or both in an amount such that the abundance ratio of the sum of these isotopes to the isotope 238 is greater than the ratio of the isotope 235 to the isotope 238 occurring in nature;

(c) "international nuclear transport" means the carriage of a consignment of nuclear material by any means of transportation intended to go beyond the territory of the State where the shipment originates beginning with the departure from a facility of the shipper in that State and ending with the arrival at a facility of the receiver within the State of ultimate destination.

ARTICLE 2

1. This Convention shall apply to nuclear material used for peaceful purposes while in international nuclear transport.

2. With the exception of articles 3 and 4 and paragraph 3 of article 5, this Convention shall also apply to nuclear material used for peaceful purposes while in domestic use, storage and transport.

3. Apart from the commitments expressly undertaken by States Parties in the articles covered by paragraph 2 with respect to nuclear material used for peaceful purposes while in domestic use, storage and transport, nothing in this Convention shall be interpreted as affecting the sovereign rights of a State regarding the domestic use, storage and transport of such nuclear material.

ARTICLE 3

Each State Party shall take appropriate steps within the framework of its national law and consistent with international law to ensure as far as practicable that, during international nuclear transport, nuclear material within its territory, or on board a ship or aircraft under its jurisdiction insofar as such ship or aircraft is engaged in the transport to or from that State, is protected at the levels described in Annex I.

ARTICLE 4

1. Each State Party shall not export or authorize the export of nuclear material unless the State Party has received assurances that such material will be protected during the international nuclear transport at the levels described in Annex I.

2. Each State Party shall not import or authorize the import of nuclear material from a State not party to this Convention unless the State Party has received assurances that such material will during the international nuclear transport be protected at the levels described in Annex I.

3. A State Party shall not allow the transit of its territory by land or internal waterways or through its airports or seaports of nuclear material between States that are not parties to this Convention unless the State Party has received assurances as far as practicable that this nuclear material will be protected during international nuclear transport at the levels described in Annex I.

4. Each State Party shall apply within the framework of its national law the levels of physical protection described in Annex I to nuclear material being transported from a part of that State to another part of the same State through international waters or airspace.

5. The State Party responsible for receiving assurances that the nuclear material will be protected at the levels described in Annex I according to paragraphs 1 to 3 shall identify and inform in advance States which the nuclear material is expected to transit by land or internal waterways, or whose airports or seaports it is expected to enter.

6. The responsibility for obtaining assurances referred to in paragraph 1 may be transferred, by mutual agreement, to the State Party involved in the transport as the importing State.

7. Nothing in this article shall be interpreted as in any way affecting the territorial sovereignty and jurisdiction of a State, including that over its airspace and territorial sea.

ARTICLE 5

1. States Parties shall identify and make known to each other directly or through the International Atomic Energy Agency their central authority and point of contact having responsibility for physical protection of nuclear material and for co-ordinating recovery and response operations in the event of any unauthorized removal, use or alteration of nuclear material or in the event of credible threat thereof.

2. In the case of theft, robbery or any other unlawful taking of nuclear material or of credible threat thereof, States Parties shall, in accordance with their national law, provide co-operation and assistance to the maximum feasible extent in the recovery and protection of such material to any State that so requests. In particular:

(a) a State Party shall take appropriate steps to inform as soon as possible other States, which appear to it to be concerned, of any theft, robbery or other unlawful taking of nuclear material or credible threat thereof and to inform, where appropriate, international organizations;

(b) as appropriate, the States Parties concerned shall exchange information with each other or international organizations with a view to protecting threatened nuclear material, verifying the integrity of the shipping container, or recovering unlawfully taken nuclear material and shall:

(i) co-ordinate their efforts through diplomatic and other agreed channels;

(ii) render assistance, if requested;

(iii) ensure the return of nuclear material stolen or missing as a consequence of the above-mentioned events.

The means of implementation of this co-operation shall be determined by the States Parties concerned.

3. States Parties shall co-operate and consult as appropriate, with each other directly or through international organizations, with a view to obtaining guidance on the design, maintenance and improvement of systems of physical protection of nuclear material in international transport.

ARTICLE 6

1. States Parties shall take appropriate measures consistent with their national law to protect the confidentiality of any information which they receive in confidence by virtue of the provisions of this Convention from another State Party or through participation in an activity carried out for the implementation of this Convention. If States Parties provide information to international organizations in confidence, steps shall be taken to ensure that the confidentiality of such information is protected.

2. States Parties shall not be required by this Convention to provide any information which they are not permitted to communicate pursuant to national law or which would jeopardize the security of the State concerned or the physical protection of nuclear material.

ARTICLE 7

1. The intentional commission of:

(a) an act without lawful authority which constitutes the receipt, possession, use, transfer, alteration, disposal or dispersal of nuclear material and which causes

or is likely to cause death or serious injury to any person or substantial damage to property;

(b) a theft or robbery of nuclear material;

(c) an embezzlement or fraudulent obtaining of nuclear material;

(d) an act constituting a demand for nuclear material by threat or use of force or by any other form of intimidation;

(e) a threat:

(i) to use nuclear material to cause death or serious injury to any person or substantial property damage, or

(ii) to commit an offence described in sub-paragraph (b) in order to compel a natural or legal person, international organization or State to do or to refrain from doing any act;

(f) an attempt to commit any offence described in paragraphs (a), (b) or (c);

(g) an act which constitutes participation in any offence described in paragraphs (a) to (f)

shall be made a punishable offence by each State Party under its national law.

2. Each State Party shall make the offences described in this article punishable by appropriate penalties which take into account their grave nature.

ARTICLE 8

1. Each State Party shall take such measures as may be necessary to establish its jurisdiction over the offences set forth in article 7 in the following cases:

(a) when the offence is committed in the territory of that State or on board a ship or aircraft registered in that State;

(b) when the alleged offender is a national of that State.

2. Each State Party shall likewise take such measures as may be necessary to establish its jurisdiction over these offences in cases where the alleged offender is present in its territory and it does not extradite him pursuant to article 11 to any of the States mentioned in paragraph 1.

3. This Convention does not exclude any criminal jurisdiction exercised in accordance with national law.

4. In addition to the States Parties mentioned in paragraphs 1 and 2, each State Party may, consistent with international law, establish its jurisdiction over the offences set forth in article 7 when it is involved in international nuclear transport as the exporting or importing State.

ARTICLE 9

Upon being satisfied that the circumstances so warrant, the State Party in whose territory the alleged offender is present shall take appropriate measures, including detention, under its national law to ensure his presence for the purpose of prosecution or extradition. Measures taken according to this article shall be notified without delay to the States required to establish jurisdiction pursuant to article 8 and, where appropriate, all other States concerned.

ARTICLE 10

The State Party in whose territory the alleged offender is present shall, if it does not extradite him, submit, without exception whatsoever and without undue delay, the case to its competent authorities for the purpose of prosecution, through proceedings in accordance with the laws of that State.

ARTICLE 11

1. The offences in article 7 shall be deemed to be included as extraditable offences in any extradition treaty existing between States Parties. States Parties undertake to include those offences as extraditable offences in every future extradition treaty to be concluded between them.

2. If a State Party which makes extradition conditional on the existence of a treaty receives a request for extradition from another State Party with which it has no extradition treaty, it may at its option consider this Convention as the legal basis for extradition in respect of those offences. Extradition shall be subject to the other conditions provided by the law of the requested State.

3. States Parties which do not make extradition conditional on the existence of a treaty shall recognize those offences as extraditable offences between themselves subject to the conditions provided by the law of the requested State.

4. Each of the offences shall be treated, for the purpose of extradition between States Parties, as if it had been committed not only in the place in which it occurred but also in the territories of the States Parties required to establish their jurisdiction in accordance with paragraph 1 of article 8.

ARTICLE 12

Any person regarding whom proceedings are being carried out in connection with any of the offences set forth in article 7 shall be guaranteed fair treatment at all stages of the proceedings.

ARTICLE 13

1. States Parties shall afford one another the greatest measure of assistance in connection with criminal proceedings brought in respect of the offences set forth in article 7, including the supply of evidence at their disposal necessary for the proceedings. The law of the State requested shall apply in all cases.

2. The provisions of paragraph 1 shall not affect obligations under any other treaty, bilateral or multilateral, which governs or will govern, in whole or in part, mutual assistance in criminal matters.

ARTICLE 14

1. Each State Party shall inform the depositary of its laws and regulations which give effect to this Convention. The depositary shall communicate such information periodically to all States Parties.

2. The State Party where an alleged offender is prosecuted shall, wherever practicable, first communicate the final outcome of the proceedings to the States directly concerned. The State Party shall also communicate the final outcome to the depositary who shall inform all States.

3. Where an offence involves nuclear material used for peaceful purposes in domestic use, storage or transport, and both the alleged offender and the nuclear material remain in the territory of the State Party in which the offence was committed, nothing in this Convention shall be interpreted as requiring that State Party to provide information concerning criminal proceedings arising out of such an offence.

ARTICLE 15

The Annexes constitute an integral part of this Convention.

ARTICLE 16

1. A conference of States Parties shall be convened by the depositary five years after the entry into force of this Convention to review the implementation of the Convention and its adequacy as concerns the preamble, the whole of the operative part and the annexes in the light of the then prevailing situation.

2. At intervals of not less than five years thereafter, the majority of States Parties may obtain, by submitting a proposal to this effect to the depositary, the convening of further conferences with the same objective.

ARTICLE 17

1. In the event of a dispute between two or more States Parties concerning the interpretation or application of this Convention, such States Parties shall consult with a view to the settlement of the dispute by negotiation, or by any other peaceful means of settling disputes acceptable to all parties to the dispute.

2. Any dispute of this character which cannot be settled in the manner prescribed in paragraph 1 shall, at the request of any party to such dispute, be submitted to arbitration or referred to the International Court of Justice for decision. Where a dispute is submitted to arbitration, if, within six months from the date of the request, the parties to the dispute are unable to agree on the organization of the arbitration, a party may request the President of the International Court of Justice or the Secretary-General of the United Nations to appoint one or more arbitrators. In case of conflicting requests by the parties to the dispute, the request to the Secretary-General of the United Nations shall have priority.

3. Each State Party may at the time of signature, ratification, acceptance or approval of this Convention or accession thereto declare that it does not consider itself bound by either or both of the dispute settlement procedures provided for in paragraph 2. The other States Parties shall not be bound by a dispute settlement procedure provided for in paragraph 2, with respect to a State Party which has made a reservation to that procedure.

4. Any State Party which has made a reservation in accordance with paragraph 3 may at any time withdraw that reservation by notification to the depositary.

ARTICLE 18

1. This Convention shall be open for signature by all States at the Headquarters of the International Atomic Energy Agency in Vienna and at the Headquarters of the United Nations in New York from 3 March 1980 until its entry into force.

2. This Convention is subject to ratification, acceptance or approval by the signatory States.

3. After its entry into force, this Convention will be open for accession by all States.

4. (a) This Convention shall be open for signature or accession by international organizations and regional organizations of an integration or other nature, provided that any such organization is constituted by sovereign States and has competence in respect of the negotiation, conclusion and application of international agreements in matters covered by this Convention.

(b) In matters within their competence, such organizations shall, on their own behalf, exercise the rights and fulfil the responsibilities which this Convention attributes to States Parties.

(c) When becoming party to this Convention such an organization shall communicate to the depositary a declaration indicating which States are members thereof and which articles of this Convention do not apply to it.

(d) Such an organization shall not hold any vote additional to those of its Member States.

5. Instruments of ratification, acceptance, approval or accession shall be deposited with the depositary.

ARTICLE 19

1. This Convention shall enter into force on the thirtieth day following the date of deposit of the twenty first instrument of ratification, acceptance or approval with the depositary.

2. For each State ratifying, accepting, approving or acceding to the Convention after the date of deposit of the twenty first instrument of ratification, acceptance or approval, the Convention shall enter into force on the thirtieth day after the deposit by such State of its instrument of ratification, acceptance, approval or accession.

ARTICLE 20

1. Without prejudice to article 16 a State Party may propose amendments to this Convention. The proposed amendment shall be submitted to the depositary who shall circulate it immediately to all States Parties. If a majority of States Parties request the depositary to convene a conference to consider the proposed amendments, the depositary shall invite all States Parties to attend such a conference to begin not sooner than thirty days after the invitations are issued. Any amendment adopted at the conference by a two-thirds majority of all States Parties shall be promptly circulated by the depositary to all States Parties.

2. The amendment shall enter into force for each State Party that deposits its instrument of ratification, acceptance or approval of the amendment on the thirtieth day after the date on which two thirds of the States Parties have deposited their instruments of ratification, acceptance or approval with the depositary. Thereafter, the amendment shall enter into force for any other State Party on the day on which that State Party deposits its instrument of ratification, acceptance or approval of the amendment.

ARTICLE 21

1. Any State Party may denounce this Convention by written notification to the depositary.

2. Denunciation shall take effect one hundred and eighty days following the date on which notification is received by the depositary.

ARTICLE 22

The depositary shall promptly notify all States of:

(a) each signature of this Convention;
(b) each deposit of an instrument of ratification, acceptance, approval or accession;
(c) any reservation or withdrawal in accordance with article 17;
(d) any communication made by an organization in accordance with paragraph 4(c) of article 18;
(e) the entry into force of this Convention;
(f) the entry into force of any amendment to this Convention; and
(g) any denunciation made under article 21.

ARTICLE 23

The original of this Convention, of which the Arabic, Chinese, English, French, Russian and Spanish texts are equally authentic, shall be deposited with the Director General of the International Atomic Energy Agency who shall send certified copies thereof to all States.

IN WITNESS WHEREOF, the undersigned, being duly authorized, have signed this Convention, opened for signature at Vienna and at New York on 3 March 1980.

ANNEX I

Levels of Physical Protection to be Applied in International Transport of Nuclear Material as Categorized in Annex II

1. Levels of physical protection for nuclear material during storage incidental to international nuclear transport include:

(a) For Category III materials, storage within an area to which access is controlled;

(b) For Category II materials, storage within an area under constant surveillance by guards or electronic devices, surrounded by a physical barrier with a limited number of points of entry under appropriate control or any area with an equivalent level of physical protection;

(c) For Category I material, storage within a protected area as defined for Category II above, to which, in addition, access is restricted to persons whose trustworthiness has been determined, and which is under surveillance by guards who are in close communication with appropriate response forces. Specific measures taken in this context should have as their object the detection and prevention of any assault, unauthorized access or unauthorized removal of material.

2. Levels of physical protection for nuclear material during international transport include:

(a) For Category II and III materials, transportation shall take place under special precautions including prior arrangements among sender, receiver, and carrier, and prior agreement between natural or legal persons subject to the jurisdiction and regulation of exporting and importing States, specifying time, place and procedures for transferring transport responsibility;

(b) For Category I materials, transportation shall take place under special precautions identified above for transportation of Category II and III materials, and in addition, under constant surveillance by escorts and under conditions which assure close communication with appropriate response forces;

(c) For natural uranium other than in the form of ore or ore-residue, transportation protection for quantities exceeding 500 kilograms U shall include advance notification of shipment specifying mode of transport, expected time of arrival and confirmation of receipt of shipment.

ANNEX II

Table: Categorization of nuclear material

Material	Form	Category I [a]	II	III[c]
1. Plutonium[a]	Unirradiated[b]	2 kg or more	Less than 2 kg but more than 500 g	500 g or less but more than 15 g
2. Uranium-235	Unirradiated[b] —uranium enriched to 20% ^{235}U or more	5 kg or more	Less than 5 kg but more than 1 kg	1 kg or less but more than 15 g
	—uranium enriched to 10% ^{235}U but less than 20%		10 kg or more	Less than 10 g but more than 1 kg
	—uranium enriched above natural, but less than 10% ^{235}U			10 kg or more
3. Uranium-233	Unirradiated[b]	2 kg or more	Less than 2 kg but more than 500 g	500 g or less but more than 15 g
4. Irradiated fuel			Depleted or natural uranium, thorium or low-enriched fuel (less than 10% fissile content)[d,e]	

[a] All plutonium except that with isotopic concentration exceeding 80% in plutonium-238.
[b] Material not irradiated in a reactor or material irradiated in a reactor but with a radiation level equal to or less than 100 rads/hour at one metre unshielded.
[c] Quantities not falling in Category III and natural uranium should be protected in accordance with prudent management practice.
[d] Although this level of protection is recommended, it would be open to States, upon evaluation of the specific circumstances, to assign a different category of physical protection.
[e] Other fuel which by virtue of its original fissile material content is classified as Category I and II before irradiation may be reduced one category level while the radiation level from the fuel exceeds 100 rads/hour at one metre unshielded.

Source: IAEA Press Release PR 79/20, 29 October 1979.

9. Negative security assurances

Square-bracketed numbers, thus [1], *refer to the list of references on page 352.*

I. Introduction

The 1968 Non-Proliferation Treaty (NPT), which prohibits an overwhelming majority of states from acquiring nuclear weapons, while tolerating the retention of the same weapons by a few, has given rise to controversies relating to the balance of rights and obligations of the parties. Indeed, in renouncing the nuclear weapon option under the NPT, the non-nuclear weapon states have assumed the main burden of obligation, while the nuclear weapon states, in undertaking not to disseminate the weapons, have sacrificed little if anything. To attenuate this asymmetry somewhat, the nuclear weapon powers pledged themselves, under a UN Security Council resolution [1], to provide immediate assistance, in accordance with the UN Charter, to non-nuclear weapon states which became "a victim of an act or an object of a threat of aggression in which nuclear weapons are used". However, these so-called positive security assurances are devoid of practical significance, mainly because they relate to a possible action only when a threat of nuclear attack has been made, or the attack has actually occurred; moreover, immediate active intervention, as envisaged by the resolution, is deemed unacceptable by some non-aligned and neutral states, unless assistance has been specifically requested by the victim. For this reason the states which decided, under the NPT, not to acquire nuclear weapons, especially states not covered by the protective nuclear 'umbrella' of the great powers, have been asking for formal guarantees that nuclear weapons would not be used against them. Such security assurances—usually called 'negative', because they imply a non-use obligation—have been the subject of discussion in different disarmament forums for a number of years, but only recently have the major powers shown a measure of readiness to meet the legitimate demands of the non-nuclear weapon states.

II. Recent developments

In 1978, during the UN Special Session on Disarmament, the Soviet Union, the United States and the United Kingdom, all parties to the NPT, made official statements containing security assurances. The USSR declared that it would never use nuclear weapons against those states which "renounce

the production and acquisition of such weapons and do not have them on their territories" [2]. The USA announced that it would not use nuclear weapons against any non-nuclear weapon state which is party to the NPT or "any comparable internationally binding agreement not to acquire nuclear explosive devices", except in the case of an attack on the USA or its allies by a non-nuclear weapon state "allied to" or "associated with" a nuclear weapon state in carrying out or sustaining the attack [3]. A similar statement was issued by the UK [4].

As far as the nuclear weapon powers not party to the NPT are concerned, the position of France is that it would give assurances of non-use of nuclear weapons, in accordance with arrangements to be negotiated, only to those states which have "constituted among themselves non-nuclear zones" [5], while China committed itself, a long time ago, not to be the first to use nuclear weapons at any time and under any circumstances [6].

Since most countries considered these unilateral declarations to be inadequate and subject to divergent interpretations, the Special Session on Disarmament urged the nuclear weapon states to pursue efforts to conclude, as appropriate, "effective arrangements" to assure non-nuclear weapon states against the use or threat of use of nuclear weapons [7]. At the 33rd regular session of the UN General Assembly, the USSR and Pakistan submitted draft conventions concerning negative security assurances (see appendices 9A and 9B for the two draft texts). The General Assembly decided to transmit these, as well as other proposals made during the session, to the Committee on Disaramment (CD) for consideration [8, 9]. The CD took up the matter in 1979 and set up an *ad hoc* working group to negotiate the required international arrangements. It had before it the Soviet and Pakistani draft conventions, as well as a US proposal for a recommendation to the UN General Assembly concerning the security of non-nuclear weapon states.

According to the Soviet draft, the nuclear weapon states would pledge themselves not to use or threaten to use nuclear weapons against "non-nuclear states" which "renounce the production and acquisition of nuclear weapons and which have no nuclear weapons in their territory or anywhere under their jurisdiction or control, on land, on the sea, in the air or in outer space". This obligation would extend to the armed forces and installations of non-nuclear states, wherever they may be. Any party having reason to believe that the actions of another party are contrary to the provisions of the convention may request that "consultations" be held with a view to clarifying the "actual circumstances of the matter", and each party would be entitled to "secede" from the convention if it decides that its "higher interests" have been placed in jeopardy [10].

According to the Pakistani draft, the nuclear weapon states would pledge themselves not to use or threaten to use nuclear weapons against

non-nuclear weapon states "not parties to the nuclear security arrangements of some nuclear weapon states". Any party having reason to believe that there has been or is likely to be a breach of the obligations arising from the convention may request an "urgent meeting" of the UN Security Council, with a view to "preventing such a breach or redressing the situation arising therefrom" [11].

According to the US proposal, the UN General Assembly would adopt a resolution welcoming and taking note of the nuclear powers' declarations providing assurances to non-nuclear weapon states with respect to the use of nuclear weapons. The resolution would "recognize" these declarations as important contributions to strengthening international peace and security [12].

In its report to the UN General Assembly, the CD noted that there was wide recognition of the "urgent" need to reach agreement on appropriate international arrangements and that it would continue negotiations on this subject in 1980 [13].

III. Conditions for providing the assurances

Non-possession of nuclear weapons

The basic feature of the negative assurances is that nuclear powers would not use, or threaten to use, nuclear weapons against non-nuclear weapon states. This is a common element of the pledges already made and of the proposals for future arrangements.

A non-nuclear weapon state is generally understood to be a state not possessing nuclear weapons. However, non-nuclear weapon status cannot be acquired simply on the basis of a unilateral statement of non-possession. A state claiming such status would have to be bound by a legal obligation not to receive and not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, and compliance with this obligation would have to be internationally controlled. There are at present only two treaties meeting these requirements, namely, the NPT and the Treaty prohibiting nuclear weapons in Latin America (Treaty of Tlatelolco), both providing for the application of International Atomic Energy Agency (IAEA) safeguards.

It will be noted that, as distinct from the NPT, the Treaty of Tlatelolco allows explosions of nuclear devices for peaceful purposes by the parties. However, the treaty contains a proviso to the effect that such activities must be in accordance with the article which prohibits the testing, use, manufacture or acquisition of nuclear weapons, as well as with the article which defines a nuclear weapon as any device which is capable of releasing

nuclear energy in an uncontrolled manner, and which has a group of characteristics that are appropriate for use for warlike purposes. Thereby, the manufacture of nuclear explosive devices for peaceful purposes is prohibited unless or until nuclear devices are developed which cannot be used as weapons. This condition can hardly be fulfilled, because nuclear explosives, irrespective of the objective pursued, contain identical components, and their production requires essentially the same technology.

Non-stationing of nuclear weapons

Another condition for providing negative security assurances, in addition to 'non-possession', is that required by the USSR, namely, that there should be no foreign nuclear weapons stationed on the territory of the recipients of the assurances. This would seem to be a logical requirement, because countries from which a nuclear attack can be launched cannot be immune to a response in kind. All they could aspire to is an assurance that they would not be subject to a first nuclear strike.

The problem is what is actually meant by the 'non-stationing' requirement. Would countries barring the introduction of nuclear explosives, but allowing installations vital for nuclear warfare to be established on their territories, still be entitled to assurances? It must be recognized that it would be difficult, if not impossible, to cover all the contingencies. It seems, however, that within the framework of the envisaged negative security assurances, the non-stationing requirement could be restricted to the non-presence of bombs and warheads. Thus an instrument that may be used for the transport or propulsion of the nuclear explosive device would not be covered (see Article 5 of the Treaty of Tlatelolco).

Another problem is that of transit. It may be argued that once nuclear weapons are allowed to be in transit in non-nuclear weapon states, even if such transit is limited to port visits and overflights, it will be impossible to maintain that such states are free from nuclear weapons. On the other hand, there may be no way of enforcing strict adherence to a non-transit requirement. The non-stationing condition, including non-transit, may prove to be most difficult to meet.

Non-participation in nuclear security arrangements

The Pakistani formula would apply to states which are not members of "nuclear security arrangements", and are, therefore, not covered by a nuclear umbrella. It would, thus, certainly exclude the non-nuclear weapon members of NATO and the Warsaw Treaty Organization. However, there may exist unpublished multilateral or bilateral agreements or tacit understandings, under which states may consider themselves to be

protected against a nuclear attack. In such circumstances, it may be difficult to ascertain who is actually covered by a nuclear umbrella. And it is precisely in this twilight zone that negative assurances might be of greatest significance.

Non-participation in armed attack

According to the US–UK formula, the assurances would not apply to non-nuclear weapon states participating in an armed attack together with a nuclear weapon state. However, the terms used in this connection, such as "associated with a nuclear weapon state in carrying out or sustaining the attack", are so imprecise that they may be interpreted as permitting the use of nuclear weapons in a wide variety of circumstances.

The USSR holds a similar position. In ratifying Protocol II of the Treaty of Tlatelolco, the Soviet Union reserved the right to reconsider its commitment not to use nuclear weapons against the members of the Latin American nuclear weapon-free zone, if one or more parties commit an act of aggression "with the backing of a State possessing nuclear weapons or together with such a State".[1] On this point, there seems to be common ground for an agreement among the major nuclear powers. However, an exemption of the kind mentioned above would fall short of the demands of the majority of non-nuclear weapon states and would hardly be welcomed by them.

IV. Form of the assurances

Assuming that the nature of the obligations against the use of nuclear weapons had been agreed upon and that, consequently, a common formula of the assurances had been worked out, there would still remain the problem of the form in which they should be provided.

One form would be for the nuclear weapon powers to issue, preferably simultaneously, appropriate policy statements worded in identical terms. The assurances thus given would become effective immediately, but to enhance their status and to make them more binding, that is, more difficult to revoke, some further action might be needed. For example, the governments of the nuclear weapon powers could pledge themselves to take all the necessary measures, in accordance with their constitutional processes, to have special laws adopted by their legislative bodies, incorporating the stated commitments. Furthermore, in order to 'internationalize' these unilateral actions, the non-use statements, and subsequently the texts of the respective laws, could be deposited with the UN Secretary-General or,

[1] This Soviet position was presaged in President Brezhnev's speech of 25 April 1978 [14].

even better, included in a formal UN Security Council resolution which would approve these actions. It will be recalled that the 1968 UN Security Council resolution on positive assurances (mentioned above) has been criticized because of its contents, and not because of the form in which it was adopted.

It should also be noted that there is no legal obstacle for states to assume binding obligations, in any form they choose. Thus, unilateral non-use obligations could be transformed into an international agreement even through the concurrence of votes in the UN General Assembly. However, the resolutions adopted by the General Assembly have a low status; many resolutions, including those containing specific recommendations, have been disregarded by UN members, and no price, political or otherwise, has been paid for this disregard. The majority of states may therefore be unwilling to resort to this procedure when their security interests are at stake.

A UN General Assembly resolution could, nevertheless, be of some use, at least as a preliminary step, to record the consent of the states directly concerned to provide specific non-use assurances, as well as their commitment to negotiate a formal treaty. This was the procedure with arms control measures regarding outer space. In 1963, the UN General Assembly approved by acclamation a resolution welcoming the expression by the USSR and the USA of their intention not to station in outer space any objects carrying nuclear weapons or other weapons of mass destruction, and four years later, in 1967, this declaration of intention was transformed into a treaty.

A treaty on security assurances could, of course, be negotiated also without such preparatory steps as those mentioned above. The UN General Assembly resolutions already adopted, and urging the conclusion of "effective arrangements" to assure the non-nuclear weapon states against the use or threat of use of nuclear weapons, are taken as a sufficient mandate for the Committee on Disarmament to work out an international agreement. A possibility was also mentioned of having non-use agreements signed between nuclear and non-nuclear weapon states on a bilateral basis. But such an arrangement would, in practice, amount to creating new dependencies on nuclear weapon powers, and would, therefore, be unacceptable to non-aligned or neutral states which form the majority of the future recipients of the assurances. In any event, if it is decided to conclude a multilateral treaty instead of having unilateral commitments acknowledged or ratified through some UN action, an important question will arise as to who should be party to the treaty.

An obligation not to use nuclear weapons can be undertaken only by states who possess them. Obviously, those who do not possess the weapons in question cannot assume such an obligation. The non-use commitment

should be formulated in such a way that the recipients of the assurances would not have to contract any new obligation. An internationally recognized non-nuclear weapon status, by virtue of adherence to such treaties as the NPT or the Treaty of Tlatelolco, should suffice. Evidently, a country recovering its nuclear weapon option by withdrawing from the relevant treaties would automatically lose the security assurances. Conversely, a country joining these or comparable treaties would automatically be entitled to security assurances. In other words, a signature by a non-nuclear weapon state under a treaty prohibiting the use of nuclear weapons would be superfluous; it is the commitment of the nuclear weapon states that matters.

Even if it is agreed that in order to enjoy security assurances states must not only preserve their non-nuclear weapon status, but also keep their territories free from foreign nuclear weapons, no new obligations should be required from such states under a treaty providing the assurances. Declarations by individual states to the effect that there are no weapons on their territories must suffice, until regional nuclear weapon-free zones are formally established, providing for reciprocal control. It would be too far-fetched to subject non-nuclear weapon states to special enquiry or inspection by nuclear weapon powers in exchange for non-use assurances, considering that the nuclear weapon powers would not even undertake to withdraw or dismantle the nuclear weapons targeted on countries covered by the assurances.

V. Conclusion

The working out of a uniform formula for negative security assurances, which would be acceptable to all nuclear weapon powers, does not seem to be impossible, especially if it does not include the 'non-stationing' requirement. It would also appear that a treaty entered into by the nuclear weapon powers alone should suffice. Such a treaty could benefit the non-nuclear weapon states more than a universal one: with blanket security assurances, that is, assurances given to *all* countries which qualify, the possibility of using a threat of withdrawal, as an instrument of political pressure with respect to individual states, would be considerably minimized. To make it even safer, the treaty should be of unlimited duration.

Negative security assurances, whatever their form, are long overdue, especially with regard to non-nuclear weapon states, party to the NPT. However, it is doubtful whether even a formal treaty embodying such assurances would stimulate adherence to the NPT of those states who have kept their nuclear weapon option open irrespective of the behaviour of the

great powers, or who consider that a non-use pledge is not a sufficient *quid pro quo* for the renunciation of nuclear weapons.

Neither can the negative security assurances be considered as a step towards total prohibition of the use of nuclear weapons, because such a prohibition is hardly conceivable without very substantial measures of nuclear disarmament. The assurances presently sought would have psychological value rather than arms control significance. The consequences of a nuclear war on a global or regional scale would not spare states enjoying a 'non-use guarantee'.

References

1. UN document S/RES/255, 19 June 1968.
2. UN document A/S-10/PV.5.
3. UN document A/S-10/AC.1/30.
4. UN document A/S-10/PV.26.
5. UN document A/S-10/PV.27.
6. UN document A/S-10/PV.7.
7. UN General Assembly Official Records: Tenth Special Session Supplement No. 4 (A/S-10/4).
8. UN General Assembly resolution 33/72A.
9. UN General Assembly resolution 33/72B.
10. Committee on Disarmament document CD/23.
11. Committee on Disarmament document CD/10.
12. Committee on Disarmament document CD/27.
13. Committee on Disarmament document CD/53.
14. Soviet Mission to the United Nations, Press Release No. 68, 25 April 1978.

Appendix 9A

Draft international convention to assure non-nuclear weapon states against the use or threat of use of nuclear weapons (submitted by Pakistan)

Annex

The State Parties to this Convention,

Convinced that nuclear weapons pose the greatest threat to mankind and to the survival of civilization,

Deeply concerned at the continuation of the arms race, in particular the nuclear arms race and the threat to mankind due to the possibility of the use of nuclear weapons,

Convinced that only nuclear disarmament and prohibition of the use of nuclear weapons leading to the complete elimination of nuclear weapons, will assure complete security in the nuclear era,

Desirous of safeguarding the independence, territorial integrity and sovereignty of non-nuclear-weapon States against the use or threat of use of nuclear weapons,

Considering that, until nuclear disarmament is achieved on a universal basis, it is imperative for the international community to devise effective measures to ensure the security of non-nuclear-weapon States against the use or threat of use of nuclear weapons from any quarter,

Bearing in mind the resolutions of the United Nations General Assembly and the Security Council on the question of strengthening the security of non-nuclear-weapon States,

Also bearing in mind that the non-nuclear-weapon States have called for legally binding and credible assurances from nuclear-weapon States that they will not use or threaten to use nuclear weapons against them,

Have agreed as follows:

ARTICLE I

The nuclear-weapon States Parties to this Convention, as a first step towards the complete ban on the use or threat of use of nuclear weapons, pledge themselves not to use or threaten to use nuclear weapons against non-nuclear-weapon States not parties to the nuclear security arrangements of some nuclear-weapon States.

This understanding is without prejudice to the obligations of States Parties to this Convention arising from treaties establishing nuclear-weapon-free zones.

ARTICLE II

The nuclear-weapon States Parties to this Convention also undertake to avoid the possibility of the use or threat of nuclear weapons in any contingency and to achieve nuclear disarmament, resulting in the complete elimination of nuclear weapons, in the shortest possible time.

ARTICLE III

Any State Party to this Convention which has reason to believe that there has been or is likely to be a breach of the obligations of the States Parties arising from articles I and II of this Convention may request an urgent meeting of the Security Council, under Chapter VII of the Charter of the United Nations, with a view to preventing such a breach or redressing the situation arising therefrom.

ARTICLE IV

This Convention shall be concluded for an indefinite period of time. It shall lapse once nuclear disarmament and the complete elimination of nuclear weapons has been achieved.

ARTICLE V

1. Any State Party to this Convention may propose amendments to this Convention. The text of each proposed amendment must be submitted to the depositary, who shall immediately transmit it to all States Parties.

2. An amendment shall enter into force for each State Party to this Convention which accepts the amendment after the documents concerning its acceptance have been deposited with the depositary by the majority of States Parties. Subsequently, the amendment shall enter into force for each of the remaining States Parties on the date of the deposit by them of the document concerning its acceptance.

ARTICLE VI

1. This Convention is open for signature by all States. Any State which does not sign the Convention before its entry into force in accordance with paragraph 3 of this article may accede to it at any time.

2. This Convention is subject to ratification by the States which have signed it. The instruments of ratification or the documents concerning accession shall be deposited with the Secretary-General of the United Nations, who is hereby designated the depositary.

3. This Convention shall enter into force following the deposit of the instruments of ratification by ... States including the two leading nuclear-weapon States i.e. the Union of Soviet Socialist Republics and the United States of America.

4. For States whose instruments of ratification or documents concerning accession are deposited after the entry into force of this Convention, the Convention shall enter into force on the date of the deposit of the instruments of ratification or documents concerning accession.

5. The depositary shall immediately notify all States Parties to this Convention of the date of each signature, the date of deposit of each instrument of ratification or document concerning accession, the date of the entry into force of this Convention or of any amendments thereto, and also of the receipt by him of other notifications.

6. This Convention shall be registered by the depositary in accordance with Article 102 of the Charter of the United Nations.

ARTICLE VII

This Convention, the Russian, Arabic, Chinese, English, French and Spanish texts of which are equally authentic, shall be deposited with the Secretary-General of the United Nations, who shall duly forward certified copies of the Convention to the Governments of the States which have signed or acceded to the Convention.

In witness whereof, the undersigned, duly authorized for that purpose by their respective Governments, have signed this Convention, which was opened for signature on . . .

Source: Committee on Disarmament document CD/10, 27 March 1979.

Appendix 9B

Draft international convention on the strengthening of guarantees of the security of non-nuclear States (Working Paper submitted by Bulgaria, Czechoslovakia, German Democratic Republic, Hungary, Mongolia, Poland and Union of Soviet Socialist Republics)

The States Parties to this Convention,

Conscious of the fact that a nuclear war would have devastating consequences for all mankind,

Prompted by a desire to take all possible steps to reduce and ultimately to eliminate the danger of such a war,

Wishing to contribute to the prevention of the wider proliferation of nuclear weapons and to promote the cessation of the nuclear armaments race and the adoption of effective measures directed towards nuclear disarmament,

Welcoming the desire of States in various regions of the world to keep their territories free from nuclear weapons,

Bearing in mind their obligations under the Charter of the United Nations to maintain peace, to refrain from the threat or use of force and to live in peace with each other as good neighbours,

Having regard to Security Council resolution 255 (1968) of 19 June 1968, General Assembly resolution 2936 (XXVII) of 29 November 1972 and the relevant provisions of the Final Document of the special session of the General Assembly devoted to disarmament of 30 June 1978, including the request made therein that urgent efforts be made to conclude effective agreements to assure non-nuclear-weapon States against the use or the threat of use of nuclear weapons,

Regarding guarantees that nuclear weapons will not be used against non-nuclear States as an important means of strengthening peace and universal security and wishing to give such guarantees an international legal character,

Have agreed as follows:

ARTICLE I

The nuclear-weapon States Parties to this Convention pledge themselves not to use or threaten to use nuclear weapons against non-nuclear States Parties to this Convention

which renounce the production and acquisition of nuclear weapons and which have no nuclear weapons in their territory or anywhere under their jurisdiction or control, on land, on the sea, in the air or in outer space.

ARTICLE II

The obligation set forth in article I of this Convention shall extend not only to the territory of non-nuclear States Parties, but also to the armed forces and installations under the jurisdiction and control of such States whatever they may be, on land, on the sea, in the air or in outer space.

ARTICLE III

Any State Party to this Convention which has reason to believe that the actions of any other State Party are contrary to the provisions of articles I and II of the Convention may request that consultations be held between the States Parties with a view to clarifying the actual circumstances of the matter. Such a request must include any information relating to the matter and also all possible evidence to support it.

ARTICLE IV

1. This Convention shall be concluded for an indefinite period of time.

2. Each Party to the Convention shall, in the exercise of its State sovereignty, be entitled to secede from the Convention if it decides that exceptional circumstances relating to the content of the Convention have placed its higher interests in jeopardy. It shall notify all the Parties to the Convention and the Security Council of the United Nations of its secession, giving three months' notice. Such notification must include a statement of the exceptional circumstances which it regards as having placed its higher interests in jeopardy.

ARTICLE V

1. Any State Party to this Convention may propose amendments to this Convention. The text of each proposed amendment must be submitted to the depositary, who shall immediately transmit it to all States Parties.

2. An amendment shall enter into force for each State Party to this Convention which accepts the amendment after the documents concerning its acceptance have been deposited with the depositary by the majority of States Parties. Subsequently, the amendment shall enter into force for each of the remaining States Parties on the date of the deposit by them of the document concerning its acceptance.

ARTICLE VI

1. This Convention is open for signature by all States. Any State which does not sign the Convention before its entry into force in accordance with paragraph 3 of this article may accede to it at any time.

2. This Convention is subject to ratification by the States which have signed it. The instruments of ratification or the documents concerning accession shall be deposited with the Secretary-General of the United Nations, who is hereby designated the depositary.

3. This Convention shall enter into force following the deposit of the instruments of ratification by ... States which have signed the Convention, including at least ... nuclear-weapon States.

4. For States whose instruments of ratification or documents concerning accession are deposited after the entry into force of this Convention, the Convention shall enter into force on the date of the deposit of the instruments of ratification or documents concerning accession.

5. The depositary shall immediately notify all States which have signed or acceded to this Convention of the date of each signature, the date of deposit of each instrument of ratification or document concerning accession, the date of the entry into force of this Convention and of any amendments thereto, and also of the receipt by him of other notifications.

6. This Convention shall be registered by the depositary in accordance with article 102 of the Charter of the United Nations.

ARTICLE VII

This Convention, the Russian, Arabic, Chinese, English, French and Spanish texts of which are equally authentic, shall be deposited with the Secretary-General of the United Nations, who shall duly forward certified copies of the Convention to the Governments of the States which have signed or acceded to the Convention.

In witness whereof, the undersigned, duly authorized for that purpose of their respective Governments, have signed this Convention, which was opened for signature on . . .

Source: Committee on Disarmament document CD/23, 21 June 1979.

10. Nuclear explosions

Square-bracketed numbers, thus [1], *refer to the list of references on page 360.*

Of 1 221 nuclear explosions reported to have been conducted between 1945 and 1979, mainly to improve the efficiency of nuclear weapons, 733 were carried out after the signing in 1963 of the Partial Test Ban Treaty (PTBT) prohibiting atmospheric tests. Thus, the rate was, on average, 45 explosions per year after the treaty as against 27 before it. The nuclear weapon powers party to the PTBT, namely, the UK, the USA and the USSR, are responsible for over 90 per cent of all nuclear explosions (see appendix 10B).

After 1963 only China and France, which have not adhered to the PTBT, continued testing nuclear weapons in the atmosphere. However, since 1975, French tests have been made exclusively underground, while China has conducted three underground explosions as well as six in the atmosphere. India has not tested a nuclear device since 1974.

Since 1976, the explosions conducted by the USA and the USSR have been held below or around the 150-kiloton yield level, in accordance with the US–Soviet Threshold Test Ban Treaty (TTBT), which was signed in 1974 but is still not formally in force. On the other hand, as shown below, the rate of testing by the major powers increased in recent years, in spite of the promise contained in the TTBT to restrict the number of tests to a minimum.

Average annual number of US and Soviet explosions in 1972–79

	USA	USSR
1972–75	12.75	17.50
1976–79	13.50	22.00

It is also noteworthy that in 1979 the USSR and France conducted more nuclear explosions than in any other year since 1963. The Soviet explosions included a record number (eight) of those that are presumed to be for peaceful purposes, because of their location outside the weapon testing sites known to be in the region of Semipalatinsk, east Kazakhstan, and on Novaya Zemlya in the Arctic Ocean.

The testing activity of the UK in 1979 was rather modest, just 1 explosion, as compared to the figures for the USSR, the USA and France,

namely, 28, 15 and 9, respectively. For the first time since 1964, the year when China started its nuclear testing programme, no Chinese nuclear explosion was registered or announced during the entire year 1979.

According to US authorities, a low-yield nuclear explosion may have taken place on 22 September 1979 in the Southern hemisphere, in a region which includes parts of the Indian and South Atlantic Oceans, as well as Southern Africa and Antarctica [1]. South Africa, which was suspected by many members of the United Nations of being the testing nation, denied having any knowledge of a nuclear explosion occurring in its vicinity [2].

Intensive testing by the major powers coincided with their talks on a treaty prohibiting nuclear weapon tests in all environments and a protocol to the treaty covering nuclear explosions for peaceful purposes. In 1979, the trilateral UK–US–Soviet negotiations concentrated on the question of verifying compliance with the obligations. Agreement was reached that the envisaged treaty should provide for verification by national technical means and for the possibility of on-site inspection [3]. The exchange of seismic data, an important aspect of verification, was discussed by the three powers on the basis of the recommendations formulated by the *ad hoc* group of seismic experts of the Committee on Disarmament, a group which is engaged in studies of international co-operative measures to detect and identify seismic events [4, 5]. The negotiating parties expressed the view that a committee of experts drawn from the parties to the treaty should be established to assist in the implementation of the data exchange.

Towards the end of 1979, the trilateral talks on a comprehensive test ban treaty were slowed down in connection with the difficulties which arose during the process of the SALT II Treaty ratification. Nevertheless, since a test ban is meant to be a multilateral undertaking, the 40-member Committee on Disarmament can continue consideration of the multilateral aspects of the future treaty.

References

1. UN document A/34/674, Annex II.
2. UN document A/34/674, Annex I.
3. Committee on Disarmament document CD/PV.46.
4. Committee on Disarmament document CCD/558.
5. Committee on Disarmament document CD/43.

Appendix 10A

Nuclear explosions, 1978–79 (known and presumed)

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. Unless otherwise indicated, the explosions were carried out underground.

3. 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.

4. m_b (body wave magnitudes) and M_s (surface wave magnitudes) indicate the size of the event; the data have been provided by the Hagfors Observatory of the Research Institute of the Swedish National Defence.

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

I. Nuclear explosions in 1978

Date (GMT)	Latitude (deg)	Longitude (deg)	Region	m_b	M_s	
USA						
23 Feb	37.125 N	116.064 W	S Nevada	5.9		
16 Mar	37.100 N	116.057 W	S Nevada			
23 Mar	37.102 N	116.051 W	S Nevada	5.9		
11 Apr	37.233 N	116.367 W	S Nevada	5.9		
12 Jul	37.079 N	116.044 W	S Nevada	6.0	4.0	
31 Aug	37.275 N	116.357 W	S Nevada	6.0	4.2	
13 Sep	37.209 N	116.211 W	S Nevada	5.0		
27 Sep	37.080 N	116.050 W	S Nevada			
27 Sep	37.070 N	116.019 W	S Nevada	6.2	4.1	
2 Nov	37.287 N	116.296 W	S Nevada			
1 Dec	37.028 N	116.035 W	S Nevada			
16 Dec	37.273 N	116.409 W	S Nevada	5.9		
USSR						
19 Mar	49.972 N	77.755 E	E Kazakh	5.4		
26 Mar	49.734 N	78.074 E	E Kazakh	6.4		
22 Apr	49.720 N	78.175 E	E Kazakh	5.7	3.3	
29 May	49.877 N	78.195 E	E Kazakh	5.0		
11 Jun	49.879 N	78.838 E	E Kazakh	7.0	4.3	
5 Jul	49.839 N	78.906 E	E Kazakh	6.9	3.9	
28 Jul	49.744 N	78.168 E	E Kazakh	5.9		
9 Aug	63.706 N	125.321 E	Central Siberia*	5.9	3.7	
10 Aug	73.335 N	54.792 E	Novaya Zemlya	6.8	4.1	
24 Aug	65.918 N	112.541 E	Central Siberia*	5.2	3.5	
29 Aug	49.839 N	78.008 E	E Kazakh	5.4		
29 Aug	50.008 N	78.996 E	E Kazakh	6.9	3.9	
15 Sep	49.898 N	78.925 E	E Kazakh	7.0	4.2	
20 Sep			E Kazakh	4.7		
21 Sep	66.541 N	86.252 E	Central Siberia*	4.9		
27 Sep	73.380 N	54.669 E	Novaya Zemlya	6.3	4.2	
8 Oct	61.60 N	112.89 E	Central Siberia*	5.5		
15 Oct	49.756 N	78.261 E	E Kazakh	5.5		
17 Oct	47.906 N	48.209 E	W Kazakh*	6.3	4.3	
17 Oct	63.207 N	63.194 E	E Ural*	5.8	3.6	
31 Oct	49.886 N	78.137 E	E Kazakh	5.6		
4 Nov	50.019 N	79.024 E	E Kazakh	6.5	3.9	
29 Nov	49.920 N	78.089 E	E Kazakh	5.6		
29 Nov	50.004 N	78.951 E	E Kazakh	7.1	4.2	
14 Dec	49.897 N	78.199 E	E Kazakh	5.0		
18 Dec	47.872 N	48.258 E	W Kazakh*	6.4	5.0	
20 Dec	49.885 N	78.172 E	E Kazakh	4.7		
UK						
11 Apr	37.300 N	116.327 W	S Nevada	5.6		
18 Nov	37.126 N	116.084 W	S Nevada	5.6		
France						
27 Feb			Mururoa			
22 Mar			Mururoa			
19 Jul			Mururoa			
26 Jul			Mururoa			
2 Nov			Mururoa			
30 Nov	21.926 S	138.967 W	Mururoa			
19 Dec	21.732 S	139.046 W	Mururoa			
China						
15 Mar			Lop Nor			(in atmosphere)
14 Oct	41.488 N	88.637 E	Lop Nor	5.4		
14 Dec						(in atmosphere)

II. Nuclear explosions in 1979 (preliminary data)

Date (GMT)	Latitude (deg)	Longitude (deg)	Region	m_b	M_s
USA					
24 Jan	37.105 N	116.011 W	S Nevada	4.7	
8 Feb	37.101 N	116.054 W	S Nevada	5.8	4.2
15 Feb	37.152 N	116.072 W	S Nevada	5.2	
14 Mar	37.028 N	116.039 W	S Nevada		
11 May	36.981 N	116.034 W	S Nevada		
11 Jun	37.290 N	116.455 W	S Nevada	5.7	4.3
20 Jun	37.107 N	116.015 W	S Nevada		
28 Jun	37.142 N	116.087 W	S Nevada	5.4	
3 Aug	37.084 N	116.070 W	S Nevada	5.3	
8 Aug	37.036 N	116.031 W	S Nevada	5.2	
6 Sep	37.087 N	116.052 W	S Nevada	6.2	4.2
8 Sep	37.154 N	116.038 W	S Nevada		
26 Sep	37.229 N	116.364 W	S Nevada	6.0	4.2
29 Nov			S Nevada		
14 Dec			S Nevada		
USSR					
10 Jan			W Kazakh*	5.0	
17 Jan	47.985 N	48.212 E	W Kazakh*	6.5	4.5
1 Feb	50.125 N	78.944 E	E Kazakh	6.4	
16 Feb	50.018 N	77.781 E	E Kazakh	5.8	
6 May	49.869 N	78.247 E	E Kazakh	5.6	
24 May			E Kazakh	4.9	
31 May	49.837 N	78.237 E	E Kazakh	5.4	
23 Jun	49.935 N	78.971 E	E Kazakh	7.2	4.4
7 Jul	50.062 N	79.110 E	E Kazakh	6.7	3.9
14 Jul	47.835 N	48.249 E	W Kazakh*	6.2	3.8
18 Jul	49.966 N	77.927 E	E Kazakh	5.2	
4 Aug	49.886 N	78.957 E	E Kazakh	7.2	4.5
12 Aug	61.909 N	122.087 E	Central Siberia*	5.4	3.6
18 Aug	49.961 N	79.020 E	E Kazakh	7.2	4.1
6 Sep	64.126 N	99.554 E	Central Siberia*	4.6	
14 Sep			E Kazakh	5.2	
24 Sep	73.335 N	54.729 E	Novaya Zemlya	6.5	4.0
27 Sep			E Kazakh	5.0	
4 Oct	60.650 N	71.525 E	W Siberia*	5.8	3.7
7 Oct	61.839 N	113.059 E	Central Siberia*	5.3	
18 Oct			E Kazakh	5.4	
18 Oct			Novaya Zemlya	6.6	3.7
24 Oct	47.769 N	48.177 E	W Kazakh*	6.4	4.1
28 Oct	49.941 N	79.041 E	E Kazakh	6.6	4.3
30 Nov	49.840 N	78.269 E	E Kazakh	4.9	
2 Dec	49.868 N	78.824 E	E Kazakh	7.2	4.4
21 Dec			E Kazakh	5.0	
23 Dec			E Kazakh	7.2	4.1
UK					
29 Aug	37.120 N	116.066 W	S Nevada	5.2	
France					
1 Mar			Mururoa		
9 Mar			Mururoa		
24 Mar	22.054 S	139.263 W	Mururoa		
4 Apr			Mururoa		
18 Jun			Mururoa		
29 Jun	22.106 S	139.401 W	Mururoa		
25 Jul	21.842 S	139.026 W	Mururoa		
28 Jul			Mururoa		
22 Nov			Mururoa		

Appendix 10B

Nuclear explosions, 1945–79 (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. 5 August 1963–31 December 1979

a atmospheric
u underground

	USA		USSR		UK		France		China		India		
Year	a	u	a	u	a	u	a	u	a	u	a	u	Total
5 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	28	0	1	0	9	0	0	0	0	**53**[b]
Total	**0**	**360**	**0**	**262**	**0**	**7**	**41**	**37**	**21**	**4**	**0**	**1**	**733**

III. 16 July 1945–31 December 1979

USA	USSR	UK	France	China	India	Total
653	426	30	86	25	1	**1 221**

[a] Five devices used simultaneously in the same test are counted here as one.
[b] The data for 1979 are preliminary.

11. Chemical disarmament

In accordance with an agreement reached in 1974, the USA and the USSR are engaged in negotiations to prepare a "joint initiative" with respect to the conclusion of an international convention dealing with means of chemical warfare. By a letter of 7 August 1979, the two powers formally transmitted to the Committee on Disarmament (CD) a joint report on progress in these negotiations, identifying the main areas of agreement and disagreement and specifying questions requiring further study (for the text of the report, see appendix 11A).

On the basis of this report as well as the explanations given by the representatives of the two powers, and in the light of the discussions held in the CD, the negotiating situation, as of mid-1979, can be described as follows.

I. Scope of the convention

The USA and the USSR are now agreed that a chemical weapons convention should be comprehensive in its coverage. This means that the parties would assume the following obligations:

(*a*) not to develop, produce, stockpile, otherwise acquire or possess, or retain chemicals for chemical warfare purposes or chemical weapons;

(*b*) not to transfer to anyone the means of chemical warfare, and not to assist, encourage or induce others to carry out the activities prohibited by the convention;

(*c*) to destroy or divert for permitted purposes the existing stocks of the relevant chemicals and weapons; and

(*d*) to destroy or dismantle means of production of chemical weapons.

The prohibition on the use of chemical weapons is not specifically mentioned. Since such a prohibition is already included in the 1925 Geneva Protocol, the two powers are prepared to refer to it in a chemical weapons convention, but are unwilling to duplicate the provisions of the Protocol.

The scope of the prohibition would be determined on the basis of a general purpose criterion. This means that the prohibition would apply to chemical substances (which are already in existence or which may be discovered in the future) that have no justification for peaceful purposes, and to weapons specifically designed to use such substances for chemical

warfare purposes. More precisely, the ban would cover supertoxic lethal chemicals (such as nerve gas), other lethal chemicals (such as phosgene), and highly toxic but not necessarily lethal chemicals (incapacitants), as well as precursors (including components of so-called binary chemical weapons[1]). It would also cover chemical munitions or other means of chemical warfare (such as spray tanks), with the exception of munitions used for smoke dissemination.

Not all the issues relating to the scope of the convention have been solved. Neither have the terms, referred to above, been defined with the precision required of an internationally binding document. It is, nevertheless, clear that comprehensive coverage is not tantamount to absolute prohibition. Dual-purpose chemicals, that is, chemicals useful for chemical warfare but intended for non-hostile purposes, of types and in quantities which can vary considerably from country to country but are appropriate for these purposes, would be exempted from the ban. It is not clear, however, who would be authorized to judge whether the quantities produced or retained by individual states were justified by 'non-hostile' needs.

The permitted purposes would include civilian industrial production, peaceful scientific and medical research, and domestic law enforcement, as well as development and testing of means of protection against chemical weapons. They could even include military purposes, as in the case of production of missile and torpedo fuels which, although toxic, are not related to chemical warfare. In addition, the United States considers that certain specific military uses of chemicals, such as the use of tear-gas for riot control in prisoner-of-war camps, or the use of anti-plant agents for clearing vegetation around the party's own military bases, should also be allowed.

The notion of permitted and non-permitted purposes implies that different degrees of prohibition and limitation would be applied. Consequently, also methods of verification would have to be differentiated. In order to facilitate verification, it was found advisable to separate chemicals into categories using toxicity criteria as a supplement to the general purpose criterion. The standards adopted for identifying such categories are as follows:

(*a*) $LCt_{50} = 2\,000$ mg min/m^3 for inhalation and/or $LD_{50} = 0.5$ mg/kg for subcutaneous injections, and

(*b*) $LCt_{50} = 20\,000$ mg min/m^3 for inhalation and/or $LD_{50} = 10$ mg/kg for subcutaneous injections.

LD_{50} and LCt_{50} indicate the amounts of toxic materials which are expected to kill 50 per cent of a large population of similar animals. LD is expressed

[1] A binary chemical weapon is a device filled with two chemicals of low toxicity which mix and react when the device is delivered to the target, the reaction product being a supertoxic warfare agent, such as nerve gas.

in milligrams of toxic material per kilogram of body weight, while LCt is the concentration of the toxic material in the air, in milligrams per cubic metre, multiplied by the time of exposure in minutes.

The use of additional criteria (for example, structural formulae, or applicability for chemical warfare) is also envisaged. In any event, the idea of compiling a catalogue of *outlawed* chemicals, as put forward in the Disarmament Committee a few years ago, has not been taken up by the two powers. Indeed, an exhaustive list of prohibited items is nearly impossible to draw up and keep up-to-date, while an incomplete list may be interpreted as permitting items not included therein. On the other hand, for reporting purposes, it may be necessary to establish lists of important chemicals in widespread *civilian* use, which could be diverted to chemical weapons purposes.

The two powers recognized the necessity for states to declare, "immediately after they become parties to the convention", the volumes of their stocks of means for chemical warfare and the means of production of chemical munitions and chemicals covered by the convention. Plans for destruction of declared stocks and for destruction or dismantling of means of production would also have to be declared. However, the specific contents of these declarations remain to be negotiated. Moreover, the term "means of production", as applied to the convention, has to be defined; declared reductions of the overall capacity of a country to produce chemical munitions and chemicals would be difficult to check, while monitoring the elimination of individual facilities previously engaged in chemical weapons production could be a simple operation.

The two sides agree that stocks of means for chemical warfare should be destroyed or diverted for permitted purposes within 10 years after a state becomes a party. Means of production should be shut down and eventually destroyed or dismantled; such destruction or dismantling should begin not later than 8 years, and should be completed not later than 10 years, after a state becomes a party. Such a long period of time envisaged for the implementation of the relevant provisions of the future convention is probably inevitable, in view of the size of the accumulated stocks and the technical problems involved in the destruction operations, as well as of the environmental considerations and safety requirements. The parties would probably begin with the elimination of obsolete stocks of munitions which they would have eliminated anyway, even without a treaty. Nevertheless, provided that it starts early and continues uninterruptedly, in co-ordinated stages, until completion, an extended process of weapons elimination may help to attenuate the acuteness of the otherwise insoluble problem of undeclared, hidden stocks, because it would allow time for a gradual build-up of confidence among parties. It can also reduce the military advantages a non-party might derive from remaining outside

the convention, because the parties would retain a chemical warfare capability for quite a long time.

II. Verification of compliance

There is a consensus that the implementation of the obligations assumed by the parties should be "adequately" verified, and that verification should be carried out through national and international means.

As far as international means are concerned, an important arrangement agreed upon is to create a consultative committee open to all parties and having a permanent secretariat. The exact powers and responsibilities of this committee are to be determined, but it is already clear that it would serve for the exchange of data on chemicals and precursors for permitted purposes, according to agreed lists, as mentioned above. It could also be used to channel requests for information from parties suspected of violations, as well as requests for on-site investigation. Upon the request of any party, or of the UN Security Council, the consultative committee would take steps to establish the "actual state of affairs"; the party suspected of a breach may or may not agree to on-site investigation, but in the latter case it would have to provide appropriate explanations. To enable the consultative body to start its work immediately after the entry into force of the convention, a preparatory committee would be set up upon signature of the convention.

While the two sides agree that in the case of civilian chemical industry routine checks would be both impractical and undesirable, and that *optional* inspection, "by challenge", would be enough, they differ as regards the need for *mandatory* international on-site inspection in other cases. The USA considers the latter type of inspection indispensable to monitor the destruction of stockpiles of chemicals and weapons, and the moth-balling and eventual destruction of chemical weapons production and filling facilities, as well as to check the facilities for permitted production of chemicals which are "primarily useful for chemical weapons purposes".

National measures of verification are usually understood to include reconnaissance satellites or extra-territorial sensors. The parties would undertake not to impede this kind of verification by resorting to deliberate concealment. It should be noted, however, that such sophisticated technical means are a virtual monopoly of the great powers.

It is further assumed that, in order to ensure compliance with the convention, states would take legislative measures in accordance with their constitutional procedures, and that they would set up such national mechanisms as they may deem necessary to enforce the adopted laws and

regulations. Possibilities for confidence-building measures to be taken before and after the entry into force of the convention are under consideration.

III. Entry into force and withdrawal

The conditions for entry into force of the convention have not yet been agreed upon. The Soviet Union insists that all the leading military states of the world, including all the permanent members of the UN Security Council, should become parties before the convention becomes effective. The question is, of course, important for the security of the prospective parties. Since France, the UK, the USA and the USSR (i.e., four out of the five permanent members of the Security Council), and other states militarily most significant, will be involved in the negotiating process as members of the CD, they are expected to adhere to a treaty commonly agreed upon. Thus, China's participation in the work of the CD and a positive attitude on its part towards chemical disarmament may help to resolve this problem.

The convention would include a withdrawal clause patterned after a provision appearing in other arms control agreements. This means that each party would have the right to denounce the convention once it had decided that extraordinary events had jeopardized its supreme interests. The parties could also turn to the UN Security Council with complaints against an offender and expect that some action would be taken in their favour by the Council, but in the prevailing political circumstances the threat of abrogation appears to be the primary means of enforcing a disarmament treaty.

IV. Summary and conclusions

The joint US–Soviet report marks progress in the bilateral negotiations for a CW convention, as regards both the scope and the verification of the envisaged prohibitions.

These are the most important agreements hitherto reached:

1. The CW ban will be comprehensive.
2. The substances banned will be defined on the basis of a general purpose criterion, supplemented chiefly by the criteria of toxicity.
3. Means for chemical warfare as well as means of their production will have to be declared immediately after a state becomes a party to the convention, and destroyed or dismantled within 10 years.
4. An international consultative committee, with a permanent secretariat, will be set up for verification purposes.

5. On-site investigation "by challenge" could be carried out in certain cases.

The most important questions which remain to be solved are as follows:

1. Whether the activities to be banned should explicitly include research and tests carried out with the intention of producing prohibited chemical agents; planning, organization and training for chemical warfare; as well as the use of chemical weapons.

As far as the use is concerned, a mere reference to, or confirmation of continuing validity of, the 1925 Geneva Protocol, which forbids asphyxiating, poisonous or other gases, would not be enough. The Protocol was concluded under the conditions of retention of chemical weapons, and in ratifying it, or in acceding to it, many countries formally reserved the right to employ these weapons against non-parties or in retaliation, and had made preparations for such employment (for the list of parties to the Geneva Protocol and the reservations made to it, see appendix 11B). Moreover, there are still differences of opinion about the scope of the ban under the Geneva Protocol, in particular as regards the legality of the use in war of certain chemical agents.

A convention banning the possession of chemical weapons should expressly rule out their use in war, without qualification and under any circumstances. Alternatively, the parties could undertake to withdraw the reservations they had made in adhering to the Geneva Protocol. The convention should also make it clear, in accordance with the 1969 UN General Assembly resolution, that the prohibition of use applies to all chemical agents having direct toxic effects on man, animals or plants. A prohibition on planning and organization and especially on training of military personnel for chemical warfare could provide additional guarantees of non-use, while restrictions on military-oriented research and tests would reinforce the ban on development and production of chemical warfare agents and weapons.

2. Whether there should be any systematic on-site verification of compliance.

In abolishing an entire category of weapons which have already been used on a large scale in war, and which are capable of mass destruction comparable to that caused by nuclear weapons, the CW convention would become the first significant disarmament measure ever concluded. In view of the security aspects involved in such a radical step, the parties would need to assure themselves that the banned items had actually been abolished, and that new ones were not being manufactured. Unilateral, unchecked declarations by governments would not provide such an assurance, while self-verification exercised exclusively by nationally constituted bodies would not meet the required criterion of impartiality. Extra-territorial verification by national means is beyond the reach of the

majority of states and, in any event, its usefulness is limited. International control is therefore irreplaceable. It could take different forms, the most important being on-site inspection, both sporadic and systematic. Sporadic inspection may be needed, for example, to investigate allegations of clandestine production of chemical warfare agents, or of their illicit use. But in the case of chemical weapon stockpiles, there is no reliable substitute for systematic on-site monitoring of the process of their destruction. There exists a body of evidence that on-site verification, whether sporadic or systematic, can be so devised as to rule out the disclosure of legitimate industrial, commercial or military secrets.

3. What kind of confidence-building measures could be taken before and after the entry into force of the convention.

In this connection, the following proposals have been made:

(*a*) official statements of national policies with respect to chemical weapons;

(*b*) gradual removal of secrecy surrounding chemical weapons through exchanges of information;

(*c*) visits of foreign technical experts to relevant chemical facilities;

(*d*) attendance of military exercises by foreign observers; and

(*e*) international co-operation in the field of protection against toxic chemicals.

These measures are conceived mainly as voluntary acts on the part of states. The purpose of the first four is to fill some inevitable gaps in the verification procedures which, as is generally admitted, cannot provide complete assurance. The purpose of the fifth is to spread knowledge about anti-chemical-warfare measures, so as to guard against a risk that chemical weapons might be used either by violators of the 1925 Geneva Protocol and the envisaged convention, or by non-parties.

Although it has, so far, been negotiated only bilaterally, between the USA and the USSR, the CW convention is meant to be a generally acceptable multilateral treaty. It is, therefore, essential that at an appropriate stage the negotiations themselves become multilateral. This stage seems to have been reached with the submission of the 1979 US–Soviet report recording a convergence of views between the two most powerful chemical weapon states on a series of key issues described above. Bilateral or regional agreements for chemical arms control might usefully supplement a universally applicable multilateral treaty, but cannot replace it. For, as stated in the Final Document of the UN Special Session on Disarmament, the *complete* and effective prohibition of *all* chemical weapons and their destruction represent one of the most urgent measures of disarmament, and the conclusion of the convention to this end is one of the most urgent tasks of *multilateral* negotiations.

Appendix 11A

Joint USSR–United States report on progress in the bilateral negotiations on the prohibition of chemical weapons

During the Vienna meeting of the leaders of the United States and the USSR in June 1979, both sides affirmed the importance of a general, complete, and verifiable prohibition of chemical weapons and agreed to intensify their efforts to prepare an agreed joint proposal for presentation to the Committee on Disarmament. The USSR and United States delegations are guided by this provision at the 10th series of the bilateral negotiations, which began on 16 July 1979.

In the negotiations, the United States and USSR delegations take into account the fact that prohibition of chemical weapons is, as was stressed in the Final Document of the United Nations General Assembly Special Session on Disarmament, one of the most urgent and vital problems in the area of disarmament. They are also guided by the requirement that a convention on the prohibition of chemical weapons, as any other international agreement in the field of arms control and disarmament, should enhance rather than diminish the security of the parties.

The USSR and United States delegations, taking into consideration the interest expressed by many delegations in the Committee on Disarmament concerning the status of the bilateral negotiations on a prohibition of chemical weapons, present the following Joint Report:

1. The two sides believe that the scope of the prohibition should be determined on the basis of a general purpose criterion. Parties to the convention should assume the obligation never in any circumstances to develop, produce, stockpile, otherwise acquire or possess, or retain super-toxic lethal chemicals, other lethal or highly toxic chemicals or their precursors, with the exception of chemicals intended for permitted purposes of such types and in such quantities as are appropriate to these purposes, as well as chemical munitions or other means of chemical warfare. Negotiations are continuing on several issues relating to the scope of prohibition.

2. Permitted purposes are understood to mean non-hostile purposes (industrial, research, medical, or other peaceful purposes, law-enforcement purposes, and purposes of development and testing of means of protection against chemical weapons), as well as military purposes not related to chemical warfare.

3. In order to facilitate verification, it would be appropriate to use, in addition to the general purpose criterion, toxicity criteria and certain other provisions.

4. Agreement has been reached on the following approximate values for the additional criteria of toxicity mentioned above:

(a) LCt_{50} = 2,000 mg min/m³ for inhalation and/or
LD_{50} = 0.5 mg/kg for subcutaneous injections;

(b) LCt_{50} = 20,000 mg min/m³ for inhalation and/or
LD_{50} = 10 mg/kg for subcutaneous injections.

On the basis of these criteria, it will be possible to separate chemicals into appropriate categories, to each of which the general purpose criterion would be applied.

5. Different degrees of prohibition and limitation as well as differentiated methods of verification would be applied on the basis of these toxicity criteria and certain other provisions. These issues continue to be subjects of negotiations.

6. Negotiations are also continuing on definition of terms and several other issues.

7. The two sides have agreed that parties to the convention should assume an obligation not to transfer to anyone, whether directly or indirectly, the means of chemical warfare, and not in any way to assist, encourage, or induce any State, group of States, or any organization to carry out activities which parties would undertake not to engage in pursuant to the convention.

8. The two sides have come to an understanding regarding the necessity for States to declare, immediately after they become parties to the convention, both the volumes of acquired stocks of means of chemical warfare and the means of production of chemical munitions and chemicals covered by the convention. Plans for destruction of declared stocks of chemical weapons should also be declared. These declarations should contain information on the volume and timetables for destruction of such stocks. Plans for destruction or dismantling of relevant means of production should also be declared. In the course of the bilateral negotiations, the two sides are continuing to make efforts to agree on the specific content of the declarations concerning stocks of means of chemical warfare and concerning means of production. In this connexion, the basic concept of means of production is also a subject that remains to be resolved.

9. Agreement has been reached that stocks of means for chemical warfare should be destroyed or diverted for permitted purposes within ten years after a State becomes a party. Means of production should be shut down and eventually destroyed or dismantled. The destruction or dismantling of means of production should begin not later than eight years, and should be completed not later than ten years, after a State becomes a party.

10. In this connexion, the United States and the USSR believe that a future convention should contain provisions in accordance with which parties would periodically exchange statements and notifications concerning: the progress of the destruction of stocks of means of chemical warfare or their diversion for permitted purposes, the progress of the destruction or dismantling of means of production of chemical munitions and chemicals covered by the convention, and of the completion of these processes.

11. The USSR and the United States believe that the fulfilment of the obligations assumed under the future convention should be subject to the important requirement of adequate verification. They also believe that measures with respect to such verification should be based on a combination of national and international measures.

12. International verification measures should include the creation of a consultative committee. This committee could be convened as appropriate by the depositary of the convention, as well as upon request of any party.

13. The activities of the consultative committee in the interval between meetings should be carried out by a secretariat. The mandate of the secretariat is a subject of negotiations.

14. The participants should exchange, through the consultative committee or bilaterally, certain data on super-toxic lethal chemicals produced, acquired, accumulated, and used for permitted purposes, as well as on important lethal chemicals and the most important precursors used for permitted purposes. To this end, it is envisaged to compile lists of the relevant chemicals and precursors. The two sides have reached a significant degree of mutual understanding in developing agreed approaches to the compilation of such lists. The scope of the data to be presented remains to be agreed.

15. Additional functions for the consultative committee remain under discussion.

16. In order to ensure the possibility of beginning the work of the consultative committee immediately after entry into force of the convention, the United States and the USSR believe it appropriate to begin the creation of a preparatory committee upon signature of the convention.

17. A convention should include provisions in accordance with which any party should have the right on a bilateral basis, or through the consultative committee, to request from another party with respect to which suspicions have arisen that it is acting in violation of obligations under the convention, relevant information on the actual state of affairs, as well as to request investigation of the actual state of affairs on site, providing appropriate reasons in support of the necessity of such an investigation.

18. A party may agree to such an on-site investigation or decide otherwise, providing appropriate explanations.

19. It should also be provided that any party could turn to the Security Council with a complaint which would include appropriate rationale. In case of suspicion regarding compliance with the convention, the consultative committee, upon request of any party, or of the Security Council of the United Nations, could also take steps to establish the actual state of affairs.

20. The question of other international verification measures remains unresolved.

21. National measures would include the use of national technical means of verification in a manner consistent with generally accepted principles of international law. In this connexion, parties should not impede, including through the use of deliberate concealment measures, the national technical means of other parties in carrying out the aforementioned verification functions.

22. The USSR and the United States believe that a future convention should reflect the obligation of each party to take appropriate internal measures in accordance with its constitutional procedures to prohibit and prevent any activity contrary to the provisions of the convention anywhere under its jurisdiction or control.

23. Possibilities for confidence-building measures are being explored.

24. A future chemical weapons convention should include a withdrawal provision of the type included in other arms control and disarmament agreements.

25. The question of the conditions for entry into force of the convention remains unagreed.

26. The two sides believe that an effective prohibition of chemical weapons will require working out a large number of technical questions which would be dealt with in annexes to the convention and which are now being studied.

* * *

The United States and the Soviet Union note the great importance attached to the elaboration of a convention by the General Assembly of the United Nations and the Committee on Disarmament which manifested itself, in particular, in the identification of the question of the prohibition of chemical weapons as one of the priority items on the agenda adopted for the current session of the Committee on Disarmament. Both sides will exert their best efforts to complete the bilateral negotiations and present a joint initiative to the Committee on Disarmament on this most important and extremely complex problem as soon as possible.

Source: Committee on Disarmament document CD/48, 7 August 1979.

Appendix 11B

Parties to the Protocol for the prohibition of the use in war of asphyxiating, poisonous or other gases, and of bacteriological methods of warfare

Signed at Geneva on 17 June 1925.
Entered into force on 8 February 1928.
Depositary: French government.
Number of parties, as of 31 December 1979: 99. (El Salvador and Nicaragua signed the Geneva Protocol on 17 June 1925 but have not ratified it.)

For the text of the Geneva Protocol, see the *SIPRI Yearbook 1974*, p. 418.

State	Ratification, accession or succession	State	Ratification, accession or succession
Argentina	12 May 1969	Indonesia	21 Jan 1971[9]
Australia	24 May 1930[1]	Iran	5 Nov 1929
Austria	9 May 1928	Iraq	8 Sep 1931[1]
Barbados	16 Jul 1976[2]	Ireland	29 Aug 1930[10]
Belgium	4 Dec 1928[1]	Israel	20 Feb 1969[11]
Bhutan	19 Feb 1979	Italy	3 Apr 1928
Brazil	28 Aug 1970	Ivory Coast	27 Jul 1970
Bulgaria	7 Mar 1934[1]	Jamaica	28 Jul 1970[12]
Canada	6 May 1930[1]	Japan	21 May 1970
Central African Republic	31 Jul 1970	Jordan	17 Mar 1977[13]
Chile	2 Jul 1935[1]	Kenya	6 Jul 1970
China	24 Aug 1929[3]	Kuwait	15 Dec 1971[14]
Cuba	24 Jun 1966	Lebanon	17 Apr 1969
Cyprus	29 Nov 1966[4]	Lesotho	10 Mar 1972[15]
Czechoslovakia	16 Aug 1938[5]	Liberia	17 Jun 1927
Denmark	5 May 1930	Libya	29 Dec 1971[16]
Dominican Republic	8 Dec 1970	Luxembourg	1 Sep 1936
Ecuador	16 Sep 1970	Madagascar	2 Aug 1967
Egypt	6 Dec 1928	Malawi	14 Sep 1970
Ethiopia	20 Sep 1935[6]	Malaysia	10 Dec 1970
Fiji	21 Mar 1973[7]	Maldives	27 Dec 1966[17]
Finland	26 Jun 1929	Malta	9 Oct 1970[18]
France	10 May 1926[1]	Mauritius	23 Dec 1970[19]
Gambia	5 Nov 1966[8]	Mexico	28 May 1932
German Democratic Republic	25 Apr 1929	Monaco	6 Jan 1967
Germany, Federal Republic of	25 Apr 1929	Mongolia	6 Dec 1968[20]
Ghana	3 May 1967	Morocco	13 Oct 1970
Greece	30 May 1931	Nepal	9 May 1969
Holy See (Vatican City)	18 Oct 1966	Netherlands	31 Oct 1930[21]
Hungary	11 Oct 1952	New Zealand	24 May 1930[1]
Iceland	2 Nov 1967	Niger	5 Apr 1967[22]
India	9 Apr 1930[1]	Nigeria	15 Oct 1968[1]
		Norway	27 Jul 1932
		Pakistan	15 Apr 1960[23]
		Panama	4 Dec 1970
		Paraguay	22 Oct 1933[24]

State	Ratification, accession or succession	State	Ratification, accession or succession
Philippines	8 Jun 1973	Tonga	28 Jul 1971
Poland	4 Feb 1929	Trinidad and Tobago	24 Nov 1970[28]
Portugal	1 Jul 1930[1]	Tunisia	12 Jul 1967
Qatar	18 Oct 1976	Turkey	5 Oct 1929
Romania	23 Aug 1929[1]	Uganda	24 May 1965
Rwanda	11 May 1964[25]	Union of Soviet Socialist Republics	15 Apr 1928[29]
Saudi Arabia	27 Jan 1971	United Kingdom	9 Apr 1930[1]
Senegal	20 Jul 1977	United Republic of Tanzania	22 Apr 1963
Sierra Leone	20 Mar 1967	United States	10 Apr 1975[30]
South Africa	24 May 1930[1]	Upper Volta	3 Mar 1971
Spain	22 Aug 1929[26]	Uruguay	12 Apr 1977
Sri Lanka	20 Jan 1954	Venezuela	8 Feb 1928
Sweden	25 Apr 1930	Yemen*	17 Mar 1971
Switzerland	12 Jul 1932	Yugoslavia	12 Apr 1929[31]
Syria	17 Dec 1968[27]		
Thailand	6 Jun 1931		
Togo	5 Apr 1971		

* Yemen refers to the Yemen Arab Republic (Northern Yemen).

[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. (These reservations were made in similar terms by *Australia*, *Belgium*, *Bulgaria*, *Canada*, *Chile*, *France*, *India*, *Iraq*, *New Zealand*, *Nigeria*, *Portugal*, *Romania*, *South Africa and the United Kingdom*.)

[2] In a note of 22 June 1976, addressed to the depositary goverment, *Barbados* declared that it considered the Protocol to be in force in respect of Barbados in virtue of its extension to it by the United Kingdom. It further declared that as far as Barbados was concerned the reservation made on 9 April 1930 by the British Empire was withdrawn.

[3] 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. The People's Republic of China considers itself bound by the Protocol on condition of reciprocity on the part of all the other contracting and acceding powers.

[4] In a note of 21 November 1966, *Cyprus* declared that it was bound by the Protocol which had been made applicable to it by the British Empire.

[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 document deposited by *Ethiopia*, a signer of the Protocol, is registered as an accession. The date given is the date of notification by the French government.

[7] In a declaration of succession of 26 January 1973 addressed to the depositary government, *Fiji* confirmed that the provisions of the Protocol were applicable to it by virtue of the ratification by the United Kingdom. The Protocol is only binding on Fiji as regards states which have both signed and ratified it and which will have finally acceded thereto. The Protocol shall cease to be binding on Fiji in regard to any enemy state whose armed forces or the armed forces of whose allies fail to respect the prohibitions which are the object of the Protocol.

[8] In a declaration of 11 October 1966, *Gambia* confirmed its adherence to the Protocol which had been made applicable to it by the British Empire.

[9] In an official declaration of 13 January 1971 addressed to the depositary government, *Indonesia* reaffirmed its acceptance of the Protocol which had been ratified on its behalf by the Netherlands on 31 October 1930, and stated that it remained signatory to that Protocol.

[10] The government of the Irish Free State 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 the Irish Free State would cease to be bound by the said Protocol in regard to such state. In a note of 7 February 1972, received by the depositary government on 10 February 1972, *Ireland* declared that it had decided to withdraw the above reservations made at the time of accession to the Protocol.

[11] 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.

[12] *Jamaica* declared to the depositary goverment that it considered itself bound by the provisions of the Protocol on the basis of the ratification by the British Empire in 1930.

[13] The accession by *Jordan* to the Protocol does not in any way imply recognition of Israel, and does not oblige Jordan to conclude with Israel any arrangement under the Protocol. 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.

[14] 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. In a note of 25 January 1972, addressed to the depositary government, Israel objected to the above reservations.

[15] By a note of 10 February 1972 addressed to the depositary goverment, *Lesotho* confirmed that the provisions of the Protocol were applicable to it by virtue of the ratification by the British Empire on 9 April 1930.

[16] The accession to the Protocol does not imply recognition or the establishment of any relations with 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. In a note of 25 January 1972 addressed to the depositary government, Israel objected to the above reservations.

[17] In a declaration of 19 December 1966, *Maldives* confirmed its adherence to the Protocol.

[18] By a notification of 25 September 1970 *Malta* informed the depositary goverment that it considered itself bound by the Protocol as from 21 September 1964, the provisions of the Protocol having been extended to Malta by the government of the United Kingdom prior to the former's accession to independence.

[19] By a notification of 27 November 1970, *Mauritius* informed the depositary goverment that it considered itself bound by the Protocol as from 12 March 1968, the date of its accession to independence.

[20] 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.

[21] Including the Netherlands Indies, Suriname and Curaçao. (On 25 November 1975 Suriname became a sovereign state.)

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.

[22] In a letter of 18 March 1967, *Niger* declared that it was bound by the adherence of France to the Protocol.

[23] By a note of 13 April 1960, *Pakistan* informed the depositary goverment that it was party to the Protocol by virtue of paragraph 4 of the Annex to the Indian Independence Act of 1947.

[24] 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 13 January 1969.

[25] In a declaration of 21 March 1964, *Rwanda* recognized that it was bound by the Protocol which had been made applicable to it by Belgium.

[26] *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.

[27] 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.

[28] By a note of 9 October 1970, *Trinidad and Tobago* notified the depositary government that it considered itself bound by the Protocol, the provisions of which had been made applicable to Trinidad and Tobago by the British Empire prior to the former's accession to independence.

[29] The Protocol only binds the *Union of Soviet Socialist Republics* 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.
[30] The Protocol shall cease to be binding on the *United States* with respect to the use in war of asphyxiating, poisonous or other gases, and of all analogous liquids, materials, or devices, in regard to any enemy state if such state or any of its allies fails to respect the prohibitions laid down in the Protocol.
[31] 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.

12. The prohibition of radiological warfare

Square-bracketed numbers, thus [1], *refer to the list of references on page 384.*

I. Introduction

In 1948 the UN Commission for Conventional Armaments, seeking to distinguish its terms of reference from those of the UN Atomic Energy Commission, resolved that weapons of mass destruction outside its jurisdiction included "atomic explosive weapons, radioactive material weapons, lethal chemical and biological weapons". During the years that followed the adoption of this resolution, nuclear, chemical and biological weapons became the subject of arms control negotiations or agreements, while radioactive material weapons remained largely ignored.

Recently, however, the question of prohibiting radiological weapons was brought up for discussion by the USA and the USSR. The reason for the renewed interest of the two great powers in such a prohibition is that the development of nuclear energy has made highly radioactive material available in great amounts to many countries [1]. In effect, what is aimed at is the prevention of misuse of radioactive material by non-nuclear weapon states rather than by nuclear weapon states, the latter already being in a position to cause lethal radiation by exploding a nuclear device.

On 9 July 1979, as a result of bilateral talks initiated two years earlier, the USA and the USSR submitted to the Geneva-based Committee on Disarmament an agreed joint proposal on "major elements" of a treaty prohibiting radiological weapons (for the text, see appendix 12A). These elements amount to a complete treaty text; all that is lacking is a preamble. There are also a few gaps in the paragraphs concerning the entry into force of the treaty and the convening of a review conference.

II. Essential provisions of the proposed treaty

The proposed treaty would prohibit the development, production, stockpiling, acquisition by other means or possession, or use of radiological weapons. A 'radiological weapon' is defined as any 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 any radioactive material, other than that produced by a nuclear explosive device, specifically designed

for such use. Thus, a clear distinction has been drawn between a weapon relying for its effect exclusively on radiation emitted by radioactive material contained in it, and a weapon relying for its effect on heat, blast *and* radiation caused by the nuclear process occurring at the time of explosion. The former would be prohibited, while the latter would not.

In addition, the parties would undertake not to employ deliberately any radioactive material not defined as a radiological weapon, and not produced by a nuclear explosive device, to cause destruction, damage or injury, and to take measures necessary to prevent loss or diversion of radioactive materials that might be used in radiological weapons.

Other substantive provisions—those dealing with mechanisms for the solution of problems which may arise in the application of the treaty, the complaints procedure involving the UN Security Council and investigation of alleged breaches, assistance to parties harmed as a result of violation of the treaty, the review of the operation of the treaty, and the right to withdraw from it—are patterned after corresponding clauses of existing arms control agreements. No systematic verification of compliance has been provided for, an omission which may be taken as an indication that the sponsors themselves do not attach high arms control value to the proposed measure.

In making a case for the prohibition of radiological weapons, the USSR pointed to the possibility of developing bombs, shells or demolition charges containing radioactive material and designed to disseminate this material by means of an explosion. The possibility of disseminating radioactive material by a non-explosive method—for example, by dispersing it in the form of liquid or solid particles—was also mentioned. The USA stressed the danger of radioactive material from spent reactor fuel rods being used over an area to make it impassable, or to kill or harm the population, or to force its evacuation. Certain other countries also seem to fear the consequences of the use of radioactive material for the natural environment [2]. However, as far as is known, no nation has manufactured a radiological weapon. In view of the enormous practical difficulties connected with the use of such weapons in war, it is even doubtful whether any serious thought is being given to developing them.

III. Military applicability of radioactive material

In order to kill or injure people by the use of radiological weapons on the battlefield, a very high radiation dose would be required. One would need radioactive isotopes having a short or very short half-life, but these cannot be stored (they would decay before being used). Alternatively, one would need such large amounts of isotopes with a long half-life that the very

method of warfare would be impractical. In general, transport of radioactive material to the battlefield would be a very cumbersome task, mainly due to the heavy protective shielding which would be needed, while delivery of this material to intercontinental targets, for so-called strategic purposes, is hard to conceive. On the other hand, it is technically possible to use material of lower activity for causing long-term effects, harmful to life or health after months or years, or even to future generations. For this purpose one might use materials having a relatively long half-life, for instance strontium-90, which has a half-life of about 28 years. These materials can be obtained from the radioactive waste of reactors. But there would be little military rationale for producing long-term harmful effects. This was acknowledged, as early as 1962, by the US Department of Defense [3], and nothing is known since then to have undermined this assessment.

Moreover, dispersal of such radioactive material would run counter to existing humanitarian law. In particular, the 1977 Protocol (I) relating to the protection of victims of international armed conflicts prohibits the use of methods and means of warfare that are intended or may be expected to cause widespread, long-term and severe damage to the natural environment and thereby prejudice the health or survival of the population (Article 35, paragraph 3, and Article 55). Radioactive contamination of an area—even if motivated by self-defence—clearly falls under the category of these internationally prohibited methods of war. It is noteworthy, however, that the nuclear powers who signed the Protocol formally stated their understanding that the rules established therein have no effect on the use of nuclear weapons; they have thus exempted from the prohibitions the contamination of the environment with radioactive fall-out produced by a nuclear explosion.

If, in spite of the low value of radioactive material as an instrument of war, it were still considered useful specifically to prohibit the use of radiation for hostile purposes, simpler ways could be found than negotiating a new treaty. For example, through an agreed statement of understanding, the applicability 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, could be extended to cover radioactive material. And a ban on the use of radiological weapons, which do not exist, would in practice preclude their manufacture. A mere non-use commitment would also have the advantage of dispelling an apprehension, which has already been voiced, that a prohibition of production of radiological weapons might in some way hinder the use of sources of radiation for peaceful purposes.

Of a more practical value is the treaty clause dealing with loss or diversion of radioactive material, for it is meant to guard against the seizure of

such material by sub-national terrorist groups. However, this goal can also be achieved by measures other than a new arms control agreement. For example, the International Atomic Energy Agency (IAEA) has made recommendations for the physical protection of nuclear material in use, transit and storage, minimizing the possibilities for unauthorized removal of nuclear material or for sabotage. In this connection, sabotage is defined as a deliberate act directed, among other things, against nuclear material which would endanger the public health and safety through radiation [4]. Moreover, the IAEA has recently negotiated a convention on the physical protection of nuclear material in international transport. The convention considers as a punishable offence an act or a threat of use or dispersal of nuclear material to cause death or serious injury to any person or substantial damage to property [5]. The materials covered by the IAEA recommendations and convention are mainly fissionable materials (uranium and plutonium). But there is no reason why the existing regulations should not be extended to cover radioactive material not containing fissile isotopes.

IV. Conclusion

The emergence of militarily useful radiological weapons is not an immediate or serious threat; therefore, a radiological warfare treaty, if needed at all, has very low arms control priority. The time and effort required to conclude such a treaty would be better spent on negotiating arms control and disarmament measures relating to nuclear weapons or chemical weapons, the mass destructive effect of which on human life and on the environment has already been demonstrated. A substantial reduction in the existing arsenals of these weapons may also have an inhibitory effect on the development of new weapons of mass destruction.

References

1. Committee on Disarmament document CD/PV.40.
2. Committee on Disarmament document CD/40.
3. Glasstone, S. (ed.), *The Effects of Nuclear Weapons* (US Atomic Energy Commission, Washington, 1962), pp. 464–65.
4. IAEA document INFCIRC/255/Rev.1.
5. IAEA Press Release PR 79/20.

Appendix 12A

Joint USSR–United States proposal on major elements of a treaty prohibiting the development, production, stockpiling and use of radiological weapons

I

Each State Party to the Treaty undertakes not to develop, produce, stockpile, otherwise acquire or possess, or use radiological weapons.

II

For the purpose of the Treaty, the term "radiological weapon" means:

1. Any 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.

2. Any radioactive material, other than that produced, by a nuclear explosive device, specifically designed for employment, by its dissemination, to cause destruction, damage or injury by means of the radiation produced by the decay of such material.

III

Each State Party to the Treaty also undertakes not to employ deliberately, by its dissemination, any radioactive material not defined as a radiological weapon in paragraph II, subparagraph 2, and not produced by a nuclear explosive device, to cause destruction, damage or injury by means of the radiation produced by the decay of such material.

IV

Each State Party to the Treaty undertakes not to assist, encourage, or induce any person, State, group of States or international organization to engage in any of the activities which the Parties to the Treaty have undertaken not to engage in under the provisions of paragraphs I and III.

V

Provisions of the Treaty shall not hinder the use of sources of radiation from radioactive decay for peaceful purposes and shall be without prejudice to any generally recognized principles and applicable rules of international law concerning such use.

VI

Each State Party to the Treaty undertakes, in accordance with its constitutional procedures, to take any measures which it deems necessary to prevent loss of and to prohibit and prevent diversion of radioactive materials that might be used in radiological weapons and any activities contrary to the provisions of the Treaty in its territory or at any place under its jurisdiction or under its control.

VII

Nothing in the Treaty shall be interpreted as in any way limiting or detracting from the obligations assumed by any State under the Treaty on the Non-Proliferation of Nuclear Weapons, the Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare, signed at Geneva on 17 June 1925, or any existing rules of international law governing armed conflict.

VIII

1. The States Parties to the Treaty undertake to consult one another and to co-operate in solving any problems which may arise in relation to the objectives of, or in the application of the provisions of, the Treaty. Consultation and co-operation pursuant to this paragraph may also be undertaken through appropriate international procedures within the framework of the United Nations and in accordance with its Charter. These international procedures may include the services of appropriate international organizations, as well as of a Consultative Committee of Experts as provided for in subparagraph 2 of this paragraph.

2. For the purposes set forth in subparagraph 1 of this paragraph, the Depositary shall, within one month of the receipt of a request from any State Party, convene a Consultative Committee of Experts. Any State Party may appoint an expert to this Committee, whose functions and rules of procedure are set out in the Annex, which constitutes an integral part of the Treaty. The Committee shall transmit to the Depositary a summary of its findings of fact, incorporating all views and information presented to the Committee during its proceedings. The Depositary shall distribute the summary to all States Parties.

3. Any State Party to the Treaty which has reasons to believe that any other State Party is acting in breach of obligations deriving from the provisions of the Treaty may lodge a complaint with the Security Council of the United Nations. Such a complaint should include all relevant information as well as all possible evidence supporting its validity.

4. Any State Party to the Treaty undertakes to co-operate in carrying out any investigation which the Security Council may initiate, in accordance with the provisions of the Charter of the United Nations, on the basis of the complaint received by the Council. The Security Council shall inform the States Parties to the Treaty of the results of the investigation.

5. Each State Party to the Treaty undertakes to provide or support assistance, in accordance with the provisions of the Charter of the United Nations, to any Party to the Treaty which so requests, if the Security Council decides that such Party has been harmed or is likely to be harmed as a result of violation of the Treaty.

IX

1. A State Party may propose amendments to the Treaty. Each proposed amendment shall be submitted to the Depositary, which shall promptly transmit it to all States Parties.

2. An amendment shall enter into force for each State Party accepting the amendment after the deposit with the Depositary of documents of acceptance by a majority of the States Parties. Thereafter, the amendment shall enter into force for each remaining State Party on the date of the deposit by it of the acceptance document.

X

1. The Treaty shall be of unlimited duration.

2. Each State Party to the Treaty shall in exercising its national sovereignty, have the right to withdraw from the Treaty if it decides that extraordinary events, related to the subject matter of the Treaty, have jeopardized the supreme interest of its country. It shall give notice of such withdrawal to all other States Parties to the Treaty and to the United Nations Security Council three months in advance. Such notice shall include a statement of the extraordinary events it regards as having jeopardized its supreme interests.

XI

1. Ten years after entry into force of the Treaty, or earlier if requested by a majority of States Parties, a conference of States Parties should be convened to review the operation of the Treaty, with a view to assuring that the purposes of the preamble and the provisions of the Treaty are being realized. Such review should take into account any new scientific and technological developments relevant to the Treaty.

2. Thereafter, a majority of the States Parties could obtain the convening of a conference with the same objectives.

3. If no review conference has been convened within (blank) years following the conclusion of a previous review conference, the Depositary should solicit the views of all States Parties on the holding of such a conference. If (blank fraction) or (blank number) of the States Parties, whichever number is less, respond affirmatively, the Depositary should take immediate steps to convene the conference.

XII

1. The Treaty shall be open to all States for signature. A State which does not sign the Treaty before its entry into force in accordance with subparagraph 3 of this paragraph may accede to it at any time.

2. The Treaty shall be subject to ratification by signatory States. Instruments of ratification and accession shall be deposited with the Secretary-General of the United Nations.

3. The Treaty shall enter into force upon the deposit of the instruments of ratification by (blank) Governments in accordance with subparagraph 2 of this paragraph.

4. For States whose instruments of ratification or accession are deposited subsequent to the entry into force of the Treaty, it shall enter into force on the date of the deposit of their instruments of ratification or accession.

5. The Depositary shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification or accession and the date of entry into force of the Treaty, as well as of any amendment to it and of the receipt of other notices.

6. The Treaty shall be registered by the Depositary pursuant to Article 102 of the Charter of the United Nations.

XIII

The Treaty, the Arabic, Chinese, English, French, Russian and Spanish texts of which are equally authentic, shall be deposited with the Secretary-General of the United Nations, who shall transmit duly certified copies of the Treaty to the Governments of the signatory and acceding States.

ANNEX TO THE TREATY

Consultative Committee of Experts

1. The Consultative Committee of Experts shall undertake to make appropriate findings of fact and provide expert views relevant to any problem raised pursuant to paragraph VIII, subparagraph 1, of the Treaty by the State Party requesting the convening of the Committee.

2. The work of the Consultative Committee of Experts shall be organized in such a way as to permit it to perform the functions set forth in paragraph 1 of this Annex. The Committee shall decide procedural questions relative to the organization of its work, where possible by consensus, but otherwise by a majority of those present and voting. There shall be no voting on matters of substance.

3. The Depositary or his representative shall serve as the Chairman of the Committee.

4. Each expert may be assisted at meetings by one or more advisers.

5. Each expert shall have the right, through the Chairman, to request from States, and from international organizations, such information and assistance as the expert considers desirable for the accomplishment of the Committee's work.

Source: Committee on Disarmament document CD/31, 9 July 1979.

13. The prohibition of inhumane and indiscriminate weapons

I. Introduction

The first session of the United Nations Conference on Prohibitions or Restrictions of Use of Certain Conventional Weapons which may be Deemed to be Excessively Injurious or to have Indiscriminate Effects was held in Geneva on 10–28 September 1979. It was agreed to hold a second session in September 1980.

This chapter briefly reviews the major issues raised,[1] most of which remain to be resolved at the second session.

The most important procedural issue is that of decision making: that is, whether agreements are to be arrived at on the basis of a majority vote or on the basis of consensus. While a majority of countries support the former principle, in keeping with UN General Assembly rules of procedure, the major NATO and Warsaw Treaty Organization (WTO) powers insist on the latter.

II. General issues

The conference began work on basic issues, such as the scope of application of any new protocols, which had hardly been touched upon at the preparatory conferences, let alone adequately prepared.

A proposal for an 'umbrella treaty' on inhumane and indiscriminate weapons was first put forward by Mexico but it was superseded by a more detailed proposal by the UK and the Netherlands. The Mexican proposal implicitly left open the question of the *scope of application*, so that any agreements would be seen as applying to all armed conflicts, whether international or internal. The UK/Netherlands proposal, on the contrary, was based on common article 2 of the four Geneva Conventions of 1949. This was remarkable since it ignored both the fact that many of the uses and abuses of the various weapons under discussion have occurred in internal conflicts, as well as the progress of international law in this respect since 1949—in particular the 1977 Additional Protocols.

This is an important matter of direct concern to every citizen. It means that states are prepared to enter into certain (limited) agreements with

[1] Previous reviews of the issues are to be found in *SIPRI Yearbooks 1973* (chapter 5), *1975* (chapter 4), and *1979* (chapter 9).

other states in order to reduce the suffering of the civilians and combatants in other states in time of war. But states are not prepared to offer their own citizens the same degree of protection against the internal use of indigenous military and police forces.

This is not only a matter of vague legal principle, but it affects actual practice with respect to specific weapons. Thus, the use of dumdum bullets is prohibited in war; but an increasing number of police forces are issued with dumdum bullets for domestic use.

We may be entering a period when the legal codes of human rights in international armed conflicts, limited though they may be, are more extensive than domestic human rights.

A second important general issue is that of *review and development* of any agreements achieved. Again, views are divided between those who consider it important to institute a mechanism for examining and possibly restricting the use of new military technologies, such as lasers, and those who wish to avoid any such international interference in national military freedom of action. In these circumstances, 'review' can mean anything from a reluctant undertaking to meet, say, ten years after the entry into force of some minimal agreements to assess the effects of those agreements, to a much more explicit requirement to meet, at shorter intervals, to continue the substantive business of outlawing inhumane and indiscriminate weapons and means of warfare.

A third general issue is the relationship of the present conference to the *Committee on Disarmament* (CD). The USSR and other WTO countries maintained the standpoint that the CD should be involved in future efforts to limit specific weapons. This view is not acceptable to those states who initiated the present effort precisely because they felt a new approach was necessary, given the lack of progress in the disarmament negotiations. These states believe that transferring the issue to the CD would simply bury it, because of the other pressing items on the agenda. In the meantime, there is nothing to stop the USSR or other states from putting forward constructive proposals—for example, on incendiary-weapon disarmament —at the CD if they regard this as the best procedure.

III. Substantive issues: restrictions of use of specific weapons

A text to prohibit the use of so-called non-detectable (by X-ray) fragments remains on the table for the second session, but it was not discussed at the first session. Although there is an increasing realization that this prohibition is aimed at a weapon myth—the so-called 'plastic pellet bomb'—no delegation had sufficient courage of conviction to draw this anomaly to the attention of the conference.

The myth concerns the actual wounding effect of a type of bomb and arose during the Viet Nam War. Certain US anti-personnel bombs used during the war contained steel balls embedded in plastic. Persons wounded by them were later found to have in their bodies plastic fragments which were not detectable by X-ray. The text for consideration at the second session would not prohibit such weapons, since it is the (detectable) steel balls rather than the plastic elements which are the *primary* wounding agent.

Incendiaries

At the first session there was, for the first time, rather general agreement—even by the great powers—that some restrictions should be made on the use of napalm. Unfortunately, the approach adopted led to endless, tangled arguments, most of which would have been unnecessary if the case had been handled differently.

Briefly, the USA—historically a major user of incendiary weapons—has finally agreed to a minimal restriction on the use of napalm: it would be prepared to accept the prohibition of *air-delivered flame weapons* against *military targets* within a *concentration of civilians*.

This formulation caused days of discussion on the definition of 'flame weapons' as opposed to 'incendiary weapons', a broader category already defined. Further days were wasted on defining the term 'concentration of civilians'.

An examination of the US proposition shows that it also thoroughly confused two separate issues: unnecessary suffering (which is primarily a matter concerning combatants) and indiscriminate effects (a matter concerning civilians). Since the USA steadfastly refuses, along with other major powers, to consider any protection for combatants against injury caused by the use of incendiaries, the point at issue is the protection of civilians.

The indiscriminate effects of incendiaries result from three factors: (*a*) uncertainties associated with the means of delivery, (*b*) the area of coverage of the incendiary munitions or incendiary agents, and (*c*) the tendency of fire to propagate.

If the indiscriminate effects of air-delivered flame weapons result from the means of delivery, then other air-delivered incendiary weapons should also be banned, in particular incendiary bombs of the kind dropped in millions during World War II. The area of coverage relates to whether large tanks with napalm or a large number of small bombs are used—bombs which may be filled with 'flame agents' (e.g., napalm) but may also be made of, for example, magnesium, thermite or zirconium, which are not regarded as flame munitions. Finally, the tendency of fire to propagate applies at least as much to incendiary bombs other than flame weapons, since they are specifically designed to set fire to objects (e.g., houses)

For all these reasons, if the purpose of the proposed rule is to avoid indiscriminate civilian casualties, then it should apply, at the very least, to all air-delivered *incendiary* weapons.

The distinction between 'flame' and incendiary weapons might be more relevant were the purpose to restrict the use of anti-personnel flame weapons in order to avoid unnecessary suffering but to permit the use of certain incendiary munitions against matériel. In the context of indiscriminate effects, the distinction is not valid.

It is to be hoped that, during the year between the two sessions of the conference, the USA will re-examine its position.

As to the further protection of combatants, in a spirit of compromise, a proposal has been put forward to prohibit the use of incendiaries against military personnel except when they are in or near fortifications or armoured vehicles. In an age where most states have mechanized forces, it is very difficult to see that such a rule is any serious limitation in combat between such forces. It would, however, substantially improve the legal protection of combatants with no access to such means of physical protection as fortifications or armoured vehicles. The rule could therefore remove one of the most blatant affronts to humanitarian concerns: the use of napalm against unprotected troops in the open and usually in developing countries with little or no medical help available.

Mines and booby-traps

Although there is no doubt that mines may cause excessive injuries, the basic issue raised by their use is that of *indiscriminate effects*.

In the text put before the conference, a distinction is made between conventionally emplaced and remotely delivered mines. In order to reduce the indiscriminate effects of conventionally emplaced mines, it is proposed to improve the procedures for recording their position, and for making the information available to the relevant authorities at the close of hostilities. This approach is better than none at all, but there is a very great difference between *recording* and *removal* of mines.

Even with conventionally emplaced mines, removal is a hazardous, costly and time-consuming task, with the result that it is often not carried out adequately. Consequently, old mines and other unexploded munitions claim thousands of victims long after the close of hostilities.

In these circumstances, merely recording the placing of mines is an inadequate response to the problem of unnecessary civilian casualties. It is essential to include an obligation upon the parties to an armed conflict, at the appropriate time, to assist in the removal of mines, unexploded munitions and other remnants of war.

Further, as a result of new technologies, mines are now deployed which

are extremely difficult to detect and dispose of with known methods. This presents a further challenge to international law.

All these problems are particularly acute in the case of *remotely delivered mines*, which may be distributed in hundreds, thousands or even millions over wide areas. For the first time, remotely delivered mines permit a more offensive use of mines, possibly even far behind front lines, both in the countryside and in cities. This in turn increases the problems of marking, recording and removing mines and adds greatly to the threat of indiscriminate effects.

The case of remotely delivered mines is a particularly severe example of the problem of reconciling military and humanitarian concerns. The new scatterable mine systems open up a range of new tactical possibilities for the military commander. At the same time they present new hazards for civilians.

Considerable progress has been made in reconciling these concerns since the first draft texts were put forward—texts which would have permitted relatively unrestricted use of remotely delivered mines. Consensus has been gradually emerging that these mines should either (*a*) be used in areas which were military targets and which could be defined and marked, or (*b*) be fitted with a mechanism which rendered the mine inoperative or destroyed it after a certain time.

Unfortunately, such consensus was lost as a result of efforts to introduce a concession in the case of mines delivered by helicopters—a position advocated in particular by Italy, which happens to specialize in the production of helicopter-delivered mines, presumably without self-destruction devices. The concession to the free use of helicopter-delivered mines without self-destruct devices was not generally acceptable, but the chairman of the working group introduced a useful compromise solution, whereby the use of these mines would be permitted but only for the purposes of laying a preplanned minefield in a properly recorded location.

Most regrettably, at that point, with the conference working very late at night, an 'accident' occurred. In order to tidy up a rather untidy discussion, Mexico introduced a text which on first sight appears to be merely a simpler rewording, but which on careful consideration would seem to undo all the progress achieved so far:

1. The use of remotely delivered mines is prohibited unless such mines are only used within an area which is itself a military objective or which contains military objectives, and unless their location can be accurately recorded in accordance with Article 3 (1) above *or* unless each such mine is fitted with an effective neutralizing mechanism, that is to say a selfactuating or remotely controlled mechanism which is designed to render a mine harmless or cause it to destroy itself when it is anticipated that the mine will no longer serve the military purpose for which it was placed in position.
2. Effective advance warning shall be given of any delivery or dropping of remotely delivered mines which may affect the civilian population, unless circumstances do not permit. (Italics added)

This text was hurried through by the chairman without further discussion. Although all the elements of the text are to be found in previous drafts, it represents a significant regression.

The term "an area which contains military objectives" is vague, but the major weakness lies in the addition of the phrase which starts "unless their location can be accurately recorded . . .". This apparently innocent and well-intentioned text is so unfortunate because it permits the scattering of non-self-neutralizing mines over large areas "which contain military objectives" as long as a map can be produced showing that the area is mined.

It is difficult enough to remove a limited number of hand- or mechanically-emplaced mines; it is well-nigh impossible to conceive of the adequate removal of mines which have been scattered over large areas of countryside by aircraft. Since such areas may merely "contain" military objectives, they are very likely also to include civilians and civilian objects or natural resources, such as fields and forests, on which civilians are dependent. Thus, this text permits in practice almost free use of remotely delivered mines without adequately reducing the threat to civilians.

The problem could be solved most effectively by changing the word *or* (italicized in the text above) to *and*. Alternatively, the conference should return to the earlier compromise text put forward by the chairman of the working group.

Small calibre weapons

Among the various other categories of weapons which could be considered inhumane and indiscriminate weapons and which should be discussed by the conference, small calibre weapons were the only ones to receive any attention at all. Even so, all that was discussed was a proposal by Sweden to hold an international seminar on the wounding effects of such weapons.

The debate revolved entirely around the question of the sponsorship of such a seminar, rather than substantive issues. Sweden has already organized three such seminars, and proposed that the fourth, though financed by Sweden, would be sponsored by the United Nations. In the end, owing to inability to achieve a consensus on this issue, Sweden announced that it would go ahead with the seminar without UN sponsorship, and the conference contented itself with a resolution welcoming this initiative.

IV. Conclusions

In adopting the pragmatic approach of focusing on specific weapons, the conference has entered upon a most tortuous route towards any agree-

ment. Since there is no agreed set of definitions of what constitutes "superfluous injury or unnecessary suffering" or "indiscriminate effects", it is difficult to know how to evaluate specific weapons.

As a result, the conference finds its time taken up with trying to accommodate the military interests of each state and military service. What is likely to emerge is not a clear normative statement about superfluous injury and indiscriminate effects—followed by a list of weapons to which these criteria apply—but a modest set of rules permitting the use of any weapon which any state can claim is needed for a particular military task.

14. A comprehensive programme of disarmament

The 1978 UN Special Session on Disarmament revived the Disarmament Commission (DC) as a deliberative body composed of all the members of the United Nations. The first substantive meetings of the Disarmament Commission were held in May–June 1979, with the main task of considering elements of a comprehensive programme of disarmament. On 8 June 1979, the DC adopted a set of recommendations and submitted them to the 34th regular UN General Assembly session. The General Assembly in turn transmitted the DC report to the Geneva-based 40-member Committee on Disarmament, which is to negotiate a comprehensive programme of disarmament.

I. The Disarmament Commission's recommendations

The Disarmament Commission recommended that the following arms control and disarmament measures should be included in a comprehensive programme of disarmament: (*a*) prohibition of nuclear weapon tests; (*b*) cessation of the qualitative improvement and development of nuclear weapon systems, cessation of nuclear weapon production as well as reduction of stockpiles of nuclear weapons and the means of their delivery, leading to their complete elimination "at the earliest possible time"; (*c*) assurances for non-nuclear weapon states against the use of nuclear weapons; (*d*) continuation of the strategic arms limitation negotiations; (*e*) further steps to prevent the spread of nuclear weapons; (*f*) establishment of nuclear weapon-free zones; (*g*) prohibition of chemical weapons as well as their destruction; (*h*) prevention of the emergence of new weapons of mass destruction; (*i*) prohibition of radiological weapons; (*j*) limitation and reduction of conventional weapons and armed forces; (*k*) prohibition of certain conventional weapons which may cause unnecessary suffering and have indiscriminate effects, or restrictions on their use; (*l*) consultations among major suppliers and recipients on the international transfer of conventional weapons; (*m*) reduction of military expenditures; (*n*) further steps to prohibit hostile uses of environmental modification techniques; (*o*) further steps to prevent an arms race on the sea-bed; (*p*) further steps to prevent an arms race in outer space; (*q*)

establishment of zones of peace; and (*r*) confidence-building measures adapted to the characteristics of each region.

The report also mentions the need to achieve relaxation of international tension, to prevent the use of force in international relations and to mobilize world opinion in favour of disarmament.

The DC attached importance to verification methods and procedures related to specific disarmament measures. It recommended an examination of the requirements of an institutional nature to facilitate the disarmament process and to ensure implementation of disarmament agreements. (For the full text of the Disarmament Commission's recommendations, see appendix 14A.)

Assessment of the DC recommendations

To provide useful guidance for negotiations on a comprehensive disarmament programme, the Disarmament Commission should have issued more specific recommendations than those contained in its report. For example, it could have worked out packages of interrelated arms limitation and reduction measures to be brought into effect, under appropriate control, in consecutive phases of the disarmament process. Balanced packages of measures could provide better guarantees against unilateral advantages and, therefore, better serve the security of states than could piecemeal arms control. Such a proposal would be of value even if no time-frames were set for individual phases. Alternatively, in lieu of a sequential approach, the DC could have elaborated a package proposal only for a first phase, making it a model for further phases. Or, if the across-the-board approach to arms control and disarmament, inherent in the package proposal, had proved premature, the DC could at least have defined in concrete terms the scope of individual priority measures proposed for negotiations in the immediate future.

However, the Disarmament Commission chose to reiterate the same principles for disarmament negotiations that have been stated many times before; and, instead of drafting a concrete plan of action consistent with these principles, it simply summarized the relevant provisions of the Final Document of the UN Special Session on Disarmament, without even paying much attention to the nuances contained in the Document. Thus, after four weeks' work, the Disarmament Commission produced no more than a catalogue of measures which are loosely related to each other, and which already appear on the agendas of the existing bilateral, trilateral and multilateral (including regional) negotiating forums.

Not only is the DC report devoid of new content, but it also contains an incongruity: it records a lack of consensus on the prohibition of the use or threat of use of nuclear weapons, on the dissolution of military alliances

and the dismantling of foreign military bases, and on the prohibition of conventional weapons of great destructive power. There may be different opinions as to when such measures should be realized, but it is difficult to see how comprehensive disarmament can be compatible with continuous nuclear threat, or with foreign military presence, or with retention of particularly destructive weapons, be they conventional or nuclear, even if 'comprehensive' is not tantamount to 'complete'. This incongruity is, of course, only an apparent one. The debate in the DC has confirmed that most states pursue short-term objectives serving their own immediate interests, rather than long-term objectives serving the interests of the whole international community.

Actually, the points of disagreement among the members of the Disarmament Commission were more numerous than those mentioned above, because certain states pressed for the adoption of proposals which had been rejected at the Special Session on Disarmament only one year before. Furthermore, as a result of concessions to a group of countries which refuse to be bound by the Treaty on the Non-proliferation of Nuclear Weapons, neither this treaty—the most important ever concluded in the field of arms control—nor the international safeguards against nuclear-weapon proliferation have been explicitly mentioned in the Commission's report. This was the high price paid by the majority of states to avoid resorting to a vote on the report.

II. Conclusion

It is doubtful whether the Disarmament Commission's recommendations will be of any help to the Committee on Disarmament, which is called upon to develop details of a comprehensive programme as well as of the ways to implement it. Rather, they are apt to widen the margin of divergent interpretations of the Final Document of the Special Session on Disarmament, which is the recognized basis for a disarmament programme.

The only new element, which seems to go beyond the Final Document, is the stated requirement for a disarmament verification institution. Such an institution would, of course, be necessary only insofar as there would be anything to supervise. Therefore, elaboration of concrete arms control and disarmament measures should have priority over any institutional arrangements.

As far as the future work of the Disarmament Commission is concerned, it would appear more useful for the Commission to focus its debate on specific subjects rather than superficially to cover the whole spectrum of disarmament, thereby repeating the annual exercise of the UN General Assembly.

Appendix 14A

Elements of a comprehensive programme of disarmament

On 8 June 1979 the UN Disarmament Commission adopted by consensus recommendations relating to the elements of a comprehensive programme of disarmament, and agreed to submit them to the General Assembly for examination and transmission to the Committee on Disarmament.

I. *Introduction*

1. Advocated by the General Assembly of the United Nations for nearly two decades, general and complete disarmament under effective international control must continue to be the ultimate goal of all endeavours undertaken in the sphere of disarmament.

2. In 1969, the General Assembly, after declaring the decade of the 1970s as a "Disarmament Decade", requested the Conference of the Committee on Disarmament

> "to work out a comprehensive programme, dealing with all aspects of the problem of the cessation of the arms race and general and complete disarmament under effective international control".[1]

Although this appeal was reiterated by the General Assembly in later years, it was not possible for the Conference of the Committee on Disarmament to discharge this mandate.

3. The first special session of the General Assembly devoted to disarmament laid the basis in its Final Document, adopted by consensus, for an international disarmament strategy, in which the elaboration of the comprehensive programme of disarmament is an important element. The Disarmament Commission was entrusted with the task of considering "the elements of a comprehensive programme for disarmament to be submitted as recommendations to the General Assembly and, through it, to the negotiating body, the Committee on Disarmament", which was requested by the Assembly to "undertake the elaboration" of such a programme.

4. The comprehensive programme of disarmament, which would provide the necessary framework for substantive negotiations in the field of disarmament, should be a carefully worked out package of interrelated measures in the field of disarmament, which would lead the international community towards the goal of general and complete disarmament under effective international control.

5. The comprehensive programme of disarmament should be based principally on the Final Document of the Tenth Special Session of the General Assembly. It should lay down an agreed framework for sustained international action in the field of disarmament, including negotiations at different levels, that is, multilateral, bilateral and regional, on specific measures of disarmament. The elaboration of the comprehensive programme of disarmament should not in any way impair the commitment entered into by Member States, in the Final Document, to make every effort faithfully to carry out the Programme of Action set forth therein.[2]

[1] General Assembly resolution 2602 E (XXIV).
[2] General Assembly resolution S-10/2, sect. III.

6. The Committee on Disarmament should commence work on the elaboration of the comprehensive programme at the earliest possible date and all efforts should be exerted so as to submit it for consideration and adoption not later than the second special session of the General Assembly devoted to disarmament, scheduled to be held in 1982.

7. The comprehensive programme of disarmament should:

(a) Define the objectives of the comprehensive programme of disarmament together with the principles that should guide the negotiations and priorities which should be applied in the negotiations;

(b) 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 prevails and in which the new international economic order is strengthened and consolidated;

(c) Include, as parallel measures accompanying progress in disarmament, measures to strengthen institutions for maintaining peace and the settlement of international disputes by peaceful means as well as measures necessary to bring about the effective application of the relevant provisions of the Charter of the United Nations;

(d) Establish appropriate procedures for:

(i) The implementation of the programme;

(ii) A continuing review of the implementation of the programme;

(e) Cover measures aimed at encouraging international and national efforts to promote knowledge and information about disarmament, in order to create an international atmosphere conducive to the implementation of measures needed to be taken to bring about the halting and the reversal of the arms race and the achievement of the ultimate objective of general and complete disarmament under effective international control.

II. *Objectives, principles and priorities*

8. The immediate objective of a comprehensive programme of disarmament should be to maintain and further the momentum generated by the first special session of the General Assembly devoted to disarmament, to initiate and expedite urgent negotiations on halting the arms race in all its aspects, to open a process of genuine disarmament on an internationally agreed basis and to increase international confidence and relaxation of international tension.

9. The long-term objectives should be, through the co-ordinated implementation of the comprehensive programme of disarmament, to achieve general and complete disarmament under effective international control, to avert the danger of war and to create conditions for a just and stable international peace and security and the full realization of the new international economic order.

10. The elaboration of the comprehensive programme of disarmament should take place as urgently as possible and parallel with the negotiations on concrete disarmament measures, particularly those agreed in the Programme of Action adopted at the tenth special session of the General Assembly. The comprehensive programme of disarmament should contain a phased programme covering measures in the different fields in which the implementation of the first stage should effectively contribute to the halting of the arms race and to the opening of the process of genuine disarmament.

11. During the first stage of the implementation of the comprehensive programme

of disarmament, special attention should be given to the immediate cessation of the nuclear arms race and the removal of the threat of a nuclear war.

12. The comprehensive programme of disarmament should be elaborated and implemented on the basis of the strict observance of the principles contained in the Final Document and in accordance with the priorities stated in paragraphs 45 thereof, it being understood that nothing should preclude States from conducting negotiations on all priority items concurrently.

III. *Measures*

13. The process to be outlined in the comprehensive programme of disarmament should be conceived and implemented in accordance with the fundamental principles enshrined in the Final Document of the Tenth Special Session of the General Assembly. It should take place in such an equitable manner as to ensure the right of each State to security, *inter alia*, through the adoption of appropriate measures, taking into account the importance of nuclear disarmament and conventional disarmament, the special responsibility of the States with the largest military arsenals and the necessity for adequate measures of verification.

14. The comprehensive programme of disarmament should encompass the following measures as envisaged in the relevant paragraphs of the Final Document of the Tenth Special Session:

A. *Disarmament measures*

1. *Nuclear weapons*

(a) Nuclear-test ban;

(b) Cessation of the nuclear arms race in all its aspects and nuclear disarmament, which will require urgent negotiation of agreements at appropriate stages and with adequate measures of verification satisfactory to the States concerned for:

(i) Cessation of the qualitative improvement and development of nuclear weapon systems;

(ii) Cessation of the production of all types of nuclear weapons and their means of delivery, and the production of fissionable material for weapons purposes;

(iii) Reduction of stockpiles of nuclear weapons and their means of delivery, leading to their ultimate and complete elimination at the earliest possible time;

(c) Effective international arrangements to assure non-nuclear-weapon States against the use of threat of use of nuclear weapons;

(d) Continuation of the strategic arms limitation negotiations between the two parties concerned;

(e) Further steps to prevent the spread of nuclear weapons, in accordance with the provisions of paragraphs 65 to 71 of the Final Document;

(f) Establishment of nuclear-weapon-free zones.

2. *Other weapons of mass destruction*

(a) Prohibition of the development, production and stockpiling of all chemical weapons and their destruction;

(b) Prevention of the emergence of new types of weapons of mass destruction and new systems of such weapons;

(c) Prohibition of the development, production and use of radiological weapons.

3. *Conventional weapons and armed forces*

(a) Cessation of the conventional arms race;

(b) Agreements and measures, multilateral, regional and bilateral, on the limitation and reduction of conventional weapons and armed forces;

(c) Prohibitions or restrictions of use of certain conventional weapons, including those which may cause unnecessary suffering or which may have indiscriminate effects, taking into account the result of the 1979 United Nations Conference on Prohibitions or Restrictions of Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects;

(d) Consultations among major arms suppliers and recipients on the international transfer of conventional weapons.

4. *Military expenditures*

Reduction of military expenditures.

5. *Verification*

Verification methods and procedures in relation to specific disarmament measures, to facilitate the conclusion and effective implementation of disarmament agreements and to create confidence among States.

6. *Related measures*

(a) Further steps to prohibit military or any other hostile use of environmental modification techniques;

(b) Consideration of further steps to prevent an arms race on the sea-bed and the ocean floor and the subsoil thereof;

(c) Further steps to prevent an arms race in outer space;

(d) Establishment of zones of peace.

B. *Other measures*

1. Confidence-building measures, taking into account the characteristics of each region.

2. Measures aimed at achieving relaxation of international tension.

3. Measures aimed at preventing the use of force in international relations, subject to the provisions of the Charter of the United Nations.

4. Implementation of the provisions contained in the Final Document intended to mobilize world public opinion in favour of disarmament.

5. Disarmament studies under the auspices of the United Nations.

Note:

With reference to the measures dealt with in the present section, explicit mention was made of the following United Nations declarations:

1. Declaration on Principles of International Law concerning Friendly Relations and Co-operation among States in accordance with the Charter of the United Nations;[3]

2. Declaration on the Strengthening of International Security;[4]

3. Declaration on the Preparation of Societies for Life in Peace.[5]

[3] General Assembly resolution 2625 (XXV).
[4] General Assembly resolution 2734 (XXV).
[5] General Assembly resolution 33/73.

C. *Disarmament and development*

Bearing in mind the close relationship between disarmament and development and taking into account the United Nations studies carried out in this field, the comprehensive programme of disarmament should include measures aimed at ensuring that disarmament makes an effective contribution to economic and social development and, in particular, to the full realization of the new international economic order through:

(i) Reallocation of resources from military purposes to economic and social development, especially for the benefit of the developing countries;

(ii) Savings from the reduction of military expenditures particularly by nuclear-weapon States and other militarily significant States should increase the flow of resources to economic and social development, especially for the benefit of the developing countries;

(iii) Strengthening of international co-operation for the promotion of the transfer and utilization of nuclear technology for economic and social development, especially in the developing countries, taking into account the provisions of paragraphs 68 to 70 of the Final Document.

D. *Disarmament and international security*

Strengthening of international procedures and institutions for:

(i) Maintenance of peace and security in accordance with the Charter of the United Nations;

(ii) Peaceful settlement of disputes;

(iii) Effectiveness of the security system of the Charter of the United Nations;

(iv) United Nations peace-keeping in conformity with the Charter of the United Nations.

IV. *Machinery and procedures*

A. *Role of the United Nations*

15. (a) The United Nations should play a central role in the consideration and adoption of the comprehensive programme of disarmament. It must also play an adequate role in its implementation. It is essential, therefore, that the General Assembly and, through it, the Commission are regularly kept informed of the results of the negotiations on and elaboration of the comprehensive programme of disarmament. It is also essential that the United Nations be kept duly informed through the Assembly, or any other appropriate United Nations channel reaching all Members of the Organization, of all disarmament efforts outside its aegis without prejudice to the progress of negotiations.

(b) Convening, as necessary, of special sessions of the United Nations General Assembly devoted to disarmament.

(c) The United Nations should sponsor programmes to promote public awareness of the dangers of the arms race, its effects on international peace and security, its economic and social consequences and its effect on the attainment of the new international economic order.

(d) The Secretary-General shall periodically submit reports to the General Assembly on the economic and social consequences of the armaments race and its extremely harmful effects on world peace and security.

B. *Form of negotiations*

16. The negotiations of the measures envisaged in the comprehensive programme of disarmament can be conducted on a bilateral, regional or multilateral level, depending on how, in each case, effective disarmament agreements can most readily be achieved. The international disarmament machinery should ensure that all disarmament issues are being dealt with in an appropriate context.

C. *World Disarmament Conference*

17. At the earliest appropriate time, a world disarmament conference should be convened with universal participation and with adequate preparation.

D. *Review and verification of agreed measures*

18. Examination of the requirements of an institutional and procedural nature to facilitate the disarmament process and to ensure implementation of disarmament agreements, including the relevant proposals referred to in paragraph 125 of the Final Document, or made elsewhere.

V. *General*

19. During the consideration of the elements of the comprehensive programme of disarmament, the Commission considered the following, on which consensus was not reached:

"(a) Prohibition of the use or threat of use of nuclear weapons;

(b) Dissolution of military alliances and the dismantling of foreign military bases;

(c) Prohibition of the development, production and deployment of conventional weapons of great destructive power."

20. Some delegations expressed views and reservations on some parts of the recommendations contained under the heading "Elements of a comprehensive programme of disarmament" above, which are reflected in the verbatim records of the 21st and 22nd plenary meetings (A/CN.10/PV.21 and 22).

21. Since the Disarmament Commission was unable to consider in detail items 4 to 7 of its agenda (see sect. II, para. 9 above), it recommends that those items be included in the agenda of the Commission's session in 1980.

Source: Report of the Disarmament Commission, General Assembly Official Records: 34th session, Suppl. No. 42 (A/34/42).

15. Confidence-building measures in Europe

I. Introduction

One important reason why there has been an almost total lack of achievement from arms control and disarmament efforts is the lack of confidence and deep mistrust among states and blocs of states concerning each other's short- and long-term political and military intentions.

The necessity of gradually building up trust in order to create a better climate for disarmament negotiations was repeatedly stressed by world leaders at the United Nations Special Session on Disarmament (SSD) in the summer of 1978. Confidence-building measures (CBMs) introduced in the Final Act of the Conference on Security and Co-operation in Europe (CSCE) in 1975 were held forth as examples to follow and develop in all areas of interstate relations and in all regions of the world. The Programme of Action contained in the Final Document of the SSD suggests, in particular, that CBMs should be undertaken to prevent armed conflicts which may arise due to accident, miscalculation or failure of communication.

At the 33rd session of the UN General Assembly, the issue of CBMs was supported by a UN resolution in which all states were invited to inform the Secretary-General of their views and experiences concerning those CBMs they consider appropriate and feasible.

The 34th General Assembly adopted another resolution in which the Secretary-General was requested to carry out a comprehensive two-year study of CBMs with the assistance of qualified governmental experts. The study is to include an examination of basic conditions which would facilitate the development of CBMs on a regional basis and of the role which the UN could play in creating such conditions. The Secretary-General was further requested to submit the study to the 36th General Assembly session in 1981, and to present a progress report on the study at the 35th session in 1980.

While CBMs in the military field cannot substitute for arms control or disarmament measures, they can provide means of reducing military tension and reassuring potential adversaries that certain military activities need not be interpreted as threats to their security.

The term 'confidence-building measures' is relatively new in international relations. Although employed in disarmament parlance since the 1960s, it was first embodied in a legal document in 1975, when a

chapter of the CSCE Final Act was devoted to CBMs. At the ongoing Vienna Mutual Force Reduction (MFR) talks concerning Central Europe, proposals for measures related to CBMs but with a more substantial military content are termed Collateral Constraints or Associated Measures, implying that they should be negotiated and implemented in parallel with other, more important arms control measures which they are meant to complement.

II. The Helsinki Document

After two years of negotiations, the CSCE produced the Final Act which was signed in Helsinki on 1 August 1975 by all European states (except Albania) and by Canada and the United States. The first follow-up meeting of the CSCE was held in Belgrade from October 1977 to March 1978. A second meeting to "continue the process" will commence in Madrid on 11 November 1980, preceded by a preparatory meeting to open on 9 September.

The CSCE Final Act, the so-called Helsinki Document, deals in the first part with "questions relating to security in Europe", and contains a "Document on confidence-building measures and certain aspects of security and disarmament", including sections on prior notification of major and other military manoeuvres, exchange of observers, prior notification of major military movements, other confidence-building measures, "questions relating to disarmament", and "general considerations". (For an analysis and the text of the Document, see *SIPRI Yearbook 1976*, chapter 8 and appendix 8D.)

The purpose of the CSCE CBMs, as expressed in the preamble to the Document on CBMs, is to reduce the risk of armed conflicts by eliminating the misunderstanding and miscalculation among nations regarding military activities which can arise when nations lack clear and timely information about the nature of such activities. In essence, the substance of the preamble and the contents of the Document are not impressive. The only concrete measure adopted concerns the notification of major military manoeuvres on a level exceeding a total of 25 000 troops, to be given at least 21 days in advance to all other states participating in the CSCE. Notification "can" also be given of manoeuvres below the level of 25 000 troops if they involve land forces together with significant numbers of either amphibious or airborne troops. The area for manoeuvres to be notified is defined as "the territory, in Europe, of any participating State as well as, if applicable, the adjoining sea area and air space". The Soviet Union and Turkey need give notification only of manoeuvres which take place within 250 km from their frontiers facing or shared with other

European states. The maritime borders of Europe along the Atlantic and Arctic Oceans and the Mediterranean Sea are not defined. The term "adjoining sea area" can also be variously interpreted when the parameters for prior notification of major naval manoeuvres are eventually taken up for discussion.

The second, related CBM which has been widely applied is the invitation for observers to attend military manoeuvres. The confidence-building effect of this measure, if any, depends upon the extent to which observers are permitted actually to observe the manoeuvre. Too much restriction in this particular case could rather have adverse effects on confidence building. (At the Belgrade follow-up meeting, proposals were made to supplement existing provisions by confidence-promoting guidelines for the treatment of observers at military manoeuvres.)

These modest measures are the compromises achieved after negotiations among some 'maximalist' states—particularly the neutral or non-aligned nations—and other states which either considered the CSCE not the proper forum for discussing such measures or traditionally opposed openness about their military activities.

The CSCE came to deal only with provisions for rather insignificant information about certain routine military activities. Another weakness was that no clear link was established between CBMs and arms control and disarmament. It is evident from the section of the Final Act dealing with questions relating to disarmament that the CSCE was prevented from conducting serious discussion of disarmament questions.

III. The CSCE Belgrade meeting

Modest though they are, the CBM undertakings adopted in the Helsinki Document nevertheless constituted first steps in the CSCE confidence-building process. However, it was clear from the start that, in order to continue and strengthen this process, the scope of existing provisions must be widened and efforts must be made soon to introduce new types of measures to achieve more rapid and concrete confidence-building effects—in particular, measures for both military restraint and greater openness in the conduct of military activities. The first opportunity to realize this progress was the Belgrade meeting, two and a half years after Helsinki.

Many proposals were tabled at the Belgrade meeting, in accordance with the cautious and cryptic phrase in the Final Act where the participating states "recognize that the experience gained by the implementation of the provisions . . ., together with further efforts, could lead to developing and enlarging measures aimed at strengthening confidence." The proposals put forth concerned, for example, (*a*) prior notification of

manoeuvres even below a level of 25 000 troops, (*b*) prior notification of naval and air force manoeuvres, (*c*) guidelines for the treatment of observers at military manoeuvres, (*d*) prior notification of major military movements, (*e*) increased openness in military matters, e.g., with regard to military budgets, and (*f*) restraints on certain military activities, e.g., upper levels on military manoeuvres. (For an analysis of the Belgrade proposals, see *SIPRI Yearbook 1979*, chapter 17.)

It soon became clear, however, that positive results concerning CBMs could not be achieved at the Belgrade meeting. Objections were raised that proposals fell outside the mandate of the meeting, or that too little experience had been obtained during the two years to justify further undertakings. It was also said that progress in the field of CBMs should follow progress made in détente in general and in disarmament in particular. Some states even denigrated CBM-promoting activities as attempts to distract attention from more important questions. Ultimately, the prevailing political relations among the big powers and the generally infected atmosphere by the end of the Belgrade meeting prevented any further progress.

Thus, the Belgrade meeting failed to take any action for recognizing the urgency of expanding the role of CBMs for strengthening détente and security in Europe. Even the proposal by non-aligned states to convene a meeting of experts to examine and prepare pertinent CBMs before the Madrid meeting was rejected by the big powers when they negotiated the final text of the concluding document from the meeting. This move destroyed the possibility of two years of post-Belgrade consultations and negotiations.

IV. Preparations for the Madrid meeting

With the increased emphasis on CBMs at the SSD and at consecutive UN General Assemblies, and with the CSCE meeting in Madrid just over the horizon, the ground has been laid for political initiatives. A notable feature is the new turn to a positive approach on the part of some previously 'minimalist' states which have declared that they are prepared to agree to several new CBMs.

In an election speech on 2 March 1979, President Brezhnev took up the matter of CBMs and suggested that the practice of prior notification of military manoeuvres could be broadened to encompass all significant military movements within the agreed area as well as major naval manoeuvres held near the territorial waters of other states participating in the CSCE. In the communiqué from the meeting of the committee of the Ministers for Foreign Affairs of the WTO member states in Budapest on

14–15 May 1979, these suggestions were further developed to cover also some previous proposals from Belgrade. The communiqué stated that conditions were now ripe for expanding CBMs in the spirit of the CSCE. The WTO states were prepared to agree on (*a*) prior notification of significant military movements in the agreed area, (*b*) prior notification of major air force manoeuvres in the same area, (*c*) prior notification of major naval manoeuvres conducted in close proximity to the territorial waters of other CSCE states, (*d*) non-enlargement of military–political groupings in Europe, (*e*) limitation of the levels of military manoeuvres, and (*f*) extension of CBMs to the Mediterranean.

The principal points in this list were repeated in the communiqué from a similar meeting in Berlin on 5–6 December. However, to this list were added: (*a*) prior notification of major military manoeuvres to be given from the level of 20 000 troops (rather than the present level of 25 000 troops provided for in the Final Act) and one month in advance (rather than three weeks), and (*b*) prior notification about movements of ground forces also to be given from the level of 20 000 troops.

It is expected that the non-aligned and the Western states will exhibit the same positive approach to expanding CBMs in Madrid as they did in Belgrade.

Prior notification of major military movements was foreseen in the CSCE Final Act and has been discussed on several other occasions. Such a measure would constitute a relevant and logical development of the currently applied notification of manoeuvres and could have value as a CBM in the military field. Such details as the time-frame of the movements and types and numerical strengths of forces engaged would certainly contribute to confidence building, but, in view of previous experience, the negotiations for reaching agreement on such details will be time-consuming. It is therefore evident that advance consultations are necessary if parties wish to achieve results at the Madrid meeting.

The prior notification of naval manoeuvres was suggested in 1974 during the negotiations over the CSCE Final Act, but without positive results. Major difficulties can be foreseen in the way of achieving a comprehensive agreement acceptable to all participating states. However, it could simplify matters if they were to select for prior notification those naval activities which could lead to a military reaction on the part of another state or other states who perceived those activities to be particularly alarming or otherwise of a sensitive nature. Such activities could include, for instance, naval exercises in waters adjacent to other states and involving a considerable number of vessels intended or suited for rapid transport of troops and military equipment, offensive naval elements designed for surprise operations, such as capturing bridge-heads, and so on. In their sensitive nature, these are equivalent to manoeuvres with

offensive land forces near the borders of other states. Manoeuvres including amphibious forces have already been mentioned in the Final Act, with the understanding that even on a rather small scale they could be perceived as potentially threatening to a neighbouring state.

Such an approach would also simplify the otherwise complicated problem of defining a "major naval manoeuvre". A level of 25 000 participants, or a certain number of vessels, or the size of participating vessels, or a combination of these parameters would obviously not easily satisfy the need for a clear definition. Previous proposals have not contained such details probably just for these reasons. However, a major amphibious exercise could be defined principally by the transport *capacity* of participating forces, for example, using the formula "aggregate transport capacity for 0000 troops and their basic equipment", since the sudden appearance of an amphibious force near the territory of a state would cause a level of anxiety directly related to how many troops and how much equipment *could* be embarked.

The actual level of transport capacity chosen to define an amphibious manoeuvre which ought to be notified as a CBM is a matter for discussion. For most European coastal states this level would probably be somewhere around 5 000–10 000 troops. The prior notification of a manoeuvre above such an agreed level should also contain information on the area involved, the purpose of the manoeuvre, the types and numbers of participating vessels and aircraft, and types and numerical strengths of the troops, including their main equipment.

Other stumbling-blocks which may be encountered are which states should be notified and the definition of the extension of sea areas bordering on Europe. For the sake of consistency with existing CSCE provisions on the notification of major land manoeuvres, all other CSCE states should be notified, rather than only those states near the area of the manoeuvre. In addition, the sea areas covered by the provisions should be agreed according to the same principle as those agreed for land areas. This would mean that all sea areas within Europe and out to a certain, negotiable distance (say, 200 nautical miles) from the coast of European states in the Arctic, Atlantic and Mediterranean would be included. Ample prior notification of naval manoeuvres along these lines, preferably coupled with the invitation of observers to the manoeuvres, should have positive confidence-building effects, particularly among neighbouring states.

Similar principles could be applied for the prior notification of major air force manoeuvres with the participation of a considerable number of airborne troops or large numbers of aircraft designed for fast transport of troops and military equipment. Here, too, the perception of threat to a neighbouring state would be directly related to the transport capacity of troop-carriers—transport aircraft and helicopters.

A limitation on all types of military manoeuvres to an upper level of, say, 50 000 troops would be a new form of CSCE CBM involving not only notification and information but also military restraints—a topic currently under discussion, although hitherto without result, at the Vienna MFR talks. Restraints regarding, for example, military activities or deployment of military units or equipment suitable for offensive warfare near the borders of other states could have considerable confidence-building value and could form a link with arms control and disarmament measures.

In summary, uncertainty about the true resources and/or intentions of an opponent is one strong contributory cause of excessive arms build-ups. The important role of greater openness about military activities for eliminating unjustified mistrust among states has rightly been characterized as "the key to confidence building". Traditionally, and according to national legislation, several states are nevertheless rigid in shrouding their military activities in secrecy, while others are more open. Many examples of unwarranted military overreaction show the consequences of a lack of reliable information about a potential opponent.

The Madrid meeting is therefore an opportune occasion to examine in depth the advantages of greater military and political openness. Negotiated measures of restraint and openness could take the form of multilateral obligations under CSCE auspices or, failing such results, of unilateral commitments, acts and gestures of goodwill.

V. A European conference for disarmament

The political importance increasingly being attributed to CBMs and the approaching CSCE meeting in Madrid seem, at least officially, to indicate enhanced readiness on the part of European states to propose, discuss and agree on further CBM developments. At the same time, however, several signs point in the opposite direction. The arms race in Europe between the two major alliances continues with unabated speed, and the future of the MFR talks is gloomy. These talks between many of the NATO and WTO states (Belgium, Canada, FR Germany, Luxembourg, the Netherlands, the United Kingdom and the United States; and Czechoslovakia, the German Democratic Republic, Poland and the Soviet Union), while they do not include the remaining European states, have proceeded since early 1973 without yielding any tangible results. A positive and energetic approach to negotiations by all CSCE parties, with swift and effective application of appropriate new measures, could regain and amplify the momentum of the confidence-building process which was lost after the Belgrade meeting. In view of previous experience, a gradual evolution of CSCE measures intended to lead to serious arms control and disarmament

negotiations is much too slow and uncertain a process. More than seven years have lapsed since the start of the CSCE negotiations and no new steps have been taken concerning either CBMs or arms control and disarmament measures in Europe. The need for an efficient all-European negotiating body to tackle the problems of military and political détente and disarmament is thus obvious.

In recent years, various suggestions for creating such a body have been put forward. At the SSD, the French President proposed that the CSCE states meet in conference to discuss disarmament in Europe. Such a conference would aim initially at building up trust by instituting measures for providing information and notification, and then at achieving a genuine reduction of conventional armaments within the European geostrategic complex which extends from the Atlantic to the Urals. When the French proposal was made, it did not envisage taking up the problems of European nuclear forces.

The WTO communiqué from the Budapest meeting in May 1979 proposed that a conference should be convened as soon as possible and should be attended by all European states, the United States and Canada, to discuss and negotiate practical measures for contributing to confidence building among European states, the easing of military confrontation and the reduction of armed forces and armaments on the continent.

In the communiqué from the WTO December meeting in Berlin, this proposal was further developed and modified along the following lines:

1. Both measures to strengthen trust between states in Europe and measures aimed at lessening concentration of and at reducing armed forces and armaments on the continent could be discussed at the conference.
2. It was advisable to consider relevant matters and to co-ordinate understanding on them stage by stage, beginning from simpler measures and proceeding step by step to more important ones. At the first stage, work should be concentrated on measures of trust.
3. Material measures of military détente and disarmament would be more effective if they were combined with political and contractual–legal steps to lessen the danger of outbreak of war and to strengthen guarantees of the security of states. The proposal to conclude a treaty on the non-first-use of both nuclear and conventional armaments against one another was directed towards this goal.
4. The conference would become a substantial part of and an important contribution to the development of the CSCE process started by the Helsinki Document.
5. A multilateral preparatory working meeting should be held in the first half of 1980.

6. Recommendations on the main questions aimed at organizing the conference, including an agenda for its first stage, which would be the result of the preparatory work, could be considered at the CSCE Madrid meeting with a view to taking final decisions as to the convocation and procedure of the conference.

With special reference to the Madrid meeting, the communiqué stated that the meeting should inject fresh stimulus to the realization of the Helsinki Final Act as a whole and should promote the achievement of accords on military aspects of European security, the adoption of appropriate and effective measures and, in particular, the convocation of a conference on military détente and disarmament in Europe. The communiqué further stressed the need for intensive preparations for the Madrid meeting: that it is important to reach, before the meeting, general understanding on which of the issues in the Final Act could be acted upon.

Thus, strong forces are aiming at creating an all-European forum for disarmament negotiations. It is still not clear whether the conference is meant to be independent or to work under the auspices of the CSCE. The French and the WTO proposals seem to visualize different approaches to the agenda: the original French proposal from 1978 suggests, first, building up trust among states through a number of detailed, verifiable CBMs and subsequently to achieve reduction of conventional armaments, while the WTO conference would embrace "a wide complex of measures for military détente in Europe", including a mix of CBMs, arms control agreements, and "political and contractual-legal steps" such as a treaty on the non-first-use of both nuclear and conventional weapons.

It seems probable that several CSCE states would be reluctant to transfer CBMs from the CSCE to another body since they consider the Final Act not only an important historical document but also a concrete basis for further development of détente and security in Europe. If the implementation and development of the Document on confidence-building measures were removed from the CSCE context, the CSCE states feel that the delicate balance of the Final Act would be upset, which could lead to undermining the CSCE process. Some states may also be doubtful about the political possibility for a new negotiating body to succeed in an area where for many years other bodies have failed to achieve concrete results. The wording of the communiqué from the North Atlantic Council meeting in Brussels on 15 December may be interpreted as a cautious expression of such doubt: "They [the ministers] considered that the proposal for a conference on disarmament in Europe put forward by France is a useful concept providing a basis upon which to continue developing their approach in this field to bring about such a conference".

Against the background of the unrestrained arms race in Europe and,

in particular, in view of the Eurostrategic nuclear arms build-up (see also chapter 4), comprehensive negotiations are urgently needed for the security of all CSCE states. It seems preferable that CBMs of the types outlined in the CSCE Final Act should continue to be treated within the CSCE framework, while more legally binding measures should be considered at a special conference in conjunction with arms control and disarmament. The latter conference should be initiated at the CSCE Madrid meeting so that the disarmament process in Europe could commence immediately after the meeting.

Appendix 15A

Notifications of military manoeuvres in 1979, in compliance with the Final Act of the Conference on Security and Co-operation in Europe

State giving notification	Date of notification	Duration of manoeuvre	Designation of manoeuvre	Number of troops involved	Area of manoeuvre
USA	28 Dec 1978	30 Jan–7 Feb	Certain Sentinel[1]	c. 66 000	FR Germany: Northern Baden-Württemberg, eastern Bavaria
FR Germany	4 Jan	30 Jan–7 Feb	Certain Sentinel[1]	c. 66 000	Bad Neustadt a.d. Saale – Bayreuth – Nürnberg – Nördlingen – Heilbronn – Schweinfurt
USSR	12 Jan	2–7 Feb	Druzhba-79[2]	c. 26 000	Czechoslovakia: Plzen – Ceske Budejovice – Hradec Kralove
Czecho-slovakia	15 Jan	2–7 Feb	Druzhba-79[2]	c. 26 000	Plzen – Ceske Budejovice – Hradec Kralove – Ceska Lipa
Switzerland	2 Feb	5–9 Mar	Knacknuss[3]	c. 34 000	Region between Bodensee, Rhein and Lake Zürich
Norway	15 Feb	17–22 Mar	Kald vinter 79[4]	10 000	Troms, northern Norway
USSR	12 Mar	2–7 Apr	..[5]	c. 25 000	Rovno – Ivano-Frankovsk – Zhitomir
Hungary	3 May	Mid May	..[6]	>25 000	Region between Tisza River and western tip of Lake Balaton
USSR	2 Jul	23–27 Jul	Neman[7]	c. 25 000	Panevezys – Taurage – Alytus
FR Germany	17 Aug	10–21 Sep	Constant Enforcer[8]	c. 29 000	Wissen a.d. Sieg – Frankenberg – Kassel – Eschwege – Bad Hersfeld – Giessen – Diez a.d. Lahn
Canada	17 Aug	10–21 Sep	Constant Enforcer[8]		FR Germany
USA	20 Aug	10–21 Sep	Constant Enforcer[8]	c. 29 000	FR Germany

State giving notification	Date of notification	Duration of manoeuvre	Designation of manoeuvre	Number of troops involved	Area of manoeuvre
FR Germany	27 Aug	17–21 Sep	Harte Faust[9]	c. 60 000	Oldenburg – Osnabrück – Münster – Nordhorn
Switzerland	31 Aug	1–6 Oct	Forte[10]	c. 27 000	Pre-Alpine region between Lake Geneva and Lake of Quatre Cantons
Turkey	6 Sep	28 Sep–14 Oct	Display Determination-79[11]	18 000	Aegean Sea and Turkish Thrace
France	10 Sep	1–7 Oct	Saône 79[12]	16 000	6th military district: Haute-Marne, Haute-Saône, Doubs, Jura and Côte d'Or
UK	24 Sep	15–27 Oct	Keystone[13]	c. 18 000	FR Germany: Hameln – Hildesheim – Salzgitter
Austria	8 Oct	19–22 Nov	Raumverteidigungsübung 1979[14]	27 500	Pre-Alpine region between St Pölten and Amstetten, Lower Austria

[1] "Certain Sentinel"—an allied field training manoeuvre including US troops transported to Europe in the "Reforger 79" movement.

Purpose of the manoeuvre: to exercise in-country and "Reforger" forces in a number of operations designed to enhance interoperability, combined arms training and river crossings.

Participating units: 7th Corps (USA); 14th Armoured Brigade (FRG); infantry battalion (Luxembourg); 4th Mechanized Brigade Group (Canada); signal regiment (UK); 1st Artillery Battalion (Netherlands).

Foreign observers invited to attend.

[2] "Druzhba" manoeuvre—a joint military exercise with forces from the Czechoslovak Army and the Soviet Army.

Purpose of the manoeuvre: to increase readiness and training of co-ordinated activities of various types of armed forces.

Participating units: Ground forces together with air force units.

[3] Purpose of the "Knacknuss" manoeuvre: mobilization under difficult conditions, control of combat mobility of infantry and mechanized troops, solution of logistic problems, training of co-operation between military and civil authorities as well as civil defence units. Command level: Commander 4th army corps.

Participating units: 6th Army Division, parts of 11th Mechanized Division, army and corps units, air force units, air defence units, logistic units, civil staffs and civil defence units. In addition to c. 34 000 troops, 13 000 civil defence personnel, 4 500 motor vehicles and 250 tracked vehicles participated.

Foreign observers invited to attend.

[4] "Kald vinter 79"—a multinational combined manoeuvre.

Purpose of the manoeuvre: routine winter-training with Norwegian troops; field exercise under winter conditions, together with allied troops. Command level: Commander 6th Division.

Participating units: the northern Norway brigade and other national army forces, 3rd Commando Brigade British marines including two Netherlands marines companies, one British infantry battalion, two US marines companies, one Canadian mobile army forces company, allied air squadrons, Norwegian air force units, Norwegian marine units.

[5] Purpose of the manoeuvre: to test co-operation between different military branches.
Participating units: ground and air force units of the Pricarpathian military district.
[6] Regular allied exercise in the framework of the 1979 WTO co-ordinated training programme. Command level: Hungarian Minister of Defence.
Participating units: army staffs and selected army units from Hungary, Bulgaria, Romania, Czechoslovakia and the Soviet Union.
[7] Purpose of the "Neman" manoeuvre: field training and co-operation between different units.
Participating units: army and air force units from the Baltic military district.
Foreign observers invited to attend.
[8] "Constant Enforcer"—a field manoeuvre with opposing land forces supported by air force units.
Purpose of the manoeuvre: training in co-operation between large allied units. Command level: Commander Central Army Group.
Participating units: 5th US Corps (3rd Armoured Division, 8th Infantry Division, 11th Armoured Cavalry Regiment), 3rd FRG Corps units, 4th Canadian Mechanized Brigade Group, one Belgian unit, Territorial Command South. Air support supplied by tactical air force units of the participating states.
Absence from garrisons: 6–23 September.
Foreign observers invited to attend.
[9] "Harte Faust"—an exercise with opposing ground forces supported by air force units.
Purpose of the manoeuvre: training of troops in combat operations and in co-operation with large allied forces, territorial army and air force units. Command level: 1st FRG Corps.
Participating units: 1st Mechanized Division, 3rd Armoured Division, parts of 1st Airborne Division, parts of corps units, 3rd US Brigade (2nd Armoured Division), one Netherlands brigade, two Danish companies. Air support supplied by tactical air force units of participating states.
Absence from garrisons: 15–23 September.
[10] Purpose of the "Forte" manoeuvre: mobilization under difficult conditions. Co-operation between different military branches as well as stationary and mobile units in the Pre-Alpine region; preparation of defence installations; repelling of attacks against defence installations. Command level: Commander 3rd Mountain Army Corps.
Participating forces: units of 10th Mountain Division, several combat brigades, army corps units, air force units, logistic units.
[11] "Display Determination-79"—a multinational manoeuvre; a co-ordinated series of national/multinational NATO exercises conducted by Turkey, UK, USA and Italy.
Purpose of the manoeuvre: to reinforce and resupply the southern region through an exercise of the ground, naval, amphibious and air forces of the southern region.
Participating Turkish units: Land Forces Command: 1st Army HQ, 2nd Corps HQ, 4th Division HQ (as Command Post Exercise), one regiment and one battalion task force (as Field Training Exercise). Naval Forces Command: three destroyers, three submarines, coastal minesweepers, six fast patrol boats, auxiliary ships, maritime patrol aircraft, one maritime infantry battalion. Air Forces Command: 1st Tactical Air Command Sector Operation Center, Airborne Operation Center, related radars.
[12] "Saône 79"—an army corps field manoeuvre with participation of armoured divisions and elements of the first army corps.
Purpose of the manoeuvre: training of a classical counter-attack by two armoured divisions, preparation of crossing the river Saône by two armoured divisions, airlift operations, function of the logistic brigade.
Foreign observers invited to attend.
[13] "Keystone"—an armoured divisional formation training exercise.
Purpose of the manoeuvre: to practice an armoured division and field force in a defensive setting. Command level: HQ Armoured Division.
Participating units: 2nd Armoured Division (including elements of 4th Armoured Division), 5th Field Force, infantry and artillery units of the territorial army.
Absence from garrisons: 13–29 October.
[14] "Raumverteidigungsübung 1979"—an exercise with opposing land forces.
Purpose of the manoeuvre: training of troops, commanders and staffs in area defence and applied combat. Command level: Corps command I.
Participating forces: Army units, Corps I units, parts of Corps II units, Military command Niederösterreich with territorial units, 1st, 3rd, 5th and 7th "Jägerbrigaden", parts of 6th "Jägerbrigade", 1st Mechanized Division, air force division.
Foreign observers invited to attend.

16. Disarmament at the 1979 UN General Assembly session

The 34th session of the UN General Assembly adopted nearly 40 resolutions on disarmament matters, many by consensus, that is, without a vote being taken on them. The most important resolutions are reviewed below.

I. The nuclear field

In noting the signing of the SALT II Treaty, the General Assembly regretted that the treaty permitted considerable increments, both quantitatively and qualitatively, in relation to the levels of the nuclear arsenals which are in existence. It nevertheless expressed confidence that the treaty would enter into force at an early date, and that negotiations on further measures for the limitation and reduction of strategic arms would be promptly resumed. The USA and the USSR were asked to keep the Assembly informed of the results of these negotiations.

The Assembly expressed dissatisfaction with the lack of progress in the trilateral UK–US–Soviet test ban negotiations, and reiterated its "grave" concern that nuclear weapon testing continued unabated. The Committee on Disarmament was requested to initiate negotiations on a comprehensive test ban treaty, as a matter of the highest priority, and the UN Secretary-General was asked to prepare a study on this subject.

Two resolutions were adopted relating to nuclear weapon proliferation. One requests the Secretary-General to prepare a study on the Israeli nuclear armament, while the other requests him to prepare a comprehensive report on South Africa's plan and capability in the nuclear field. Both resolutions demand that the countries in question should submit all their nuclear installations to inspection by the International Atomic Energy Agency (IAEA). The above recommendations are remarkable on two counts: first, because the United Nations has found itself competent critically to examine the armaments of individual states; and, second, because it considers that the non-proliferation rule, including full-scope international nuclear safeguards, should be applicable also to states which are not parties to the Non-Proliferation Treaty (NPT), such as Israel and South Africa. These resolutions can make an important contribution to the

strengthening of the non-proliferation régime by setting a precedent for a detailed examination of the nuclear weapon capability of all non-NPT states, especially those which are engaged in significant civilian nuclear activities.

II. The non-nuclear field

The General Assembly urged the Committee on Disarmament to undertake negotiations on the complete prohibition of chemical weapons and on their destruction, and to report on the results achieved. This recommendation implies that the Committee should not wait for the completion of bilateral US–Soviet talks on the same subject, which have made slow progress since 1974.

The Assembly also called for agreements to freeze, reduce or otherwise restrain military expenditures. At the same time, it recognized the need for a satisfactory instrument for standardized reporting on the military expenditures of states since, without such an instrument, it may be difficult to discuss the envisaged agreements.

It was decided to convene in 1981, in Colombo, Sri Lanka, a conference for the implementation of the declaration of the Indian Ocean as a zone of peace. The declaration, adopted in 1971, was intended to eliminate any manifestation of great-power military presence in the Indian Ocean conceived in the context of great power rivalry. Recognizing that the positions of the USA and the USSR are of paramount importance, the UN members urged the two powers to resume their talks on this subject.

Upon the recommendation of the General Assembly, a study will be undertaken on confidence-building measures on a world-wide scale. It is understood that the experience gained from the implementation of confidence-building measures in Europe, under the 1975 Helsinki Declaration on European Security, will be taken into account in this study.

The decade of the 1980s was declared the Second Disarmament Decade. The Disarmament Commission was given the task to prepare elements of an appropriate draft General Assembly resolution, which would embody an indication of "targets" during the decade for accomplishing the major objectives and goals of disarmament, as well as ways and means of mobilizing world public opinion in this regard.

And, finally, the Secretary-General was requested to carry out a comprehensive study assessing present institutional requirements and future estimated needs in the UN management of disarmament affairs and outlining possible functions, structure and institutional framework that could meet those requirements and needs.

Although the resolutions cover a wide gamut of arms control and disarmament issues, there are a few important omissions. In particular, there are no resolutions concerning the reduction or limitation of conventional armaments or international transfers of arms, in spite of specific recommendations issued in this respect by the UN Special Session on Disarmament. It seems that, after that session, the role of the regular annual meetings of the General Assembly in establishing guidelines for disarmament negotiations has been somewhat reduced. All major tasks are geared to the second Special Session, due to take place in 1982.

For summaries of all the resolutions adopted at the 1979 UN General Assembly and the record of voting, see appendix 16B.

Appendix 16A

UN member states and year of membership

The following list of names of UN member states is provided for convenience in reading the record of votes on the UN resolutions listed in appendix 16B.

Afghanistan, 1946
Albania, 1955
Algeria, 1962
Angola, 1976
Argentina, 1945
Australia, 1945
Austria, 1955
Bahamas, 1973
Bahrain, 1971
Bangladesh, 1974
Barbados, 1966
Belgium, 1945
Benin, 1960
Bhutan, 1971
Bolivia, 1945
Botswana, 1966
Brazil, 1945
Bulgaria, 1955
Burma, 1948
Burundi, 1962
Byelorussia, 1945
Cambodia: see Democratic Kampuchea
Cameroon: see United Republic of Cameroon
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
Democratic Kampuchea (Cambodia), 1955
Democratic Yemen,[a] 1967
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
Germany, Federal Republic of, 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: see Democratic Kampuchea
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
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: see United Republic of Tanzania
Thailand, 1946
Togo, 1960
Trinidad and Tobago, 1962
Tunisia, 1956
Turkey, 1945
Uganda, 1962
Ukraine, 1945
Union of Soviet Socialist Republics, 1945
United Arab Emirates, 1971
United Kingdom, 1945
United Republic of Cameroon, 1960
United Republic of Tanzania, 1961
United States, 1945
Upper Volta, 1960
Uruguay, 1945
Venezuela, 1945
Viet Nam, 1977
Yemen,[a] 1947
Yugoslavia, 1945
Zaire, 1960
Zambia, 1964

[a] The name Democratic Yemen refers to the People's Democratic Republic of Yemen (Southern Yemen). The name Yemen refers to the Yemen Arab Republic (Northern Yemen).

Appendix 16B

UN General Assembly resolutions on disarmament matters adopted in 1979

Note

Only the essential provisions of each resolution are given here. The text has been abridged, but the wording is close to that of the resolution.

The resolutions are grouped according to subject, irrespective of the agenda items under which they were discussed.

Subject, number, date of adoption and contents of the resolution	Voting results
Nuclear disarmament	
34/87 F 11 December 1979 Notes that it has not been possible for the Treaty on the limitation of strategic offensive arms (SALT II) to go beyond certain limitations which permit considerable increments, both quantitatively and qualitatively, in relation to the levels of the nuclear arsenals existing at present; welcomes the agreement reached by both parties to pursue negotiations, on the further limitation and reduction in the number of strategic arms as well as their further qualitative limitation; and trusts that the SALT II Treaty will enter into force at an early date, and that negotiations, intended to achieve as soon as possible agreement on further measures for the limitation and reduction of strategic arms, will begin promptly after the entry into force of the treaty.	Adopted without vote
34/83 J 11 December 1979 Requests the Committee on Disarmament to continue consideration of the item "Nuclear weapons in all aspects" and to initiate, as a matter of high priority, negotiations, with the participation of all nuclear weapon states, on the question of the cessation of the nuclear arms race and nuclear disarmament, in accordance with the provisions of paragraph 50 of the Final Document of the Tenth Special Session of the General Assembly.	*In favour* 120 *Against* 2: France, USA *Abstentions* 19: Australia, Belgium, Brazil, Canada, Denmark, Federal Republic of Germany, Greece, Iceland, Israel, Italy, Japan, Luxembourg,

Subject, number, date of adoption and contents of the resolution	Voting results
	Netherlands, New Zealand, Norway, Portugal, Spain, Turkey, UK[a] *Absent or not participating in the vote*: Albania, China, Colombia, Democratic Kampuchea, Dominica, Equatorial Guinea, Nicaragua, Saint Lucia, Seychelles, Solomon Islands
34/87 D 11 December 1979 Requests the Committee on Disarmament, at an appropriate stage of its work on the item entitled "Nuclear weapons in all aspects", to pursue its consideration of the question of adequately verified cessation and prohibition of the production of fissionable material for nuclear weapons and other nuclear explosive devices.	*In favour* 118 *Against* 9: Bulgaria, Byelorussia, Czechoslovakia, German Democratic Republic, Hungary, Mongolia, Poland, Ukraine, USSR *Abstentions* 12: Afghanistan, Algeria, Angola, Argentina, Bhutan, Brazil, Congo, Cuba, France, India, Mozambique, Viet Nam *Absent or not participating in the vote*: Albania, China, Colombia, Democratic Yemen, Djibouti, Dominica, Equatorial Guinea, Lao People's Democratic Republic, Nicaragua, Saint Lucia, Seychelles, Solomon Islands
34/87 C 11 December 1979 Believes it necessary to examine possibilities for an international agreement on the non-stationing of nuclear weapons on the territories of states where there are no such weapons at present.	*In favour* 99 *Against* 18: Australia, Belgium, Canada, Denmark, France, Federal Republic of Germany, Greece, Iceland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Turkey, UK, USA *Abstentions* 19: Algeria, Angola, Austria, Benin, Brazil, Burma, Congo, Cuba, Ghana, Ireland, Israel, Malawi, Saudi Arabia, Singapore, Spain, Sweden, Yugoslavia, Zaire, Zambia

Absent or not participating in the vote: Albania, China, Colombia, Comoros, Democratic Kampuchea, Djibouti, Dominica, Equatorial Guinea, Libya, Nicaragua, Saint Lucia, Senegal, Seychelles, Solomon Islands, Tunisia

Cessation of nuclear weapon tests

34/73
11 December 1979

Reiterates the grave concern that nuclear weapon testing continues unabated against the wishes of the overwhelming majority of member states; reaffirms the conviction that a treaty to achieve the prohibition of all nuclear test explosions by all states for all time is a matter of the highest priority; expresses the conviction that progress in the negotiations by the Committee on Disarmament on such a treaty is a vital element for the success of efforts to prevent both vertical and horizontal proliferation of nuclear weapons and will contribute towards an end to the arms race and the achievement of nuclear disarmament; requests the Committee on Disarmament to initiate negotiations on such a treaty, as a matter of the highest priority; calls upon the three negotiating nuclear weapon states to use their best endeavours to bring their negotiations to a positive conclusion in time for consideration during the next session of the Committee on Disarmament; and invites governments of member states to contribute to the further development of national and international co-operative measures to detect seismic events aimed at setting up a global verification system of a comprehensive test ban treaty.

In favour 137
Against 0
Abstentions 2: China, France
Absent or not participating in the vote: Albania, Colombia, Democratic Kampuchea, Dominica, Equatorial Guinea, Gambia, Malawi, Nicaragua, Saint Lucia, Seychelles, Solomon Islands, Somalia

34/422
11 December 1979

Requests the Secretary-General to prepare a study on the question of a comprehensive nuclear test ban.

In favour 126
Against 9: Bulgaria, Byelorussia, Czechoslovakia, German Democratic Republic, Hungary, Mongolia, Poland, Ukraine, USSR
Abstentions 4: France, Portugal, UK, USA
Absent or not participating in the vote: Albania, China, Colombia, Dominica, Equatorial Guinea, Israel, Lao People's Democratic Republic, Nicaragua, Saint Lucia, Seychelles, Solomon Islands, Viet Nam

Subject, number, date of adoption and contents of the resolution	Voting results
Non-use of nuclear weapons	
34/83 G 11 December 1979 Taking into account proposals submitted by states concerning the non-use of nuclear weapons, avoidance of nuclear war and related matters, decides to transmit to the Committee on Disarmament the views of states and requests the Committee to take them into appropriate consideration.	*In favour* 112 *Against* 16: Belgium, Canada, Denmark, France, Federal Republic of Germany, Greece, Iceland, Italy, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Turkey, UK, USA *Abstentions* 14: Australia, Austria, Bulgaria, Byelorussia, Czechoslovakia, German Democratic Republic, Hungary, Israel, Japan, Mongolia, Poland, Spain, Ukraine, USSR *Absent or not participating in the vote*: Albania, Colombia, Dominica, Equatorial Guinea, Nicaragua, Papua New Guinea, Saint Lucia, Seychelles, Solomon Islands
34/84 11 December 1979 Welcomes the conclusion of the Committee on Disarmament that it is urgent to reach agreement on effective international arrangements to assure non-nuclear weapon states against the use or threat of use of nuclear weapons, and requests the Committee to continue the negotiations on this subject on a priority basis during its 1980 session with a view to the elaboration of an international convention.	*In favour* 114 *Against* 1: Albania *Abstentions* 25: Australia, Austria, Belgium, Bhutan, Brazil, Canada, Denmark, France, Federal Republic of Germany, Greece, Iceland, India, Ireland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, UK, USA *Absent or not participating in the vote*: China, Colombia, Democratic Kampuchea, Dominica, Equatorial Guinea, Libya, Nicaragua, Saint Lucia, Seychelles, Solomon Islands, Turkey

34/85
11 December 1979

Recommends that the Committee on Disarmament should conclude during its 1980 session effective international arrangements to assure non-nuclear weapon states against the use or threat of use of nuclear weapons, taking into account the widespread support for the conclusion of an international convention and giving consideration to any other proposals designed to secure the same objective.

In favour 120
Against 0
Abstentions 22: Australia, Austria, Belgium, Bhutan, Denmark, France, Federal Republic of Germany, Greece, Iceland, India, Ireland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Sweden, UK, USA
Absent or not participating in the vote: Albania, Colombia, Dominica, Equatorial Guinea, Malawi, Nicaragua, Saint Lucia, Seychelles, Solomon Islands

34/86
11 December 1979

Notes the statements that the nuclear weapon states have made on assurances to non-nuclear weapon states with respect to the use of nuclear weapons; welcomes the report of the Committee on Disarmament in which it reported on the initial consideration of and negotiation on effective international arrangements further to strengthen the security of the non-nuclear weapon states; and requests the Committee to continue its efforts at its next session with a view to reaching agreement on such arrangements.

In favour 110
Against 1: Albania
Abstentions 29: Afghanistan, Algeria, Angola, Argentina, Bhutan, Brazil, Bulgaria, Byelorussia, Cape Verde, Congo, Cuba, Czechoslovakia, Democratic Yemen, Ethiopia, German Democratic Republic, Ghana, Guinea-Bissau, Hungary, India, Madagascar, Mongolia, Mozambique, Niger, Poland, Sao Tome and Principe, Syria, Ukraine, USSR, Viet Nam
Absent or not participating in the vote: Colombia, Dominica, Equatorial Guinea, Kuwait, Lao People's Democratic Republic, Nicaragua, Saint Lucia, Senegal, Seychelles, Solomon Islands, Trinidad and Tobago

Nuclear weapon-free zones

34/71
11 December 1979

Invites France and the USA to take all necessary steps in order to secure the ratification of Additional Protocol I of the Treaty of Tlatelolco at the earliest possible date.

Adopted without vote

Subject, number, date of adoption and contents of the resolution	Voting results
34/74 11 December 1979 Welcomes the fact that Additional Protocol II of the Treaty of Tlatelolco has already been signed and ratified by the UK, the USA, France, China and the USSR, thus fulfilling an aspiration of the General Assembly.	Adopted without vote
34/76 A 11 December 1979 Strongly reiterates the call upon all states to consider and respect the continent of Africa, comprising the continental African states, Madagascar and other islands surrounding Africa, as a nuclear weapon-free zone; vigorously condemns the reported explosion of a nuclear device by South Africa; reaffirms that the nuclear programme of the racist régime of South Africa constitutes a very grave danger to international peace and security of African states and increases the danger of the proliferation of nuclear weapons; condemns any nuclear collaboration by any state, corporation, institution or individual with South Africa and calls upon them to terminate forthwith such collaboration; requests the Security Council to prohibit all forms of co-operation and collaboration with South Africa in the nuclear field; requests the Security Council to institute effective enforcement action, bearing in mind the recommendations of the UN seminar on nuclear collaboration with South Africa, held in London on 24–25 February 1979; demands that South Africa submit all its nuclear installations to inspection by the IAEA; and requests the Secretary-General to render all necessary assistance to the Organization of African Unity towards the realization of its declaration on the denuclearization of Africa.	*In favour* 128 *Against* 0 *Abstentions* 11: Belgium, Canada, France, Federal Republic of Germany, Greece, Israel, Italy, Luxembourg, Netherlands, UK, USA *Absent or not participating in the vote*: Albania, Argentina, Colombia, Dominica, Equatorial Guinea, Gambia, Nicaragua, Paraguay, Saint Lucia, Seychelles, Solomon Islands, Somalia
34/77 11 December 1979 Urges all parties directly concerned seriously 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 in accordance with the relevant resolutions of the General Assembly, and, as a means of promoting this objective, invites the countries concerned to adhere to the Treaty on the non-proliferation of nuclear weapons; invites these countries, pending the establishment of such a zone in the Middle East and during the process of its establishment, to declare solemnly that they will refrain on a reciprocal basis from producing, acquiring or in any other way possessing nuclear weapons and nuclear explosive devices; calls upon these countries to refrain, on a reciprocal basis,	*In favour* 136 *Against* 0 *Abstentions* 1: Israel *Absent or not participating in the vote*: Albania, Argentina, Colombia, Congo, Dominica, Equatorial Guinea, Gambia, Libya, Malawi, Nicaragua, Saint Lucia, Seychelles, Solomon Islands, Somalia

from permitting the stationing of nuclear weapons on their territory by any third party, and to agree to place all their nuclear activities under IAEA safeguards; and reaffirms its recommendation to the nuclear weapon states to refrain from any action contrary to the spirit and purpose of the present resolution and the objective of establishing in the region of the Middle East a nuclear weapon-free zone under an effective system of safeguards.

34/78
11 December 1979

Reaffirms its endorsement, in principle, of the concept of a nuclear weapon-free zone in South Asia; urges 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 a nuclear weapon-free 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 a nuclear weapon-free zone in South Asia

In favour 96
Against 2: Bhutan, India
Abstentions 40: Afghanistan, Algeria, Angola, Argentina, Australia, Austria, Bahamas, Brazil, Bulgaria, Burma, Byelorussia, Congo, Cuba, Cyprus, Czechoslovakia, Denmark, Ethiopia, Fiji, France, German Democratic Republic, Greece, Hungary, Indonesia, Israel, Italy, Lao People's Democratic Republic, Maldives, Mongolia, Morocco, Mozambique, Norway, Poland, Sao Tome and Principe, Seychelles, Sweden, Ukraine, UK, USSR, Viet Nam, Yugoslavia
Absent or not participating in the vote: Albania, Colombia, Djibouti, Dominica, Equatorial Guinea, Madagascar, Malawi, Mauritius,[a] Nicaragua, Saint Lucia, Solomon Islands, Somalia, Syria

Indian Ocean as a zone of peace

34/80 A
11 December 1979

Urges that the talks between the USSR and the USA regarding their military presence in the Indian Ocean should be resumed without delay.

In favour 117
Against 0
Abstentions 23: Belgium, Bulgaria, Byelorussia, Canada, Czechoslovakia, Denmark, France, German Democratic Republic, Federal Republic of Germany, Hungary, Ireland, Israel, Italy, Luxembourg, Mongolia, Netherlands, Norway, Poland, Portugal, UK, Ukraine, USA, USSR

Subject, number, date of adoption and contents of the resolution	Voting results
	Absent or not participating in the vote: Afghanistan, Albania, Colombia, Dominica, Equatorial Guinea, Malawi, Nicaragua, Saint Lucia, Seychelles, Solomon Islands, Somalia
34/80 B 11 December 1979 Decides to convene a conference on the Indian Ocean during 1981 at Colombo, Sri Lanka, for the implementation of the Declaration of the Indian Ocean as a Zone of Peace, as contained in General Assembly resolution 2832 (XXVI); and requests the *Ad Hoc* Committee on the Indian Ocean to undertake the preparatory work for the convening of the conference, including consideration of appropriate arrangements for any international agreement that may ultimately be reached.	*In favour* 126 *Against* 0 *Abstentions* 14: Belgium, Canada, Denmark, France, Federal Republic of Germany, Ireland, Israel, Italy, Luxembourg, Netherlands, Norway, Portugal, UK, USA *Absent or not participating in the vote*: Albania, Colombia, Congo, Dominica, Equatorial Guinea, Malawi, Nicaragua, Saint Lucia, Seychelles, Solomon Islands, Somalia
Non-proliferation of nuclear weapons	
34/76 B 11 December 1979 Deeply alarmed at the report that South Africa might have detonated a nuclear explosive device in September 1979, requests the Secretary-General to follow the situation closely and to prepare, with the assistance of appropriate experts, a comprehensive report on South Africa's plan and capability in the nuclear field and to submit the report to the General Assembly at its 35th session.	Adopted without vote
34/89 11 December 1979 Calls upon all states to take all necessary measures to prevent the transfer of fissionable material and nuclear technology to Israel which could be used for nuclear arms, and calls upon Israel to submit all its nuclear facilities to inspection by the IAEA. Requests the Secretary-General, with the assistance of qualified experts, to prepare a study on the Israeli nuclear armament.	*In favour* 97 *Against* 10: Belgium, Denmark, Guatemala, Honduras, Iceland, Israel, Luxembourg, Netherlands, Norway, USA

Abstentions 38: Argentina, Australia, Austria, Bolivia, Burma, Canada, Central African Republic, Chile, Costa Rica, Dominican Republic, Fiji, Finland, France, Federal Republic of Germany, Greece, Haiti, Ireland, Italy, Ivory Coast, Japan, Liberia, Malawi, Nepal, New Zealand, Panama, Paraguay, Philippines, Portugal, Samoa, Singapore, Spain, Suriname, Swaziland, Sweden, Thailand, UK, Upper Volta, Uruguay
Absent or not participating in the vote: Colombia, Dominica, Equatorial Guinea, Saint Lucia, Seychelles, Solomon Islands

Prohibition of chemical weapons

34/72
11 December 1979

Urges the Committee on Disarmament to undertake, at the beginning of its 1980 session, negotiations on an agreement on the complete and effective prohibition of the development, production and stockpiling of all chemical weapons and on their destruction, as a matter of high priority, taking into account all existing proposals and future initiatives.

Adopted without vote

Prohibition of radiological weapons

34/87 A
11 December 1979

Welcomes the report of the Committee on Disarmament with regard to radiological weapons and, particularly, its stated intention to continue consideration at its next annual session of proposals for a convention banning these weapons; and requests the Committee to proceed as soon as possible to achieve agreement on the text of such a convention.

Adopted without vote

Prohibition of new weapons of mass destruction

34/79
11 December 1979

Requests the Committee on Disarmament, in the light of its existing priorities, actively to continue negotiations, with the assistance of qualified governmental experts, with a view to preparing a draft

In favour 117
Against 0

Subject, number, date of adoption and contents of the resolution	Voting results
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, where necessary, specific agreements on particular types of such weapons.	*Abstentions* 24: Australia, Austria, Belgium, Canada, Denmark, France, Federal Republic of Germany, Greece, Guatemala, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Turkey, UK, USA *Absent or not participating in the vote*: Albania, China, Colombia, Dominica, Equatorial Guinea, Nicaragua, Saint Lucia, Seychelles, Solomon Islands, Somalia
Prohibition of inhumane conventional weapons 34/82 11 December 1979 Takes note of the report of the UN Conference on prohibitions or restrictions of use of certain conventional weapons which may be deemed to be excessively injurious or to have indiscriminate effects; notes with appreciation that the conference reached agreement with regard to a draft protocol banning the use of non-detectable fragments; notes also that the report indicates a wide measure of agreement in respect of land-mines and booby traps, and that there was a further convergence of views in relation to the prohibition or restriction of use of incendiary weapons; takes note of the conference resolution which stressed the need to exercise the utmost care in the development of small calibre weapon systems, so as to avoid an unnecessary escalation of the injurious effects of such systems; and endorses the recommendations of the conference to hold another session at Geneva on 15 September 1980, with a view to completing the negotiations.	Adopted without vote
Reduction of military expenditures 34/83 F 11 December 1979 Recognizing the need for the availability of a satisfactory instrument for standardized reporting on the military expenditures of member states, considers that a new impetus should be given to endeavours to achieve agreements to freeze, reduce or otherwise restrain, in a balanced manner, military expenditures, including adequate measures of verification satisfactory to all parties concerned.	Adopted without vote

Requests the Disarmament Commission to undertake during 1980 to examine and identify effective ways and means of achieving such agreements; and appeals to 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.

Satellite monitoring

34/83 E
11 December 1979

Requests the Secretary-General to carry out an in-depth study with the assistance of governmental experts on the question of the establishment of an international satellite monitoring agency.

In favour 124
Against 0
Abstentions 11: Bulgaria, Byelorussia, Czechoslovakia, German Democratic Republic, Hungary, Mongolia, Poland, Ukraine, USA, USSR, Viet Nam
Absent or not participating in the vote: Albania, Colombia, Democratic Yemen, Dominica, Equatorial Guinea, Ethiopia, Iraq,[b] Israel,[b] Lao People's Democratic Republic, Mozambique, Netherlands,[b] Nicaragua, Saint Lucia, Seychelles, Solomon Islands, Somalia

Disarmament and development

34/83 K
11 December 1979

Emphasizing that one of the principal aims of the study on the relationship between disarmament and development should be to produce results that could effectively guide the formulation of practical measures, takes note of the interim report of the Secretary-General with respect to this study, and appeals to governments to make available relevant data and information.

Adopted without vote

Disarmament and international security

34/83 A
11 December 1979

Takes note of the report of the Secretary-General entitled "Study on the relationship between disarmament and international security"; calls upon all states to eliminate tensions and conflicts in

Adopted without vote

Subject, number, date of adoption and contents of the resolution	Voting results
their relations and proceed towards effective, collective measures under the Charter of the United nations for a system of international order, security and peace, concurrently with efforts at disarmament measures; calls upon all states also to pursue policies to strengthen international peace and security and to build confidence among states; and requests the organs of the United Nations to initiate or accelerate work on developing and strengthening institutions for maintaining peace and security, in accordance with the purposes and principles of the Charter.	
Confidence-building measures	
34/87 B 11 December 1979	
Recommends that all states should continue to consider arrangements for confidence-building measures, taking into account the specific conditions and requirements of each region, and requests the Secretary-General to carry out a comprehensive study on confidence-building measures with the assistance of a group of qualified governmental experts appointed by him.	Adopted without vote
Disarmament machinery	
34/83 H 11 December 1979	
Requests the Disarmament Commission to continue its work with the aim of elaborating, in accordance with the priorities established at the Special Session on Disarmament, a general approach to negotiations on nuclear and conventional disarmament.	Adopted without vote
34/83 B 11 December 1979	
Urges the Committee on Disarmament to proceed, without further delay, to negotations on the priority questions of disarmament on its agenda, in accordance with the provisions of the Final Document of the Tenth Special Session of the General Assembly and the other relevant resolutions of the Assembly on these subjects; invites the members of the Committee involved in separate negotiations on specific priority questions of disarmament to make every effort to achieve a positive conclusion of these negotiations without further delay for submission to the Committee and, failing	*In favour* 130 *Against* 0 *Abstentions* 11: Afghanistan, Bulgaria, Byelorussia, Czechoslovakia, German Democratic Republic, Hungary, Mongolia, Poland, Ukraine, USA, USSR

this, to submit to the Committee a full report on the status of their separate negotiations and results achieved so far in order to contribute most directly to the negotiations in the Committee; and requests the Committee to initiate negotiations at its next session on the comprehensive programme of disarmament, with a view to completing its elaboration before the second special session of the General Assembly on disarmament and, in doing so, to take as a basis the recommendations adopted by the Disarmament Commission.	*Absent or not participating in the vote*: Albania, Colombia, Dominica, Equatorial Guinea, Lao People's Democratic Republic, Nicaragua, Saint Lucia, Seychelles, Solomon Islands, Somalia
34/83 C 11 December 1979 Urgently calls upon all states, in particular nuclear weapon states and all other major military powers, immediately to undertake steps leading to effective halting and reversing of the arms race and to disarmament and, to this end: (*a*) to make every effort to bring to a successful end the negotiations which are currently going on in the Committee on Disarmament and in a limited or regional framework on effective international agreements according to the priorities of the Programme of Action of the UN Special Session on Disarmament; and (*b*) to resume or undertake as soon as possible negotiations on a bilateral, regional or multilateral basis on measures which have been agreed upon by consensus at that session, taking into consideration all relevant proposals. Invites all states which are engaged in bilateral, regional or multilateral disarmament or arms limitation negotiations outside the United Nations framework to keep the General Assembly informed of the results of such negotiations.	Adopted without vote
34/83 L 11 December 1979 Noting that the Committee on Disarmament adopted its rules of procedure, which contain detailed arrangements on all aspects relating to its work, requests the Secretary-General to provide the staff as well as the necessary assistance and services needed by the committee and any subsidiary bodies which it may establish.	Adopted without vote
34/87 E 11 December 1979 Requests the Secretary-General, with the assistance of qualified governmental experts, to carry out a comprehensive study assessing present institutional requirements and future estimated needs in the United Nations management of disarmament affairs and outlining possible functions, structure and institutional framework that could meet those requirements and needs, including legal and financial implications, and formulating recommendations for possible later decisions on the matter.	*In favour* 121 *Against* 9: Bulgaria, Byelorussia, Czechoslovakia, German Democratic Republic, Hungary, Mongolia, Poland, Ukraine, USSR *Abstentions* 9: Afghanistan, Angola, Brazil, Congo, Cuba, Ivory Coast, Niger, Sierra Leone, Viet Nam

Subject, number, date of adoption and contents of the resolution	Voting results
	Absent or not participating in the vote: Albania, Colombia, Dominica, Equatorial Guinea, Ethiopia, Lao People's Democratic Republic, Libya, Mozambique, Nicaragua, Saint Lucia, Seychelles, Solomon Islands
34/81 11 December 1979 Renews the mandate of the *Ad Hoc* Committee on the World Disarmament Conference; and requests this 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.	Adopted without vote
34/88 11 December 1979 Calls upon all states actively to promote the development, strengthening and intensification of international co-operation designed to achieve the goals of disarmament.	*In favour* 116 *Against* 0 *Abstentions* 27: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Federal Republic of Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Mexico, Morocco, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Turkey, UK, USA, Zaire *Absent or not participating in the vote*: Albania, China, Colombia, Dominica, Equatorial Guinea, Saint Lucia, Seychelles, Solomon Islands
Information, research and training 34/83 I 11 December 1979 Invites all states, in carrying out appropriate measures at the local level on the occasion of 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 holding Disarmament Week.	Adopted without vote

34/83 M 11 December 1979 Requests the Secretary-General to hold consultations with the UN Institute for Training and Research regarding the establishment of the UN Institute for Disarmament Research.	Adopted without vote
34/83 D 11 December 1979 Decides to continue the programme of fellowships on disarmament and requests the Secretary-General to make adequate arrangements regarding the programme for 1980.	Adopted without vote
Disarmament Decade	
34/75 11 December 1979 Decides to declare the decade of the 1980s as the Second Disarmament Decade; directs the Disarmament Commission to prepare elements of a draft resolution entitled "Declaration of the 1980s as the Second Disarmament Decade" and submit them to the General Assembly at its thirty-fifth session for consideration and adoption; and determines that the draft resolution should embody, *inter alia*, an indication of targets during the Second Disarmament Decade for accomplishing the major objectives and goals of disarmament, as well as ways and means of mobilizing world public opinion in this regard.	Adopted without a vote

[a] Later advised the Secretariat it had intended to vote against.
[b] Later advised the Secretariat it had intended to vote in favour.

17. The implementation of multilateral arms control agreements

The eight major multilateral arms control treaties and conventions in force on 31 December 1979 were concluded with the following objectives:

(*a*) to prevent militarization or military nuclearization of certain areas or environments (Antarctica, Latin America, outer space and the seabed);

(*b*) to restrict nuclear weapon tests;

(*c*) to prevent the spread of nuclear weapons;

(*d*) to prohibit the production and eliminate the stockpiles of biological weapons; and

(*e*) to prevent the use of environmental forces for military ends.

Section I of this chapter summarizes the essential provisions of the agreements, while Section II lists information on ratifications, accessions or successions to these agreements.

I. Summary of the essential provisions of the agreements

Antarctic Treaty

Signed at Washington on 1 December 1959.
Entered into force on 23 June 1961.
Depositary: US government.

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.

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.
Depositaries: UK, US and Soviet governments.

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.

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.
Depositaries: UK, US and Soviet governments.

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.

Treaty for the prohibition of nuclear weapons in Latin America (Treaty of Tlatelolco)

Signed at Mexico, Federal District, on 14 February 1967.

The Treaty enters into force for each state that has ratified it when the requirements specified in the Treaty have been met—that is, that all states in the region which were in existence when the Treaty was opened for signature deposit the instruments of ratification; that Additional Protocols I and II be signed and ratified by those states to which they apply (see below); and that agreements on safeguards be concluded with the IAEA. The signatory states have the right to waive, wholly or in part, those requirements.

The Treaty came into force on 22 April 1968 as between Mexico and El Salvador, on behalf of which instruments of ratification, with annexed declarations wholly waiving the above requirements, were deposited on 20 September 1967 and 22 April 1968, respectively.

Depositary: Mexican government.

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 International Atomic Energy Agency (IAEA) for the application of safeguards to their nuclear activities.

Additional Protocols

The Additional Protocols enter into force for the states that have ratified them on the date of the deposit of their instruments of ratification.

Depositary: Mexican government.

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 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.

Treaty on the non-proliferation of nuclear weapons (Non-Proliferation Treaty —NPT)

Signed at London, Moscow and Washington on 1 July 1968.
Entered into force on 5 March 1970.
Depositaries: UK, US and Soviet governments.

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.

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.
Depositaries: UK, US and Soviet governments.

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.

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.
Depositaries: UK, US and Soviet governments.

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.

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.
Depositary: UN Secretary-General.

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.

II. Parties to multilateral arms control treaties, as of 31 December 1979

Number of parties

Antarctic Treaty	20	
Partial Test Ban Treaty	111	
Outer Space Treaty	80	
Treaty of Tlatelolco	22	
Additional Protocol I	2	
Additional Protocol II	5	
Non-Proliferation Treaty	111	
NPT safeguards agreements	67	non-nuclear weapon states
Sea-Bed Treaty	68	
BW Convention	87	
ENMOD Convention	27	

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 list are the earliest dates on which countries deposited their instruments of ratification, accession or succession—whether in London, Washington or Moscow.
Under the Antarctic Treaty, the only depositary is the US government; under the Treaty of Tlatelolco, the Mexican government; and under the ENMOD Convention, the UN Secretary-General.

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.

State	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention	ENMOD Convention
Afghanistan		12 Mar 1964	S		4 Feb 1970 SA: 20 Feb 1978	22 Apr 1971	26 Mar 1975	
Algeria		S						
Argentina	23 Jun 1961	S	26 Mar 1969	S[1]		S[1]	27 Nov 1979	
Australia	23 Jun 1961	12 Nov 1963	10 Oct 1967		23 Jan 1973[1] SA: 10 Jul 1974	23 Jan 1973	5 Oct 1977	S
Austria		17 Jul 1964	26 Feb 1968		27 Jun 1969 SA: 23 Jul 1972	10 Aug 1972	10 Aug 1973[1]	
Bahamas		16 Jul 1976[1]	11 Aug 1976[1]	26 Apr 1977[2]	11 Aug 1976[2]			
Bangladesh					31 Aug 1979			3 Oct 1979
Barbados			12 Sep 1968	25 Apr 1969[2]	S		16 Feb 1973	
Belgium	26 Jul 1960	1 Mar 1966	30 Mar 1973		2 May 1975 SA: 21 Feb 1977	20 Nov 1972	15 Mar 1979	S
Benin		15 Dec 1964[2]			31 Oct 1972	S	25 Apr 1975	S
Bhutan		8 Jun 1978					8 Jun 1978	

Bolivia		4 Aug 1965	S	18 Feb 1969[2]	26 May 1970	S	30 Oct 1975	S
Botswana		5 Jan 1968[1]	S		28 Apr 1969	10 Nov 1972	S	
Brazil	16 May 1975	15 Dec 1964	5 Mar 1969[2]	29 Jan 1968[3]		S[2]	27 Feb 1973	S
Bulgaria		13 Nov 1963	28 Mar 1967		5 Sep 1969 SA: 29 Feb 1972	16 Apr 1971	2 Aug 1972	31 May 1978
Burma		15 Nov 1963	18 Mar 1970			S	S	
Burundi		S	S		19 Mar 1971	S	S	
Byelorussia		16 Dec 1963[3]	31 Oct 1967[3]			14 Sep 1971	26 Mar 1975	7 Jun 1978
Cambodia: see Democratic Kampuchea								
Cameroon: see United Republic of Cameroon								
Canada		28 Jan 1964	10 Oct 1967		8 Jan 1969 SA: 21 Feb 1972	17 May 1972[3]	18 Sep 1972	S
Cape Verde		24 Oct 1979			24 Oct 1979 -	24 Oct 1979	20 Oct 1977	3 Oct 1979
Central African Republic		22 Dec 1964	S		25 Oct 1970	S	S	

State	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention	ENMOD Convention
Chad		1 Mar 1965			10 Mar 1971			
Chile	23 Jun 1961	6 Oct 1965	S	9 Oct 1974[4]			S	
China				PII: 12 Jun 1974[5]				
Colombia		S	S	4 Aug 1972[2]	S	S	S	
Congo					23 Oct 1978	23 Oct 1978	23 Oct 1978	
Costa Rica		10 Jul 1967		25 Aug 1969[2]	3 Mar 1970 SA: 22 Nov 1979	S	17 Dec 1973	
Cuba			3 Jun 1977[4]			3 Jun 1977[4]	21 Apr 1976	10 Apr 1978
Cyprus		15 Apr 1965	5 Jul 1972		10 Feb 1970 SA: 26 Jan 1973	17 Nov 1971	6 Nov 1973	12 Apr 1978
Czechoslovakia	14 Jun 1962	14 Oct 1963	11 May 1967		22 Jul 1969 SA: 3 Mar 1972	11 Jan 1972	30 Apr 1973	12 May 1978
Democratic Kampuchea					2 Jun 1972	S	S	
Democratic Yemen*		1 Jun 1979	1 Jun 1979		S	S	S	12 Jun 1979

Denmark	20 May 1965	15 Jan 1964	10 Oct 1967		3 Jan 1969 SA: 21 Feb 1977	15 Jun 1971	1 Mar 1973	19 Apr 1978
Dominican Republic		3 Jun 1964	21 Nov 1968	14 Jun 1968[2] SA[15]	24 Jul 1971 SA: 11 Oct 1973	11 Feb 1972	23 Feb 1973	
Ecuador		6 May 1964	7 Mar 1969	11 Feb 1969[2] SA[15]	7 Mar 1969 SA: 10 Mar 1975		12 Mar 1975	
Egypt		10 Jan 1964[4]	10 Oct 1967		S		S	
El Salvador		3 Dec 1964	15 Jan 1969	22 Apr 1968[2] SA[15]	11 Jul 1972 SA: 22 Apr 1975		S	
Equatorial Guinea						S		
Ethiopia		S	S		5 Feb 1970 SA: 2 Dec 1977	12 Jul 1977	26 May 1975	S
Fiji		14 Jul 1972[1]	18 Jul 1972[1]		21 Jul 1972[2] SA: 22 Mar 1973		4 Sep 1973	
Finland		9 Jan 1964	12 Jul 1967		5 Feb 1969 SA: 9 Feb 1972	8 Jun 1971	4 Feb 1974	12 May 1978
France	16 Sep 1960		5 Aug 1970	PI: S[6] PII: 22 Mar 1974[7]				
Gabon		20 Feb 1964			19 Feb 1974		S	

State	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention	ENMOD Convention
Gambia		27 Apr 1965[1]	S		12 May 1975 SA: 8 Aug 1978	S	S	
German Democratic Republic	19 Nov 1974[1]	30 Dec 1963[5]	2 Feb 1967[5]		31 Oct 1969[3] SA: 7 Mar 1972	27 Jul 1971	28 Nov 1972	25 May 1978
Germany, Federal Republic of	5 Feb 1979[2]	1 Dec 1964[6]	10 Feb 1971[6]		2 May 1975[4] SA: 21 Feb 1977	18 Nov 1975[5]	S	S
Ghana		27 Nov 1963	S		4 May 1970 SA: 17 Feb 1975	9 Aug 1972	6 Jun 1975	22 Jun 1978
Greece		18 Dec 1963	19 Jan 1971		11 Mar 1970 SA: 1 Mar 1972	S	10 Dec 1975	
Grenada				20 Jun 1975[2]	2 Sep 1975[2]			
Guatemala		6 Jan 1964[2]		6 Feb 1970[2]	22 Sep 1970	S	19 Sep 1973	
Guinea						S		
Guinea-Bissau		20 Aug 1976	20 Aug 1976		20 Aug 1976	20 Aug 1976	20 Aug 1976	
Guyana			S				S	

Haiti		S	S	23 May 1969[2]	2 Jun 1970		S	
Holy See (Vatican City)			S		25 Feb 1971[5] SA: 1 Aug 1972			S
Honduras		2 Oct 1964	S	23 Sep 1968[2] SA[15]	16 May 1973 SA: 18 Apr 1975	S	14 Mar 1979	
Hungary		21 Oct 1963	26 Jun 1967		27 May 1969 SA: 30 Mar 1972	13 Aug 1971	27 Dec 1972	19 Apr 1978
Iceland		29 Apr 1964	5 Feb 1968		18 Jul 1969 SA: 16 Oct 1974	30 May 1972	15 Feb 1973	S
India		10 Oct 1963	S			20 Jul 1973[6]	15 Jul 1974[2]	15 Dec 1978
Indonesia		20 Jan 1964	S		12 Jul 1979[6]		S	
Iran		5 May 1964	S		2 Feb 1970 SA: 15 May 1974	26 Aug 1971	22 Aug 1973	S
Iraq		30 Nov 1964	4 Dec 1968		29 Oct 1969 SA: 29 Feb 1972	13 Sep 1972[4]	S	S
Ireland		18 Dec 1963	17 Jul 1968		1 Jul 1968 SA: 21 Feb 1977	19 Aug 1971	27 Oct 1972[3]	S
Israel		15 Jan 1964	18 Feb 1977					
Italy		10 Dec 1964	4 May 1972		2 May 1975[7] SA: 21 Feb 1977	3 Sep 1974[7]	30 May 1975	S

State	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention	ENMOD Convention
Ivory Coast		5 Feb 1965			6 Mar 1973	14 Jan 1972	S	
Jamaica		S	6 Aug 1970	26 Jun 1969[2] SA[15]	5 Mar 1970 SA: 6 Nov 1978	S	13 Aug 1975	
Japan	4 Aug 1960	15 Jun 1964	10 Oct 1967		8 Jun 1976[8] SA: 2 Dec 1977	21 Jun 1971	S	
Jordan		29 May 1964	S		11 Feb 1970 SA: 21 Feb 1978	17 Aug 1971	30 May 1975	
Kampuchea: see Democratic Kampuchea								
Kenya		10 Jun 1965			11 Jun 1970		7 Jan 1976	
Korea, South		24 Jul 1964[2]	13 Oct 1967[4]		23 Apr 1975[9, 10] SA: 14 Nov 1975	S[4]	S[4]	
Kuwait		20 May 1965[7]	7 Jun 1972[7]		S		18 Jul 1972[5]	[1]
Lao People's Democratic Republic		10 Feb 1965	27 Nov 1972		20 Feb 1970	19 Oct 1971	20 Mar 1973	5 Oct 1978
Lebanon		14 May 1965	31 Mar 1969		15 Jul 1970 SA: 5 Mar 1973	S	26 Mar 1975	S

Lesotho			S	20 May 1970 SA: 12 Jun 1973	3 Apr 1973	6 Sep 1977	
Liberia		19 May 1964		5 Mar 1970	S	S	S
Libya		15 Jul 1968	3 Jul 1968	26 May 1975			
Liechten-stein				20 Apr 1978[11] SA: 4 Oct 1979			
Luxembourg		10 Feb 1965	S	2 May 1975 SA: 21 Feb 1977	S	23 Mar 1976	S
Madagascar		15 Mar 1965	22 Aug 1968[8]	8 Oct 1970 SA: 14 Jun 1973	S	S	
Malawi		26 Nov 1964[1]				S	5 Oct 1978
Malaysia		15 Jul 1964	S	5 Mar 1970 SA: 29 Feb 1972	21 Jun 1972	S	
Maldives				7 Apr 1970 SA: 2 Oct 1977			
Mali		S	11 Jun 1968	10 Feb 1970	S	S	
Malta		25 Nov 1964[1]		6 Feb 1970	4 May 1971	7 Apr 1975	
Mauritania		6 Apr 1964					

State	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention	ENMOD Convention
Mauritius		30 Apr 1969[1]	16 Apr 1969[1]		8 Apr 1969 SA: 31 Jan 1973	23 Apr 1971	7 Aug 1972	
Mexico		27 Dec 1963	31 Jan 1968	20 Sep 1967[2, 8] SA: 6 Sep 1968	21 Jan 1969[12] SA: 14 Sep 1973		8 Apr 1974[6]	
Mongolia		1 Nov 1963	10 Oct 1967		14 May 1969 SA: 5 Sep 1972	8 Oct 1971	5 Sep 1972	19 May 1978
Morocco		1 Feb 1966	21 Dec 1967		27 Nov 1970 SA: 18 Feb 1975	26 Jul 1971	S	S
Nepal		7 Oct 1964	10 Oct 1967		5 Jan 1970 SA: 22 Jun 1972	6 Jul 1971	S	
Netherlands	30 Mar 1967	14 Sep 1964	10 Oct 1969	PI: 26 Jul 1971[9]	2 May 1975 SA: 21 Feb 1977	14 Jan 1976	S	S
New Zealand	1 Nov 1960	10 Oct 1963	31 May 1968		10 Sep 1969 SA: 29 Feb 1972	24 Feb 1972	13 Dec 1972	
Nicaragua		26 Jan 1965	S	14 Oct 1968[2, 10] SA[15]	6 Mar 1973 SA: 29 Dec 1976	7 Feb 1973	7 Aug 1975	S
Niger		3 Jul 1964	17 Apr 1967			9 Aug 1971	23 Jun 1972	
Nigeria		17 Feb 1967	14 Nov 1967		27 Sep 1968		3 Jul 1973	

Norway	24 Aug 1960	21 Nov 1963	1 Jul 1969		5 Feb 1969 SA: 1 Mar 1972	28 Jun 1971	1 Aug 1973	15 Feb 1979
Pakistan		S	8 Apr 1968				25 Sep 1974	
Panama		24 Feb 1966	S	11 Jun 1971[2]	13 Jan 1977	20 Mar 1974	20 Mar 1974	
Paraguay		S		19 Mar 1969[2]	4 Feb 1970 SA: 20 Mar 1979	S	9 Jun 1976	
Peru		20 Jul 1964	28 Feb 1979	4 Mar 1969[2]	3 Mar 1970 SA: 1 Aug 1979		S	
Philippines		10 Nov 1965[2]	S		5 Oct 1972 SA: 16 Oct 1974		21 May 1973	
Poland	8 Jun 1961	14 Oct 1963	30 Jan 1968		12 Jun 1969 SA: 11 Oct 1972	15 Nov 1971	25 Jan 1973	8 Jun 1978
Portugal		S			15 Dec 1977 SA: 14 Jun 1979	24 Jun 1975	15 May 1975	S
Qatar						12 Nov 1974	17 Apr 1975	
Romania	15 Sep 1971[3]	12 Dec 1963	9 Apr 1968		4 Feb 1970 SA: 27 Oct 1972	10 Jul 1972	25 Jul 1979	S
Rwanda		22 Oct 1963	S		20 May 1975	20 May 1975	20 May 1975	
Saint Lucia					28 Dec 1979[2]			

State	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention	ENMOD Convention
Samoa		15 Jan 1965			17 Mar 1975 SA: 22 Jan 1979			
San Marino		3 Jul 1964	29 Oct 1968		10 Aug 1970[9]		11 Mar 1975	
Sao Tome and Principe						24 Aug 1979	24 Aug 1979	5 Oct 1979
Saudi Arabia			17 Dec 1976			23 Jun 1972	24 May 1972	
Senegal		6 May 1964			17 Dec 1970	S	26 Mar 1975	
Seychelles			5 Jan 1978			29 Jun 1976	11 Oct 1979	
Sierra Leone		21 Feb 1964	13 Jul 1967		26 Feb 1975	S	29 Jun 1976	S
Singapore		12 Jul 1968[1]	10 Sep 1976		10 Mar 1976 SA: 18 Oct 1977	10 Sep 1976	2 Dec 1975	
Somalia		S	S		5 Mar 1970		S	
South Africa	21 Jun 1960	10 Oct 1963	30 Sep 1968			14 Nov 1973	3 Nov 1975	
Spain		17 Dec 1964	27 Nov 1968				20 Jun 1979	19 Jul 1978
Sri Lanka		5 Feb 1964	S		5 Mar 1979		S	25 Apr 1978

Sudan	4 Mar 1966			31 Oct 1973 SA: 7 Jan 1977	S		
Suriname			10 Jun 1977[2] SA[15]	30 Jun 1976[2] SA: 2 Feb 1979			
Swaziland	29 May 1969			11 Dec 1969 SA: 28 Jul 1975	9 Aug 1971		
Sweden	9 Dec 1963	11 Oct 1967		9 Jan 1970 SA: 14 Apr 1975	28 Apr 1972	5 Feb 1976	
Switzerland	16 Jan 1964	18 Dec 1969		9 Mar 1977[11] SA: 6 Sep 1978	4 May 1976	4 May 1976[7]	
Syria	1 Jun 1964	14 Nov 1968[9]		24 Sep 1969[9]		S	S
Taiwan	18 May 1964	24 Jul 1970		27 Jan 1970	22 Feb 1972[8]	9 Feb 1973[8]	
Tanzania: see United Republic of Tanzania							
Thailand	15 Nov 1963	5 Sep 1968		7 Dec 1972 SA: 16 May 1974		28 May 1975	
Togo	7 Dec 1964	S		26 Feb 1970	28 Jun 1971	10 Nov 1976	
Tonga	22 Jun 1971[1]	22 Jun 1971[1]		7 Jul 1971[2]		28 Sep 1976	

State	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention	ENMOD Convention
Trinidad and Tobago		14 Jul 1964	S	3 Dec 1970[2]	S			
Tunisia		26 May 1965	28 Mar 1968		26 Feb 1970	22 Oct 1971	18 May 1973	11 May 1978
Turkey		8 Jul 1965	27 Mar 1968		S	19 Oct 1972	25 Oct 1974	S[2]
Tuvalu					19 Jan 1979[2]			
Uganda		24 Mar 1964	24 Apr 1968					S
Ukraine		30 Dec 1963[3]	31 Oct 1967[3]			3 Sep 1971	26 Mar 1975	13 Jun 1978
Union of Soviet Socialist Republics	2 Nov 1960	10 Oct 1963	10 Oct 1967	PII: 8 Jan 1979[11]	5 Mar 1970	18 May 1972	26 Mar 1975	30 May 1978
United Arab Emirates							S	
United Kingdom	31 May 1960	10 Oct 1963[8]	10 Oct 1967[10]	PI: 11 Dec 1969[12] PII: 11 Dec 1969[12]	27 Nov 1968[13] SA: 14 Aug 1978[14]	18 May 1972[9]	26 Mar 1975[9]	16 May 1978
United Republic of Cameroon		S[2]	S		8 Jan 1969	S		
United Republic of Tanzania		6 Feb 1964				S	S	

United States	18 Aug 1960	10 Oct 1963	10 Oct 1967	PI: S PII: 12 May 1971[13]	5 Mar 1970 SA[15]	18 May 1972	26 Mar 1975	[3]
Upper Volta		S	18 Jun 1968		3 Mar 1970			
Uruguay		25 Feb 1969	31 Aug 1970	20 Aug 1968[2] SA[15]	31 Aug 1970 SA: 17 Sep 1976	S		
Venezuela		22 Feb 1965	3 Mar 1970	23 Mar 1970[2,14]	25 Sep 1975		18 Oct 1978	
Viet Nam**								
Yemen*		S			S		S	20 Jul 1977
Yugoslavia		15 Jan 1964	S		4 Mar 1970[16] SA: 28 Dec 1973	25 Oct 1973[10]	25 Oct 1973	
Zaire		28 Oct 1965	S		4 Aug 1970 SA: 9 Nov 1972		16 Sep 1975	S
Zambia		11 Jan 1965[1]	20 Aug 1973			9 Oct 1972		

* Yemen refers to the Yemen Arab Republic (Northern Yemen), Democratic Yemen refers to the People's Democratic Republic of Yemen (Southern Yemen).

** South Viet Nam ratified the Non-Proliferation Treaty on 10 September 1971 and concluded a safeguards agreement with the IAEA under that Treaty on 9 January 1974. It signed the Partial Test Ban Treaty, the Outer Space Treaty and the BW Convention but did not ratify these treaties. On 30 April 1975 the Republic of South Viet Nam ceased to exist as a separate political entity. As from 2 July 1976 North and South Viet Nam constitute a single state under the official name of the Socialist Republic of Viet Nam. The government of the unified state has not announced whether it will adhere to international commitments undertaken by the former administration.

The Antarctic Treaty

[1] The German Democratic Republic stated that in its view Article XIII, paragraph 1 of the Antarctic 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 Antarctic 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.

The Partial Test Ban Treaty

[1] Notification of succession.
[2] With a statement that this does not imply the recognition of any territory or régime not recognized by this state.
[3] The United States considers that Byelorussia and Ukraine are already covered by the signature and ratification by the USSR.
[4] Egypt stated that its ratification of the Treaty does not mean or imply any recognition of Israel or any treaty relations with Israel.
[5] The United States did not accept the notification of signature and deposit of ratification of the Treaty in Moscow by the German Democratic Republic, which it then did not recognize as a state. On 4 September 1974, the two countries established diplomatic relations with each other.
[6] The Federal Republic of Germany stated that the Treaty applies also to *Land* Berlin.
[7] Kuwait stated that its signature and ratification of the Treaty does not in any way imply its recognition of Israel, nor does it oblige it to apply the provisions of the Treaty in respect of the said country.
[8] The UK stated its view that if a régime 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 régime 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 of the USSR.
[4] With a statement that this does not imply the recognition of any territory or régime not recognized by this state.
[5] The USA stated that this did not imply recognition of the German Democratic Republic. On 4 September 1974, the two countries established diplomatic relations with each other.
[6] The Federal Republic of Germany stated that the Treaty applies also to *Land* Berlin.
[7] 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.
[8] 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.
[9] 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.
[10] On depositing its instrument of ratification, the United Kingdom declared that the Treaty will not be applicable in regard to Southern Rhodesia unless and until the United Kingdom informs the other depositary governments that it is in a position to ensure that the obligations imposed by the Treaty in respect of that territory can be fully implemented.

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 specified in paragraph 1 of that Article: namely, that all states in the region deposit the instruments of ratification; that Additional Protocol I and Additional 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 (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 stated also that it did not waive the requirements laid down in Article 28 of the Treaty. The Treaty is therefore not yet in force for Brazil. In ratifying the Treaty, Brazil reiterated its interpretation of Article 18, which it made upon signing.

[4] Chile has not waived the requirements laid down in Article 28 of the Treaty. 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 her means of transportation and delivery carrying nuclear weapons to cross the territory, territorial sea or airspace of Latin American countries. It is necessary to point out that the signing of Additional Protocol II to the Treaty for the Prohibition of Nuclear Weapons in Latin America by the Chinese Government does not imply any change whatsoever in China's principled stand on the disarmament and nuclear weapons issue and, in particular, does not affect the Chinese Government's consistent stand against the treaty on non-proliferation of nuclear weapons and the partial nuclear 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 super-powers, which possess huge numbers of nuclear weapons, must first of all undertake earnestly not to use or threaten to use nuclear weapons against the Latin American countries and the Latin American nuclear-weapon-free zone, and they must be asked to undertake to observe and implement the following: (1) dismantling of all foreign military bases in Latin America and refraining from establishing any new foreign military bases there; (2) prohibition of the passage of any means of transportation and delivery carrying nuclear weapons through Latin American territory, territorial sea or air space."

[6] On signing Protocol I, France made the following reservations and interpretative statements: the Protocol as well as the provisions of the Treaty of Tlatelolco, 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 national defence of France; the provisions of Articles 1 and 2 of the Protocol apply to the text of the Treaty of Tlatelolco 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 not 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 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 of Tlatelolco 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 thereof 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 procedure 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. With respect to nuclear explosions for peaceful purposes on the territory of Suriname and the Netherlands Antilles, no other rules apply than those operative for the parties to the Treaty. Upon Suriname's accession to independence on 25 November 1975, the obligations of the Netherlands under the Protocol apply only to the Netherlands Antilles.

[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 Additional 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 NPT 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 as provided in Article 4(2) 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 envisaged 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 Tlatelolco 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 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 Additional Protocol I and Additional 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 Additional 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 Additional Protocol II.

In addition, the UK declared that its undertaking under Article 3 of Additional 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 Additional Protocol I becomes effective.

[13] The United States signed and ratified Additional 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.

[14] 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.

[15] Safeguards under the NPT 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 25 November 1969, the United States notified its non-acceptance of notification of signature and ratification by the German Democratic Republic which it then did not recognize as a state. On 4 September 1974, the two countries established diplomatic relations with each other.

[4] 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 USSR and the German Democratic Republic stated that this declaration by FR Germany had no legal effect.

[5] 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 international control.

[6] On signing the Treaty, Indonesia stated, *inter alia*, that the government of Indonesia attaches great importance to the declarations of the USA, the UK and the USSR 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 cooperate 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.

[7] 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 that 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.

[8] 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.

[9] A statement was made containing a disclaimer regarding the recognition of states party to the Treaty.

[10] 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.

[11] 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.

[12] 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 for the Prohibition of Nuclear Weapons in Latin America (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.

[13] The United Kingdom recalled its view that if a régime 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 régime by any other state. The provisions of the Treaty shall not apply with regard to Southern Rhodesia unless and until the government of the United Kingdom informs the other depositary governments that it is in a position to ensure that the obligations imposed by the Treaty in respect of that territory can be fully implemented. Cameroon stated that it was unable to accept the reservation concerning Southern Rhodesia. Also Mongolia stated that the obligations assumed by the United Kingdom under the Non-Proliferation Treaty should apply equally to Southern Rhodesia. In a note addressed to the British Embassy in Moscow, the Soviet government expressed the view that the United Kingdom carries the entire responsibility for Southern Rhodesia until the people of that territory acquire genuine independence, and that this fully applies to the Non-Proliferation Treaty.

[14] 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.

[15] This agreement, under which US civilian nuclear facilities will be placed under IAEA safeguards, was approved by the IAEA Board but was not in force by 31 December 1979.

[16] 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 NPT.

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.

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 sovereign 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 Sea-Bed 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 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 international 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] Romania stated that it considered null and void the ratification of the Treaty by the Taiwan authorities.

[9] The United Kingdom recalled its view that if a régime 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 régime by any other state.

[10] 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 USA concerning the Yugoslav note, as follows: "Insofar 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 in 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 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 régime 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 (or any other arrangement).

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 United States government enters its objection to this reservation.

[8] The USSR stated that it considered the deposit of the instrument of ratification by Taiwan as an illegal act because the government of the Chinese People's Republic is the sole representative of China.

[9] The United Kingdom recalled its view that if a régime 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 régime by any other state. It declared that the provisions of the Convention shall not apply in regard to Southern Rhodesia unless and until the British government informs the other depositary governments that it is in a position to ensure that the obligations imposed by the Convention in respect of that territory can be fully implemented. In a note addressed to the British Embassy in Moscow, the Soviet government expressed the view that the United Kingdom carries the entire responsibility for Southern Rhodesia until the people of that territory acquire genuine independence, and that this fully applies to the BW Convention.

The ENMOD Convention

[1] Kuwait acceded to the Convention on 2 January 1980.

[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 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] The US deposited its instruments of ratification of the Convention on 17 January 1980.

18. Bilateral US–Soviet arms control agreements

Since 1969, some 25 documents in the field of arms control have been signed between the USA and the USSR, including agreements, treaties, protocols and memoranda of understanding, as well as statements.

The arms control subjects covered in these documents are as follows:

(*a*) limitation of strategic defensive and offensive arms,
(*b*) establishment of a data base on the numbers of strategic arms,
(*c*) consultative machinery for implementation of arms control agreements,
(*d*) principles and guidelines for negotiations on further limitation of strategic arms,
(*e*) prevention of nuclear weapon accidents,
(*f*) prevention of a nuclear war,
(*g*) reduction of fissionable material production,
(*h*) limitation of underground nuclear weapon tests,
(*i*) limitation of nuclear explosions for peaceful purposes,
(*j*) prevention of incidents on the high seas,
(*k*) improvement of communications at government level, and
(*l*) principles of relations between states.

These documents are listed below in chronological order according to the dates of signature, together with a brief summary of their essential provisions.

US–Soviet Memorandum of understanding regarding the establishment of a direct communications link (US–Soviet 'Hot Line' Agreement)

Signed at Geneva on 20 June 1963.
Entered into force on 20 June 1963.

Establishes a direct communications link between the governments of the USA and the USSR for use in time of emergency. An annex attached to the Memorandum provides for two circuits, namely, a duplex wire telegraph circuit and a duplex radio telegraph circuit, as well as two terminal points with telegraph–teleprinter equipment between which communications are to be exchanged.

Statements by the USA and the USSR on the reduction of fissionable materials production

Made on 20 April 1964, simultaneously by the US President and the Soviet Prime Minister.

The US government orders a substantial reduction in the production of enriched uranium, to be carried out over a four-year period. When added to previous reductions, this will mean an overall decrease in the production of plutonium by 20 per cent, and of enriched uranium by 40 per cent.

The Soviet government decides to stop the construction of two new large atomic reactors for the production of plutonium; to reduce substantially during the next few years, the production of uranium-235 for nuclear weapons; and to allocate accordingly more fissionable materials for peaceful uses.

Agreement on measures to improve the USA–USSR direct communications link (US–Soviet 'Hot Line' Modernization Agreement)

Signed at Washington on 30 September 1971.
Entered into force on 30 September 1971.
Amended on 29 April 1975.

Establishes, for the purpose of increasing the reliability of the direct communications link set up pursuant to the Memorandum of understanding of 20 June 1963 (see above), two additional circuits between the USA and the USSR, each using a satellite communications system, and a system of terminals (more than one) in the territory of each party. Matters relating to the implementation of these improvements are set forth in an annex to the Agreement.

Agreement on measures to reduce the risk of outbreak of nuclear war between the USA and the USSR (US–Soviet Nuclear Accidents Agreement)

Signed at Washington on 30 September 1971.
Entered into force on 30 September 1971.

Provides for immediate notification in the event of an accidental, unauthorized incident involving a possible detonation of a nuclear weapon (the party whose nuclear weapon is involved should take necessary

measures to render harmless or destroy such weapon); immediate notification in the event of detection by missile warning systems of unidentified objects, or in the event of signs of interference with these systems or with related communications facilities; and advance notification of planned missile launches extending beyond the national territory in the direction of the other party.

US–Soviet Agreement on the prevention of incidents on and over the high seas

Signed at Moscow on 25 May 1972.
Entered into force on 25 May 1972.

Provides for measures to assure the safety of navigation of the ships of the armed forces of the USA and the USSR on the high seas and flight of their military aircraft over the high seas, including rules of conduct for ships engaged in surveillance of other ships as well as ships engaged in launching or landing aircraft. The parties also undertake to give notification of actions on the high seas which represent a danger to navigation or to aircraft in flight, and to exchange information concerning instances of collisions, instances which result in damage, or other incidents at sea between their ships and aircraft.

US–Soviet Treaty on the limitation of anti-ballistic missile systems (SALT ABM Treaty)

Signed at Moscow on 26 May 1972.
Entered into force on 3 October 1972.

Prohibits the deployment of ABM systems for the defence of the whole territory of the USA and the USSR or of an individual region, except as expressly permitted. Permitted ABM deployments are limited to two areas in each country—one for the defence of the national capital, and the other for the defence of some intercontinental ballistic missiles (ICBMs). No more than 100 ABM launchers and 100 ABM interceptor missiles may be deployed in each ABM deployment area. ABM radars should not exceed specified numbers and are subject to qualitative restrictions. National technical means of verification are to be used to provide assurance of compliance with the provisions of the Treaty.

The ABM Treaty is accompanied by agreed interpretations and unilateral statements made during the negotiations.

US–Soviet Interim Agreement on certain measures with respect to the limitation of strategic offensive arms (SALT I Interim Agreement)

Signed at Moscow on 26 May 1972.
Entered into force on 3 October 1972.

Provides for a freeze for a period of five years of the aggregate number of fixed land-based intercontinental ballistic missile launchers and ballistic missile launchers on modern submarines. The parties are free to choose the mix, except that conversion of land-based launchers for light ICBMs, or for ICBMs of older types, into land-based launchers for modern heavy ICBMs is prohibited. National technical means of verification are to be used to provide assurance of compliance with the provisions of the Agreement.

A protocol, which is an integral part of the Interim Agreement, specifies that the USA may have not more than 710 ballistic missile launchers on submarines and 44 modern ballistic missile submarines, while the USSR may have not more than 950 ballistic missile launchers on submarines and 62 modern ballistic missile submarines. Up to those levels, additional ballistic missile launchers—in the USA over 656 launchers on nuclear-powered submarines and in the USSR over 740 launchers on nuclear-powered submarines, operational and under construction—may become operational as replacements for equal numbers of ballistic missile launchers of types deployed before 1964, or of ballistic missile launchers on older submarines.

The Interim Agreement is accompanied by agreed interpretations and unilateral statements made during the negotiations.

In September 1977 the USA and the USSR formally stated that, although the Interim Agreement was to expire on 3 October 1977, they intended to refrain from any actions incompatible with its provisions, or with the goals of the ongoing talks on a new agreement.

Agreement on basic principles of relations between the USA and the USSR

Signed at Moscow on 29 May 1972.

States that the USA and the USSR will proceed from the common determination that in the nuclear age there is no alternative to conducting their mutual relations on the basis of peaceful coexistence. They will do their utmost to avoid military confrontations and to prevent the outbreak of nuclear war. The prerequisites for maintaining and strengthening peace-

ful relations between the USA and the USSR are the recognition of the security interests of the parties based on the principle of equality and the renunciation of the use or threat of force. The parties will continue their efforts to limit armaments on a bilateral as well as on a multilateral basis. They will continue to make special efforts to limit strategic armaments. Whenever possible, they will conclude concrete agreements aimed at achieving these purposes. They regard as the ultimate objective of their efforts the achievement of general and complete disarmament and the establishment of an effective system of international security in accordance with the purposes and principles of the United Nations.

US–Soviet Memorandum of understanding regarding the establishment of a Standing Consultative Commission

Signed at Geneva on 21 December 1972.
Entered into force on 21 December 1972.

Establishes a Standing Consultative Commission to promote the objectives and implementation of the provisions of the SALT ABM Treaty and Interim Agreement, of 26 May 1972, and of the Nuclear Accidents Agreement of 30 September 1971. Each government shall be represented by a commissioner and a deputy commissioner, assisted by such staff as it deems necessary. The Commission is to hold at least two sessions per year.

Protocol to the US–Soviet agreement on the prevention of incidents on and over the high seas (see above)

Signed at Washington on 22 May 1973.
Entered into force on 22 May 1973

Provides that ships and aircraft of the parties shall not make simulated attacks by aiming guns, missile launchers, torpedo tubes and other weapons at non-military ships of the other party, nor launch nor drop any objects near non-military ships of the other party in such a manner as to be hazardous to these ships or to constitute a hazard to navigation.

Protocol with regulations regarding the US–Soviet Standing Consultative Commission

Signed at Geneva on 30 May 1973.
Entered into force on 30 May 1973.

Establishes regulations governing procedures and other relevant matters of the Standing Consultative Commission pursuant to the provisions of the US–Soviet Memorandum of understanding of 21 December 1972 (see above).

US–Soviet Agreement on basic principles of negotiations on the further limitation of strategic offensive arms

Signed at Washington on 21 June 1973.

Provides that the two powers will continue negotiations in order to work out a permanent agreement on more complete measures for the limitation of strategic offensive arms, as well as their subsequent reduction. Both powers will be guided by the recognition of each other's equal security interests and by the recognition that efforts to obtain unilateral advantage, directly or indirectly, would be inconsistent with the strengthening of peaceful relations between the USA and the USSR. The limitations placed on strategic offensive weapons could apply both to their quantitative aspects as well as to their qualitative improvement. Limitations on strategic offensive arms must be subject to adequate verification by national technical means. The modernization and replacement of strategic offensive arms would be permitted under conditions formulated in the agreements to be concluded. Pending a permanent agreement, both sides are prepared to reach agreements on separate measures to supplement the SALT Interim Agreement of 26 May 1972. Each power will continue to take necessary organizational and technical measures for preventing accidental or unauthorized use of nuclear weapons under its control in accordance with the Nuclear Accidents Agreement of 30 September 1971.

US–Soviet Agreement on the prevention of nuclear war

Signed at Washington on 22 June 1973.
Entered into force on 22 June 1973.

Provides that the parties will act in such a manner as to exclude the outbreak of nuclear war between them and between either of the parties and other countries. Each party will refrain from the threat or use of force against the other party, against the allies of the other party and against other countries in circumstances which may endanger international peace and security. If at any time relations between the parties or between either party and other countries appear to involve the risk of a nuclear conflict, or if relations between countries not parties to this

Agreement appear to involve the risk of nuclear war between the USSR and the USA or between either party and other countries, the Soviet Union and the United States, acting in accordance with the provisions of this Agreement, shall immediately enter into urgent consultations with each other and make every effort to avert this risk.

Protocol to the US–Soviet treaty on the limitation of anti-ballistic missile systems (see above)

Signed at Moscow on 3 July 1974.
Entered into force on 25 May 1976.

Provides that each party shall be limited to a single area for deployment of anti-ballistic missile systems or their components instead of two such areas as allowed by the SALT ABM Treaty (see above). Each party will have the right to dismantle or destroy its ABM system and the components thereof in the area where they were deployed at the time of signing the Protocol and to deploy an ABM system or its components in the alternative area permitted by the ABM Treaty, provided that, before starting construction, notification is given during the year beginning on 3 October 1977 and ending on 2 October 1978, or during any year which commences at five-year intervals thereafter, those being the years for periodic review of the ABM Treaty. This right may be exercised only once. The deployment of an ABM system within the area selected shall remain limited by the levels and other requirements established by the ABM Treaty.

US–Soviet Treaty on the limitation of underground nuclear weapon tests (Threshold Test Ban Treaty—TTBT)

Signed at Moscow on 3 July 1974.
Not in force by 31 December 1979.

Prohibits from 31 March 1976 the carrying out of any underground nuclear weapon test having a yield exceeding 150 kilotons. Each party undertakes to limit the number of its underground nuclear weapon tests to a minimum. The provisions of the Treaty do not extend to underground nuclear explosions for peaceful purposes which are to be governed by a separate agreement. National technical means of verification are to be used to provide assurance of compliance and a protocol to the Treaty specifies the data that have to be exchanged between the parties to ensure such verification.

Since the Treaty was not in force by 31 March 1976, the agreed cut-off date for explosions above the established threshold, the parties stated that they would observe the limitation during the pre-ratification period.

Joint US–Soviet Statement on the question of further limitations of strategic offensive arms (Vladivostok Agreement)

Signed in the area of Vladivostok on 24 November 1974.

States that a new US–Soviet agreement on the limitation of strategic offensive arms will incorporate the relevant provisions of the SALT Interim Agreement of 26 May 1972 and will cover the period from October 1977 to 31 December 1985. Based on the principle of equality and equal security, it will include the following limitations: both powers will be entitled to have a certain agreed aggregate number of strategic delivery vehicles and to have a certain agreed aggregate number of intercontinental ballistic missiles (ICBMs) and submarine-launched ballistic missiles (SLBMs) equipped with multiple independently targetable warheads. The Agreement will include a provision for further negotiations beginning no later than 1980–81 on the question of further limitations and possible reductions of strategic arms after 1985.

US–Soviet Treaty on underground nuclear explosions for peaceful purposes (Peaceful Nuclear Explosions Treaty—PNET)

Signed at Moscow and Washington on 28 May 1976.
Not in force by 31 December 1979.

Prohibits the carrying out of any individual underground nuclear explosion for peaceful purposes, having a yield exceeding 150 kilotons, or any group explosion (consisting of two or more individual explosions) with an aggregate yield exceeding 1 500 kilotons. The Treaty governs all nuclear explosions carried out outside the weapon test sites after 31 March 1976. The question of carrying out individual explosions with a yield exceeding 150 kilotons will be considered at an appropriate time to be agreed. In addition to the use of national technical means of verification, the Treaty provides for an exchange of information and, in certain specified cases, access to sites of explosions. A protocol to the Treaty sets forth operational arrangements for ensuring that no weapon-related benefits precluded by the TTBT are derived from peaceful nuclear explosions. The PNET may not be terminated while the TTBT remains in force.

Soviet Statement on the Backfire bomber

Handed, on 16 June 1979, by the Soviet President to the US President.

The USSR informs the USA that the Soviet 'Tu-22M' aircraft, called 'Backfire' in the USA, is a medium-range bomber. The Soviet Union does not intend to give this bomber an intercontinental capability and will not increase its radius of action to enable it to strike targets on US territory. It also pledges to limit the production of the Backfire to the current (1979) rate.

US–Soviet Treaty on the limitation of strategic offensive arms (SALT II Treaty)

Signed at Vienna on 18 June 1979.
Not in force by 31 December 1979.

Sets, for both parties, an initial ceiling of 2 400 on intercontinental ballistic missile (ICBM) launchers, submarine-launched ballistic missile (SLBM) launchers, heavy bombers, and air-to-surface ballistic missiles capable of a range in excess of 600 kilometres (ASBMs). This ceiling will be lowered to 2 250 and the lowering must begin on 1 January 1981, while the dismantling or destruction of systems which exceed that number must be completed by 31 December 1981. A sublimit of 1 320 is imposed upon each party for the combined number of launchers of ICBMs and SLBMs equipped with multiple independently targetable re-entry vehicles (MIRVs), ASBMs equipped with MIRVs, and airplanes equipped for long-range (over 600 kilometres) cruise missiles. Moreover, each party is limited to a total of 1 200 launchers of MIRVed ICBMs and SLBMs, and MIRVed ASBMs, and of this number no more than 820 may be launchers of MIRVed ICBMs. A freeze is introduced on the number of re-entry vehicles on current types of ICBMs, with a limit of 10 re-entry vehicles on the one new type of ICBM allowed each side, a limit of 14 re-entry vehicles on SLBMs and a limit of 10 re-entry vehicles on ASBMs. An average of 28 long-range air-launched cruise missiles (ALCMs) per heavy bomber is allowed, while current heavy bombers may carry no more than 20 ALCMs each. Ceilings are established on the throw-weight and launch-weight of light and heavy ICBMs. There are bans: on the testing and deployment of new types of ICBMs, with one exception for each side; on building additional fixed ICBM launchers; on converting fixed light ICBM launchers into heavy ICBM launchers; on heavy mobile ICBMs, heavy SLBMs, and heavy ASBMs; on surface-ship ballistic missile launchers; on systems to launch missiles from the sea-bed or the beds of internal waters; as well as on systems for delivery of nuclear weapons from Earth orbit, including fractional orbital missiles. National

technical means will be used to verify compliance. Any interference with such means of verification, or any deliberate concealment measures which impede verification, are prohibited. The Treaty is to remain in force until 31 December 1985.

The parties also signed a series of agreed statements and common understandings clarifying their obligations under particular articles of the Treaty and of the Protocol to the Treaty (see below).

Protocol to the US–Soviet treaty on the limitation of strategic offensive arms

Signed at Vienna on 18 June 1979.
Not in force by 31 December 1979.

Bans until 31 December 1981: the deployment of mobile ICBM launchers or the flight-testing of ICBMs from such launchers; the deployment (but not the flight-testing) of long-range cruise missiles on sea-based or land-based launchers; the flight-testing of long-range cruise missiles with multiple warheads from sea-based or land-based launchers; and the flight-testing or deployment of ASBMs. The Protocol is an integral part of the Treaty.

Memorandum of understanding between the USA and the USSR regarding the establishment of a data base on the numbers of strategic offensive arms

Signed at Vienna on 18 June 1979.

States that the parties have agreed, for the purposes of the SALT II Treaty, on the number of arms in each of the 10 categories of strategic offensive weapons limited by the Treaty, as of 1 November 1978. In separate statements of data, each party declares that it possesses the stated number of strategic offensive arms subject to the Treaty limitations as of the date of signature of the Treaty (18 June 1979).

US–Soviet Joint Statement of principles and basic guidelines for subsequent negotiations on the limitation of strategic arms

Signed at Vienna on 18 June 1979.

States that the parties will pursue the objectives of significant and substantial reductions in the numbers of strategic offensive arms, qualitative limitations on these arms, and resolution of the issues included in the Protocol to the SALT II Treaty. To supplement national technical means of verification, the parties may employ, as appropriate, co-operative measures.

19. United Nations peace-keeping operations in the 1970s

Square-bracketed numbers, thus [1], *refer to the list of references on page 494.*

I. Introduction

Peace-keeping operations conducted by the United Nations are a highly visible expression of an essential function of the world organization—to help maintain international peace and security. Since the founding of the United Nations, a substantial number of such operations have been set up in response to acute crisis situations, most notably in the Middle Eastern region. Although these operations were intended as temporary measures in order to provide a breathing-space for negotiations to settle the conflicts peacefully, some of them have, in the absence of an effective and lasting settlement, continued for extended periods of time.[1]

This chapter deals particularly with the peace-keeping operations which were initiated after 1973 (that is, UNEF II, UNDOF and UNIFIL) and a number of older operations, such as UNTSO and UNFICYP (see the list of abbreviations in table 19.1, below).

Terminology

Peace-keeping entails the interpositioning of a multinational military presence in a violent conflict between two or more hostile communities or states. The short-term objective of peace-keeping is the prevention or curtailment of fighting. Its long-term goal is to create an environment in which it is possible to conduct negotiations which may pave the way for a solution to the conflict. Progressing from peace-keeping to peace-making is therefore a dynamic dimension of peace-keeping and a vital condition for its success.

Peace-keeping forces organized by the United Nations are by definition multinational in composition. They have, in the 1970s, followed two basic principles: (*a*) that they must operate with the consent or at the request of the country or countries concerned, and (*b*) that they do not use armed force for the achievement of their aims except in self-defence (see table 19.1 for a list of UN Forces operative in the 1970s).

[1] The perennial Middle Eastern crisis situation has caused UNTSO to remain functioning as a co-ordinating organization since 1948; the Cyprus conflict has demanded the presence of UNFICYP from 1964 until the present time.

Table 19.1. UN peace-keeping missions operative in the 1970s

Name of operation	Abbreviation	Date of authorization by UN Security Council	Type of operation	Main function	Approx. peak strength	Troop-contributing countries (1979)	Number of fatal casualties
United Nations Truce Supervision Organization in Palestine	UNTSO	29 May 1948	Military observer mission	Observation and inspection in co-operation with UNEF, UNDOF[a] and UNIFIL	572	Observers from 17 countries	27 (18 observers, 9 civilian personnel)
United Nations Peace-keeping Force in Cyprus	UNFICYP	4 Mar 1964	Armed contingents and civilian police detachments	Supervision of cease-fire; contribution to normalization of conditions on island	6 411	Austria, Canada, Denmark, Finland, Ireland, Sweden, UK; civilian police from Australia and Sweden	111
United Nations Emergency Force	UNEF II[a]	23 Oct 1973	Military observers and armed forces	Supervision of cease-fire; prevention of recurrence of fighting	6 973	Australia, Canada, Finland, Ghana, Indonesia, Poland, Sweden; observers from UNTSO	47
United Nations Disengagement Observer Force	UNDOF	31 May 1974	Military observers and armed forces	Maintenance of the cease-fire; supervision of areas of separation and limitation	1 250	Austria, Canada, Finland and Poland	18
United Nations Interim Force in Lebanon	UNIFIL	19 Mar 1978	Armed contingents	Confirmation of withdrawal of Israeli forces, restoration of peace and security; assisting government of Lebanon to return its effective authority to South Lebanon	7 100	Fiji, France, Ireland, Nepal, Netherlands, Nigeria, Norway, Senegal	25

[a] Being phased out in 1979.

Source: Reference [8].

There are two basic types of operations: a full-fledged *peace-keeping force* composed of several armed and fully equipped national contingents of all ranks, and a *military observer mission* composed of individual officers of different nationalities. While an observer mission is basically a monitoring element whose function is to report breaches of the cease-fire, a full-fledged peace-keeping force with a military operational capability may seek to prevent and resolve possible breaches of the peace by direct action. The following discussion will centre on the creation, structure and operation of a peace-keeping force.

II. Creation of a peace-keeping Force

Role of the UN Security Council

The first step leading to the establishment of a United Nations peace-keeping operation is usually for the Security Council to adopt a resolution authorizing the creation of such a Force.[2] Simultaneously, the Council will request a report from the Secretary-General outlining his proposals for the implementation of this resolution. The guidelines contained in the Secretary-General's report, when accepted by the Council, thereafter serve as terms of reference for the establishment and initial operation of the UN Force. Both the resolution itself—the relevant provisions of which are considered to be the Force's 'mandate'—and the Secretary-General's report are carefully worded documents which represent a consensus of the members of the Security Council and take into account the views of the opposing parties, whose consent is considered a precondition of prime importance for the successful operation of the Force.

Given these political restraints, the way in which a mandate is phrased often describes only in bare outline the actual tasks to be performed by the Force and places the burden of interpretation and execution on the UN Secretariat and the peace-keepers in the field (see table 19.2 for examples of such UN Force mandates).

The Security Council's authorization is normally given for a certain defined time-period, most frequently a period of six months, after which the mandate is reconsidered by the Council on the basis of a report by the Secretary-General; and, as the case may be, the mandate is then renewed or terminated.[3]

[2] The only exception was UNEF I, which was created by the General Assembly in 1956. For a history of this precursor force, see references [1a, 2a].

[3] Most recently, and subsequent to the Egyptian–Israeli peace treaty, the Security Council decided to terminate the operation of UNEF II, which is currently being phased out.

Table 19.2. Main provisions of mandates of several peace-keeping operations

Operation	Date of operation	Mandate provisions
UNEF I	1956–67	To secure the cessation of hostilities and supervise the cease-fire; to ensure the orderly withdrawal of British, French and Israeli forces; to patrol the border area between Egypt and Israel; and to oversee the observance of the Egypt–Israel armistice provisions
UNFICYP	Mar 1964	To prevent a recurrence of fighting; to contribute to the maintenance and restoration of law and order; and to contribute to a return to normal conditions
UNEF II	Oct 1973	To supervise the implementation of the cease-fire and the return of the parties to their respective positions held on 22 Oct 1973; and to use its best efforts to prevent a recurrence of fighting and to co-operate with the International Red Cross in its humanitarian efforts
UNDOF	1974	To help maintain the cease-fire and to secure its observation; and to supervise the areas of separation and limitation
UNIFIL	Mar 1978	To confirm the withdrawal of Israeli forces; to restore international peace and security; and to assist the government of Lebanon in effectively restoring its authority in the area

Relationship with the parties

In addition to the general consent of the countries on whose territory the Force operates, it has proven highly desirable, from an operational and legal point of view, to conclude a Status of the Force agreement between the United Nations and the host government(s). Such an agreement defines the privileges and immunities of the United Nations Force and its members. It deals with questions of jurisdiction with regard to the Force, settlement of disputes and claims between the UN and nationals of the host country, arrangements for the use of premises by the Force, and the freedom of movement of the Force. It has been considered essential that, notwithstanding immunity of the Force, its members are to abide by the laws of the host country and respect the legitimate authorities of that country.

Most important for the Force's operation is agreement with the contending parties for freedom of movement of the Force. From the point of view of the United Nations, complete freedom of movement is an optimal condition—not only in the immediate area of operation but also throughout the countries concerned. However, for reasons of internal security or apprehensions of the United Nations, some parties to a conflict have, at times, restricted the movement of UN Forces to certain roads and hours or have demanded advance clearance procedures, thus seeking to control access by the UN to their territory. The United Nations has also had to contend with insistence by one or another party that its vehicles may be searched, a procedure which the UN believes should only be carried out by or in conjunction with UN military police.

Restrictions of this nature have, in general, been more frequently encountered when dealing with military rather than civilian authorities. The frequency of and intentions behind such restrictions are often a good gauge of the UN's acceptability to the parties and the cordiality of their relations.

Time pressure

Since peace-keeping forces are created in response to a situation which is an immediate threat to peace in the region, there is very little time for advance planning or preparation for the launching of the Force. A prime example of the establishment of a Force under extreme time pressure is the case of UNEF II [3]. When a cease-fire was negotiated between Egypt and Israel in October 1973, the United Nations had to arrange the immediate deployment of a Force large enough to create a presence in the area. Interim measures were taken, such as the dispatch of three core contingents of Austrian, Finnish and Swedish troops of 200 men each, which were withdrawn from the UN Force in Cyprus. The United Nations was thus able to establish its presence on the ground in Egypt within 48 hours [1b]. In creating the nucleus of UNEF II, the United Nations was able to draw upon the administrative, logistic and command structure of UNTSO, from which the interim Force Commander was also appointed. This example of one peace-keeping operation drawing upon the experience and logistic structure of earlier operations is one way in which the operations can interact and in which know-how is passed on from one operation to another.[4]

Furthermore, in cases like the launching of UNEF II, prior training and practical experience of the troops was an essential prerequisite to fulfilling the function of an effective interpositioning force and mediating element. The kinds of training programme set up by the Nordic countries [4] and others who have earmarked certain forces for service with the United Nations have proven to be good preparations for a peace-keeping assignment. Most of all, the experience accumulated over the years by those contributing countries which have had contingents in several operations has been of great value.

Balancing a Force

The selection of nationalities for a particular Force has always been a difficult political problem for the Secretary-General. The aim has been to achieve a balanced Force composition which can be considered 'neutral' in

[4] "The nucleus of UNEF I was drawn from UNTSO; that of ONUC was drawn essentially from UNTSO and UNEF I, and the nucleus of UNEF II was drawn from UNFICYP and UNTSO." [3a]

the sense of not being seen as biased towards one side of the conflict or the other. In practice, as there are very few countries which are accepted as truly neutral in any international dispute, an attempt has been made to balance the troop-contributing countries in such a way that the Force as a whole is acceptable to the hostile parties and is agreeable to the Security Council, even though any individual contributing country may not be entirely acceptable.[5]

Apart from political considerations, the other main criterion for selecting contingents must obviously be their suitability for the kind of technical and psychological demands that will be placed upon them in the field.[6] As these matters are the prerogative of the countries providing the contingents, liaison with UN Headquarters in New York is necessary, and the sending of advanced parties is highly desirable; but, under great time pressure, the latter has not always been possible.

Over the years, the Secretary-General has increasingly aimed at the creation of UN Forces which are not only suitable from a technical point of view but also representative of the spectrum of regional and political groupings in the United Nations as a whole.[7] A prime example of this kind of geographical balance is UNEF II which, during much of its time of operation, was composed of contingents from all five regions of the world, including Eastern Europe.[8]

National contingents in UN peace-keeping forces are normally of battalion size, that is, they consist of about 600 officers and men. The strength of UN battalions has, however, been at times below this figure, as currently in UNFICYP, where the Austrian and Danish contingents each are about 350 strong; or it has risen to over 900 men (as with one contingent serving with UNIFIL) (see table 19.4). In general, keeping the size of the battalions flexible has proven most useful from an operational

[5] There have, however, been cases in the history of the UN when the Secretary-General has insisted on the inclusion of certain national contingents, as when Secretary-General Hammarskjöld insisted on the participation of Canada in UNEF I. In other cases, i.e., UNEF II and UNDOF, practical ways have been found to have a contingent which was not acceptable to one of the parties to the conflict participate in the Force without being stationed on that party's territory (for example, the Polish contingent in UNEF and UNDOF is not stationed in Israel).

[6] Equipment is an obvious problem here. Complaints have been made that some contingents which arrived for service with UNIFIL were ill-equipped for the conditions in Southern Lebanon and that others who were given certain sophisticated equipment were not trained to use and service it.

[7] UNFICYP remains an obvious exception, in that its troop contributors all belong to the West European group. It is also an exceptional case since the United Kingdom, as former colonial power in Cyprus, has taken on peace-keeping functions for the United Nations.

[8] At some stage in 1974, the geographical spread of UNEF troop contributors was broadest, with Ghana and Senegal representing the African region; Indonesia and Nepal, the Asian region; Panama and Peru, Latin America; Austria, Canada, Finland and Ireland representing the West European group; and Poland, the East European countries. The selection process for UN Observer Missions which are not composed of contingents but of individual officers has similarly aimed at a broad geographical balance. Since 1948, observers have been provided by 30 different countries.

Table 19.3. Contingent strength in several UN peace-keeping missions
(Figures as of June 1979, civilian police contingents excluded)

UNEF		UNDOF		UNIFIL		UNFICYP	
Contributing country	Force strength	Contributing country	Force strength	Contributing country	Force strength	Contributing country	Force strength
Australia[a]	46	Austria	523	Fiji	656	Austria	330
Canada	840	Canada[b]	171	France	609	Canada	515
Finland	637	Finland[c]	148	Ireland	754	Denmark	365
Ghana	595	Poland[b]	98	Nepal	643	Finland[d]	11
Indonesia	509	Military observers from UNTSO	88	Netherlands	800	Ireland[d]	7
Poland	917			Nigeria	776	Sweden	427
Sweden	634			Norway	942	UK	817
				Senegal	592		
Total	**4 178**		**1 028**		**5 772**		**2 472**

[a] Air support.
[b] Logistics.
[c] Company.
[d] The Finnish and Irish contingents at UNFICYP are rump contingents consisting of officers and NCOs working at Headquarters, while the bulk of the contingents was withdrawn earlier. The advantage of keeping these rump contingents is that in case of urgent need, they could rather easily be expanded into full-size contingents.

point of view. It has permitted, for example, speedy adjustments after the withdrawal of a contingent, and it has eased adjustment to changes in operational areas and responsibilities of the Force.

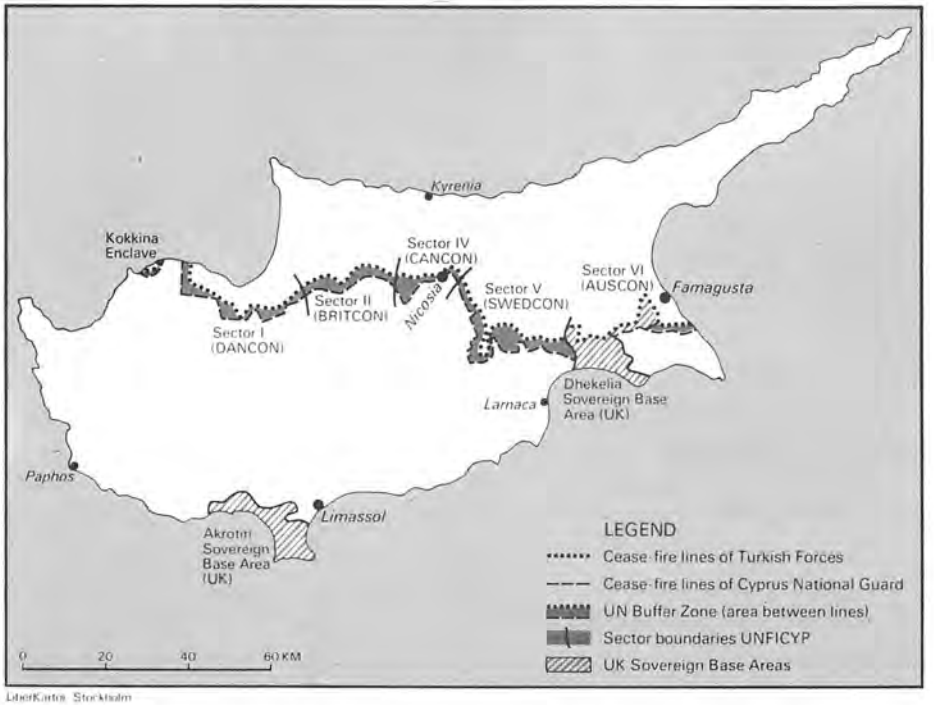
As was mentioned above, rapid deployment of peace-keeping units to the area of conflict is a most important requirement. Characteristically, the early hours and days of a cease-fire are precarious; the interpositioning of UN forces on the ground is therefore of utmost importance. While men and their personal weapons can be moved reasonably quickly by air, their vehicles, heavy weapons, logistics and communications support cannot. In order to overcome these difficulties, contributing governments have often been asked to send self-contained units which can operate on minimum scales of support until full force-level support becomes available. For air-lift of the troops from their home stations or other operational areas, the Secretary-General has frequently approached governments of nations with the necessary transport capability. Air-lifts made available in response to these appeals have usually been provided free of charge.[9]

[9] In the past, air-lifts have been provided by such countries as the United States, the United Kingdom, the Soviet Union, the Federal Republic of Germany, Italy and Switzerland [3b].

III. Organization of a UN Force

Although the organizational pattern of UN Forces is by no means rigid, common structural features can be observed. There are two distinctive components: the headquarters, composed of both military and civilian personnel, and the contingents or units. The role of the headquarters is to provide direction and guidance in operational matters and the co-ordination of administrative and logistic support. The contingents are deployed in specific geographical areas of operation and are responsible for the day-to-day conduct of peace-keeping operations. Figure 19.1 shows the current sectoral deployment of contingents in UNFICYP.

Figure 19.1. Sectoral deployment of UNFICYP (November 1979)



LiberKartor Stockholm

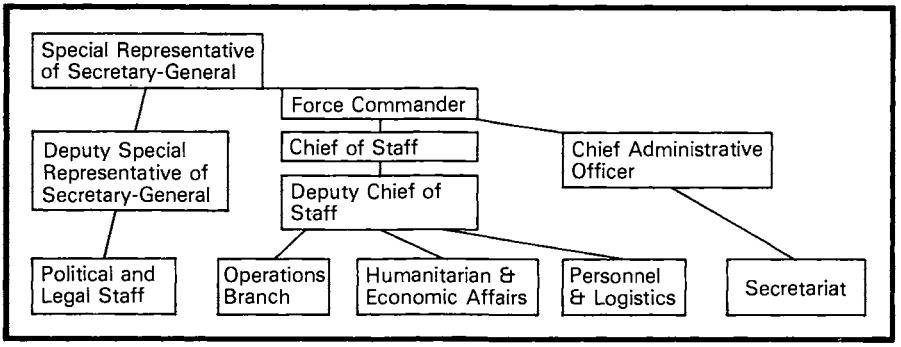
Headquarters

While the size of a headquarters military staff varies from Force to Force, its composition is usually balanced to include officers and non-commissioned officers from all contingents. The Force headquarters therefore reflects to a certain extent the overall composition of the Force[10];

[10] At UNFICYP headquarters, for example, there were, as of November 1979, two Danish, ten British, five Canadian, six Swedish and four Austrian military officers, as well as three Finnish and two Irish officers.

size and composition of the civilian staff are decided by UN Headquarters according to requirements.[11] The structure of a peace-keeping Force is illustrated by figure 19.2, depicting UNFICYP headquarters.

Figure 19.2. Force headquarters of UNFICYP



The Political Office, as seen on the left side of the figure, is more developed at UNFICYP than in the peace-keeping operations in the Middle East, where one or two individual political and legal officers advise the Force Commander. However, as will be described in the next section, the role of a mediator or, as in the case of UNFICYP, of a Special Representative of the Secretary-General can become an integral element of a Force, pointing to the ultimate aim of peace-*making* rather than simply peace-*keeping*.

Among the military branches at Force headquarters, Operations Branch has a key position. It channels incoming information from the contingents and relays outgoing orders and policy guidelines to the military in the field. Its primary concern is day-to-day maintenance of the cease-fire. The main function of the Economics and Humanitarian Branch is to contribute to a "restoration of normal conditions". The Personnel and Logistics Branch is responsible for organizing the administrative support to the Force. Its task is difficult because of the significant variations in national contingent standards of support demanded and the varieties of equipment in service. The Force Headquarters also administers the basic rules and guidelines for the Force which are normally laid down in an SOP (Standing Operating Procedures) document, which covers everything from instructions on the use of arms to guidelines for freedom of movement, off-duty regulations and dress requirements.

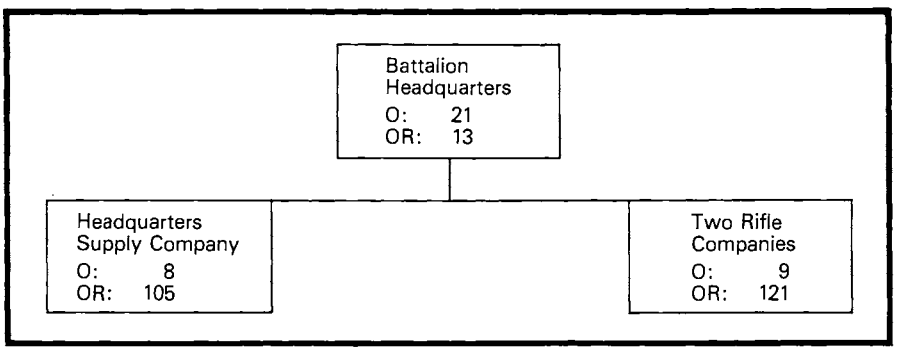
[11] At UNEF II, in the first half of 1979, there were 440 civilians, employed in communications, security, transport, finance, general services, registry and personnel.

Contingents

The allocation of tasks and the method of operation within each sector are the prerogative of the Sector Commander, who also exercises military jurisdiction over his soldiers in accordance with national regulations. Members of different contingents operate their national equipment and are permitted to wear their national uniforms, provided they wear blue UN badges and berets. Because of these national differences, it would be difficult to point out any one contingent as a 'typical' one. As countries are encouraged to provide battalions tailor-made for their specific job, contingents can vary greatly in composition, background, training and equipment.

Figure 19.3 outlines the organization of the Swedish battalion currently serving with UNFICYP.

Figure 19.3. Organization of the Swedish battalion serving with UNFICYP



Other battalions of a peace-keeping force are organized in similar fashion. Usually, each battalion puts two companies on line duty and supports these with a headquarters and logistics company. The composition of the 'on line' peace-keeping units, however, varies markedly with different national contingents. At UNFICYP, for example, the British and Canadian contingents are composed of combat units selected on a rotation basis for service in Cyprus. Personnel of these contingents are normally long-service, regular Force members. In contrast, the Danish, Swedish and Austrian units at UNFICYP are *ad hoc* battalions created specifically for duty with that Force. The officers and non-commissioned officers of these units are a combination of regular and reserve force, while the rank and file are normally reservists on contract for a certain period.

The question of whether professional military or reserve soldiers are better suited for UN service continues to be debated, but seems to have been resolved by the International Peace Academy (IPA), which has come

to the conclusion that the limited military proficiency of volunteer reservists is offset by the fact that they have a civilian approach and attitude in a situation which is often more a social-community problem than a straightforward military one.[12]

IV. A Force in operation

The basic methods of operation of a UN Force are observation, patrolling, reporting and interpositioning. While interpositioning in order to separate contestants or to prevent aggressive acts is resorted to only in emergency situations, the more routine tasks are those of observing and reporting. For this purpose, the UN normally establishes a system of observation posts (OPs) between the forward defence lines of the two opposing parties. Through its network of OPs, the UN Force on the ground observes and reports any violation of the cease-fire or other breaches of peace in the area under its control. These daily situation reports are received and evaluated by the Operations Branch for further action at Headquarters level.

Underlying these basic mechanisms of peace-keeping are some fundamental principles which have been defined by the International Peace Academy in the following manner:

1. Negotiation is the primary means of finding solutions.
2. Suggestion, advice and objective response to courses of action taken by the parties to the dispute rather than direction, imposition and coercion are the methods by which the mandate is fulfilled.
3. Armed force is not a means of achieving the solutions. Armed force can only be used in self-defence and protection of UN property against attack, or as a last resort in carrying out the Force mandate. Armed force should *not* be initiated in the first instance by the UN Force.
4. Impartiality is required of all members of the Force, along with restraint and patience at all times when dealing with all parties to the dispute.
5. It is important that the authority of the government(s) of the host country(ies), on whose territory the Force is stationed, is recognized by members of the Force [6].

Mediation

The statement that negotiation rather than confrontation is the best means of finding solutions to international conflicts is a commonplace observation not only applicable to third-party peace-keeping but to United Nations

[12] For example, see references [5, 6].

politics in general. When applied to an essentially military operation, such as a UN Force, this principle tends to subvert conventional military thinking. Third-party peace-keeping requires an entirely different approach on the part of military people in that its main aim is not the most effective application of force but peaceful intervention to prevent further violence. In practice this means a clear preponderance of political over military considerations, which places special requirements on military personnel participating in UN operations: they should be individuals of a democratic rather than an autocratic bent, they should have a solid understanding of political processes, and they should have an aptitude for playing the role of third-party mediator—that is, soldier–diplomats with flexible minds are required.[13]

The role of mediator is a vital one in all situations where communication between the opposing parties is interrupted or totally absent. The peace-keeping Force must open up channels through which the conflicting parties can request action that may lead to the resolution of outstanding issues. In providing such a channel, the UN Force uses its 'good offices' to help the parties to settle disputes. Active use of UN good offices has, in the past, facilitated the return of war-dead and injured, and the search for missing persons. The UN Force, on a more routine basis, has assisted in arranging periodic family reunions, has delivered food and medicines to people on both sides of the cease-fire lines, and has contributed to the resettlement of refugees. On a smaller scale, the United Nations transfers mail and Red Cross parcels and provides meeting-places for groups of people from the opposing sides willing to hold discussions on neutral ground.[14]

Establishing new links of communication can further lead to an improvement in the general political climate and may eventually clear the way for a more far-reaching settlement. This must, of course, be the long-term aim of any peace-keeping operation, which should never become an end in itself. It has, however, been the feature of some of the more intractable international disputes, such as Cyprus and the Middle East, that repeated and intense mediation efforts by the UN and other parties over a period of years or decades have not led to a comprehensive peace settlement. Unless vigorous attempts at peace-making are combined with strong international pressure to bring all parties to the negotiating table, there is a danger that a UN Force will become established as simply another pawn in a conflict which the parties are unwilling or unable to resolve.

[13] The success of the diplomacy of peace-keepers at all levels of the military hierarchy depends on "the individual peace-keeper's personality, powers of reasoning and friendly persuasion, his commonsense and his manner in terms of tact and patience; the latter two being of supreme importance." [6a, 6b]

[14] UNFICYP, for example, regularly provides the Ledra Palace Hotel in the buffer zone in Nicosia as a venue for meetings of Greek and Turkish Cypriots, journalists, trade union leaders as well as for meetings for joint communal projects such as the Nicosia sewerage project.

Normalization of conditions

One concept which has been prominent in peace-keeping activities is the notion that the UN must seek to contribute to the normalization of conditions in the area affected by war or intercommunal strife. As soon as fighting has stopped and reasonably stable cease-fire arrangements have been made, UN efforts are directed not only at maintaining the *status quo* (i.e., assuring the hostile parties' adherence to the cease-fire conditions), but also at promoting a return to 'normal conditions'. This may include tasks of an essentially domestic peace-keeping nature, particularly police functions. For this purpose, one or more police contingents, called UNCIVPOL (United Nations Civilian Police), have at times[15] been added to work alongside the military contingents. For example, in the Cyprus operation, UN civilian police seek to act as a third-party police force between the hostile communities.

UNCIVPOL has no authority or powers to arrest or interrogate. Its primary tasks, evolved over the years, are the following: protection of individuals' rights (during searches, at checkpoints, etc.), negotiating the release of hostages or missing persons, investigation of criminal cases of an intercommunal nature, protection of convoys passing through enclaves of the opposing community, welfare of enclaved people, as well as civilian police tasks in the buffer zone or area between the lines.

The civilian staff of the Force, in particular the political and legal advisers, must also work to further the goal of normalization. By attending to legal disputes, claims and all issues which can be seen as incursions on the cease-fire and *status quo*, the civilian staff is often the only link of communication between the contending parties. Constant liaison by the political officers with the respective ministries or other civilian authorities can not only help to settle contentious issues but may give impetus for further negotiations. In Cyprus, the intercommunal talks have been seen as the main avenue to an overall settlement. Ever since 1964, the United Nations political representatives have sought, through high-level meetings either on the island or abroad, to get the two sides to agree to basic principles or formulae on which a lasting solution to this problem could be based.

It is in the area between the cease-fire lines that the United Nations can make most practical attempts at normalization. Both UNFICYP and UNIFIL have Economic and Humanitarian Branches at their headquarters

[15] Apart from in Cyprus, civilian police have also participated in two earlier UN operations: in the Congo (ONUC, 1960–64) and in West Irian (Dutch West New Guinea, UNTEA, 1962–63). In the Congo, the task was to replace the former colonial constabulary, and the UN operation took over such general law and order functions as traffic or riot control. In West Irian, the UN temporarily replaced the former Dutch police officers until Indonesian police officers were trained to take over at the end of the UN interregnum administration.

and economics officers in each contingent. The military economic branches co-operate closely with the civilian assistance and development programmes in their area, such as the United Nations High Commissioner for Refugees (UNHCR), the United Nations Development Programme (UNDP), the Special Representative of the Secretary-General for humanitarian assistance in Lebanon and the International Committee of the Red Cross.

Among the functions of the Economic Branch of a peace-keeping Force are the supply of food, clothing, medicine, building materials, equipment and fuel; mediation in disputes over land, water rights and electricity supply; negotiations to restore normal public services; assistance for repair of property, including schools and churches; arrangements for the continuation of educational facilities, including the recruitment of teachers and supply of teaching material; and medical treatment for civilians in emergency cases. Furthermore, on a routine basis, the UN military forces provide observers and escorts for civilians pursuing agricultural activity in those parts of the UN's area of operation which are sensitive and where unannounced and unescorted civilian activity could provoke a violent reaction. In the same context, the UN also assists in the harvesting and disposal of crops in disputed areas. In Cyprus, for example, where the Buffer Zone covers over 3 per cent of the island's territory, farmers from both communities are regularly monitored or escorted to farm over 150 fields.

Another significant function of UNIFIL, UNDOF and UNFICYP is the identification and location of mines and unexploded bombs or shells and their clearance. Mines pose great danger to both civilians and UN military personnel in many places and have been the cause of many deaths and serious injuries. Their identification and clearance serve to defuse tension in the area of conflict and provide greater security for civilian activities.

Use of force

In regard to the question of the use of armed force by UN troops, the principle that has been adhered to since the Congo operation[16] is that force should be resorted to only when other measures to defend UN positions, property or lives have failed. Experience has shown that the initiation of force by UN troops—albeit with the aim of furthering UN goals—not only leads to an escalation of the conflict and the accompanying loss of lives, but further makes the UN an active party to the conflict, thus dangerously eroding its position of third-party mediator. Restraint has therefore been considered essential in all recent UN operations, a principle which has, at

[16] For a description of the grave difficulties encountered by the UN in the Congo when it initiated force to end the secession of Katanga, see references [2b, 9].

times, involved UN Forces suffering abuse and violence.[17] When lives of UN soldiers are lost as a result of premeditated violence against a UN Force, it is emotionally difficult not to agree to an increased combat capacity for the Force. Nevertheless, most UN officers with experience in peace-keeping would agree that a strengthening of the Forces' military capability to a level comparable with that of the hostile parties is unrealistic.[18]

V. Summary and conclusions

Characteristically, UN peace-keeping operations have been established in the course of attempts by the international community to mediate in regional conflicts. Agreement among the members of the UN Security Council and the consent of the parties concerned are vital pre-conditions to the effective deployment of a UN Force.

Once mediation has led to a cease-fire agreement, the rapid interpositioning of a UN military presence is essential. The main aims of an operation are the maintenance of the cease-fire, assisting in the restoration of normal conditions and negotiations to reach agreement on problems underlying the conflict. The basic method of operation is to deploy elements of the Force in the area between the hostile factions, where they observe adherence to the cease-fire from static observation posts or mobile patrols. When breaches of the cease-fire are observed, the UN moves to restore the *status quo*, normally through negotiations but, if required, by direct action. Weapons are used only in self-defence.

The long-term goal of any UN operation is to prepare the ground for a lasting settlement of the conflict. Vigorous efforts at peace-making to help normalize conditions in the area of strife and to further rapprochement between the parties must be combined with international political pressure. In this manner, peace-keeping operations can be a valuable means for the United Nations community to mediate in regional conflicts.

[17] The repeated shelling of the UN headquarters and the attacks on UN positions in Southern Lebanon through 1979 are most recent examples of the kind of physical attacks a peace-keeping Force may have to endure without being immediately in a position to forestall the violence committed against it or to retaliate 'in kind'. UNFICYP found itself in a similarly frustrating situation when it had to give up positions and retreat from advancing Turkish troops in the summer of 1974.

[18] This statement is based on discussions with a number of senior officers at UNFICYP who had experiences in several peace-keeping operations. Discussions with more junior officers, particularly company commanders working 'on the line', more often revealed the frustration, helplessness and anger that can be experienced when serving with a UN Force.

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20. Chronology of major events concerning disarmament issues

January–December 1979

8 January The USSR ratifies Protocol II of the Treaty of Tlatelolco and undertakes thereby not to use or threaten to use nuclear weapons against the parties to the treaty.

24 January The Committee on Disarmament, a negotiating body reconstituted by the 1978 Special Session on Disarmament, meets in Geneva for its first session.

1 February The USSR proposes that the Committee on Disarmament should hold preparatory consultations for possible negotiations on the cessation of the production of nuclear weapons and on their destruction.

2 March France signs Protocol I of the Treaty of Tlatelolco and undertakes thereby to apply the statute of military denuclearization to its territories lying within the limits of the zone established by the treaty.

2 March In a speech made in Moscow, President Brezhnev proposes that states participating in the Conference on Security and Co-operation in Europe should notify each other in advance not only about military manoeuvres in a specified area, but also about significant movements of troops, as well as major naval exercises conducted in the vicinity of other states.

26 March The Treaty of Peace between Egypt and Israel is signed in Washington. It establishes, *inter alia*, limited-forces zones between Israel and Egypt and a presence of UN forces that can be terminated only by approval of the UN Security Council. Furthermore, US reconnaissance flights to monitor compliance with the disengagement agreements are sanctioned.

6 April The US government announces that it will wind down its economic assistance to Pakistan, which refuses to place the uranium enrichment plant it is building under international safeguards.

25 April Referring to modernization of Soviet theatre nuclear force systems, the Ministers of Defence of eight NATO countries, participating in a conference of the NATO Nuclear Planning Group, reaffirm that

NATO cannot rely on conventional forces alone for credible deterrence in Europe, and that, without increasing dependence on nuclear weapons or prejudicing long-term defence improvements in conventional forces, it will be necessary to maintain and modernize NATO theatre nuclear forces.

28 April In a French–Soviet statement, the two powers emphasize the importance of efforts aimed at restricting the trade in conventional arms on a basis to be agreed among all the states concerned, as well as the necessity of collective examination by the signatories of the 1975 Helsinki Declaration of measures to reduce the military confrontation, decrease the concentration of armaments and reduce these armaments in Europe.

15 May The Foreign Ministers of states belonging to the Warsaw Treaty Organization, meeting at Budapest, state that, in addition to measures which are being implemented in accordance with the 1975 Helsinki Declaration, they are prepared to agree on prior notification of significant military movements, major air force manoeuvres and major naval manoeuvres conducted in close proximity to the territorial waters of other states participating in the European Security Conference. The states represented at the meeting are also prepared to agree on the non-enlargement of the military and political groupings in Europe, the limitation of the levels of military manoeuvres and the extension of confidence-building measures to the Mediterranean area. They propose that a conference on military détente in Europe should be convened on a political level and be attended by all the European states, the USA and Canada. The ministers consider as particularly dangerous NATO plans for the deployment on the territories of certain West European countries of medium-range nuclear missile weapons aimed at targets on the territories of the European Socialist states, as well as the revival of the plans to develop and deploy neutron weapons.

16 May In a communiqué issued at the conclusion of a ministerial meeting of the NATO Defence Planning Committee, the participating ministers state that the Soviet SS-20 missile introduces a new dimension of threat in the nuclear field, because for the first time a weapon on the continental scale can reach all the territories of Western Europe with multiple warheads from mobile launchers based in the Soviet Union; also, from the point of view of its greater accuracy, this new weapon constitutes a qualitative change in the Soviet arsenal. The ministers say that Soviet defence efforts are backed by resource allocations involving increases in expenditure of 4 to 5 per cent a year in real terms and absorbing 11 to 13 per cent of the Soviet gross national product.

31 May The Foreign Ministers attending the North Atlantic Council

state that they have had an exchange of views on the proposal made by France in May 1978 for the limitation and reduction of conventional weapons in Europe. They decide to continue examining this proposal and its prospects for confidence building and security on this continent.

1 June A joint Soviet–Hungarian statement reiterates the proposal of the Warsaw Treaty Organization to convene a conference which would consider the lowering of the military confrontation, as well as the diminishing of the concentration of armed forces and armaments in Europe and their possible reduction.

8 June The UN Disarmament Commission, revived by the 1978 Special Session on Disarmament, adopts recommendations relating to the elements of a comprehensive programme of disarmament.

18 June Presidents Brezhnev and Carter sign the documents that represent the outcome of the second round of the Strategic Arms Limitation Talks (SALT II) between the USA and the USSR: a treaty imposing limits on strategic nuclear offensive weapons until 31 December 1985; a protocol which sets forth certain limitations until 31 December 1981; and a joint statement of principles and basic guidelines for subsequent negotiations on the limitation of strategic arms (i.e., for SALT III).

28 June At the Vienna talks on mutual reduction of forces in Europe, the Soviet Union and its allies suggest that each nation should reduce its forces by an approximately proportionate share of the forces that each nation now has in the proposed reduction zone.

9 July The USA and the USSR submit to the Committee on Disarmament a joint proposal on major elements of a treaty prohibiting the development, production, stockpiling and use of radiological weapons.

7 August The USA and the USSR submit to the Committee on Disarmament a joint report on progress in their bilateral negotiations on the prohibition of chemical weapons.

15 August The Prime Minister of India states that if Pakistan persists in its efforts to make a nuclear bomb, India will be forced to reconsider its earlier decision not to produce such a bomb.

1 September At a symposium held in Brussels, Henry Kissinger, former US Secretary of State, says that the European allies should not keep asking the USA to multiply strategic assurances that the USA "cannot possibly mean", or if it does mean, "should not want" to execute because of the risk of destroying civilization.

10–28 September A UN conference is held to consider prohibitions or restrictions of use of certain conventional weapons which are excessively injurious or have indiscriminate effects.

26 September With the closing of its headquarters in Ankara, the Central Treaty Organization (CENTO) officially ceases to operate.

6 October In a speech made in Berlin, President Brezhnev says that the USSR is prepared to reduce the number of medium-range nuclear missiles deployed in the Western areas of the Soviet Union, if no additional medium-range nuclear missiles are deployed in Western Europe. He announces the decision unilaterally to reduce the number of Soviet troops in Central Europe. Up to 20 000 Soviet servicemen, 1 000 tanks and a certain amount of other military hardware will be withdrawn from the German Democratic Republic within the next 12 months. The USSR is prepared to agree that prior notification of major ground force manoeuvres, provided for by the 1975 Helsinki Declaration, should be given earlier and not from the present level of 25 000 men, but from a lower one, say, 20 000 men. The Soviet Union is also prepared, on the basis of reciprocity, not to conduct military exercises involving more than 40 000–50 000 men. Moreover, timely notification should be given of movements of ground forces involving more than 20 000 men.

26 October Negotiations held in Vienna for a convention on the physical protection of nuclear material are concluded.

9 November In response to the UN Secretary-General's request for information, the USA states that data from one of its satellites indicates that a nuclear explosion may have taken place on 22 September in the southern hemisphere, in a region which includes parts of the Indian and South Atlantic Oceans, as well as Southern Africa and Antarctica.

9 November A false alarm, caused by a mechanical error in the US strategic warning system, places some of the US defences on alert against a missile attack.

5 December The USSR begins withdrawing some of its troops from the territory of the German Democratic Republic, according to its decision announced on 6 October 1979.

6 December The Foreign Ministers of states members of the Warsaw Treaty Organization, meeting in Berlin, call upon the governments of NATO states to refrain from actions that may complicate the situation on the European continent. In particular, they point out that a decision on the production and deployment of new types of US medium-range nuclear

missiles and the implementation of this decision would undermine the basis for negotiations on Soviet proposals made on 6 October 1979 (see above). The ministers suggest that the conference on military détente and disarmament in Europe, the convening of which was proposed by the Warsaw Treaty Organization on 15 May 1979 (see above) should in its first stage deal with confidence-building measures. Notifications should be given of military manoeuvres from the level of 20 000 troops, instead of 25 000, and one month in advance, instead of three weeks, as is now the case; prior notification should be given of movements of ground troops from the level of 20 000 men; notification should also be given of major air force exercises and of major naval exercises conducted in the proximity of territorial waters of states participating in the European Security Conference. Military manoeuvres should be restricted to the level of 40 000–50 000 men.

11 December The UN General Assembly adopts nearly 40 resolutions on disarmament matters.

12 December Foreign and Defence Ministers decide to modernize NATO's long-range theatre nuclear forces by the deployment in Europe of US ground-launched systems comprising 464 ground-launched cruise missiles, and 108 Pershing II launchers, the latter to replace the existing US Pershing I-A. They agree that as an integral part of theatre nuclear forces modernization, 1 000 US nuclear warheads will be withdrawn from Europe as soon as feasible. At the same time, the ministers support the decision taken by the USA to negotiate arms limitations on long-range theatre nuclear forces and to propose to the USSR to begin negotiations, as soon as possible, along the following lines: (*a*) any future limitations on US systems principally designed for theatre missions should be accompanied by appropriate limitations on Soviet theatre systems; (*b*) limitations on US and Soviet long-range theatre nuclear systems should be negotiated bilaterally in the SALT III framework in a step-by-step approach; (*c*) the immediate objective of these negotiations should be the establishment of agreed limitations on US and Soviet land-based long-range theatre nuclear missile systems; (*d*) any agreed limitations on these systems must be consistent with the principle of equality between the sides; and (*e*) any agreed limitations must be adequately verifiable. A special consultative body at a high level will be constituted within NATO to support the US negotiating effort.

14 December The ministers participating in the North Atlantic Council agree to work towards the adoption during the 1980 European Security Conference meeting in Madrid of a mandate for negotiations on militarily significant and verifiable confidence-building measures, applicable to the

entire continent of Europe. The ministers of countries participating in the negotiations on mutual force reductions in Europe note that agreement on the starting size of forces to be reduced is not only an essential prerequisite to any reductions, but can also serve to build confidence that a reduction agreement is being observed and that mutual security is being enhanced. To advance the negotiations, the ministers approve a proposal for an interim phase I agreement which would focus on US and Soviet manpower withdrawals and limitations, based on agreed US–Soviet data, and on associated measures applied on a multilateral basis.

18 December US Secretary of State submits to the Soviet Union the NATO proposal for negotiations on long-range theatre nuclear forces. (On 3 January 1980 the USSR rejected the NATO offer.)

20 December The Western participants in the Vienna Talks on mutual force reductions in Europe put forward the NATO proposal for ground force manpower reductions by the USA and the USSR.

Errata

World Armaments and Disarmament, SIPRI Yearbook 1979

Page 12, line 8.	Read "of an improved NS-20" for "the NS-20".
Page 146.	By "Country: Japan", first entry, delete licensed production of Mitsubishi T-2, as this is an indigenous Japanese aircraft.
Page 186, Table 3.6.	Line of figures by "Finland" should read: 23, 0.1 and 0.4, positioning Finland below Switzerland in the table.
Page 194.	By "Recipient: Finland", for supply of the SA-3 Goa, Year of delivery should read "(1979)" and Number delivered "..". Delete entire entry concerning supply of the SA-6 Gainful.
Page 214.	By "Recipient: India, Supplier: UK", delete entire entry concerning supply of Avadi Vijayanta-2, as this appears under licensed production on page 164.
Page 220.	By "Recipient: Ivory Coast", delete entire entry concerning supply of Panavia Tornado ADV.
Page 226.	By "Recipient: Morocco", delete entire entry concerning supply of Panavia Tornado ADV.
Page 238.	By "Recipient: Togo", delete entire entry concerning supply of Panavia Tornado ADV.
Page 304, reference 26, line 3.	Line should read: "Development, Executive Office of the President, December 1967."
Page 372, Table 6.7, final column.	Under "Landing craft, Total WTO", read "204" for "174".
Page 374, Tables 6.9 and 6.10.	At foot of both tables, insert: "*Sources:* see the sources to table 6.8."

INDEX

WORLD ARMAMENTS AND DISARMAMENT

SIPRI *yearbook* 1980

This is the eleventh Yearbook. The aim is to bring together information on world armaments and the efforts made to limit or reduce them. The first ten Yearbooks attracted world-wide attention and were used extensively in the United Nations, in international disarmament negotiations and in national parliamentary and government debates as an authoritative source of information.

The *SIPRI Yearbook 1980* continues SIPRI's analyses of the world's arms races, based on annual series of data on world military expenditures, arms production and arms trade. Efforts to control the arms races are described, including such topics as the as yet unratified SALT II Treaty, the Non-Proliferation Treaty and the 1980 Review Conference, the negotiations on a chemical disarmament treaty, the proposal for a treaty prohibiting radiological weapons, the nuclear test ban, and the prohibition of inhumane weapons. A detailed account is given of the status of the implementation of the major arms control agreements, with tables of parties.

This Yearbook deals with such other arms control-related topics as the role of satellites in verification of arms control agreements, negative security assurances for NPT members not in possession of nuclear weapons, confidence-building measures in Europe, and UN peace-keeping operations, as well as with the modernization of nuclear weapons in Europe.

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Scientific American (USA)

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