World Armaments and Disarmament SIPRI vearbook 1985

Stockholm International Peace Research Institute

World Armaments and Disarmament SIPRI Yearbook 1985

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Stockholm International Peace Research Institute

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Preface

One main purpose of SIPRI's sixteenth Yearbook is to provide material which will aid understanding of the renewed disarmament negotiations between the United States and the Soviet Union at Geneva. This is the main theme of the Introduction, and a number of the chapters give further background. Changes in public opinion on these questions are part of that background; they are discussed in an appendix to the Introduction.

Part I provides an analysis of present and expected future nuclear weapon developments, so far as they are known; the usual figures are given on nuclear weapon tests. There is a special study of thirdgeneration nuclear weapons which, *inter alia*, questions the feasibility of the X-ray laser. The final chapter surveys recent Soviet literature on the global consequences of nuclear war—that is, on nuclear winter.

Part II gives, first, a report on recent developments in the technologies which may be used in the continued militarization of outer space. Second, it reviews the events in the field of chemical and biological warfare, with an appendix on Iraq's use of chemical weapons against Iran.

Part III surveys trends in world military expenditure and in the trade in major weapons. Statistics of world expenditure on military research and development are now included as a regular item in this data base. There are a number of additional studies in this section—on militarization in Africa; on arms production in Third World countries; and on the extent to which military spending has contributed to the rise in debt in the non-oil developing countries.

Part IV, the arms control section, in its discussion of events at the Committee on Disarmament at Geneva, concentrates on the one area where serious negotiations are in progress—the banning of possession of chemical weapons. There is a special study of the first year of the Stockholm Conference. A separate study examines the peacekeeping experience in Sinai in 1975–82 and considers whether the verification techniques used there might be applicable to Europe.

Part V is a conflict study on Afghanistan.

Part VI provides reference material on the treatment, in the various countries in the world, of conscientious objection to military service.

There is the regular disarmament and arms control chronology at the back of the book.

SIPRI is grateful to the large number of outside contributors who wrote for this Yearbook. It is also heavily indebted to Connie Wall and Billie Bielckus who, once again this year, have had the editorial responsibility for the Yearbook.

SIPRI March 1985 Frank Blackaby Director

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Acronyms

AAM	Air-to-air missile	ERW	Enhanced radiation (neutron)
AASM	Advanced air-to-surface missile	FT	Emerging technologies
ABM	Anti-ballistic missile	EDE	Energing technologies
ACM	Advanced cruise missile	LDD V	Forward-dased system
ALCM	Air-launched cruise missile	FEBA	Forward edge of the battle area
APC	Armoured personnel carrier	FOBS	Fractional orbital bombardment system
ASAT	Anti-satellite	GLCM	Ground-launched cruise missile
ASM	Air-to-surface missile	IAEA	International Atomic Energy
ASMS	Advanced strategic missile system	ICBM	Agency Intercontinental ballistic missile
ASW	Anti-submarine warfare	ICCM	Intercontinental cruise missile
ATM	Anti-tank missile		International Court of Justice
AWACS	Airborne warning and control system	ICRC	International Committee of the Red Cross
BMD	Ballistic missile defence	INF	Intermediate-range nuclear
BW	Biological weapon (Warfare)		force
C ³ I	Command, control, communications and	IRBM	Intermediate-range ballistic missile
CBM	intelligence Confidence-building measure	ISMA	International Satellite Monitoring Agency
CBW	Chemical and biological warfare	Laser	Light amplification by stimulated emission of radiation
CD	Conference on Disarmament (Geneva)	LRTNF	Long-range theatre nuclear force
CDE	Conference on Disarmament in	MAD	Mutual assured destruction
	Europe (Stockholm)	MARV	Manoeuvrable re-entry vehicle
CEP	Circular error probable	M(B)FR	Mutual (balanced) force
COIN	Counterinsurgency		reduction
CSBM	Confidence- and security- building measure	MBT	Main battle tank
CSCE	Conference on Security and Co-operation in Europe (Helsinki, Belgrade, Madrid)	MIRV	Multiple independently targetable re-entry vehicle
		MLRS	Multiple launch rocket system
СТВ	Comprehensive test ban	MRV	Multiple (but not independently
CW	Chemical weapon (Warfare)		targetable) re-entry vehicle
DC	Disarmament Commission	NATO	North Atlantic Treaty Organization
DoD	(US) Department of Defense		
DoE	(US) Department of Energy	NGO	Non-governmental organization
EMP	Electromagnetic pulse	NPT	Non-Proliferation Treaty
Enmod	Environmental modification	NWFZ	Nuclear weapon-free zone

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PNE(T)	Peaceful Nuclear Explosions (Treaty)	SLBM	Submarine-launched ballistic missile
PTB(T)	Partial Test Ban (Treaty)	SLCM	Sea-launched cruise missile
R&D	Research and development	SRAM	Short-range attack missile
RDT&E	Research, development, testing	SRBM	Short-range ballistic missile
	and evaluation	SSB	Ballistic missile-equipped,
RPV	Remotely piloted vehicle		diesel-powered submarine
RV	Re-entry vehicle	SSBN	Ballistic missile-equipped, nuclear-powered submarine
RW	Radiological weapon	START	Strategic arms reduction talks
ŞALT	Strategic arms limitation talks	тоw	Tube-launched, optical, wire-guided
SAM	Surface-to-air missile	TTBT	Threshold Test Ban Treaty
SCC	Standing Consultative Commission (US-Soviet)	VLS	Vertical launching system
SDI	Strategic Defense Initiative	WTO	Warsaw Treaty Organization (Warsaw Pact)

World Armaments and Disarmament, SIPRI Yearbook 1985

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ABSTRACTS

DEN OUDSTEN, E., 'Public opinion', in SIPRI Yearbook 1985, pp. 31-38.

Fear of war, missile deployments in western Europe, arms control attitudes and NATO's flexible response policy are the four subjects of this report on public opinion in the West. The fear of war and concern about nuclear weapons receded in 1984. After the deployment of new nuclear missiles in FR Germany, majorities in Italy and the UK still disapprove. Large margins in the Netherlands and Belgium oppose new deployments. Productive arms control talks and a US-Soviet dialogue are favoured over keeping a military balance. In the USA there now appears to be consensus that nuclear war would be suicidal and that a nuclear arms race cannot be won. Many people in NATO countries believe that the USA and NATO currently have a policy of no-first-use of nuclear weapons, and majorities are in favour of such a policy.

ARKIN, W. M., BURROWS, A. S., FIELDHOUSE, R. W., COCHRAN, T. B., NORRIS, R. S. & SANDS, J. I., 'Nuclear weapons', in *SIPRI Yearbook 1985*, pp. 41–74.

US and Soviet military programmes during 1984 presaged plans for the deployment of large numbers of more advanced nuclear weapon systems in the late 1980s and early 1990s. The US government is pressing ahead with the Peacekeeper (MX) missile, the Trident II submarine programme, the B-1B bomber and thousands of cruise missiles. The USSR continued testing the new Blackjack A bomber and long-range cruise missiles. If the SALT II provisions are no longer adhered to, the USSR may greatly expand its land- and sea-based ballistic missile forces as well. France introduced its first MIRVed SLBM in early 1985; the UK is moving forward with Tornado deployments and Trident II preparations; and China is preparing for its first operational ballistic missile submarine system. President Reagan's SDI opened a debate about the structure of nuclear relations. Depending on how plans will be translated into systems, it redefines or overthrows mutual deterrence.

FERM, R., 'Nuclear explosions', in SIPRI Yearbook 1985, pp. 75-82.

Acording to preliminary information, 52 3 nuclear explosions were conducted during 1984. Most of these explosions were carried out by the USSR and the USA. Almost one-third of the Soviet explosions were conducted outside the known test sites, indicative of civil purposes. Since French testing in the south Pacific has been criticized for being hazardous man and the environment. French TO authorities invited a team of scientists to inspect the Mururoa atoli. The team reported that there is no risk of radioactive leakages or venting from the test site at present, but leakage could occur in the long term. In an investigation concerning the British atmospheric nuclear tests in Australia in the 1950s, it is claimed that security precautions were inadequate and the environment was severely damaged by radioactive fall-out.

TSIPIS, K., 'Third-generation nuclear weapons', in *SIPRI Yearbook 1985*, pp. 83-106.

Third-generation nuclear weapons are variants of the common fission-fusion-fission weapons widely deployed by the USA, the USSR and other major nuclear powers. Their special designs are meant to allow partitioning of energy released by the nuclear force so that they perform more efficiently for given military missions, although this may not change the overall destructive effect. Their use would breach the fire-break between nuclear and conventional weapons, since an attacked nation could not distinguish between their effects and those of a regular nuclear weapon and would retaliate with a nuclear response, leading to an escalation to all-out nuclear war. The development and testing of them make negotiations for a complete test ban on nuclear detonations more difficult to conclude. The chapter argues that operational difficulties in fact make the X-ray laser useless. It is not only a waste of money and trained manpower, but also a threat to peace.

GINSBURG, A. S., GOLITSYN, G. S. & VASILIEV, A. A., 'Global consequences of a nuclear war: a review of recent Soviet studies', in *SIPRI Yearbook 1985*, pp. 107–130.

The meteorological, climatological and ecological effects of nuclear explosions have been studied for years by Soviet and other scientists. Since 1983 studies have focused on the 'nuclear winter', or the global consequences of a nuclear war: the spread and fallout of radioactive products, the impact on the stratospheric ozone layer, the ecological consequences of radioactive fall-out and destruction of ozone, and the possibility of a global ecological catastrophe. In the literature, 'nuclear night'-the dimming of the sunlight near the surface of the Earth as the result of the saturation of the atmosphere by smoke, dust and soot particles from mass fires after a nuclear explosion—is described as followed by 'nuclear winter'-a strong drop in the temperature of the Earth's surface. It has become clear that ideas of using nuclear weapons even in regional crisis situations represent a threat to all mankind. By revealing the climatic consequences, scientists have shown the inconsistency of the concept that it is possible to 'wait out' a nuclear war far from its core. A nuclear war would spare no one.

JASANI, B. & PERRY, G. E., 'The military use of outer space', in *SIPRI Yearbook 1985*, pp. 133–158.

Two advances in military use of outer space technology were made in 1984: US tests of the F-15 aircraft, the missile part of the ASAT weapon and the ASAT warhead; and US tests of a BMD interceptor using a guidance technique similar to that tested to intercept a Minuteman I missile warhead above the atmosphere. The tests involved non-nuclear kinetic-energy weapons. They were made in spite of concern about the arms race in space weaponry. The debate focused on defensive weapons, particularly the suitability or unsuitability of chemical and X-ray lasers as BMD systems. Insufficient attention was paid to, e.g., microwave lasers and hypervelocity projectiles as ASAT weapons. Passive military satellite technology also made progress. The USSR appears to have developed photographic reconnaissance satellites which remain in orbit for much longer than 14 days. There was considerable debate on the possible use by the USA of an electronic reconnaissance satellite when a Korean Airlines aircraft was shot down in 1983. The arms control implications of the development of ASAT and BMD systems are discussed.

PERRY ROBINSON, J. P., 'Chemical and biological warfare: developments in 1984', in *SIPRI Yearbook 1985*, pp. 159–219.

The first year of full-scale negotiation on chemical disarmament yielded solid progress but the key issues remained unresolved. The US Congress again declined to fund resumed US production of chemical weapons, but within NATO pressure for rearmament increased. The USSR maintained its silence over its own chemical armament which, according to Western sources, continued to expand. Eight countries stood accused of violating the international regime of CBW arms control. Only in the case of Iraq, in its use of poison gas against Iran, was there conclusive verification. At least 11 countries, in addition to the known possessor states (France, Iraq, the USA and the USSR), were reported to have armed themselves with chemical weapons.

BRZOSKA, M., HAGMEYER-GAVERUS, G., LOOSE-WEINTRAUB, E., SKÖNS, E. & TULLBERG, R., 'World military expenditure and arms production', in *SIPRI Yearbook* 1985, pp. 223–286.

The real growth of world military spending in the period 1980-84 was 3.6% annually, compared to 2.4% for the years 1976-80. This acceleration is largely explained by the rearmament programme of the United States, which has increased by 8.6% each year since 1980. The Soviet Union is believed to be using more of its resources for arms purchases than in previous years. Growth has slowed elsewhere in the world, reflecting the problems created by the world recession. Despite this, many countries are devoting as large or even a greater share of their national resources to military purposes now than in 1980. ACLAND-HOOD, M., 'Military research and development expenditure', in *SIPRI Yearbook 1985*, pp. 287–293.

The rise in the volume of world military R&D expenditure accelerated in 1984 to more than double the rate of growth of military expenditure as a whole. World R&D expenditure was roughly \$70-80 billion, having been well over \$60 billion in 1983. This can be expected to create pressures to increase military expenditure far into the future. The bigger spenders on military R&D use bigger shares of their total R&D, military expenditure and GDP on it.

LUCKHAM, R., 'Militarization in Africa', in SIPRI Yearbook 1985, pp. 295-328.

During the 1970s African arms imports rose faster than in any other region of the world; military expenditure doubled; and the disparity in capability between African military countries increased alarmingly. By 1984 half of Africa's 52 countries were ruled by militarydominated governments. Armed conflicts between African states have become more frequent and, moreover, increasingly intertwined with intervention by foreign powers. Although there have been significant regional differences, no part of the African continent has escaped the impact of militarization.

WULF, H., 'Arms production in the Third World', in SIPRI Yearbook 1985, pp. 329-343.

The main rationale for indigenous arms production is to reduce dependence on outside suppliers. Economic arguments, such as cost reductions, are also powerful. Partly due to increasing recipient leverage, suppliers agree to export production technology to maintain influence and expand their markets. About 20 Third World countries can produce major weapons on a large scale. Israel, India, Brazil and Argentina have diversified and sizeable arms production capacities. Production of most weapon categories occurs in South Africa, Taiwan, North and South Korea and Egypt. Factors that impede self-sufficiency in arms production are a weak industrial base, various industrial bottlenecks and continued dependence on technology inflow. Production of less sophisticated arms in Third World countries has increased, but the technological lead of the major industrialized countries keeps them dependent. Basic asymmetries remain.

BRZOSKA, M. & OHLSON, T., 'The trade in major conventional weapons', in *SIPRI* Yearbook 1985, pp. 345–443.

The trend in the volume of arms transfers is one of decline. Economic problems, market saturation, problems absorbing weapons already acquired and increased domestic arms production are the main explanations. The USA was the leading arms exporter in the period 1980-84, accounting for nearly 40% of total exports. The share of the USSR was 32%. The two superpowers together have a decreasing share of global arms exports. The share of Western industrialized countries is rising. France is the third largest exporter. There is a steep rise in exports from Britain, FR Germany and Spain; and from China, as a result of major policy changes. The arms market is structurally changing: the trend towards a buyer's market is propelled by fierce competition among suppliers and reductions in the demand for weapons. It is difficult for suppliers to avoid industrial offsets, special financing arrangements and technology transfers in connection with arms deals. The prospects for transfer control are bleak owing to lack of political will and strong economic pressures to increase exports in supplier countries.

TULLBERG, R., 'Military-related debt in non-oil developing countries', in *SIPRI Yearbook 1985*, pp. 445–458.

Of the public foreign debt acquired each year from 1972 to 1982 by non-oil developing countries, about 20% is estimated to have been directly or indirectly attributable to the purchase of foreign weapons. Domestic military spending, by contributing to overall budget deficits, has also led to increased foreign borrowing by developing countries. Budget deficits in developed countries have interest rates which increase the debt problems of developing countries. The cases of Argentina, Peru and Thailand illustrate some of these problems.

GOLDBLAT, J., 'Multilateral arms control efforts', in *SIPR1 Yearbook 1985*, pp. 461–497.

The negotiations for a convention prohibiting chemical weapons made some progress with regard to the requirement of on-site inspection: the USSR expressed readiness "in principle" to consider a permanent presence of international inspectors at facilities for destruction of stocks. Inspection methods for other aspects of the prohibition are to be developed. The USA proposed that parties must consent at 24 hours' notice to a "special inspection", permitting unimpeded access, of any location or facility owned or controlled by the government of a party, including military facilities. Implications for the 1925 Geneva Protocol of including in a new CW convention a ban on the use of chemical weapons are considered. The lack of adequate reaction to the established violation of the Protocol in the Iran-Iraq war is pointed out. A new, gradual approach to the cessation of nuclear tests was proposed by Japan. A conference convened to review the 1977 Enmod Convention failed to remove the deficiencies which are responsible for its widespread unattractiveness.

BIRNBAUM, K., 'The first year of the Stockholm Conference', in *SIPRI Yearbook* 1985, pp. 527-539.

The Stockholm Conference on Confidenceand Security-Building Measures and Disarmament in Europe was the only forum in 1984 where East and West met for negotiations on arms control-related issues. While tense relations between the superpowers prevented major progress at the conference, the presentation of five formal proposals laid the necessary foundation for substantive negotiations. They were initiated only towards the end of the year, when relations had begun to improve and agreement had been reached on the organizational arrangements, but this agreement in no way implied a breakthrough for substantive issues. The Soviet demand for political measures such as an agreement on no-first-use and no-use of force, the Western insistence on tangible steps promoting greater openness in military dispositions, and the interest of neutral and non-aligned states in physical constraints on military activities reflected the different priorities of the main negotiating parties.

BARTON, D., 'The Sinai peacekeeping experience: a verification paradigm for Europe', in *SIPRI Yearbook 1985*, pp. 541-573.

The Sinai peacekeeping experience of 1975-82 culminated in an Egyptian-Israeli peace treaty which guaranteed the common border, with a narrow buffer zone patrolled by a multinational peacekeeping force. In the earlywarning phase, a US electronic system was established to monitor approaches to the Giddi and Mitla Passes in a larger demilitarized buffer zone monitored by the UN Emergency Force. Egypt and Israel also maintained strategic suveillance stations. The system of divided responsibilities and co-operative operation performed well. In the inspection/ verification phase, the USA served as the trusted third party and ultimate inspection authority. Many features of the Sinai experience could recommend it as a paradigm for Europe: e.g., a demonstration earlywarning and verification zone could be implemented along the border between the two Germanies in one of the attack corridors such as the Fulda Gap. If successful, the zone might be enlarged to cover other corridors and eventually a larger border/buffer area in central Europe. Even though there are important differences such as terrain, political conditions and military circumstances, there may be enough strong, adaptable features to recommend it for serious consideration as a model for Europe.

VICTOR, J-C., 'The conflict in Afghanistan', in *SIPRI Yearbook 1985*, pp. 577-614.

Study of the conflict in Afghanistan is made difficult by the lack of both data and sources. Neither the Soviet Red Army nor the armed Afghan resistance provides precise information. Observers from France and evewitness accounts provide some basis for analysis of the conflict. The chapter evaluates the strategy and tactics of both parties in the conflict, against the historical background of rivalry over Afghanistan in the 19th century. Changes in Soviet military tactics during the past five years are analysed, and an explanation of the sociocultural causes of the divisions among the guerrilla fighter groups is followed by a description of the assault tactics of the resistance. About 3 million Afghan refugees are now living in Pakistan, under precarious conditions. Despite several attempts to find a diplomatic resolution of the conflict, none seems in sight.

WHITTLE, P., 'Conscientious objection to military service', in *SIPRI Yearbook 1985*, pp. 617–644.

Resistance to compulsory military service is a well-established form of protest against this demand of the state. There is a tendency towards increased awareness, even at the international level, of the need to recognize and legislate for human rights, including in particular the right to refuse to kill. The concepts of conscientious objection and the relevant international standards relating to those concepts are thoroughly examined in a report for the UN Commission on Human Rights which is summarized here: tables illustrate the widely diverse situations in which conscientious objectors find themselves. About half the countries in the world have some form of conscription; measured by population, the proportion is rather larger. Of those countries, just over half have some formal provision for conscientious objection, and some 38 countries without formal provisions may have arrangements for possible assignment to non-combatant duties. Statistics, however, are inadequate for any general assessment of the trend.

Introduction

FRANK BLACKABY

Superscript numbers refer to the list of notes and references at the end of the chapter.

I. US-Soviet negotiations

Arms control negotiations on space and nuclear weapons are now the central issue between the United States and the Soviet Union. In the discussions between the two powers, no other issue comes near this in importance. It is sometimes argued that the success of the negotiations will require an improvement in the relations between the two states. Perhaps the more important connection is now the other way: it is difficult to see how there can be much improvement in those relations unless there is at least some tentative progress at Geneva. As Foreign Minister Gromyko said on leaving Geneva in January 1985: "The situation in the world as a whole largely depends on the state of US-Soviet relations".

Arms control negotiations, then, are at the centre of the world stage. At the same time, they have become much more difficult—so that some commentators in the USA are saying that the arms control period is over. They are more difficult because many new types of nuclear weapon and delivery system are being rapidly deployed: some, like sealaunched cruise missiles, pose formidable verification problems. They are also more difficult because of the depth of suspicion between the two superpowers.

The 'agreement to negotiate' reached at Geneva in January 1985 already seems to be interpreted differently by the two sides. Under the general umbrella, there are three sets of negotiations—on space weapons, on intercontinental nuclear weapons, and on intermediaterange nuclear weapons. The United States appears to take the line that it should be possible to make progress and indeed negotiate a treaty in one of these areas, even if there is no progress elsewhere. The Soviet position is different: as Foreign Minister Gromyko has said, "If there were no advancement on the issues of outer space, it would be superfluous to discuss the possibility of reducing strategic armaments".¹

The Soviet position, therefore, is that if there is to be an agreement there must be some constraint on the development of space weapons. The United States Administration seems determined to press ahead

with its \$26 billion Strategic Defence Initiative programme for defence against ballistic missiles. It will not be easy to reconcile these two positions. If, at some point, the Geneva negotiations fail, then one possible future is a future with no nuclear arms control at all. By the turn of the decade, the Strategic Defence Initiative programme (as at present planned) will almost certainly be in contravention of the Anti-Ballistic Missile Treaty, which does not ban just deployment, but also development and testing of anti-ballistic missile systems. If this Treaty goes, then it is most unlikely that the two superpowers will agree to continue to observe the provisions of the SALT I and SALT II treaties, both of which will have long since expired. Totally unconstrained competition in nuclear weapons between the United States and the Soviet Union would probably mean more of everything-more warheads on intercontinental ballistic missiles, more sea-launched cruise missiles, more anti-satellite weapons and more anti-ballistic missile systems. In such a world, it would be hard to believe that the present non-proliferation regime could survive. It would not be right, at this stage, to say that this prospect of unconstrained world competition in nuclear weapon developments is the most probable future: but it is certainly a possible one.

This section—on US–Soviet negotiations on nuclear and space weapons—first sets out some of the general background to these negotiations. It discusses movements of world public opinion on nuclear weapon issues, since it is partly because of the pressure of public opinion that the negotiations are taking place at all. It also discusses other general background material—on the allegations each side has made that the other side is in breach of treaty obligations or understandings, for these allegations certainly affect the tenor of the negotiations. Then material is presented which is relevant to each of the three parts of the negotiations—on intercontinental nuclear weapons, on intermediate-range nuclear weapons, and on space weapons.

Public opinion

It is, at least partly, the force of public opinion which explains why arms control issues are now so central: so it is important to trace changes in public attitudes.

During 1984, fairly extensive publicity was given to the results of studies of 'nuclear winter'. (It should be remembered that this is just one more effect of the use of nuclear weapons, over and above the blast, heat and radioactive fall-out.) In general, the recent work done in this area has tended to corroborate earlier findings: if a significant proportion of the world stock of nuclear weapons was in fact detonated, the resultant smoke and debris from the fires that would be started could lead to sharp drops in temperature over wide areas of the world for a period of up to several months, with calamitous consequences. This obviously leads to questions in people's minds about the size of the world stockpile of some 50 000 nuclear weapons.

There is little doubt that, as a result of these and other studies and campaigns, public attitudes towards nuclear weapons have changed. The change is best documented in the United States. In the early 1950s, the majority view was that the invention of atomic weapons was beneficial, and that nuclear weapons could be used in war. Now there appears to be something of a consensus that nuclear war would be suicidal. Further, according to opinion polls, there is also a consensus in the United States on two other important points: that both the United States and the Soviet Union have huge nuclear 'overkill' capacities; and that a nuclear arms race cannot be won, since any development on the US side is eventually matched on the Soviet side.

The idea that nuclear weapons are in some way illegitimate has struck deep roots in many places. The New Zealand government's recent decision is an example of this. Under pressure from public opinion, it has decided that it will not accept nuclear weapons on its territory. This has precluded port calls from US naval vessels, since the United States follows the general practice of nuclear weapon powers in refusing to say whether a particular vessel does or does not carry nuclear weapons. The US reaction suggests that it is concerned that the 'nuclear weapon allergy' might spread to other countries. There is some risk that New Zealand's economy might suffer. New Zealand's exports to the United States consist largely of agricultural produce, subject to quota. The US Administration would not need to impose any actual sanctions: it could just put up no opposition to pressure from the US agricultural lobby.

The exploration of possible nuclear weapon-free zones is another example of moves to 'delegitimize' nuclear weapons. There has long been interest in nuclear weapon-free zones in Scandinavia and the Balkans: now there has been some progress towards a South Pacific nuclear weapon-free zone. In November, senior officials from member countries of the South Pacific Forum (including Australia, New Zealand and Fiji) prepared the draft of a treaty on a South Pacific nuclear weapon-free zone, which will be considered by heads of government in August 1985.

In western Europe, there were fewer demonstrations, and with smaller attendances, than in 1983. However, public opinion polls do not suggest any change towards approval of the deployment of new US missiles in western Europe. In all the countries concerned, the polls sug-

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gest a majority against deployment. In the Netherlands 65 per cent, in Italy 70 per cent, and in Belgium 74 per cent of respondents have said that they are not in favour of deployment. In Belgium, however, the decision has been taken to deploy 16 cruise missiles. In the Netherlands, deployment in 1988 is contingent on the number of SS-20 missiles deployed by the Soviet Union. The decision is due in November 1985, and the peace movement has announced a major campaign for October.

In the German Democratic Republic and (to a lesser extent) in Czechoslovakia, there have been overt protests against the SS-22s, particularly from church organizations.

The public is now more interested than it used to be in nuclear weapon issues and it is also better informed. It is entitled to know what each side is proposing at Geneva, so that it can exercise some influence on the negotiations. In the past, the negotiations have been technically confidential, but there have been selective leaks of information. It would be more sensible to have less pretence of confidentiality, and more open statements of proposals.

The absence of complete confidentiality does, unfortunately, mean that public relations experts will be at work to dress up proposals so as to make them sound attractive: the previous Geneva negotiations provide a number of examples of the adroit use of language for this purpose. Any claims by either side that it is occupying the high moral ground in the negotiations should be suspect; it is not likely that the proposals of either side will have had their origin in moral considerations.

Allegations of treaty infringement

Allegations of treaty infringement are also, unfortunately, part of the background to the negotiations. Both countries can be said to have exploited loopholes in past treaties, in that they have intensified weapon development in those areas which had been left unconstrained; but that is not a treaty infringement. The judgement of these allegations (most of which are not new) remains as it was last year: most of them are vague and conjectural. In some cases they are the result of insufficiently precise language in a treaty: for example, the SALT II Treaty, which bans the concealment of missile test data which would impede verification, fails to indicate what kinds and amounts of information are needed for that purpose. Some further suspicions arise because other relevant treaties have not been ratified: if the United States had ratified the 1974 Threshold Test Ban Treaty, it would presumably have received data which would have enabled it to estimate more accurately the size of Soviet nuclear explosions. Some charges are not of great military significance: for instance, the construction of a radar, at whatever location, does not by itself do much to provide a country with effective ballistic missile defence. Finally, official US sources continue to repeat the allegation that the Soviet Union was, up to 1982, involved in the production, transfer and use of trichothecene mycotoxins for hostile purposes in Laos, Kampuchea and Afghanistan. The hard scientific evidence for this allegation has been discredited: the samples of 'Yellow Rain' which have been tested are clearly not chemical or biological warfare agents, but are of natural origin. The allegation should be withdrawn.

Strategic weapons

While negotiations have been at a standstill, weapon deployment has not. As so often is the case, negotiators have to aim at a moving target.

Both the United States and the Soviet Union are moving ahead fast with strategic nuclear weapon programmes. The big increases in capability will come later in the decade: 1984 saw just the beginning of this expansion.

These are the main points on what is happening in the United States:

1. A very large sea-launched cruise missile programme is under way, posing formidable problems for arms control.

2. About 800 nuclear warheads were added to the US strategic stockpile in 1984, as a result of the commissioning of two Trident submarines and the activation of two B-52 bomber squadrons equipped with air-launched cruise missiles.

3. Testing of the MX missile continued and FY 1985 funds for production of 21 missiles were released.

4. Engineering design of the small, single-warhead, land-based missile (Midgetman) proceeded.

5. The Trident submarine programme continues—the eighth will be launched in May 1986. The full programme may be 20-25 submarines. From the ninth submarine onwards, they are to be equipped with the more accurate Trident II missile.

6. The purchase of 100 B-1B bombers will be completed in fiscal year 1986; there is some pressure from industry to increase the number.

7. The new, advanced cruise missile will soon be replacing the existing model on B-1B bombers.

8. Congress is showing increasing concern with nuclear weapon issues, though up to now no major programme has been stopped.

Information about Soviet nuclear weapon deployment comes from US intelligence sources, and is less precise. The US Administration has

reported that the Soviet total of nuclear warheads exceeds that of the United States. The USA now assumes that virtually all the Soviet SS-17s, -18s and -19s carry multiple independently targetable re-entry vehicles (MIRVs).

The Soviet Union is proceeding to deploy the new Typhoon Class submarine, and is testing a new submarine-launched ballistic missile. It also announced the deployment of long-range cruise missiles, both airlaunched and sea-based. The United States lists some 13 categories of new Soviet strategic nuclear weapon developments.

Britain, France and China are all extending their nuclear weapon capabilities. The British programme includes refitting all Polaris missiles with the improved Chevaline warhead; by mid-1987 220 Tornado dual-capable aircraft will be deployed in Europe, which will add considerably to NATO's airborne nuclear capability; and the Trident submarine programme goes ahead. By 1993, France is expected to have refitted all its ballistic missile submarines, except the first, with the sixwarhead M-4 missile, raising the number of warheads on submarines from 80 in 1984 to 496 by 1993.

Negotiating positions

These various present and prospective deployments add new problems for the negotiators; and the old problems have not gone away. These are some of them.

1. Both sides claim that their objective in the negotiations is 'parity', or 'equal security'. Given the different mix of weapons, different geographical circumstances, different alliance structures, and also given the general atmosphere of suspicion, it will be very difficult to get an agreement on whether a particular proposal provides for parity. Further, the demand for parity is a political, not a military demand. The military requirement is simply that one side, if it were first attacked with nuclear weapons, would be able in response to inflict unacceptable damage on the attacker. The only requirement of an agreement, therefore, is that it should not give either side the possibility of implementing an effective, that is, disarming, first strike. There are a great many combinations of numbers of weapons which would fulfil this requirement.

2. In the previous negotiations, the United States has had as its objective a reduction in the number of Soviet land-based heavy missiles: for example, its proposal to move total throw-weight on either side towards equality was motivated by this declared need. The justification for this objective was the perception of a threat: that Soviet land-based

missiles could destroy the whole of the US land-based missile force; and that the United States, if this happened, would be inhibited from any retaliation. That seems an unreal perception of threat.

First, it would require perfect functioning and absolutely precise timing for a very large number of missiles: it is not conceivable that a government would expect this degree of perfection from its missile force.

Second, such a scenario requires the assumption that the United States would not retaliate with any of its large fleet of ballistic-missile submarines—and the United States has deliberately chosen to install over half its warheads on submarines.

Third, there is the more technical point made by the Scowcroft Commission, which reported on the United States' strategic posture. There is no way that the Soviet Union could co-ordinate an attack by landbased missiles on US land-based missiles with an attack by submarinelaunched missiles on US military airfields, without giving the United States prior warning either for its bombers or its missiles.

Fourth, it does not appear to be correct to say that the United States has no missiles with the capability of the Soviet SS-18s and SS-19s. 'Capability' in this context is not measured by throw-weight, but by the ability to destroy the missile silos of the other side. That ability depends mainly on accuracy. The US Minuteman III missile with the Mark 12A warhead has about the same accuracy as the Soviet SS-18 (in the 10 warhead model) and also has about the same probability of destroying a missile silo.

3. The United States at the last negotiations floated the idea of a 'build-down' proposal; this was under pressure from a number of members of the Congress. It suggested a joint working party with the Soviet Union on this subject. The idea, in its simplest form, is that for each new warhead deployed, more than one old warhead would be dismantled: the ratio between new and old warheads could be varied in order to encourage development in certain directions. It is a proposal which allows modernization, but prevents escalation in numbers.

4. The Soviet position appeared broadly to follow the SALT I and SALT II pattern—with a limit on total numbers (either of warheads or launchers, or some combination of both), but with a certain 'freedom to mix'. The Soviet objection to the United States' proposal was that it was an attempt to force the Soviet Union to divert its resources away from land-based missiles, where it was relatively advanced, towards missiles where its state of technological development was relatively backward. The Soviet submarine-launched ballistic missile fleet lags behind that of the United States in a number of respects. 5. The question must soon be settled, whether or not the two powers will continue to observe the main provisions of the SALT I and SALT II agreements. The term of the SALT I agreement has expired; however, both sides have agreed that the commitments reached should remain in force. The SALT II Treaty was not ratified by the United States, and in any case is due to expire at the end of 1985. Here also, the two sides have agreed to observe the main provisions of the Treaty.

The SALT I and SALT II constraints do have some effect. For instance, SALT I limits the United States to 44 ballistic missile submarines with 710 launchers, and limits the Soviet Union to 62 ballistic missile submarines with 950 launchers. SALT II limits the number of launchers with multiple warheads on either side-on those weapon systems included in the Treaty-to 1200. As a consequence of these constraints, the Soviet Union has converted some older Yankee Class submarines to cruise missile carriers. The constraints also mean that the United States, as it launches new Ohio Class submarines equipped with Trident missiles, will come up against the limit of 1 200 launchers with multiple warheads. If it is to keep within the provisions of SALT II, it will have to dismantle some older systems. The test will come later in 1985, when the seventh Ohio Class submarine, the Alaska, goes for its sea trials. So far, the indications are that the SALT I and SALT II limits will be kept-in spite of the fact that it appears rather curious for the United States to refuse to ratify a treaty and then to agree to observe its main provisions.

6. It is possible that the Soviet Union will argue that, if the United States rejects the arguments for including French and British missiles in the intermediate nuclear force part of the negotiations, then it must be prepared to have them counted in the strategic nuclear weapon negotiations. There is a unilateral Soviet statement to the effect that an allowance was made for them in the SALT I negotiations; this statement was rejected by the United States.

7. Sea-launched cruise missiles are now proliferating to such an extent, and have such range and accuracy, that they must surely be included somewhere in the negotiations. There are, unfortunately, so many ships and submarines which could carry them that the counting rules would be very difficult to establish.

Intermediate-range forces

As with the negotiations on strategic nuclear forces, the negotiations on intermediate-range systems will inherit the old problems, with the added complications which arise from the new deployments on both sides.
The last Soviet offer on missiles was that the Soviet Union would be ready to reduce the number of its SS-20s on the European side from 243 to about 120, and would retire all its SS-4s and SS-5s, if NATO were prepared to cancel its deployment of Pershing II and cruise missiles. The USSR was also prepared to freeze the number of SS-20s in Asia, so long as the United States did not build up its nuclear forces in the Far East.

The United States' position was still for equality between the number of Soviet warheads targeted on western Europe and the number of US intermediate-range nuclear warheads in that area. The issue, in effect, was still whether French and British warheads should be counted on the Western side—although the Soviet Union was prepared to make its offer in a form which made no reference to French or British forces. However, they would in effect have been included in the count.

The situation is now more complicated. On the NATO side, the deployment of Pershing IIs in the Federal Republic of Germany has gone ahead rapidly: 54 were in place by the end of 1984, and the remaining 54 are due to be deployed by the end of 1985.

By the end of 1984, 80 cruise missiles had been deployed—48 at Greenham Common in the UK and 32 at Comiso in Italy. The number at Greenham Common is expected to rise to 96 by the end of 1985. The total programme of 464 missiles, in five countries, stretches out to the end of 1988. Belgium took 16 missiles in March 1985. However, it is still uncertain whether the Netherlands will agree to deploy them: it is scheduled to take 48 missiles.

The Netherlands has made deployment in 1988 contingent on the number of SS-20 missiles 'operational' anywhere in the Soviet Union. The Dutch government decided on 1 June 1984 that it would take a decision on 1 November 1985 on whether to deploy or not. If at that date there are more than 378 SS-20 missiles operational, then the Netherlands has decided to deploy 48 cruise missiles at Woensdrecht air base (the estimate of the number of SS-20 missiles on 1 June 1984 was 378). The government has not made clear how it will arrive at its estimate of the number of SS-20s; it is assumed that NATO (and the Pentagon) will be consulted.

On the Soviet side, there are new deployments of SS-12 or SS-22 missiles—with a range of 900 km—in the German Democratic Republic and Czechoslovakia: the numbers are not known. Nor is it clear exactly what is happening with new deployments of SS-20s. According to United States intelligence, the world-wide deployment of SS-20s has been increased from the 378 which were operational as at the time when negotiations broke down to 396. This is denied by the Soviet Union. US intelligence also reports that nine additional bases with nine launchers each are under construction. However, there are some reports that

intercontinental missiles—SS-25s—are being deployed on sites assumed to be for SS-20s.

Thus when the negotiations on intermediate-range nuclear forces (INF) are resumed, there will be new problems to add to the old ones. The problem of counting French and British missiles will not have gone away. It is possible that the Soviet Union will offer the option of counting them in the strategic rather than the INF negotiations; but it is unlikely to accept the proposition that they should not be counted at all.

On the NATO side, there will probably be pressure to count in the new missiles deployed in the Democratic Republic of Germany and Czechoslovakia, even though their range is less than 1 000 km.

Space weapons

Space weapons will be a most complex area of negotiations. So far as arms control is concerned, there are two distinct issues—the problem of anti-satellite weapons, and the problem of defence against ballistic missiles. However, although the arms control issues may be distinct, the military technology associated with them is not. Weapons which could be used against ballistic missiles could also be used against satellites.

Both the United States and the Soviet Union have, in their time, deployed anti-satellite weapons. Between 1964 and 1968 the United States had a system which it claimed was operational: this was a direct ascent system using nuclear warheads launched by Air Force Thor missiles from Johnston Island in the Pacific. This system was dismantled in the 1970s. The Soviet Union has deployed interceptor satellites—a somewhat cumbersome system—which take a long time to reach their targets. There were some 20 tests of this system between 1968 and 1982. Since 1982 the Soviet Union has unilaterally declared a moratorium on further testing: however, it has not at any time admitted that it had an anti-satellite programme. The United States is now developing a twostage short-range attack missile (SRAM), equipped with a 'miniature homing vehicle'. This locates the target with infra-red sensors and then rams it with destructive force; no explosive device is employed. The missile is mounted on an F-15 aircraft. It has been tested against a point in space, and against a star, to test the guidance system and the on-board computer.

The US system is clearly more capable than the Soviet system; however, both systems can only attack satellites in a relatively low orbit.

There is at present no treaty banning the development of anti-satellite systems, although there is a ban on interfering with at least some of the



satellites. However, it does not seem to be disputed that the further development and extensive deployment of such systems would be destabilizing.

The other arms control issue concerns the research programme into ballistic missile defence. The United States is now engaged in a major research effort, scheduled to cost \$26 billion over five years. The initial objective is to establish whether ballistic missile defence is feasible. If it is judged to be feasible, then the intention of the present US Administration is to deploy it; it has been said that the technology would be made internationally available. The scale of the research programme in the Soviet Union is not known. The Soviet Union is more threatened than the United States by possible attack from aircraft, and it spends a great deal on anti-aircraft defence. It has basic research programmes concerned with laser technologies, for example. There is little evidence of the vigorous development of new ABM systems.

The questions arise: is such a system feasible? Is it desirable? If undesirable, are there appropriate arms control proposals?

The eventual feasibility of such a system is a much debated matter. Strictly speaking, what is envisaged is not just one system, but a whole set of systems which attempt to intercept the ballistic missile in its boost phase, or failing that in mid-course, or failing that in the missile's reentry phase. The problem of feasibility has to cover the consideration of counter-measures which might be adopted—of which there are many. Ballistic missiles are not the only available delivery system for nuclear weapons: any effective defence would have to provide protection against cruise missiles and aircraft as well. Given new cruise missile technologies, and the development of 'stealth' characteristics for aircraft, this protection would also be very costly. This is a point of particular relevance to Europe, where many nuclear delivery systems are short-range.

Second, even if such a system were feasible, would its development be desirable? There was a great deal of discussion of this before the signing of the Anti-Ballistic Missile (ABM) Treaty in 1972. In the initial discussion which preceded the Treaty, it was the Soviet Union which argued that, since an ABM system was defensive, it must be acceptable. It was the United States which pointed to the destabilizing consequences of ABM development. The Soviet side was persuaded and the ABM Treaty was signed. Nation-wide deployment of ABMs was then judged by both sides to be futile, destabilizing and costly.

Futile: because in a competition between defensive systems and offensive missiles with nuclear warheads, the offense would win, especially against populations and urban areas. Destabilising: because the arms race would be accelerated as both sides developed and deployed not only competing



ABM systems, but also offsetting systems to overpower, evade, or attack and disable the opposing ABM system. Furthermore, each side would fear the purpose or the capability of the other's ABMs (especially against a weakened retaliatory strike), and in a crisis these fears could bring mounting pressures for striking first. What strategic theorists refer to as arms race instability and crisis instability could both result. Costly: because both ABM development and deployment, and the buildup, modernization and diversification of offsetting offensive forces, must be purchased.²

These were the judgements at that time. The question to examine now is what reason there might be for changing them.

If ABM development is judged to be undesirable, what are the arms control requirements? The main requirement is a reaffirmation of the ABM Treaty, and the removal of ambiguities. The existing ABM Treaty is of unlimited duration. Article V of the Treaty reads: "Each party undertakes not to develop, test, or deploy ABM systems or components which are sea-based, air-based, space-based or mobile landbased". If work on ABM defence progresses beyond the research phase to actual testing, the provisions of the Treaty may well be infringed. The present US programme is intended to progress beyond the research phase. The President's National Security Decision Directive no. 119 (January 1984) directs the programme manager of the Strategic Defence Initiative to conduct four major demonstrations of critical missile defence technologies before 1990.

A party has the right to withdraw from the Treaty, after six months' notice, "if it decides that extraordinary events related to the subject matter of this Treaty have jeopardized its supreme interests.... Such notice shall include a statement of the extraordinary events the notifying party regards as having jeopardized its supreme interests".

II. Chemical and biological warfare

There is no reasonable doubt that Iraq has made use of chemical weapons in its war with Iran. Iraq acceded to the Geneva Protocol as long ago as 1931. It is thus under a legal obligation not to use these weapons against another party (Iran is a party to the treaty), unless the fellow signatory has used the weapons first (there is no suggestion that Iran did so).

This is a clear breach of international law, but the reaction of the international community has been muted. The culprit has not even been named in resolutions either of the Security Council or the General Assembly which expressed concern about the use of chemical weapons. There have been no sanctions (apart from embargoes on certain exports



to both countries). On the contrary, the United States has resumed diplomatic relations with Iraq, and the Soviet Union has renewed arms supplies. The impression has clearly been given that a breach of one of the major treaties constraining military activity is a matter of minor importance. Many countries may draw the general conclusion that in this matter they can disregard their accession to the protocol. This development has weakened the arms control regime, not only in the field of chemical warfare.

However—in this field of allegations of use—there is one important example where the evidence for the allegation is now seen to be weak: that is, the allegation of the use of Soviet chemical or biological weapons in South-East Asia. The hard scientific evidence for these allegations consisted of samples of 'Yellow Rain', which were supposed to be a biological agent, carrying Soviet-manufactured mycotoxins. However, all the samples which have been tested for pollen have been found to contain pollen—and further, pollen from a wide assortment of South-East Asian plants. There is no doubt that these samples are not agents of chemical or biological warfare, but bee faeces. Further, although the allegations suggest that these biological agents were used over a period of eight years, not a single spent or dud round of toxicagent ammunition has been found. This leaves as evidence the accounts given by refugees. For many reasons, it is not adequate to base an allegation on such accounts.

Weapon developments

The US Administration, for the third year running, put strong pressure on the Congress in 1984 to approve the production of the new binary chemical weapons. The attempt was made to get approval for those items needed for their production which have long lead times, with the promise that actual production would still need further approval; and of course the 'bargaining chip' argument was used—that the decision to produce would help the arms control negotiations. The Congress did not agree, and production was again postponed.

One (possibly minor) reason for Congressional unwillingness to approve production is that no European government has said that it is prepared to store the new weapons on its territory. During 1984, however, there seems to have been something of a concerted campaign among some NATO commanders in favour of chemical weapons; in both the Federal Republic of Germany and the United Kingdom there were reviews of chemical weapon policy.

As always, the Soviet Union said nothing about its production and deployment of chemical weapons. This leaves the field open for US



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intelligence sources, which describe in some detail a very substantial Soviet programme. These accounts—in so far as they rely on evidence from defectors—may contain some exaggeration: but the outside observer, in the absence of other information, is likely to conclude that they have some basis in fact.

It used to be the case that the USSR, the USA and France were the three nations cited as possessing chemical weapons. During 1984, there was an official US suggestion that the list is much longer—possibly some 15 countries in all. The fact that Iraq possesses a chemical warfare capability, of which other nations were unaware, suggests that there may, indeed, be additional nations possessing chemical weapons.

III. World military expenditure and the arms trade

Military expenditure

The world spent something of the order of \$800 billion on the military sector in 1984.³ The upward trend has accelerated in recent years. The average real rise in 1980–84 was 3.5 per cent a year, well up on the 2.5 per cent average of the previous four years.

It is the US rearmament programme which explains this acceleration: there, military spending has been rising very fast indeed—by about 8.5 per cent a year (in real terms) since 1980. Elsewhere in the world the rise has been much slower. This section comments on some facets of military spending in the main countries and regions.

The United States. The US Administration's view is that the rearmament programme is by no means over. After a 40 per cent real increase in military spending over the past four years, the Administration's plans are for a further 40 per cent rise in the next five fiscal years—up to fiscal year 1989. This is in spite of the fact that this continued rapid rearmament programme runs counter to the Administration's declared economic objective, of reducing and eliminating the budget deficit.

Up to last year, the Congress has not been very effective in checking the rise in this enormous programme. It is estimated that the Administration obtained 97.5 per cent of the funding it had originally requested when it set the programme in 1981. Although the Congress may now hold back further authority, there is a substantial backlog of funds already appropriated but not spent, which may well keep actual outlays rising fast for some time. There is the further point that many major weapon programmes are at or near the point of no return, when cancellation could be almost as expensive as continuation.

Spending on weapon procurement (particularly on strategic weapons), and spending on research and development, have been the



fastest-growing elements in the rearmament programme. Up to now, all the Administration's major strategic nuclear weapon programmes have been approved. However, one of these programmes—that for the MX missile—faced a difficult passage through the Houses of Congress. The other major strategic weapon programmes—the B-1 bomber, the new generation of ballistic missile submarines, and the air-launched and sea-launched cruise missiles—are unlikely to be held back.

Other NATO countries. Other NATO countries have not followed the United States in inaugurating massive rearmament programmes. Only three countries—Canada, Britain and Italy—have met the 3 per cent growth target for military expenditure set in the late 1970s. In Britain, the average rise in the past three years has been over 6 per cent—partly the consequence of the Falklands/Malvinas War and its aftermath. European NATO countries, apart from Italy and Britain, have had real growth rates in military spending of under 1 per cent a year in the past three years. European NATO countries in general have a rather calmer view than the USA of the Soviet threat: the economic objective of holding back the rise in public expenditure has been given primacy.

It is likely that-there will be increasing pressure from the United States for more military spending in western Europe: the lever used will be the threat of the withdrawal of US troops.

The Soviet Union. The current CIA estimate is that military spending in the Soviet Union has been rising by about 2 per cent a year, in real terms, in recent years. From now on, it is likely to rise faster: the official budget figure for defence in 1985 is 12 per cent higher than in 1984. Most information about Soviet military spending comes from United States intelligence sources. The weapon procurement estimates for the past five years suggest a high level of military spending, but—up to now—not a sharply rising trend. However, the US sources now predict a new surge in procurement figures: the US Department of Defense claims to have identified some 200 new Soviet weapon systems to be fielded in the 1980s.

It is unlikely that the Soviet Union will be driven by economic pressures to accept a position which the outside world might consider to be one of military inferiority. Economic sacrifices will be imposed if necessary. In any case the rise in national output seems to have picked up from the low figure in 1982.

Other Warsaw Treaty Organization countries show some acceleration in their military spending in recent years—in spite of the fact that their economic growth rates have come down considerably.

In Japan, military spending has increased by about 4 per cent a year (in real terms) in recent years; the 1985 increase may be rather higher.



However, the ceiling of 1 per cent of GNP for defence will probably be kept (although it is currently subject to some criticism) by the device of deferred payment for some weapon procurement.

China continues to give low priority to military modernization. From 1980 to 1984, the military share of the state budget fell from 16 to 13 per cent, while the share of education, health, culture and science rose from 13 to 17 per cent.

In Third World countries in general, economic constraints have held back increases in military spending. For a long period in the 1960s and 1970s, military spending was rising faster in Third World countries than in the industrial world. In recent years, that has not been the case. Even the oil-rich countries have had to curb their military budgets. The developing countries without great oil reserves are heavily in debt-and approximately one-fifth of the increase in their debt in recent years is accounted for by arms purchases from abroad. Many of these countries have been forced to borrow from the International Monetary Fund. The Fund normally requires reductions in overall government expenditure (although it very rarely criticizes the share taken by military budgets). In South America, civil governments have replaced military governments in a number of countries, but this has not always led to cuts in military spending. In Central America, civil wars and threats of external intervention have kept military spending rising. In the Middle East, Israel has continued to receive very large subventions from the United States; Egypt also received over \$1 billion in US military aid.

Military research and development

World military research and development expenditure was some 70-80 billion in 1984. The rise in its volume has been accelerating much faster than that of military expenditure as a whole. In the second half of the 1970s the average rise per year was under 1 per cent—less than half that of total military expenditure. From 1980 to 1983 it was 5-8 per cent and from 1983 to 1984 over 10 per cent—more than double that of total military expenditure.

The result is likely to be that the speed with which new and modernized weapons can replace older ones will be increased, creating pressures to raise military expenditures far into the future, irrespective of the state of political relations then.

Arms trade

Trade in major weapons has been declining since 1980. The main reason is economic. Third World countries in general are deeply in



debt, and consequently have been cutting back on foreign purchases, including arms. There are other reasons for this decline in trade—more production of weapons in Third World countries themselves; more transfer of technology; and more exports of components and modification and upgrading kits. In some countries which have in the past been major purchasers—such as Libya—the market may now be saturated.

The arms market is thus a buyer's market; there is less demand. And more countries—North Korea and China are examples—are looking for overseas markets for their arms production. Many consequences follow. The United States and the Soviet Union are not as dominant as they were: some west European suppliers—France, Britain and FR Germany—have been gaining shares. There are many more offset deals now—and offsets often equal, and sometimes exceed, the value of the arms transfers. Favourable financial arrangements have to be offered. Buyers now often demand top-of-the-line weapon systems, and do not accept weapons which they consider to have down-graded capabilities. Thus, the United States has failed to find buyers for its FX export fighter aircraft, which recipient countries consider inferior to the F-15 and F-16; the Soviet Union had sold an advanced fighter—the MiG-29—to India before it had even been supplied to its own forces.

In a buyer's market, it is much more difficult for supplying countries to exercise any political control. So, for example, advanced fighters may be introduced into an area of potential conflict when both the United States and the Soviet Union might have wished to avoid escalating the arms competition in that way. Thus, when the United States refused to supply Jordan and Kuwait with new surface-to-air missiles, both countries turned to the Soviet Union. An incidental consequence is that Soviet and US advisers will be working side by side to modernize the Kuwaiti air defence system, since Kuwait is also upgrading its US-supplied Hawk surface-to-air missiles.

Iran and Iraq continue to receive weapons from a large number of countries, both clandestinely and openly. Several governments, with an eye to trade possibilities both now and after the end of the war, show no particular interest in stopping the flows of arms.

Supplies of arms to Turkey and Greece illustrate the political and commercial complexities of the arms trade. Turkey is considered by the United States to be a more loyal ally than Greece, and therefore to be favoured with arms supplies—particularly now that Iran is hostile to the United States. The Greek government's behaviour in regard to NATO has been exasperating to the United States. However, a refusal to supply arms to Greece would simply mean giving the sales to some other supplier—possibly, indeed, the Soviet Union; Greece has purchased from the USSR a quantity of military auxiliary equipment. The



United States will therefore sell F-16 fighters to Greece, with offsets expected eventually to reach 100 per cent of the total sales price. Thus Greece and Turkey are both being equipped with US weapons, primarily to confront each other.

In 1984, the United States firmly re-established its position as the world's foremost arms supplier—the delayed consequence of the much less restrictive policy of the Reagan Administration. The main recipients are Japan, Egypt, Saudi Arabia and Israel. The United States sells arms to a much larger number of countries than does the Soviet Union. The volume of Soviet sales of major weapons continued to decrease in 1984. Libva, for a long period a major market for Soviet weapons, seems to have decided that it is now adequately equipped. New clients, such as Nigeria and Kuwait, have only bought small amounts. Syria, Iraq and India were the main recipients of Soviet weapons in the 1980-84 period. Soviet weapon exports are an important source of hard currency: they are estimated to have accounted for about half of total Soviet exports to non-communist countries in the Third World in 1983. There is some evidence that the Soviet Union is charging rather higher interest rates than in the past on loans to cover the cost of weapon purchases.

IV. Multilateral arms control talks

Most people who think about arms control or disarmament are, quite rightly, predominantly concerned with nuclear weapons. They judge, correctly, that this issue dwarfs the rest. There were no negotiations about nuclear weapons in 1984.

Such negotiations as did take place were (with the exception of negotiations on chemical weapons) on matters of lesser importance on confidence-building measures at Stockholm, and on force reductions in central Europe at Vienna. In none of them was there much advance.

The Geneva Conference on Disarmament

At the 40-nation Geneva Conference on Disarmament there is only one area in which there is a serious attempt to negotiate a treaty—that on a ban on possession of chemical weapons. The UN General Assembly had recommended that the Conference should deal with proposals for the prevention of an arms race in outer space, and that it should continue the examination of a possible comprehensive nuclear test ban. The United States is no longer prepared to negotiate a comprehensive test ban, since it has a range of new nuclear warheads which it will wish to test.

The Committee of the CD in charge of elaborating a chemical weapon convention tentatively agreed to the wording of several convention provisions, but important differences remain. The most serious differences concern the verification of compliance. Some progress was made, in that the Soviet Union expressed readiness to accept international observers at the facilities for the destruction of stocks. The United States, in the draft convention which it submitted, proposed that each party, at 24 hours' notice, must consent to a special inspection of any location or facility owned or controlled by the government of a party to the convention, including military facilities. The US proposal for practically unlimited inspection went further than any arms control verification scheme put forward in recent years: it must be doubted on the US side how far the US military, or US industry, would be content with intrusive inspection by foreigners of defence facilities and chemical plants. Soviet representatives at Geneva have said that this proposal is totally unacceptable. Mandatory, almost instantaneous inspections 'anywhere', seem hardly necessary: chemical weapons are not ultimate instruments of war. Large-scale violations involving militarily relevant quantities of chemical in readily useable form could not remain undetected, even without the 'special inspections' proposed by the United States.

Outside the Geneva forum there were, in 1984, some discussions of other possible approaches to chemical disarmament. There was the suggestion that moves might be made to make Europe (or central Europe) a chemical weapon-free zone. There were also discussions on the same subject between German political parties—the Socialist Unity Party (SED) in the German Democratic Republic and the Social Democratic Party (SPD) in the Federal Republic of Germany. The populations of both countries could suffer enormously if chemical warfare were to occur in Europe; both states are thought to have the chemical weapons of their major alliance partners on their territory.

The Stockholm Conference

The Stockholm Conference is one of all European states (except Albania and Andorra), plus the USA and Canada. The Conference, according to its mandate, is to be "devoted to the negotiations and adoption of a set of mutually complementary confidence- and securitybuilding measures designed to reduce the risk of military confrontation in Europe". The three groups which matter at the Stockholm Conference are the NATO countries, the Warsaw Treaty Organization countries, and the neutral and non-aligned countries.

The problem of the Conference from the beginning has been that the Soviet Union has had a very different view about the agenda from that of the other two groups of countries. The NATO countries have put forward proposals for a set of military confidence-building measuresitems such as exchange of information on the structure of ground forces, obligatory prior notification of major troop movements and obligatory invitations to observers for such manoeuvres. These proposals, they argue, are in line with the limited mandate given to the Conference-a mandate which had been agreed upon at Madrid. The Warsaw Treaty group's set of proposals is very different: it includes such matters as a declaration of non-use of force in international relations, a no-first-use of nuclear weapons obligation, and moves to make Europe free of chemical weapons, as well as traditional military confidence-building measures. The neutral and non-aligned proposals are closer to the NATO proposals but with certain actual constraints added-such as ceilings on the number of forces engaged in manoeuvres.

Most of 1984 was taken up with confrontations in plenary sessions. The NATO countries argued that most of the Soviet proposals were outside the mandate, and—if they were to be dealt with at all—should be dealt with elsewhere. The Soviet position was that the Western proposals amounted to legalized espionage, and that there had to be proposals in the political as well as the military field.

The Western alliance made one concession towards the Soviet position: the possibility of reaffirming the principle of the non-use of force, as 'the crowning glory' of a negotiating process that brought substantial agreements on concrete confidence- and security-building measures. The NATO group was also giving consideration to the neutral and nonaligned proposal for certain constraints—a proposal which was supported by the WTO group.

At the end of the year, it was finally agreed to set up two working parties. One was to deal with all proposals on notification and observation of military activities; the other was to deal with all other proposals. However, it was made clear that agreement to discuss a proposal did not in any way imply that it should have a place in the final declaration; it would still be open to any country to say that the proposal was not in conformity with the conference mandate.

The Vienna M(B)FR talks

The negotiations at Vienna on force reductions in central Europe are moving into their twelfth year. The negotiations began formally on 30



October 1973. Eleven countries participate directly in them—those with forces in central Europe. Progress during 1984 was negligible. It is becoming increasingly difficult to take these negotiations seriously. In 12 years, a compromise could have been found between the different positions, given political will.

So long as negotiations continue, it is made more difficult for the United States unilaterally to reduce the number of its forces in FR Germany, since—if it did so—this would appear to be conceding something to the Soviet Union without obtaining anything in return. However, this has not prevented some US senators from proposing that such reductions be made unless the Europeans show more enthusiasm for spending on their own defence.

There has long been agreement on the main objective of the negotiations—an end-state of 900 000 total ground and air force troops on either side. However, there has for years now been disagreement about the present number of Warsaw Treaty Organization troops in the central region. The West does not accept the WTO figure. It claims that it is substantially understated. The discrepancy—which was put at around 160 000 troops in 1980—is now, according to the West, nearer 250 000.

The Soviet Union, in line with its policy of 'no verification without disarmament', proposes that there should be an agreement to reduce the number of troops to 900 000, and then the figure should be verified. This is not accepted by NATO.

In April 1984 NATO made a new proposal: there should be an initial data agreement for combat and combat-support troops only. (It is assumed that a good deal of the discrepancy is in service-support troops.) Further, the West would accept Eastern figures if they fell within a certain range—say 5-10 per cent—of Western estimates.

However, this new Western proposal was to be accompanied by more stringent verification requirements, but up to the end of the year the West had not tabled its proposal under this heading. This certainly suggests a leisurely negotiating tempo.

The verification requirements, which at Vienna go under the heading of 'associated measures', have some overlap with the confidencebuilding measures which are being discussed at Stockholm. There are differences, of course. The Stockholm measures, if agreed, would apply to all European nations (except Albania and Andorra). The Vienna measures are limited to the central region, and contain verification proposals which would not be relevant for discussion at Stockhom—such as monitoring stations for checking the movement of troops in or out of the central region.



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The third NPT Review Conference

The third Review Conference of the parties to the 1968 Treaty on the Non-Proliferation of Nuclear Weapons (NPT) is to be convened in autumn 1985, in accordance with Article VIII of the Treaty.

The first Review Conference, which took place in 1975, adopted a declaration reaffirming the role of the NPT in international efforts to avert further proliferation of nuclear weapons; promising more favourable treatment of the parties than non-parties; stressing that the responsibilities and obligations of all parties must be balanced; promoting international arrangements to ensure the physical protection of nuclear materials; and providing a stimulus to the idea of setting up multinational nuclear fuel cycle centres.

The second Review Conference, held in 1980, demonstrated a convergence of views on the following points: (a) international cooperation likely to contribute to the development of a nuclear weapon capability by non-parties to the NPT should be avoided; (b) safeguards procedures need continuous improvement to deal with increasing amounts of nuclear material and more complex facilities; (c) the Convention on the physical protection of nuclear material should be acceded to by all states; (d) more assistance should be provided to lessdeveloped non-nuclear weapon parties in the application of nuclear energy for peaceful purposes; (e) conditions of nuclear supplies should be more fully discussed between supplier and recipient states; and (f)IAEA efforts towards the establishment of a scheme for international plutonium storage and the management of spent fuel should continue. The Conference was unable, however, to adopt a consensus declaration, mainly because of disagreement over the NPT provisions dealing with disarmament.

In particular, the nuclear weapon powers refused to accede to the demands put forward by the majority of participants that they should undertake concrete commitments to halt the arms race. They even declined to step up the pace of their ongoing negotiations or establish procedures for new ones.

Another major controversy arose in connection with the application of safeguards under Article III of the NPT. While all the participants were, in principle, in favour of full-scope safeguards (that is, safeguards applying to all nuclear activities) in states not party to the Treaty, there was no agreement as to whether such safeguards should be required as a condition of supply.

Since 1980 the situation regarding these two points—full-scope safeguards, and the disarmament responsibilities of the nuclear weapon powers—has not improved. As regards safeguards, the differences per-



sist, even though a few countries have unilaterally tightened the terms of nuclear exports. The rule which has been eagerly advocated by a number of states, that there should be no nuclear supplies to any country without comprehensive safeguards, is still not being universally followed.

The nuclear weapon powers, far from disarming, are engaged in massive nuclear weapon rearmament programmes. In the past 13 years, since the conclusion of the SALT I agreements, no nuclear arms control treaty has become effective, while the agreements in force have been under constant threat of collapse. Nor has there been any movement towards a comprehensive nuclear test ban (CTB), which has long been considered as an essential measure to halt nuclear weapon proliferation. The importance of a CTB was recognized in the NPT itself, which reiterated the determination of the parties to the 1963 Partial Test Ban Treaty to achieve the discontinuation of all test explosions of nuclear weapons "for all time". The trilateral British–US–Soviet talks on a test ban treaty have remained suspended since 1980, and the multilateral talks on the same subject, held at the Conference on Disarmament, have been stalemated.

The one minor move that the United States, Britain, France and recently also the Soviet Union have made is to open certain civil nuclear power installations to inspection by the International Atomic Energy Agency. The Soviet Union's recent agreement to do this is important: it belies the proposition often made that the Soviet Union refuses all forms of international inspection.

In signing the NPT the parties agreed that the Treaty was only a step in the larger process of disarmament, in which the self-imposed denial of non-nuclear weapon states was to be matched, ultimately, by corresponding acts of the nuclear weapon powers. The non-fulfilment by the latter of their disarmament obligations contributes to sapping the legitimacy of the non-proliferation regime, particularly in Third World countries, where the regime may begin to be seen as an imposition by the great powers. Moreover, the climate of US–Soviet confrontation generated by the arms race creates disincentives for non-parties to join the Treaty and prevents joint political action against would-be nuclear weapon states.

For more than a decade, since the 1974 Indian nuclear explosion, despite the development of nuclear energy in different parts of the world, no country has demonstrated a nuclear weapon capability. This belies the fears that troubled many people in the 1950s. The NPT has so far held remarkably well. It has attracted a record number of adherents for an arms control treaty. These include almost all highly developed, industrialized and militarily significant non-nuclear weapon countries.



However, at least half a dozen so-called 'threshold' countries remain outside the Treaty. They carry out significant unsafeguarded nuclear activities and often claim the right to 'peaceful' nuclear explosions. They are, therefore, considered to be the likely next candidates for membership of the 'nuclear club'. The logic that may impel them to demonstrate a nuclear weapon capability would be political rather than military. The nuclear weapon states clearly believe that possession of these weapons gives them status in world affairs. Other states which wish to enhance their importance in world affairs may come to the same conclusion.

V. Assessment

The objective

Arms control is not, of course, an end in itself. The objective is to avoid war—primarily nuclear war. Given that it is unlikely that the nuclear powers will be willing (for the foreseeable future) simply to give up their nuclear weapons, the way to avoid nuclear war is by establishing, and preserving, some kind of stable nuclear balance.

However, there is little chance of such a stable balance when a major nuclear weapon rearmament programme is in full swing, as it is at present. A multiplicity of forces militate against the possibility of balance: the military doctrines which have moved beyond deterrence to war-fighting concepts; the political demand for avoiding apparent inferiority, which in effect becomes indistinguishable from establishing superiority; and the pressure from research and development establishments to adopt new or improved weapons.

When negotiations take place, as the Geneva negotiations will do, against a background of rapid rearmament, there is a legitimate fear that—far from reducing weapons—the negotiations may actually lead to an increase. The fact that negotiations are in progress may be used as an argument for political approval for military programmes which might otherwise be in doubt. The 'bargaining chip' argument will be used vigorously: this or that weapon system is needed to force concessions from the other side.

This is not to say that negotiations are a mistake. If the two superpowers are unwilling to reach a negotiated agreement, they are even less likely to be willing to observe any kind of unspecified and unverified mutual restraint. The argument is rather that the negotiations need to be accompanied by some kind of pause in rearmament. That is the case for a moratorium on nuclear weapon



deployments covering intercontinental and intermediate-range systems —that is, all weapons currently under negotiation. It so happens that the number of warheads deployed by each side in these two categories, taken together, is roughly the same. So a moratorium now would meet political demands for parity. To this could be added a moratorium on tests of the weapons under negotiation—for instance tests of the MX and Trident II missiles on the US side, of the SS-X-24 and SS-X-25 on the Soviet side, and of anti-satellite systems on both sides. Without some check of this kind the chances of reaching an agreement are much reduced.

Guidelines for negotiations

Arms control negotiations should reflect military realities. The military reality is that many different types of nuclear weapon, located in many different places, can attack the same target. Weapons with an intercontinental range can be used over shorter distances. Weapons with ranges less than 5 500 km (the traditional criterion for a strategic system) can be used for strategic missions if they are forward-based. As more forward-based systems are deployed, the link between range and mission becomes weak. Further, negotiations limited to certain categories of weapon can be-and are-circumvented. The sea-based cruise missile is a case in point. It was not included in either the strategic nuclear weapon or the intermediate-range nuclear weapon talks. Partly as a consequence large numbers are now being built. This is the case for the format at Geneva, where the three sets of negotiations have been brought under one umbrella. It will be harder to omit major systems, and it will be easier to take care of the overlap between intercontinental- and intermediate-range systems.

Offensive and defensive systems also have to be considered together. Improvements in defence worsen the offensive capabilities of one side and improve the offensive capabilities of the other. The interrelationship was recognized at the very beginning of strategic arms control. In 1972 the two major powers signed the ABM Treaty as well as the Interim Agreement on offensive arms. It was a formal recognition that both sides were ready to avoid an offence-defence race in the strategic weapon field. The SALT and START negotiations could thus concentrate on offensive weapons. Now that the future of the ABM Treaty is in question, possible defensive systems will have to be brought within the ambit of the negotiations again.

Both sides, in their negotiations, set great store by the concept of parity, meaning some kind of equality by one or other yardstick. There is no military need for parity: at the present level of nuclear armaments,



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margins of numerical superiority are militarily meaningless. The demand for parity is a political demand; both sides fear that if they are seen to be inferior, their position in the world would be in some way weakened. It has never been explained why this should be the case; the requirement of parity is an illusion to some extent fostered by the military, even though all that is needed for military security is sufficiency, not parity.

Should the negotiations aim for a simple agreement or should they attempt to agree on more complex provisions which produce a bias against destabilizing systems?

There is a strong—possibly overriding—case to be made for a simple agreement, fixing limits for only a few dimensions of nuclear weapon capability. Deliverable warheads would be the main unit of account. Detailed regulations require complex technological assessments, slow down the pace of negotiations, make the talks centre on the weapons of the past rather than the technologies of the future, and may create ambiguities and verification problems. The SALT II accord was certainly more comprehensive than SALT I; however, its complex provisions have led to many of these difficulties.

Stability

The alternative to a simple agreement is one with more elaborate provisions to discourage particular systems on the grounds that they are destabilizing. One of the problems here is that West and East do not agree on what is destabilizing. In the West, destabilizing developments are defined primarily in technological terms.

By now, it is widely recognized that it was a mistake, in the early stages of SALT, simply to limit launchers. This encouraged the development of multiple warheads, and this in turn increased the ratio of warheads to targets—taking missile silos as the main targets. That is the argument for an agreement which covers warheads as well as launchers (as SALT II does) and which favours less vulnerable launchers and single-warhead missiles.

Improved missile accuracies are a destabilizing development. They lead to nuclear war-fighting scenarios, threatening missile silos and command centres. Unfortunately, it now appears to be too late to reverse this trend. It is no longer possible to reduce the accuracy of missiles. A ban on testing might prevent further improvements.

Third, the deployment of forward-based systems is destabilizing because of their short flight times. As the warning time is reduced, the temptation to adopt a 'launch-on-warning' posture is increased. Further, flight time and warning time are not necessarily identical. A



cruise missile with 'stealth' technology which conceals it from radar detection may have a long flight time, but a short warning time.

Fourth, if the offensive system is itself vulnerable, this is destabilizing. This is particularly true if a system is both vulnerable and forward-based—as is the case for the Pershing II missiles in western Europe and the SS-22s in eastern Europe.

It is always possible for either side unilaterally to design its nuclear forces in such a way as to make them less destabilizing. Unfortunately in recent years there have been few signs of this. It is true that, on the US side, a single-warhead intercontinental ballistic missile is now being developed: it may, however, simply add to the stock, rather than replace any of the missiles with multiple warheads.

Soviet analysts describe destabilizing developments in a rather different way, which leads to a list of destabilizing systems which differs from that of the West:

stability is primarily endangered by those systems which are most effective in destroying the defense warning system, command posts, and staffs and their communications, but which do not have sufficiently reliable communications with headquarters...and which require special operational measures which can aggravate tension (for instance the takeoff of heavy bombers). According to these criteria, the most destabilizing means are the ballistic missiles deployed on submarines; heavy bombers armed with stealth technology; long-range cruise missiles; and the Pershing II missile deployed in forward positions.⁴

The Soviet Union proposes restraint on the extent to which some of these systems can be manoeuvred into threatening positions. It is particularly concerned with measures which improve the control of events, and the effective command and control over nuclear arms in the course of a crisis. It is noticeable that each side describes as 'destabilizing' the systems in which the other side is presumed to have an edge. The United States cites Soviet heavy missiles. The Soviet Union cites bombers, submarine-launched ballistic missiles and the Pershing II.

Space weapons

The negotiations about space weapons will clearly be one of the most difficult areas at Geneva. There are a great many variants of the way in which the ballistic missile defence programme is being presented in the United States. The most ambitious vision is that of President Reagan, holding out the hope of a world in which the development of non-nuclear defensive weapons will make offensive nuclear weapons



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obsolete. The deterrent strategy of 'mutual assured destruction' would give way to a doctrine of 'mutual assured security'. It would be the adequacy of defence rather than the threat of retaliation which would prevent an attack from taking place. The idea is added that the technology at some point could be shared with the Soviet Union—an attractive idea which at present, however, seems rather incredible. This vision of a world in which nuclear weapons are made obsolete obviously has strong popular appeal.

Other presentations of the idea go a long way to accepting the criticism that there is no reasonable prospect of achieving a perfect defence of populations. Ballistic missile defence is presented, not as replacing deterrence, but as enhancing it by providing protection to missile sites and command centres. This, it is argued, would reduce the threat of a first strike. It is sometimes put forward as a better way than arms control of dealing with the alleged threat posed by Soviet heavy land-based missiles.

The third presentation concentrates on the proposition that this is a research programme only, which is being undertaken partly because the Soviet Union is thought to have a major programme also. Before deployment, stringent conditions would have to be met. The system would have to be shown to be invulnerable to attack (which would be a difficult condition to meet in so far as it is space-based); it would also have to be cost-effective, that is, it would have to cost less than countermeasures that could negate its defence capabilities.

The Soviet view of the United States' Strategic Defence Initiative programme is clearly very different from these US presentations. It is argued that there is no sign on the US side that these ideas of developing defensive weapons have led to any decline of interest in offensive strategic systems. On the contrary, the programme is being started at a time when the United States is in the middle of a formidable programme of strategic offence. All the new missiles in the process of development and deployment-the MX, the Trident II, the small ICBM (the Midgetman) and the air-launched, ground-launched and sea-launched cruise missiles-have high degrees of accuracy; and there substantial programme devoted to developing improved is а penetration aids. To the Soviet Union, this must appear as a programme for the development of war-fighting capabilities. If a ballistic missile defence system is eventually added, this would be seen as part of a first-strike capability. The ballistic missile defence would be intended to deal with the retaliatory missiles left after a first strike.

The Soviet Union's present position (which, of course, may change) has been clearly stated: there will be no agreement on strategic offensive missiles unless something is done about the control of space weapons.



Here, there is the additional complication of the overlap between the problem of ballistic missile defence and the problem of anti-satellite weapons. Anti-satellite weapons are generally agreed to be destabilizing: no argument has been put forward to the contrary. In a crisis their very existence could give rise to the suspicion that any military satellite malfunction was the consequence of enemy action. However, if the development and testing of anti-satellite weapons were to be banned, it is not easy to see how a development and testing programme for ballistic missile defence could be permitted; for weapons which could incapacitate a missile could also (and much more easily) incapacitate a satellite.

There is a further complexity in the connection between research into anti-satellite weapons and research into ballistic missile defence. If—as seems virtually certain—the envisaged ballistic missile defence system would be at least partly space-based, such a system would be highly vulnerable to anti-satellite weapons. The same research which is addressed to the development of anti-ballistic missile systems can also be used to devise weapons to attack that system.

The proponents of ballistic missile defence are contending that this new technological development will serve to stabilize the arms race in nuclear weapons. The experience of the past 40 years suggests that new developments in military technology serve to exacerbate rather than stabilize arms competition.

Europe

The negotiations on nuclear and space weapons are, of course, just between the United States and the Soviet Union—European countries can only have an indirect influence on them. However, European states have security interests which are not identical with those of the superpowers. They have a strong interest in re-establishing detente: it was not the European countries which brought it to an end. They are consequently interested in arms control not only for its own sake, but also because it would help to lower the barriers—military, political and economic—in a divided Europe. They have legitimate fears that some conflict between the United States and the Soviet Union which began in the Third World might spread to Europe.

West European countries have more scepticism than they officially express about the US Strategic Defence Initiative. France and Britain in particular must, for obvious reasons, be concerned to preserve the integrity of the Anti-Ballistic Missile Treaty. Again, their influence is limited because they are not parties to the treaty—it is a bilateral treaty between the United States and the Soviet Union.



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The freedom of manoeuvre of European states is thus limited in many ways; the deployment of new nuclear missiles on both sides of the border is a further limitation of that freedom. Nonetheless, something can be done to pursue objectives which do not tally precisely with those of the leaders of the two alliances: it is useful to clarify what those objectives might be.

In the long run, European countries will no doubt wish to reduce the enormous concentrations of military forces which exist on either side of the border. In the shorter run there might be more possibilities for various forms of disengagement. First, there is the obvious need to withdraw battlefield nuclear weapons from areas close to the border, and in this way to reduce the rise of inadvertent escalation. Second, this could eventually be accompanied by changes in deployment of certain conventional weapons as well—with a corridor from which some major offensive capabilities are excluded, but in which defensive capabilities are permitted. At Stockholm the influence of the neutral and nonaligned group of states (which could be as important as it was at Madrid) could be used to add certain constraints on military activity to the proposals for notification and information.

For the West, if there were some prior redeployment of nuclear weapons on both sides, and some concomitant measures to enhance the credibility of Western conventional defence, it should be possible in time to move to a doctrine of no-first-use of nuclear weapons. This could go some way to re-establish a Western consensus on a credible nuclear weapon doctrine: this consensus does not at present exist. (Opinion polls suggest that most people in the West believe that NATO is already committed never to use nuclear weapons first.)

It is by pursuing disengagement, measures to prevent surprise attack, changes in nuclear weapon deployment and consequently in nuclear weapon doctrines, and also more generally by working to revive detente, that European powers can best exert pressure on the crucial arms control negotiations of the United States and the Soviet Union.

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- 1. 'Andrei Gromyko's television interview', *Soviet News* (London), No. 6257, 16 January 1985, p. 19.
- 2. ¹The Reagan Strategic Defense Initiative', Arms Control Today, Vol. 14, No. 6, July/August 1984, p. 10.
- 3. The US dollar has appreciated considerably, in terms of other currencies, since 1980. To avoid the distortion which the use of 1984 exchange-rates would produce, military expenditure is valued at 1980 prices, converted into dollars at 1980 exchange-rates; the figure is then increased by the rise in US prices between 1980 and 1984.
- Foreign Broadcast Information Service, Daily Report: Soviet Union, 26 January 1983, p. 1-6. See also Hart, D. M., 'Soviet approaches to crisis management: the military dimension', Survival, Vol. 24, No. 5, September/October 1984.



Appendix A. Public opinion

EYMERT DEN OUDSTEN

Superscript numbers refer to the list of notes and references at the end of the appendix. See also the bibliography.

Introduction

Four areas have been chosen for this year's short report on public opinion in the West: the fear of war; views on the deployment of new missiles in Europe; arms control attitudes, particularly in the United States; and opinions on NATO's current strategy of 'flexible response', which includes the option of being the first to use nuclear weapons.

Particularly in the United States and the Federal Republic of Germany, the fear of war and the extent of concern about nuclear weapons both receded during 1984: some other countries show a different pattern—one of growing concern. Although there are fewer mass demonstrations today, such opinion polls as exist do not suggest any greater approval of the deployment of new missiles in western Europe. The majority still disapproves in Britain, Italy and FR Germany; and there are large margins of disapproval in Belgium, and in the Netherlands (where the missiles have not yet been deployed).

A widespread desire is expressed in the West for productive arms control talks, and for dialogue with the Soviet Union. Over the post-war period, opinion in the United States has changed on many nuclear weapon issues: there now appears to be a consensus that nuclear war would be suicidal; that both the United States and the Soviet Union have an 'overkill' capacity; and that a nuclear arms race cannot be won.

A great many people, particularly in the United States, are under the impression that the United States and NATO now have a policy of no-first-use of nuclear weapons. In all countries where the question was asked, there was substantial support for the principle of no-first-use of nuclear weapons.

Fear of war

Asked about their greatest concerns for themselves and their country, 36 per cent of the respondents cited 'the threat of war', and 30 per cent 'nuclear weapons'. This was in a poll held in May 1984 in eight countries, with over 8 500 respondents (table A1). Their feelings of concern have receded somewhat from the high figures of the autumn of 1983, when the negotiations on intermediate-range nuclear forces in Europe were on the point of breaking down, and deployment of new US missiles was imminent.

However, the movement is not uniform between countries. The most striking change has been in FR Germany. Between October 1983 and May 1984 the proportion of respondents expressing great concern about the threat of war halved: there was also a dramatic fall in the extent of concern about nuclear weapons. A relaxation of concern was also evident in the United States, though not to the same extent. Other countries, however, showed a pattern of growing concern: that is true for Italy, Spain and particularly the United Kingdom.



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In spite of these expressions of concern, most people (it seems) still think a new world war is unlikely. From a poll conducted in the EEC countries of western Europe, it appears that only about one person in ten now considers that there is more than a 50 per cent chance of a new world war in the next ten years. In 1980, about one person in three (in Europe) believed that world war in the next ten years was probable (table A2).

In Western countries the military build-up of the two superpowers was blamed much more in 1984 than in 1982 for the increase in international tension; in general, more

Table A1. The "threat of war" and "nuclear weapons" among the greatest concerns for yourself and your country, 1983-84

Figures are the percentage of respondents naming them. Total may add up to more than 100 per cent owing to multiple answers given.

	Threat of	war		Nuclear weapons			
	Mar 83	Oct 83	May 84	Mar 83	Oct 83	May 84	
FR Germany	16	28	14	42	38	15	
France	34	44	47	19	26	26	
Italy	44	36	56	33	38	39	
Japan	36	42	35	28	34	32	
Netherlands	33	37		47	49		
Norway	31	37	30	42	40	31	
Spain	48	39	49	29	30	33	
United Kingdom	26	31	40	32	29	43	
United States	25	45	32	20	37	28	
Weighted averages ^a	30	40	36	27	35	30	

"Weighted by population.

Source: Atlantic Institute for International Affairs/Harris polls, AIIA Release, Paris, 7 June 1984.

Table A2. Replies to the question: "Here you see a scale from 1 to 100 per cent. Can you tell me where on this scale you place the danger of a new world war in the next 10 years?", 1980-84

Figures are the percentage of respondents indicating more than a 50 per cent chance that a new world war will break out in the next 10 years.

	Apr 80	Oct 81	Oct 82	Oct 83	Oct 84
FR Germany	25	32	19	18	14
France	42	25	20	24	13
Italy	32	18	14	18	12
Netherlands	24	20	19	13	21
United Kingdom	39	21	17	17	14
Belgium	33	32	20	17	16
Denmark	18	-	10	15	13
Ireland	31	28	25	2 7	18
Luxembourg	15	27	19	14	15
Greece	_	8	9	12	10
EEC (average)	34	24	18	19	13

Source: Eurobarometer (EEC, Brussels), No. 22, December 1984, p. 11.

Table A3. Replies to the question: "Which of the following things do you feel are most responsible for current international tensions", 1982-84

Figures are the percentage of respondents naming them. Total may add up to more than 100 per cent owing to multiple answers given.

	Soviet military build-up			US military build-up			Superpower activity in Third World		
	Sep 82	Oct 83	May 84	Sep 82	Oct 83	May 84	Sep 82	Oct 83	May 84
FR Germany	55	55	50	39	41	41	26	29	32
France	21	29	31	14	24	20	29	27	29
Italy	37	39	37	20	29	26	15	20	20
Japan		52	52	••	34	30	••	25	23
Netherlands	38	36		24	24	••	17	22	
Norway	57	59	54	28	34	27	28	29	31
Spain	23	18	42	26	20	47	31	23	27
United Kingdom	33	43	47	15	24	37	16	22	32
United States	27	52	37	11	25	19	17	33	22
Weighted averages ^a Weighted averages	32	47	42	18	28	27	20	28	25
excl. USA ^a	35	44	45	23	30	32	23	25	27

"Weighted by population.

Source: Atlantic Institute for International Affairs/Harris polls, AIIA Release, Paris, 7 June 1984.

Table A4. Replies to the questions, asked in the United Kingdom and FR Germany: "Do you think that US policies promote peace or increase the risk of war" and "Do you think that the policies of the Soviet Union promote peace or increase the risk of war?", a 1982-83

Figures are the percentage of respondents, in each country, naming them.

	Apr 82	Jul 82	Apr 83	Jul 83	Dec 83
In the UK					
US policies					
Promote peace	39	43	24	34	16
Increase risk of war	39	35	57	52	70
Soviet policies					
Promote peace	9	18	11	18	10
Increase risk of war	75	52	60	60	62
In FR Germany					
US policies					
Promote peace	46	32	31	27	26
Increase risk of war	33	33	38	48	41
Soviet policies					
Promote peace	9	15	17	14	9
Increase risk of war	68	52	49	60	56

"The exact wording of the questions is not available.

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Source: USIS Research Memorandum, 6 February 1984 (USIS, Washington, D.C.).

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blame was put on the Soviet Union than on the United States. However, Spain was an exception; throughout the period the US military build-up was seen as having greater responsibility. In general, in western Europe and Japan there was some tendency for a slight shift of blame towards the United States. Whereas in 1982 the proportion blaming the US military build-up was only 66 per cent of the Soviet figure, by 1984 it was 71 per cent of that figure (table A3).

Another survey, conducted by the United States Information Service (USIS) (table A4), shows this same pattern in the United Kingdom and FR Germany. Here the question was whether the policies of the United States, or the Soviet Union, promoted peace or increased the risk of war. Throughout the period from spring 1982 to the end of 1983, the judgement of Soviet policies in both FR Germany and the United Kingdom stayed much the same; negative judgements of Soviet policy exceeded positive judgements in the ratio of 5 or 6 to 1. However, there was a very substantial change in both countries in the judgement of US policies. At the beginning of the period, respondents in the United Kingdom were equally divided between favourable and unfavourable judgements. By the end of the period, unfavourable judgements outnumbered the favourable by 4 to 1. In FR Germany the movement was in the same direction—towards a more unfavourable judgement—but it was less marked than in Britain.



Figure A1. Great Britain: replies concerning the deployment of cruise missiles, 1983-84

Source: USIS Research Memorandum, 6 February 1984 (USIS, Washington, D.C.). Other polls: May 1983, Marplan; June 1983, National Opion Polls; November and December 1983, January 1984, MORI; April and June 1984, Gallup.

The new missiles in Europe

After the actual deployment of the Pershing II missiles in FR Germany and cruise missiles in Britain and Italy, there have not been as many opinion surveys as there were before January 1984. The answers to survey questions vary with the wording of the questions; however, there is little doubt that in general in Europe the majority of respondents oppose the deployment.

In Britain, the polls conducted for the United States Information Service showed a much higher degree of support for deployment than other polls (figure A1). However, even the USIS poll shows a majority opposing deployment by December 1983. Since deployment, other polls, taken up to the middle of 1984, show increasing opposition and dwindling support. Other questions also show, not surprisingly, that—together with this dwindling support for deployment—there is a growing belief that additions to the stock of nuclear weapons deployed in western Europe increase the risk of war.

In FR Germany, even the USIS polls consistently showed opponents to deployment exceeding the number of supporters: this conclusion is supported by other polls as well (figure A2). Since deployment a poll was taken in November 1984, asking for a judgement on whether deployment had been beneficial or damaging to West German security: 16 per cent said beneficial; 36 per cent said damaging; 48 per cent said it had had no effect either way.



Figure A2. FR Germany: replies concerning the deployment of new nuclear missiles, 1983-84

Source: USIS Research Memorandum, 6 February 1984 (USIS, Washington, D.C.). Other polls: May 1983, Forschungsgruppe Wahlen; July 1983, INFAS; September 1983, INFAS; October 1983, Allensbach; November 1983, Gallup.

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In the three other countries which are directly concerned with the deployment of these missiles, the majorities against deployment seem, if anything, larger than in either Britain or FR Germany. In January 1984, 63 per cent of respondents in the Netherlands were opposed to deployment. In Italy, the figure was 64 per cent in May 1984—a figure roughly unchanged since 1981. In Belgium, the opposition appears to be stronger than in any of the other four countries—79 per cent of respondents declaring themselves opposed in June 1983, and 76 per cent in June 1984.

Arms control and US attitudes

The public attitude, in general, in Western countries is highly favourable towards arms control and dialogue with the Soviet Union. In a series of polls in nine countries, conducted between 1982 and 1984, respondents were asked about items which were 'most important for the future security of Western countries'. Taking the average for all the countries in the survey, 'productive arms control talks' and 'continued dialogue and contacts with the Soviet Union' ranked first throughout the period, with not a great deal of change from year to year. In each survey, both these propositions (taking the countries together) were given higher priority than the requirement to keep a military balance with the Soviet Union (table A5).

In the United States attitudes to arms control and to nuclear weapon policy in general were studied in some depth before the US election.¹ The study by the Public Agenda Foundation shows some dramatic shifts in US attitudes towards nuclear weapons over the post-war period. In 1949, only 29 per cent of respondents thought that it was a bad thing that the atomic bomb had been developed; by 1982, the figure had become 65 per cent. There have been other similar changes. Americans no longer believe, as they once did, that nuclear war is winnable and survivable. The study set out certain consensus attitudes: attitudes espoused by more than 75 per cent of the population; attitudes that

Table A5. Replies to the question: "In your opinion, which of these things are the most

	Productive arms control talks			Continued dialogue and contacts with the USSR			Military balance with the USSR		
	Sep 82	Oct 83	May 84	Sep 82	Oct 83	May 84	Sep 82	Oct 83	May 84
FR Germany	36	36	40	33	42	43	37	33	33
France	37	49	40	15	18	18	18	1 9	21
Italy	23	26	30	16	22	18	15	15	13
Japan	••	18	21		33	27		20	21
Netherlands	49	51		22	21		23	18	
Norway	34	30	30	28	31	21	28	27	25
Spain	21	32	32	25	40	32	7	5	6
United Kingdom	21	36	42	19	36	36	24	27	32
United States	21	39	30	25	40	32	21	39	22
Weighted averages ^a	26	34	31	23	35	30	21	27	22

Figures are the percentage of respondents naming them.

important to the future security of Western countries?", 1982-84

"Weighted by population.

Source: Atlantic Institute for International Affairs/Harris polls, AIIA Release, Paris, 7 June 1984.

do not vary significantly, no matter how questions are worded; and attitudes that show only minimal differences among demographic subgroups. These consensus attitudes include the following:

that nuclear war is suicidal; that both the USA and the USSR have an 'overkill' capability; that a nuclear arms race cannot be won, since the Soviet Union would match US increases; and that the USA and the USSR must never resort to war, because it is too dangerous.

However, the US consensus attitude is still that the Soviet Union is a dangerous adversary, which secretly built up its military strength in the period of detente.

No-first-use of nuclear weapons

The consensus of public opinion on the issue of the first-use of nuclear weapons can be simply stated. Wherever the question is asked, a substantial majority take the view that under no circumstances should their country—or their alliance—be the first to use nuclear weapons. This is shown in public opinion surveys taken in the United States, Britain, Italy and Belgium.

In the United States this subject provides another example of a change in attitude over the post-war period. In 1949 the majority accepted the idea that the USA might use nuclear weapons to defend western Europe if it should be attacked (by any means). Then, only 38 per cent of respondents were opposed to the use of nuclear weapons for this purpose. By May 1984 the opposition to this idea had risen from 38 per cent to 75 per cent.

Indeed, in the United States, and probably in other Western countries as well, most people appear to believe that the West has already adopted a no-first-use policy. In the USA, 81 per cent of the respondents believed that it is in fact current US policy to use nuclear weapons only if the United States itself is attacked first with nuclear weapons. More particularly, the majority believe that in Europe it is US policy to use nuclear weapons only if the Soviet Union uses them first.

In Italy, Belgium and in Britain there is also a majority in favour of a no-first-use policy.

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Opinion poll data was obtained from the following organizations

AIIA, Atlantic Institute for International Affairs: Paris, France Allensbacher Institut für Demoskopie: Allensbach, FR Germany Dimarso: Brussels, Belgium Emnid: Bielefeld, FR Germany Eurobarometer, EEC: Brussels, Belgium Forschungsgruppe Wahlen: Mannheim, FR Germany Gallup Organization: Princeton, N.J., USA L. Harris Associates: Paris, France IMR, Institute for Market Research: Brussels, Belgium INFAS: Bonn, FR Germany Makrotest: Brussels, Belgium MORI, Market & Opinion Research Institute: London, UK NORC, National Opinion Research Center: Chicago, Ill., USA NSS, Nederlandse Stichting voor Statistiek: Bussum, The Netherlands Public Agenda Foundation: New York, USA Social Surveys: London, UK USIS, US Information Service: Washington, D.C., USA Yankelovich, Skelly and White, Inc: USA

Part I. The nuclear arms race

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1. Nuclear weapons

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Superscript numbers refer to the list of notes and references at the end of the chapter.

I. Introduction

Progress in US and Soviet military programmes during 1984 presaged the significant qualitative and quantitative expansion and improvement of nuclear arsenals planned by the superpowers for the late 1980s and early 1990s. Nonetheless, during 1984 sustained increases occurred in the number of nuclear weapons, especially in the strategic nuclear stockpile. Approximately 800 strategic nuclear weapons were added to the US stockpile as a result of the commissioning of two Trident submarines and the activation of two more air-launched cruise missile (ALCM)-equipped B-52 bomber squadrons. The Soviet Union also appears to have virtually completed the MIRVing of its intercontinental ballistic missile (ICBM) force, resulting in at least a fourfold increase in strategic warheads since the late 1970s, while actively pursuing the deployment of a number of shorter-range nuclear systems. Both the United States and the Soviet Union also deployed their first modern long-range sea-launched cruise missiles (SLCMs) (see section V).

Whereas in 1983 the focus was on key decisions and milestones in the modernization of offensive nuclear forces (e.g., the Scowcroft Commission report on ICBM modernization, and the initial deployment of Pershing II and ground-launched cruise missiles (GLCMs) in Europe; see *SIPRI Yearbook 1984*, chapter 1), 1984 was dominated by discussions relating to President Reagan's Strategic Defense Initiative (SDI). Indeed, as the United States and the Soviet Union manoeuvred towards one another to try and find a way to resume arms negotiations, SDI replaced the Pershing II missile as the main Soviet focus and obstacle.

The SDI programme (and ideology) is extraordinarily radical. It is beginning to force open a debate about the fundamental structure and relationship of US and Soviet nuclear forces and doctrines. Depending on how much the plans will be translated into actual systems, it either redefines or overthrows the fact of mutual deterrence. President Reagan and other SDI supporters have claimed that strategic defences would provide an alternative to a Mutual Assured Destruction (MAD) doctrine. The FY 1984 Annual Report to Congress of the Secretary of Defense reaffirmed the overall objectives of the 'countervailing strategy' of the Carter Administration, but emphasized that "deliberately designing weapons aimed at populations is neither necessary nor sufficient for deterrence. If we are forced to retaliate and can only respond by destroying population centers, we invite the destruction of our own population. Such a deterrent strategy is hardly likely to carry the conviction as a deterrent".¹

The Administration characterization of MAD serves to justify not only new counterforce weapons but SDI as well. But as a number of strategic experts wrote in *Scientific American*, MAD "is not a policy or a doctrine but rather a fact of life. It simply descended like a medieval plague—a seemingly inevitable consequence of the enormous destructive power of nuclear weapons, of rockets that could hurl them across almost half of the globe in 30 minutes and of the importance of political institutions in the face of such momentous technological innovations".²

Although the SDI programme did not become a major issue in the US presidential campaign of 1984, arms control and defence analysts are lining up in support of or opposition to the proposed programme.³ The attention focused on SDI by the Soviet Union has also coincided with Administration arguments that it was the fear of 'Star Wars' and the strategic offensive build-up that brought the Soviets back to the negotiating table. The reality is certainly more complex.⁴

While the superpowers were expanding their offensive arsenals and preparing for new defensive programmes, the smaller nuclear powers were also upgrading their nuclear forces (see section IV). France is planning to add its first MIRVed submarine-launched ballistic missile (SLBM) system in early 1985, while Britain is moving forward with Tornado deployments and Trident II preparations. China is also preparing for its first operational ballistic-missile submarine (SSBN) system.

II. US nuclear weapon programmes

Technical and quantitative developments during 1984 were secondary to the fundamental changes in Western public opinion concerning the superpower relationship. In 1980 the public perception was, rightly or wrongly, that the United States was lagging behind the Soviet Union militarily. By 1984 much of Western public opinion subscribed to the belief that US strength had been regained.⁵ President Reagan asserted that "America is back—standing tall". A steady stream of statements were made that created this new perception although they little corresponded to the numerical tables commonly consulted to determine the 'military balance'. To an interviewer's question in January 1984 about evidence of the President's claim that the world was a safer place as a result of his policies, Mr Reagan answered, "we have a deterrent capacity we didn't have three years ago".⁶ In March 1984 he said, "I think that there is less tension today and less threat and danger with the rebuilding that we have done that makes us more secure than there was earlier when our defense was so lax that there was a window of vulnerability".⁷ Assistant Secretary of State Richard Burt put this dimension of the arms race well when he said, "The strategic nuclear balance is what the world understands as to who's ahead. It is a psychological as much as a hardware dimension. And in terms of deterrence, it does not matter if the difference is psychological or not".⁸

The nuclear weapon budget

While deliberations on the FY 1985 budget were taking place (see chapter 7, section III), the vigorous programmes to modernize and increase the size and capability of the US nuclear arsenal continued. During 1984 sustained increases occurred, especially in the strategic stockpile. Approximately 800 strategic weapons were added as a result of two Trident submarines and two ALCM-equipped B-52 squadrons becoming operational. The budget for future nuclear weapons continued to rise at a faster rate than the total military budget. There is no convenient figure that specifies how much the United States annually spends on nuclear weapons. For the first time the Administration did present a figure of \$50.3 billion,⁹ which it said was approximately 15 per cent of the National Defense Budget. It is difficult to assess the validity of the figure because there was no explanation of how it was computed. Other estimates put the figure in the 21–22 per cent range.

Two measures that can be used to compute increases in spending for nuclear weapons are the Department of Energy's (DoE) budget for nuclear weapons and the strategic forces programme of the Department of Defense (DoD) budget. Reagan has increased the former budget by 105 per cent since FY 1981 and the latter by over 150 per cent.

ICBMs

The year saw little change in the land-based missile force (see table 1.1). Ten Titan II missiles were deactivated, reducing the number of these

Table 1.1. US strategic nuclear forces, 1985

Delivery system	Weapon system						
	Туре	No. deployed	 Year deployed 	Range (km)	Warheads × yield	Warhead type	Number in stockpile
Land-based missiles	Minuteman II	450	1966	11 300	1 × 1.2 Mt	W-56	480
Minuteman III	550	1970	13 000	3 × 170 kt/	W-62	825	
					335 kt	W-78	1 000
	Titan II	30	1963	15 000	1 × 9 Mt	W-53	50
Submarine-based missiles	Poseidon	304	1971	4 600	10×40 kt	W-68	3 300
	Trident I	312	1979	7 400	$8 \times 100 \text{ kt}$	W-76	3 000
Bombers	B-52G/H	263	1955	16 000	8-24 ^a	a	4 733
	FB-111	61	1969	4 700	6 ^{<i>a</i>}	a	360
Aerial refuellers	KC-135	615	1957	—	_	—	_

^a Bomber weapons include five different nuclear bomb designs with yields from 70 kt to 9 Mt, air-launched cruise missiles (ALCMs) with a yield of 200 kt, and short-range attack missiles (SRAMs) with a yield of 200 kt. FB-111s do not carry ALCMs or the 9-Mt bomb.

Sources: Cochran, T. B., Arkin, W. M. and Hoenig, M. H., Nuclear Weapons Databook, Volume 1: US Forces and Capabilities (Ballinger, Cambridge, Mass., 1984), updated in Bulletin of the Atomic Scientists, August/September 1984.
missiles to 30. There was no change in the 450 Minuteman IIs or the 550 Minuteman IIIs. The Pentagon continued to implement the three major recommendations proposed by the Scowcroft Commission.

The first was to deploy 100 MX/Peacekeeper missiles: 69 in existing Minuteman silos in eastern Wyoming and 31 in western Nebraska. The Administration requested \$5 billion in its FY 1985 budget to buy 40 MX missiles and continue research, development and construction funding to meet an initial operating capability of 10 missiles on alert by December 1986. As had been the case in 1982 and 1983, the MX proved to be one of the most controversial issues with Congress. In two votes in the Senate, it narrowly won (55 to 41 and 48 to 48) with the latter tie broken by Vice-President Bush. In the House of Representatives, the votes were 218 for and 212 against, and 197 for and 199 against. In conference the two Houses compromised by producing a complex formula for the MX. In the end, \$1.5 billion to procure 21 missiles was withheld until after 1 March 1985, pending satisfaction of three conditions: (a) that the President submit a report to Congress addressing several issues about the need for the MX; (b) that both Houses of Congress pass jointly a resolution to authorize \$1.5 billion for the MX; and (c) that both Houses pass jointly a resolution to appropriate those same funds. By 29 March 1985 the Administration had won all four votes.

According to the latest Pentagon estimates, the total cost of the Peacekeeper missile will be \$21.68 billion. This figure is somewhat misleading in that it excludes another \$4.2 billion spent from 1973 to 1982, when it was officially known as the MX. The figure also excludes DoE warhead costs. Therefore, a more realistic estimate is \$30 billion.

Three more research and development tests were conducted in 1984: on 30 March, using 10 Mk 12A re-entry vehicles (RVs); on 15 June, using 1 Mk 21 and 5 Mk 12A RVs; and on 1 October, using 6 Mk 21s. The Air Force stated that MX tests achieved "tremendous accuracy".¹⁰ The CEP¹¹ goal for the MX is half that of the Minuteman III, probably of the order of 105–120 metres. The final 12 (of a total of 20) MX tests planned will be from modified Minuteman silos at Vandenberg Air Force Base in California.

Midgetman

The second Scowcroft Commission recommendation concerning ICBMs was to begin engineering design of a small, single-warhead missile (SICBM) to be on alert by 1992. The current concept is a missile of not more than 15 000 kg, 13 m long, with a range of 10 000 km,

deployed at up to 12 major military installations on mobile launchers hardened to 30 psi (pounds per square inch). The baseline warhead and re-entry vehicle would be the same as the MX (W-87 and Mk 21), giving it similar hard-target accuracy using the Northrop lightweight advanced inertial reference system (AIRS).

Congress appropriated \$462 million for the small ICBM in FY 1985. In December 1983, February 1984 and May 1984 the Air Force awarded small ICBM contracts to competing corporations in the areas of missiles (Boeing, General Dynamics, McDonnell Douglas and Martin Marietta); propulsion systems (Aerojet General, Hercules, Morton Thiokol and United Technologies Chemical Systems Division); hard mobile launchers (Bell/Textron, Boeing, General Dynamics/Convair and Martin Marietta); and guidance and control systems (Rockwell, Autonetics, Litton, Honeywell and General Electric).

A test to measure how blast-resistant the mobile launchers might be was conducted in October 1983 at White Sands Missile Range. Called Direct Course, in the test 600 tons of high explosives were detonated simulating the blast from a 1-kt nuclear explosion and its effects on small scaled-down versions of Midgetman launchers. Other experiments to determine the survivability of launchers were conducted at Sandia Laboratories in New Mexico. One test included detonation of up to half a ton of high explosives inside a new 155-m long, 6-m diameter tube generating winds of up to 1760 kilometres per hour.¹²

The number of small ICBM missiles has still not been decided upon. Now that the Administration has won the MX vote, the Air Force may propose deployment of only 400-500 of these small ICBMs, rather than 1 000 or more had the MX been defeated.

The third Scowcroft Commission recommendation was to conduct technology programmes in the areas of silo hardening and deep basing. The Pentagon requested almost \$260 million for these programmes in FY 1985. Some US scientists have concurrently revised their thinking on how hard missile silos can be made. Using steel liners with concrete and reinforced steel, Air Force and Defense Nuclear Agency officials believe silos can be hardened to 20–25 times the 2000-psi levels now used in Minuteman silos. New experiments have also concluded that craters produced by nuclear detonations may be smaller than was once thought. Data from the Pacific tests conducted in wet soil showed that nuclear explosions produced large saucer-type craters. Tests and experiments conducted in loose, dry soil, more similar to where US silos are based, produced smaller-diameter, soupbowl-like craters.

The Pentagon is pursuing a deep-basing programme with other possible applications in addition to protection of missiles. Deep basing is pursued to meet the requirements of Presidential Directive PD-59 and National Security Decision Directive NSDD-13, which demand long-term endurance of US strategic forces and a 'strategic reserve'.

Supplementing the strategic efforts is a seven-year (fiscal years 1983–89) \$1.3 billion set of research programmes known as the Advanced Strategic Missile Systems (ASMS). In FY 1985 the Pentagon will spend almost \$100 million researching new penetration aids, defence suppression and advanced re-entry systems.¹³ Research into guidance improvements to further increase the accuracy of the Minuteman III and Minuteman II missiles is also being pursued.

Strategic submarine programmes

During 1984 two more Trident submarines began their first patrols. By the end of the year the force included 5 Trident and 31 Poseidon submarines capable of firing 592 SLBMs and carrying 5 536 warheads. From March 1983 to March 1984, ballistic-missile submarines conducted 81 patrols. From the first patrol in November 1960 to 13 March 1984 the total number of patrols was 2 219.¹⁴

The FY 1985 budget provided funds for the twelfth Ohio Class SSBN and advanced funding for the thirteenth and fourteenth. During the year, the Ohio (SSBN 726) and Michigan (SSBN 727) continued patrols (from 1982 to 13 March 1984 they had completed seven between them); the Florida (SSBN 728) and Georgia (SSBN 729) began patrols; and the Henry M. Jackson (SSBN 732, ex-Rhode Island) was commissioned (6 October). The Navy has not yet specified exactly how many Trident submarines it wants, although a figure of 20-25 is often mentioned.

Unless arms control agreements require otherwise, the Navy plans to retire 31 Lafayette/Franklin Class SSBNs between 1993 and 1999. The most immediate issue must be decided before the seventh Trident submarine, the Alaska (SSBN 734), goes on sea trials sometime in September 1985.¹⁵ By then the USA will have 14 more than the unratified SALT II limit of 1200 MIRVed-missile launchers. This would bring up two crucial decisions for the Reagan Administration. The first and most important would be whether to continue to "refrain from actions which undercut" the SALT treaties "so long as the Soviet Union shows equal restraint", a statement made by President Reagan on 31 May 1982 (see SIPRI Yearbook 1984, page 661). In a press conference on 9 January 1985, the President indicated in the strongest language so far that the policy would continue. If it is decided to keep under the limit, then the Pentagon could dismantle either a Lafavette Class Poseidon submarine (16 launch tubes) or 14 Minuteman III silos or implement some other solution. The problem will persist with sea trials of the eighth submarine, the Nevada (SSBN 735), in May 1986

and the sea trials of each subsequent submarine. A Congressional resolution in 1984 was introduced to continue the 'no undercut' policy and reports were required of the Pentagon to clarify its policy.¹⁶

Because the Navy accelerated the introduction of the Trident II missiles to be put on the ninth submarine instead of the eleventh, it terminated purchase of Trident I (C-4) SLBMs in 1984. The current plan is to buy 570 Trident Is (plus 25 for research and development) for 12 retrofitted Poseidon submarines and the first eight Trident hulls. As of 13 March 1984 398 missiles had been delivered.¹⁷

The Navy requested over \$2.2 billion in the FY 1985 budget for research for the Trident II SLBM, with which it plans eventually to arm all Trident submarines. Unlike the MX, which has garnered headlines and controversy, a notable feature of the Trident II is the apparent lack of concern about a weapon system that is more strategically significant and more expensive than the MX. If and when it is fully deployed, the MX would include 100 missiles carrying 1 000 warheads. An eventual force of 25 Trident submarines will carry 600 Trident II missiles with some 4 800 warheads. Though slightly less accurate than that of the MX, Trident II's planned higher yield warhead (475 kt vs 300 kt) will give it a hard-target kill capability nearly equal to that of the MX. The Trident programme also promises to be the most expensive US nuclear weapon system. Counting all parts of the programme, a force of 20 will cost over \$100 billion; a force of 25, some \$120 billion.

Strategic bomber programmes

The number of strategic bombers remained approximately the same in 1984, although the number of deliverable weapons increased with the addition of two ALCM-equipped B-52G squadrons. On 1 January 1985 there were 167 B-52Gs, 96 B-52Hs and 61 FB-111s. Several B-1B milestones occurred in 1984, and more concrete plans were known. On 1 February 1984, future B-1B bases were announced. Between September 1986 and June 1988, five squadrons of B-1Bs will be activated at Dyess AFB, Texas; Ellsworth AFB, South Dakota; Grand Forks AFB, North Dakota; and McConnell AFB, Kansas. Dyess AFB will get the first of 26 aircraft in June 1985 and will become the training base. Ellsworth AFB will receive two squadrons (32 aircraft) between January and September 1987. Grand Forks AFB will receive one squadron (16 aircraft) between September 1987 and January 1988, and McConnell AFB will receive 16 aircraft between February 1988 and June 1988.

In 1984 Congress appropriated \$7 billion for 34 more B-1B aircraft, bringing the total number of aircraft purchased to date to 52. The final

48 aircraft will be requested in the FY 1986 budget. Concern has been expressed over the economic impact of stopping the enormous production complex that makes the B-1B. With over 5 000 subcontractors in 48 states and no more purchases planned beyond FY 1986, there is speculation that the Air Force might ask for more than 100 B-1Bs.

The rollout of the first B-1B occurred at the Rockwell factory in Palmdale, California, on 4 September 1984, five months ahead of schedule. The first B-1B bomber successfully completed a 3 h 10 min maiden flight on 18 October.

Bomber weapons—including the short-range attack missile (SRAM), the ALCM and bombs—are also undergoing modernization. In 1984 the fifth operational ALCM-equipped B-52 squadron was deployed. Production of the ALCM, however, is nearing termination at 1 739 missiles as interest shifts to the Advanced Cruise Missile (ACM) with its longer range, higher speed and lower radar signature. The ACM will eventually arm the B-1B bomber force. An intercontinental cruise missile with a 9 600–12 800-km range is also under development.¹⁸ A replacement for the SRAM, called the Advanced Air-to-Surface Missile (AASM), is also under development. A new nuclear bomb, the B-83, entered the bomber force in 1984 and will eventually replace the older high-yield B-28, B-43 and B-53 bombs.

Theatre nuclear forces

After the extraordinary attention surrounding the ground-launched cruise missile and Pershing II in 1983, 1984 was relatively calm. Both the GLCM and the Pershing II were introduced in Europe at a rate of about one missile per week. No official announcements were made so as not to arouse additional public furore or debate. By year's end, 48 GLCMs were operational at Greenham Common in the UK¹⁹ and 32 at Comiso, Italy. In the Federal Republic of Germany, the number of Pershing IIs had risen to 54 by then. The first battalion of 36 missiles with four batteries was completed at Schwäbisch Gmünd. Eighteen more missiles at Heilbronn and Neu Ulm were activated.²⁰ The remainder are scheduled for deployment by December 1985.

Sixteen cruise missiles have been deployed at Florennes, Belgium. Although the exact timetable for cruise missile deployment has not been made public and may be subject to political alterations, the following schedules are planned:

Greenham Common, UK	96 between December 1983 and December
	1985
Comiso, Italy	112 between March 1984 and early 1987

Table 1.2. US theatre nuclear forces, 1985

	Weapon system						
Delivery system	Туре	No. deployed	Year deployed	Range (km)	Warheads × yield	Warhead type	Number in stockpile
Aircraft	a	2 000	-	1 060 – 2 400	$1-3 \times \text{bombs}$	a	2 800
Land-based missiles	Pershing II	54	1983	1 7 9 0	1×0.3 –80 kt	W-85	54
	GLCM	80	1983	2 500	$1 \times 0.2 - 150$ kt	W-84	100
	Pershing 1a	144	1 962	740	1 × 60-400 kt	W-50	280
	Lance	100	1 972	125	$1 \times 1 - 100$ kt	W-70	1 282
	Honest John	24	1954	38	$1 \times 1-20$ kt	W-31	200
	Nike Hercules	200	1958	160	$1 \times 1-20$ kt	W-31	500
Artillery ^b	b	4 300	1956	30	$1 \times 0.1 - 12$ kt	b	2 422
Atomic demolition mines	Medium/special	610	1 964	_	$1 \times 0.01 - 15 \text{ kt}$	W-45/54	610
Naval systems							
Carrier aircraft	c	900		550 1 800	$1-2 \times bombs$	c	1 000
Land-attack SLCMs	Tomahawk	50	1984	2 500	$1 \times 5 - 150$ kt	W-80	50
ASW systems	ASROC	n.a.	1961	10	$1 \times 5 - 10$ kt	W-44	574
-	SUBROC	n.a.	1965	60	$1 \times 5 - 10$ kt	W-55	285
	P-3/S-3/SH-3	630	1964	2 500	$1 \times < 20$ kt	B-57	897
Ship-to-air missiles	Terrier	n.a.	1956	35	$l \times 1$ kt	W-45	100

^a Aircraft include Air Force F-4, F-16 and F-111, and NATO F-16, F-100, F-104 and Tornado. Bombs include four types with yields from sub-kt to 1.45 Mt. ^b There are two types of nuclear artillery (155-mm and 203-mm) with three different warheads: a 0.1-kt W-48, 155-mm shell; a 1–12-kt W-33, 203-mm shell; and

a 1-kt W-79, enhanced-radiation, 203-mm shell.

^c Aircraft include Navy A-6, A-7, F/A-18 and Marine Corps A-4, A-6 and AV-8B. Bombs include three types with yields from 20 kt to 1 Mt.

Sources: Cochran, T. B., Arkin, W. M. and Hoenig, M. H., Nuclear Weapons Databook, Volume 1: US Forces and Capabilities (Ballinger, Cambridge, Mass., 1984), updated in Bulletin of the Atomic Scientists, August/September 1984.

Florennes, Belgium	48 between March 1985 and December 1987
Hasselbach, FR Germany	96 between June 1986 and June 1988
Woensdrecht, Netherlands	48 between December 1986 and June 1988
Molesworth, UK	64 between September 1987 and December
	1988

In the Netherlands the final government decision on deployment was again delayed until November 1985. The nuclear-armed Tomahawk sea-launched cruise missile was first deployed in June 1984 (see section V).

A number of other important developments concerning lesser known weapons occurred during 1984 (see table 1.2). The October 1983 NATO Ministers' meeting in Montebello, Canada, called for the withdrawal of

Weapon system			
(warhead)	As of 1985	Withdrawals ^a	As of 1992
Stored in Europe	· · · · · · · · · · · · · · · · · · ·		
Pershing II	54	0	108
Pershing 1a	231	131	100
Ground-launched CM	100	0	464
Bombs	1730	0	1 730
Lance	690	0	690
Honest John	190	190	0
Nike Hercules	680	680	0
8-inch (W-33)	930	500	430
8-inch (W-79)	0	0	200 ^b
155-mm (W-48)	730	350	380
155-mm (W-82)	0	0	100
Atomic demolition mines	370	370	0
Depth bombs	190	0	190
Total in Europe	5 895	2 221	4 392
Committed to Europe ^c			
Poseidon	400	0	400
Carrier bombs	360	0	500
Bombs	600	0	800
Depth bombs	140	0	140
Lance	380	0	380
8-inch (W-79)	200	0	200
Total committed	2 080	0	2 420
Total	7 975	2 221	6 812

Table 1.3. US European nuclear modernization, 1985-92

"Withdrawals in accordance with the modernization decision of 1979 (equal withdrawals for deployments); the Montebello decision of 1983 (1400 additional withdrawals); and (other) anticipated changes in artillery stockpiles.

^b Deployment of non-enhanced radiation warheads in Europe.

^c Warheads committed by Europe or planned for storage in Europe (does not include tactical naval nuclear weapons).

Source: Authors' estimates.

Weapon system	Total no. to be pro- duced	First year operational	Spent by FY 1986 (\$ bn)	Requested funding FY 1986 (\$ bn)	Number requested	Proposed funding FY 1987 (\$ bn)	Unit cost FY 1986 (\$ mn)	Estimated total cost " (\$ bn)	Comments
MX missile	223	1986	13.1 ^b	4.0	48	3.2	116	25.9	100 deployed by 1989
Trident submarine	20-25	1982	16.8	2.0	1	1.8 ^c	1 600	31-39	Cost for first 16 subs: \$25.1 bn
Trident I	595	1979	8.1	0.066	0	0.047	19	11.2	For 12 Poseidon and 8 Trident, 211 tests and spares
Trident II	764	1989	4.4	2.7	0	3.6	49	37.4	For 16 subs; for 20-25, cost would be \$42-48 bn
B-1B	100	1986	26.4	6.0	48	0.136	400	40	90 operational aircraft
Stealth	132	1990s	d	0.80	0	2,272	?	40-50?	One estimate \$6.3 bn for FY 84-88
B-52 modifications	263	Ongoing	3.3	0.480	_	0.805	20 each	5.8	Radar, engines, avionics
ALCM	1 739	1982	4.1	0.049	0	0.037	2.5	4.5	Production stopped
GLCM	565	1983	2.8	0.620	95	0.243°	6.5	3.7	
SLCM	4 068	1984	3.3	0.849	249	1	3.2	13.0	758 nuclear versions
Advanced cruise missile	2 600	1988	?	?	0	?	5–7	7.0	Figures are estimates
Pershing II	325	1983	2.2	0.335	70	0.007	7.0	2.9	
Midgetman	1 000	1992	.807	0.625	0	?	38-70	38-70	20-year cost could be \$107 bn

Table 1.4. Major US nuclear weapon system programmes

^a Does not include DoE costs for nuclear warheads and bombs which normally are an additional 10-20 per cent of the weapon system cost.
^b Does not include \$1.5 billion for 21 missiles in FY 1985 budget pending Congressional vote.
^c Does not include military construction funds.
^d Partial figures first available in FY 1986 budget request are not comprehensive.

Source: FY 1986 Defense budget requests to Congress.

1 400 nuclear warheads from Europe as part of the compensation for long-range modernization, but also approved the modernization of short-range nuclear forces (see table 1.3). The most controversial programme of this modernization is nuclear artillery, which is going to move forward under complicated Congressional guidelines: (a) no more than 925 new artillery projectiles can be produced; (b) the military must determine the mix of 155-mm and 203-mm shells within this ceiling; (c) no new enhanced radiation warheads can be built; and (d) the cost of the overall programme cannot exceed \$1.2 billion.²¹

Other theatre weapons include the B-61 nuclear bomb, which continues in production, arming new US and NATO F-16 and Tornado aircraft in Europe. According to the Army, investigations have also begun on the possibility of "a modernized mid-range replacement or modification to Lance, and perhaps a standoff air-delivered weapon".²² A standoff replacement for the B-57 nuclear depth bomb is also under development, as is a nuclear warhead for a naval air-to-air missile.

Congressional control of nuclear programmes

The second session of the 98th Congress continued a pattern of active participation in exercising oversight responsibilities in military programmes in general and nuclear weapons and arms control issues in particular. It did this through its regular and special hearings and resolutions and by requesting detailed reports and actions from the Pentagon.

An increasingly frequent device to help Congress fulfil its oversight responsibilities is to request reports from the executive branch of the government. Language in the FY 1985 bills demanded various reports and actions that will be due during the year. Among the more significant in the area of nuclear weapons and arms control are the following:

1. A report from the President on the need for the MX missile, due on 1 March 1985.

2. The survivability of the US strategic nuclear ballistic missile submarine force, due on 1 April 1985.

3. A spring 1985 presidential report on anti-satellite (ASAT) weapons certifying that the USA is seeking to negotiate a mutual, verifiable agreement with the USSR on ASAT weapons, that renewed ASAT tests are necessary and will not impair negotiations, and that such tests are consistent with the Anti-Ballistic Missile (ABM) Treaty.

4. The arms control methods which might make it possible to verify the difference between conventionally armed sea-launched cruise missiles and those armed with nuclear warheads (due on 15 March 1985).

5. Strategic Defense Initiative programmes, due each fiscal year from FY 1986 to FY 1990, with budget presentation materials. Major parts of the report shall include details of the programmes, definition of objectives, the status of consultations with allies, and statement of anticipated impact on the ABM Treaty.

6. Theatre nuclear weapons and force structure, due on 19 January 1985. The report will address specific issues on how to reduce pressures for early-first-use of NATO tactical nuclear weapons and how to make the arsenal more stable and credible.

7. Withdrawal of tactical nuclear warheads from Europe, due 90 days after the final decision is made regarding implementation of the NATO Montebello decision of 17 October 1983. The report shall specify the types, numbers and rationale for the particular warheads chosen for withdrawal.

8. US counterforce capability, due on 15 April 1985. The report shall discuss the required strategic counterforce capability consistent with existing US policy.

9. Transmittal to Congress of the General Advisory Committee Report on Soviet Compliance with Arms Control Agreements, occurred in October 1984.

10. Nuclear Winter findings and policy implications, due on 1 March 1985. The report shall include: (a) a detailed review and assessment of the current scientific studies and findings on the atmospheric, climatic, environmental and biological consequences of nuclear explosions and nuclear exchanges; (b) a thorough evaluation of the implications that such studies and findings have on strategy, targeting, planning, command, control, procurement, deployment, arms control and civil defence policy; and (c) an analysis of the extent to which current scientific findings on the consequences of nuclear explosions are being studied, disseminated and used in the Soviet Union.

11. Findings regarding Soviet adherence to the 'no undercut' policy, due on 15 February 1985.

12. The implications of the USS Alaska's sea trials for the US 'no undercut' policy, due on 1 June 1985.

13. Report of a Blue Ribbon Task Group to the President and Congress on how to make the research, development, testing, production, surveillance and retirement of nuclear weapons more cost-effective, due in mid-June 1985.²³

Nuclear weapons

The Strategic Defense Initiative

President Reagan's Strategic Defense Initiative (SDI) or 'Star Wars' proposal was debated widely in 1984 and by year's end became entwined with a range of issues from the fundamentals of US strategic doctrine to arms control. On 6 January President Reagan signed National Security Decision Directive 119, which set into motion an accelerated research programme for strategic defences. The FY 1985 military budget which soon followed provided details. Envisioned in the near term was a \$26 billion effort for the fiscal years 1985–89. Existing anti-ballistic missile (ABM) and new SDI research was reorganized into five major technical areas. The FY 1985 budget request was almost \$2 billion: \$1.78 billion for the DoD and \$210 million for the DoE. Congress cut the DoD funding by almost \$380 million.

Throughout the spring and summer Congress held an extensive set of hearings on SDI.²⁴ Pentagon, Congressional and private research organizations also focused on the feasibility of an SDI programme. The Scowcroft Commission report in March 1984 concluded that "strategic implications of ballistic missile defense and the criticality of the ABM Treaty to further arms control agreements dictate extreme caution in proceeding to engineering development in this sensitive area".²⁵ The Office of Technology Assessment released a background paper on 24 April which concluded: "The prospect that emerging 'Star Wars' technologies, when further developed, will provide a perfect or nearperfect defense system, literally removing from the hands of the Soviet Union the ability to do socially mortal damage to the United States with nuclear weapons, is so remote that it should not serve as the basis of pubic expectation or national policy about ballistic missile defense".²⁶ The Congressional Budget Office released a report on 23 May 1984 entitled Analysis of the Costs of the Administration's Strategic Defense Initiative, 1985–1989, which concluded that SDI cost estimates were dependent on how comprehensively or narrowly defence is defined. Details of the 1983 Fletcher Commission and Hoffman Commission reports were also released in 1984.²⁷

The SDI debate intensified as more and more former government officials, scientists, defence intellectuals and arms control proponents contributed their views. Former Secretary of Defense James Schlesinger attacked the Star Wars plans, estimating that the cost would be at least \$1 trillion and saying, "There is no serious likelihood of removing the nuclear threat from our cities in our lifetime or in the lifetime of our children".²⁸ McGeorge Bundy, George F. Kennan, Robert S. McNamara and Gerard Smith struck again with another *Foreign Affairs* article entitled "The President's choice: Star Wars or arms

control" (Winter 1984–85). Former Secretary of Defense Harold Brown said that "technology does not offer even a reasonable prospect of a successful population defense", even at a cost of \$1 trillion. He called on President Reagan to give up the ambitious project and "publicly acknowledge that there is no realistic prospect for a successful population defense certainly for many decades and probably never".²⁹

More unclear at the end of the year than at the beginning were the official goals for the scope of strategic defences. Although it was originally intended to be a comprehensive population/city defence, some talked as if it might only defend missile fields and facilities. Whether for technological, financial or strategic reasons, evidence emerged in 1984 suggesting that civilian and military officials were quietly scaling back the goals of the programme.³⁰ Congressional scepticism also grew, and the prospects of crushing deficits looming over the budget may ensure that the high price tag of \$4 billion in FY 1986 will be reduced. The sensitive point of protection of allies caused critical reactions and some suspicion from French, British and West German leaders during the year.³¹

III. Soviet nuclear weapon programmes

Virtually every official and private analysis of the nuclear 'balance' between the United States and the Soviet Union made since the late 1960s has pointed out that, while the USSR has more nuclear delivery vehicles than the USA, the United States has more warheads than the Soviet Union. In spring 1984, US officials, including the President, indicated that the Soviet Union had surpassed the USA in the size of its nuclear arsenal and indeed had a numerical warhead advantage of some 25 per cent.³² According to charts presented by US officials in testimony before Congress for the FY 1985 budget, the Soviet nuclear arsenal is considerably higher than the US peak of about 31 000 warheads in 1967. The charts portrayed the total Soviet arsenal surpassing that of the USA sometime in the mid-1970s.³³

This new analysis of the military balance could have a significant impact on the politics of weapon procurement, the formulation of arms control stances and the battle for public opinion. These estimates, it should nevertheless be noted, are equivocal and may be the product of inflationary assumptions and generous arms control counting rules.³⁴ Given the lack of public knowledge about the accuracy of US intelligence estimates in this obscure area, it is difficult to determine at this time the exact size of the Soviet nuclear arsenal and thus to judge the veracity of US government figures on the overall number of warheads. If a 'warhead gap' exists, it has little military significance, given that

both the USA and the USSR have a full range of accurate and reliable strategic and theatre nuclear weapon systems in great numbers. Nonetheless it appears that the intention of the US government's analysis of the Soviet stockpile size is to stimulate Congressional and public support for US nuclear programmes.

Soviet strategic nuclear forces

The Soviet Union's land-based ICBM force remained at 1 398 missiles during 1984 and was armed with more than 6000 warheads (see table 1.5). The warheads continued to account for about 70 per cent of the strategic nuclear arsenal.³⁵ It is now presumed by the US Defense Department that all 150 SS-17s, 308 SS-18s and 360 SS-19s carry multiple independently targetable re-entry vehicles (MIRVs), although some single-warhead SS-17 and SS-19 missiles may still be deployed. One additional modification each for the SS-18 and SS-19 missiles is expected, though tests have not yet taken place. At least one and possibly two new types of solid-fuelled ICBMs-the mediumsized SS-X-24 with 10 MIRV warheads (a modification/replacement of the SS-17) and the small-sized single-warhead SS-X-25 (a modification/replacement of the SS-13)-were first tested in 1982 and 1983, respectively. Deployment and flight-testing of both missiles continued in 1984.³⁶ It has been suggested that site preparation for and possible deployment of the SS-X-25 have taken place in both mobile and silo modes at former SS-7 and SS-8 missile sites and the existing SS-13 silos.³⁷ The motors for two other ICBMs—the solid-fuelled, MIRVed SS-X-26 reported to be an improvement over the SS-X-24, and a large, liquid-fuelled follow-on to the SS-18 called the SS-X-27-were also reported to be undergoing testing, with flight tests possibly to take place in 1985 or 1986.³⁸

The future size and type breakdown of the land-based missile force depends greatly upon whether the USSR intends to continue to comply with the SALT II Treaty. Continued verified adherence would permit virtually no increase in force levels and only modest increases in capabilities, while circumvention of the constraints of arms control could bring exponential improvements in both quality and quanitity of Soviet land-based ICBM forces.

The present force of strategic ballistic-missile submarines includes 64 boats, 62 of which are 'modern' nuclear-powered types (SSBNs) and carry 936 SLBMs armed with approximately 2 100 warheads, or about 30 per cent of the overall strategic arsenal.³⁹ An additional 14 older submarines with 42 SLBMs are assigned theatre missions. The first two Typhoon Class submarines with the SS-N-20 SLBM are now in service

Table 1.5. Soviet strategic nuclear forces, 1985

	Weapon system					
Delivery system	Туре	No. deployed	Year deployed	Range (km)	Warheads × yield	Number in stockpile ^a
Land-based missiles	SS-11 Mod 1 ^b Mod 2/3	520	1966	11 000	1×1 Mt 3×250 350 kt (MBV)	640-1280
	SS-13 Mod 2	60	1972	9 400	$1 \times 600-750$ kt	60-120
	SS-17 Mod 3 ^c	150	1979	10 000	4 × 750 kt	600-1200
	SS-18 Mod 4	308	1979	11 000	10 × 550 kt	3 080-6 160
	SS-19 Mod 3^d	360	1979	10 000	6 × 550 kt	2 160-4 320
Submarine-based missiles	SS-N-5	42	1963	1 400	1×1 Mt	42-60
	SS-N-6 Mod 1/2	336	1967	2 400	1×1 Mt	336-672
	Mod 3		1973	3 000	2×200-350 kt (MRV)	
	SS-N-8	292	1973	7 800	1×800 kt -1 Mt	292-584
	SS-N-17	12	1977	3 900	1×1 Mt	12-24
	SS-N-18 Mod 1/3	224	1978	6 500	$3-7 \times 200-500$ kt	672-2510
	Mod 2		1978	8 000	1 × 450 kt-1 Mt	
	SS-N-20	60	1983	8 300	6-9 × 350-500 kt	360-432
Bombers)	Mya-4 Bison	45	1956	8 000	$2 \times \text{bombs}$	90-180
	Tu-95 Bear	120	1956	8 300	$2 \times \text{bombs}$ and ASMs	366-812
	Tu-22M Backfire	130	1974	5 500	$2 \times \text{bombs}$ and ASMs	390-780
Aerial refuellers	e	125	_		_	_
ABMs	Galosh	32	1964	750	$1 \times 3-5$ Mt	32-64

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"Warheads represent low and high estimates of possible force loadings (including reloads).

^b Approximately 100 Mod 1 with one warhead, 360 Mod 2, and 60 Mod 3 are deployed.

^c Some SS-17 Mod 2 missiles with one warhead may also be deployed.

^d Some SS-19 Mod 2 missiles with one warhead may also be deployed.

^e Includes Badger and Bison A bomber converted for aerial refuelling.

Sources: Authors' estimates derived from: Arkin, W. M. and Sands, J. I., 'The Soviet Nuclear Stockpile,' Arms Control Today June 1984, pp. 1-7; Department of Defense, Soviet Military Power, 1st, 2nd, 3rd eds; NATO, 'NATO-Warsaw Pact Force Comparisons, 1st, 2nd eds.; Berman, R. P. and Baker, J. C., Soviet Strategic Forces: Requirements and Responses (Brookings Institution, Washington, D.C., 1982); Defense Intelligence Agency, Unclassified Communist Naval Orders of Battle, DDB-1200-124-84, May 1984.

with the Northern Fleet, with another on sea trials and at least two more probably under construction and two more planned.⁴⁰ Additionally, the SS-NX-23, a new liquid-propelled SLBM with improved accuracy, better reliability and increased MIRV capabilities, continued flight-testing in 1984. It will be initially deployed in the near term on a new class of strategic-missile submarine, the Delta IV, and is expected to replace the SS-N-18 on Delta III submarines.⁴¹ A second new SLBM is also believed to be in the research and development phase; together with the SS-NX-23, it could result in true counterforce capabilities in the sea-based missile force.⁴² These programmes indicate a clear intention to increase the portion of future intercontinental strike forces at sea. Modernization of sea-based systems within SALT restrictions can take place with continued dismantling of older Yankee Class submarines. Without SALT restrictions, a significant expansion of seabased forces would be possible, including deployments of additional MIRVed sea-based missiles as follow-ons to the SS-N-20 and SS-N-23 (otherwise restricted by SALT).

Soviet long-range bomber assets include some 165 Bear and Bison bombers capable of delivering gravity bombs and air-to-surface missiles (ASMs). A new variant of the Bear bomber entered production in late 1983, designated Bear H by US intelligence, with some 20 now in service.⁴³ This bomber carries the new long-range ALCM, the AS-15, which is now operational in small numbers and provides much greater range and improved accuracy over older ASMs. The deployment of the Bear H, with the AS-15 missile, is advancing more rapidly than the US intelligence community expected.⁴⁴ Several older Bear B/C bombers have been modified to carry the AS-4 instead of the AS-3 ASM and are now designated Bear G. All 69 of these aircraft will probably be reconfigured in the future to carry the AS-4 or the longrange AS-15. The new Blackjack A bomber is also likely to carry the AS-15 as well as bombs and will replace the Bison and the Bear A gravity bombers. During 1984, Blackjack continued in testing and will probably be operationally deployed in 1985 or 1986.

Improvements in strategic nuclear defence also occurred in 1984, with continued development of a replacement system for the ABM-1B Galosh ABM system. It is also believed that the SA-5, the SA-10 (which is deployed at fixed sites and is beginning deployment in a mobile mode) and the new SA-X-12 may have strategic defence applications. It is not known whether these systems can carry nuclear warheads.

Theatre nuclear weapon systems

The across-the-board build-up of Soviet theatre nuclear forces also continued during 1984 (see table 1.6). Seven land-based missiles and

	Weapon system	Vear	Range	Warheads \times	Number in	
Delivery systems	Туре	No. deployed	deployed	(km)	yield	stockpile ⁴
Aircraft	Tu-16 Badger	316	1955	4 800	$2 \times \text{bombs}$ and ASMs	632
	Tu-22 Blinder	139	1962	2 200	$1 \times \text{bombs or ASMs}$	139
	Tactical aircraft ^b	2 545	_	700-1000	$1-2 \times bombs$	2 545
Land-based missiles	SS-20	396°	1977	5 000	3 × 150 kt	2 376
	SS-4	224	1959	2 000	1×1 Mt	224
	SS-12	120	1969	800	$1 \times 200 \text{ kt} - 1 \text{ Mt}$	120
	SS-22	100	1979	900	1×1 Mt	100
	Scud B	570	1965	280	1 × 100–500 kt	1140
	SS-23	48	1982	350	1 × 100 kt	48
	Frog	620	1965	70	$1 \times 10-200$ kt	2 480
	SS-21	120	1978	120	$1 \times 20 - 100 \text{ kt}$	480
	$SS-C-1B^d$	100	1962	450	$1 \times 50-200 \text{ kt}$	100
	e	n.a.	1956	40300	$1 \times low kt$	n.a.
Artillery	f	1 080	1974	10-30	$1 \times low kt$	1 080
Atomic demolition mines	n.a.	n.a.	n.a.		n.a.	n. a .
Naval systems						
Aircraft	Tu-22M Backfire	105	1974	5 500	$2 \times \text{bombs or ASMs}$	210
	Tu-16 Badger	240	1961	4800	$1-2 \times \text{bombs or ASMs}$	480
	Tu-22 Blinder	35	1962	2 200	$1 \times bombs$	35
	ASW aircraft ^g	200			$1 \times depth$ bombs	200

Table 1.6. Soviet theatre nuclear forces, 1985

Anti-ship cruise missiles	SS-N-3	336	1962	450	1 × 350 kt	336
•	SS-N-7	96	1968	56	1×200 kt	96
	SS-N-9	200	1968	280	1×200 kt	200
	SS-N-12	136	1976	500	1 × 350 kt	136
	SS-N-19	88	1980	460	1×500 kt	88
	SS-N-22	36	1981	110	$1 \times ? kt$	36
ASW missiles and	SS-N-14	310	1968	50	$1 \times low kt$	310
torpedoes	SS-N-15	76	1 9 72	40	1×10 kt	76
-	SUW-N-1	10	1967	30	1 × 5 kt	10
	Torpedoes	n.a.	1957	16	1 × low kt	n.a.
Ship-to-air missiles	SA-N-6	264	1 97 7	55	$1 \times low kt$	264

" Estimates of total warheads are based on minimal loadings of delivery systems.

^b Nuclear-capable tactical aircraft models include Su-24 Fencer, Su-17 Fitter, MiG-27 Flogger, MiG-21 Fishbed, Yak-28 Brewer, MiG-25 Foxbat and Su-25 Frogfoot.

^c The Soviet Union denies that the figure is as high as this.

^d Land-based anti-ship missile.

^e Land-based surface-to-air missiles. Nuclear-capable SAMs probably include SA-1, SA-2, SA-5 and SA-10.

^f Artillery includes 152-mm towed and self-propelled guns and 180-mm, 203-mm and 240-mm calibres.

⁸ Includes Bear, Mail and May aircraft.

Sources: Arkin, W. M. and Sands, J. I., 'The Soviet nuclear stockpile', Arms Control Today, June 1984, pp. 1–7; Polmar, N., Guide to the Soviet Navy, 3rd ed. (US Naval Institute, Annapolis, Md., 1983); Department of Defense, Soviet Military Power, 1st, 2nd, 3rd eds; NATO, NATO-Warsaw Pact Force Comparisons, 1st, 2nd eds; Defense Intelligence Agency, 'A guide to foreign tactical nuclear weapon systems under the control of ground force commanders', DST-1040S-541-83 (secret, partially declassified), 9 September 1983; Statement of Rear Admiral John L. Butts, USN, Director of Naval Intelligence, before the Seapower and Force Projection Subcommittee, Senate Armed Services Committee, 26 February 1985.

artillery systems are currently being fielded, including additional deployments of SS-20 missiles.

By the end of 1984, another two SS-20 bases were reported by NATO to have reached operational status, bringing deployments of SS-20s to a total of 396, a claim denied by the Soviet Union.⁴⁵ Nine additional bases with nine launchers each are believed to be under construction. These deployments, if true, will have an impact on the decision in the Netherlands to move ahead with deployments of 48 GLCMs, a decision planned for implementation by 1 November 1985.

Perhaps more significant than renewed SS-20 deployments are deployments of Soviet operational-tactical and tactical nuclear weapon systems in eastern Europe. The 900-km range SS-12 Scaleboard and its replacement, the SS-22, are being forward-deployed in the German Democratic Republic and Czechoslavakia, the first such deployment for these long-range weapons, and the SS-22 is replacing SS-12 missiles in the Soviet Army (but the SS-12 was never deployed outside the USSR). Additionally, the SS-21 is replacing the Frog-7 at a rate of four per month with Soviet forces, with conversion in the German Democratic Republic and Czechoslovakia almost completed. The SS-23 is also replacing Scud B missiles with Soviet forces, although deployments are at a slightly slower rate. Replacement systems for SS-21, SS-22 and SS-23 missiles may also emerge from the Soviet research, development, testing and evaluation (RDT&E) process over the next two years. Finally, deployments of new 152-mm towed and self-propelled guns and self-propelled howitzers, 203-mm selfpropelled howitzers, and 240-mm towed and self-propelled heavy mortars have continued, and the older 152-mm howitzers are now considered to be nuclear-capable.⁴⁷ A new version of the 152-mm howitzer is also believed to be in development.⁴⁸

The Soviet Union has also continued development of its own groundlaunched cruise missiles. The SSC-X-4, which has been undergoing tests since late 1981, may be ready for operational deployment in 1986. With a range of about 3 000 km, the missile will most likely be used for theatre missions. A larger, longer-range GLCM, not yet designated, may be ready for deployment by the late 1980s. This missile may have strategic applications and a capability against hardened targets. Both missiles may eventually be fitted with either nuclear or conventional warheads.⁴⁹

The status of Soviet nuclear-capable aviation has remained roughly stable, with some increases in the number of Tu-22M Backfire B bombers and MiG-27 Flogger D/J and Su-24 Fencer A theatre nuclearcapable aircraft. The annual production rate for the Backfire is now assessed by US intelligence to be in excess of 30 per year, the produc-

Nuclear weapons

Strategic	Theatre/tactical
SS-18 Mod 5	SS-X-28 (replacement for SS-20)
SS-18 Mod 4	SS-21
SS-X-24	SS-22
SS-X-25	SS-23
SS-X-26	Replacement for SS-21
SS-X-27	Replacement for SS-22
SS-NX-23/Delta IV	Replacement for SS-23
New undesignated SLBM	SS-CX-4
Bear G	MiG-27 Flogger J
Bear H/with AS-15 ALCM	Su-25 Frogfoot
Blackjack A	152-mm howitzer M-1987
Backfire C	SS-N-21
ABM-X-3	SS-N-22
	Next-generation SLCM/GLCM

Table 1.7. Soviet nuclear weapon systems introduced or under development, 1981-85

Sources: DoD, Soviet Military Power, 1984; Joint Economic Committee, Allocation of Resources in the Soviet Union and China, 1983, Hearings, Part 9, pp. 202-205.

tion rate pledged by the USSR during SALT II.⁵⁰ The Su-25 Frogfoot is now also believed to have the capability to deliver free-fall nuclear bombs.⁵¹

The Soviet Navy also showed significant developments during 1984. In April, a Soviet naval exercise in the northern Atlantic simulated a NATO attack and Soviet response, with one large battle group led by the Kirov Class from the Northern Fleet meeting two other battle groups from the Baltic Fleet. The exercise included a surge of 20 submarines (including Delta Class strategic missile submarines) from Northern Fleet bases, as well as participation by the first Oscar Class cruise-missile submarine.⁵² An explosion the following month at the Severomorsk naval base destroyed a sizeable portion of replenishment stocks for the fleet's surface-to-air and cruise missiles. (Another explosion at Bobruysk airfield at the same time destroyed several Badger aircraft.) 1984 also saw the deployment of a second Kirov Class cruiser (this one deployed with additional surface-to-air weaponry in place of the SS-N-14 ASW missile), the conversion of the first Yankee Class SSBN to carry cruise missiles, and deployments of the first Tomahawklike SS-N-21 cruise missile aboard submarines (see section V).

Additional units of Kirov and Slava Class cruisers and Sovremennyy and Udaloy Class destroyers are under construction, and US photographic evidence of a large nuclear-powered aircraft carrier capable of launching fixed-wing aircraft was published in the Western press, providing the greatest detail of the scope of this programme.⁵³ Soviet submarines had problems in 1984, with a Victor I colliding with the USS Kitty Hawk in March, another Victor I colliding with a Soviet tanker ship in the Straits of Gibraltar in September, and the crippling

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of a Golf II submarine in the Sea of Japan the same month. The year ended with an errant test of a submarine-launched cruise missile (a hybrid of old vintages) which overflew Norwegian airspace before crashing in Finland. The missile was unarmed, and the Soviet Union officially apologized for the accident.

IV. Nuclear weapon programmes of other powers

The UK

Polaris A3-TK/Chevaline missiles continued to be deployed on Resolution Class strategic-missile submarines (see table 1.8). During 1984 the second submarine was brought back into commission from overhaul with the improved Chevaline 'front end' and warheads. All four of Britain's SSBNs are scheduled to be refitted with the Chevaline by mid-1987. The Chevaline is thought to contain 2 MRV warheads, of greater targeting flexibility and survivability than the Polaris, and is thereby increasing both the range and the accuracy of the Polaris missile.

As outlined in the British Defence White Paper, the government remains committed to the Trident modernization programme.⁵⁴ Major orders were placed in 1984 for equipment for the Trident submarines. Plans are well advanced for the new Trident shore facilities on the Clyde Estuary, Scotland, and a comprehensive Environmental Impact Assessment, a first for British defence-related projects, has been submitted.

The Tornado dual-capable strike aircraft continues to be deployed both in the UK and in FR Germany. Seven squadrons are at present operational, with a total of 11 squadrons of 220 aircraft planned by mid-1987. In early 1984 the first Tornado squadron became fully active at RAF Laarbruch in FR Germany, the first permanent deployment outside the UK. Eight squadrons are earmarked to be stationed in FR Germany, four at Laarbruch and four at RAF Brüggen, replacing the Buccaneer and Jaguar aircraft, respectively.

The Tornado programme will result in a vast increase in the capability of the British front-line nuclear strike attack force. The number of Tornado aircraft planned almost doubles the combined number of nuclear-capable Jaguar and Buccaneer aircraft deployed in FR Germany. This would indicate that Britain will require a larger stockpile of gravity bombs to arm these aircraft. The stockpile will increase even further, however, since the aircraft withdrawn from FR Germany may retain nuclear strike roles in the United Kingdom. After return to the UK, some Buccaneers will be given maritime strike roles,

Delivery system	Weapon system				Warheads $ imes$ yield	No. in stockpile
	Туре	No. deployed	Year deployed	Range (km) ^c		
Aircraft	Buccaneer 52 ^a	30	1962	1 700	$2 \times bombs$	60
	Jaguar A^a	36	1973	1 400	$1 \times \text{bombs}$	36
	Tornado GR-1 ^b	140	1982	1 300	$2 \times bombs$	280
Submarine-based	Polaris A3	32	1968	4 600	3×200 kt	96
missiles	Polaris A3-TK	32	1982	4 700	2×40 kt	64
Carrier aircraft	Sea Harrier	30	1980	450	$1 \times bombs$	30
ASW helicopters	Sea King	69	1976		$1 \times depth$ bombs	69
•	Wasp	16	1963	_	$1 \times depth$ bombs	16
	Lynx	35	1976	_	$1 \times depth$ bombs	35

Table 1.8. British nuclear forces, 1985

^a Some Buccaneer and Jaguar aircraft withdrawn from bases in FR Germany may be assigned nuclear roles in the UK.

^b 220 Tornado attack aircraft (GR1) are on order for the Royal Air Force and continue to replace Jaguar aircraft.

^c Range for aircraft indicates combat radius.

Note: 34 Nimrod ASW aircraft, 12 Lance launchers and artillery guns are also certified to use US nuclear weapons.

Sources: Moore, J., ed., Jane's Fighting Ships 1982-83, 1983-84 (Jane's, London, annual); Taylor, J. W. R., Jane's All the World's Aircraft, 1982-83, 1983-84 (Jane's, London, annual); Beaver, P., The Encyclopaedia of the Modern Royal Navy (London, 1982); UK Ministry of Defence, Statement on the Defence Estimates, 1980, 1981, 1982, 1983 and 1984 (HMSO, London, annual); Rogers, P., Guide to Nuclear Weapons 1984-85 (University of Bradford, Bradford, 1984); UK, House of Commons, Defence Committee Report, Session 79/80, 23 July 1980.

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possibly with nuclear weapons (as are the Lossiemouth-based Buccaneers). Some nuclear-capable Jaguars withdrawn from FR Germany will also join the UK-based squadrons in a back-up role, but their nuclear capability is unknown.

France

The MIRVed M-4 SLBM is due to enter service with the French strategic submarine force in 1985 (see table 1.9). The M-4 will be first deployed on the new SSBN, *L'Inflexible*, and will then be backfitted on all but the first SSBN, *Le Redoutable*, as part of an extensive retrofit programme. The introduction of the six-warhead M-4 missile into the French nuclear force will result in a large net increase in the number of warheads: from 80 warheads in 1984 to 496 by 1993.

The M-4 missile is now in its qualification and acceptance phase, after completing the last development test firing in February 1984. Delivery of the TN-70 nuclear warhead for the M-4 began in July 1983 and development continues on the TN-71 warhead, to be fitted on M-4 missiles after 1987. The TN-71 will reportedly bring the warheads up to the standard of warheads used by the USA, but it is unclear whether this refers to increased yield-to-weight ratio or advanced fusing.⁵⁵

July 1984 saw the first deployment of the Mirage-2000 aircraft in the French Air Force. The Mirage-2000N variant is configured for nuclear attack and will eventually replace the Mirage IIIE and Jaguar A aircraft of the FATAC (tactical air command). Flight testing of the Mirage-2000N began in February 1983. Its initial operational date is expected to be 1988, and a total of 85 Mirage-2000N versions are planned.

Development work continues on France's first nuclear-armed air-tosurface missile, the ASMP. In the strategic role, the ASMP will be deployed on 18 Mirage-IVPs starting in 1986–87. In the tactical role, the ASMP will be deployed on 85 Mirage-2000N aircraft from 1988. The aircraft carriers *Foch* and *Clemenceau* have already been modified to accommodate the ASMP, probably for delivery by the Super Etendard.⁵⁶

China

The 1 October 1984 military parade in Beijing was the first public display of Chinese nuclear missiles and included ICBMs, IRBMs and SLBMs (see table 1.10). The parade included CSS-1, -2, -3, and -4 missiles, as well as two CSS-N-3 SLBMs towed on trucks driven by naval personnel.⁵⁷ The appearance of nuclear weapons in the public parade was indicative of increased Chinese emphasis on nuclear

Table 1.9. French nuclear forces, 1985

Delivery system	Weapon system					Warhead type	Number in stockpile
	Туре	No. deployed	Year deployed	Range (km) ^c	Warheads $ imes$ yield		
Aircraft ^a	Mirage-IVA ^a	34	1964	1 500	2 × 70 kt	AN-22	75
	Jaguar A	45	1973	1 400	1 × 6-8/30 kt	Ь	50
	Mirage-IIIE	30	1964	1 200	$1 \times 6 - 8/30$ kt	Ь	35
Air refuellers	C-135F	11	1965		_	_	_
Land-based missiles	S3	18	1980	3 500	1×1 Mt	TN-61	18
	Pluton	42	1974	120	$1 \times 15 - 25$ kt	ANT-51	120
Submarine-based	M-20	80	1977	3 000	1×1 Mt	TN-61	80
missiles	M-4	16	1985	4 000	6×150 kt	TN-70	96
Carrier aircraft	Super Etendard	36	1978	650	$1 \times 6 - 8/30$ kt	Ь	40

^a The AN-51 warhead is also possibly a secondary bomb for tactical aircraft, and the AN-52 is also possibly a secondary bomb for the Mirage IVA.

^b Warheads include ANT-51, ANT-52 and possibly a third type.

^c Range for aircraft indicates combat radius.

Sources: Laird, R. F., 'French nuclear forces in the 1980s and the 1990s', Comparative Strategy, Vol. 4, No. 4, 1984, pp. 387–412; Langereux, P., 'Missiles tactiques et engins: cibles français en service, en developpement ou en étude', Air et Cosmos, 28 May 1983, p. 180; Defense Intelligence Agency, 'A guide to foreign tactical nuclear weapon systems under the control of ground force commanders, DST-1040S-541-83-CHG 1 (secret, partially de-classified), 17 August 1984; International Institute for Strategic Studies, The Military Balance 1983–84 (IISS, London, annual).

Delivery	Weapon system		Year deployed			No. in stockpile
	Туре	No. deployed		Range (km)	Warheads $ imes$ yield	
Aircraft ^a	B-4 (Bull)	30	1966	6 100	$1-4 \times \text{bombs}$	30
	B-5 (Beagle)	10	1974	1 850	1×1 Mt	10
	B-6 (Badger)	100	1966	5 900	$1-3 \times 1$ Mt	30
Land-based missiles	CSS-1 (DF-2)	40-60	1966	1 100	1×20 kt	40-60
	CSS-2 (DF-3)	85-125	1972	2 600	$1 \times 2 - 3$ Mt	85-125
	CSS-3 (DF-4)	~ 5	1978	7 000	1×1 Mt	10
	CSS-4 (DF-5)	~ 5	1980	12 000	$1 \times 5 - 10 \text{ Mt}$	10
	$DF-1^{b}$	10-30	1966	650	$1 \times 2 - 10$ kt	10-30
Submarine-based missiles	CSS-N-3	26	1983	3 300	1×200 kt -1 Mt	26

Table 1.10. Chinese nuclear forces, 1985

" All figures for these bomber aircraft refer to nuclear-capable versions only. Hundreds of these aircraft are also deployed in non-nuclear versions.

^b A number of SRBMs (DF-1s) have been deployed in 'theatre support' roles, although they may no longer be active. Some of the MRBM and IRBM missiles are assigned to 'regional nuclear roles'. China has tested a number of warheads with yields from 2 to 20 kt.

Sources: Joint Chiefs of Staff, Military Posture (annual report) FY 1978, 1982, 1983; Department of Defense, Annual Report for 1982; Defense Intelligence Agency, Handbook on the Chinese Armed Forces, April 1976; Defense Intelligence Agency, 'A guide to foreign tactical nuclear weapon systems under the control of ground force commanders', DST-1040S-541-83-CHG 1 (Secret, partially declassified), 17 August 1984; Godwin, P. H., The Chinese Tactical Airforces and Strategic Weapons Program: Development, Doctrine, and Strategy (Air University, Maxwell AFB, Ala., 1978); Washburn, T. D., The People's Republic of China and Nuclear Weapons: Effects of China's Evolving Arsenal ADA 067350 (NTIS, 1979); US Congress, Joint Economic Committee, Allocation of Resources in the Soviet Union and China 1976, Part 2, pp. 94–96; Anderson, J., 'China shows confidence in its missiles', Washington Post, 19 December 1984, p. F11; International Institute for Strategic Studies, The Military Balance 1983-84 (IISS, London, annual).

Nuclear weapons

weapons in the overall defence programme. While the military has received the lowest priority of the four modernizations, nuclear programmes have received high priority.

In June 1984 the Chinese government also announced the establishment of a new Strategic Missile Force, taking over the previous nuclear responsibilities of the 2nd Artillery of the PLA.⁵⁸ In weapon development, trials of Xia Class SSBNs with CSS-N-3 SLBMs continued, preparing for possible deployment in 1985. About three submarines are reported to be under construction. According to the US Defense Intelligence Agency, production of CSS-3 and -4 ICBMs and CSS-2 IRBMs continues at a rate of 10 and 20 missiles per year, respectively.

V. Nuclear sea-launched cruise missiles

The deployment in June 1984 of the long-range nuclear-armed Tomahawk sea-launched cruise missile by the US Navy and in October of the long-range nuclear-armed SS-N-21 SLCM by the Soviet Navy are perhaps the most significant nuclear weapon developments in 1984. According to Admiral Stephen Hostettler, Director of the Joint Cruise Missile Program Office, Tomahawk provides "a new dimension in naval warfare".⁶⁰ These new long-range SLCMs now join long-range air-launched cruise missiles and ground-launched cruise missiles already deployed or about to be deployed by the superpowers. The Soviet Union, in addition, already has some 500 shorter-range SLCMs on 70 submarines.

The nuclear SLCM in the US Navy will serve three key military roles: strategic, theatre and tactical. This versatility means that it will probably be assimilated into a wide variety of nuclear war plans and strategies. The US Navy has enumerated a number of the specific tactical roles SLCMs could serve in support of military operations:

1. To "strike selected naval targets ashore to enhance sea control operations".

2. To "strike selected fixed targets in support of the land war".

3. To "strike quasi-fixed targets to disrupt enemy second and third echelon movement".

4. To "strike or hold at risk selected targets after a major theater nuclear exchange".

5. To "strike selected targets in contingencies such as Third World crises involving Soviet intervention or introduction of nuclear weapons".⁶¹

Deployment of the nuclear Tomahawk will expand the Navy's

long-range offensive strike platforms from 14 aircraft carriers to over 200 ships and submarines (in addition to SSBNs). By the early 1990s there will be over 2500 ship and submarine launchers able to carry the nuclear Tomahawk. Of the 3 994 Tomahawk SLCMs planned for production, 2739 will be for surface ships and 1255 will be on submarines. According to their missions, 593 are for anti-ship, 2643 for conventional land attack and 758 for nuclear land attack. By FY 1995, 4 battleships, 29 cruisers, 51 destroyers and 106 attack submarines will be converted to carry the nuclear Tomahawk.⁶² Ships and submarines will be able to launch the Tomahawk from standard 21-inch torpedo tubes, deck-mounted 'armoured box launchers', or new vertical launchers. New Los Angeles Class attack submarines, the first of which will be deployed in 1985, will have 12 vertical launch tubes (the vertical launching system) in their forward sections, which will allow them to carry Tomahawks without reducing their load of torpedoes.

SLCM deployment, according to the Navy, enhances "the capability to execute a variety of options within both sea control and power projection functions". Targets not assigned to carrier-based aircraft including "targets deep inside enemy territory, currently outside the combat radius of tactical aircraft, point targets of extreme hardness, previously unable to be attacked with a high kill probability, and targets close to the FEBA [forward edge of the battle area] that are so heavily defended as to cause excessively high levels of aircraft attrition"—will be suitable for SLCM attack.⁶³ The Tomahawk on "independent covert forward-deployed submarines", Admiral Hostettler told the US Congress in 1984, "presents the Soviets a formidable threat from 360 degree axis".⁶⁴

The introduction of the 2160-km range land-attack SLCM will be particularly significant in the Pacific and Indian Oceans where the Navy says it will be "able to hold at risk large land areas not currently covered by naval forces or other theater forces [and]...significantly increase the Pacific Fleet's theater nuclear arsenal and provide the capability to strike land targets from survivable sea-based platforms".⁶⁵ According to the Navy, Tomahawk's presence around the periphery of the Soviet Union will "convey to the Soviet Union that its territory is not a sanctuary".⁶⁶

Tomahawk will also be called upon for 'strategic' and 'strategic reserve' roles. Admiral Frank B. Kelso, Director of the Strategic Submarine Division of the Navy, explained to Congress in 1981 that SLCMs "will not be automatically launched in a general war scenario" but remain available so that "the United States would, in any postnuclear exchange environment, retain a measure of coercive power".⁶⁷ Admiral Williams, Director of the Navy's Strategic and Theater Nuclear Warfare Division, said in 1981 that Tomahawk "will provide additional survivable nuclear forces for the Strategic Reserve Force. The latter role could be pivotal in the postwar balance and struggle for recovery".⁶⁸

The new Soviet long-range SLCM—the SS-N-21—is also thought to be dual-capable like the Tomahawk. The 3 000-km range missile is small enough to be fired from the standard 533-mm torpedo tubes found on virtually all Soviet submarines and will primarily arm Yankee and Victor III Class submarines. Flight-testing of the SS-N-21 appears to have been completed and the missile may already be operationally deployed on submarines near US coasts.⁶⁹ The SS-N-21 will be primarily allocated to theatre strike roles, but tactical 'strategic reserve' and strategic strike missions against US command, control and communications facilities and naval bases must also logically be accepted.⁷⁰

Arms control implications

The 1984 Arms Control Impact Statement prepared by the Arms Control and Disarmament Agency on the Tomahawk SLCM stated that the "relatively slow flight of current generation cruise missiles does not represent a first-strike threat to the Soviet Union. Rather, cruise missile deployments symbolize a second-strike capability which should have a stabilizing effect". This assessment appears to miss the point that they are destabilizing and cause arms control problems.

The vertical launching system (VLS), able to deliver not only Tomahawk but also surface-to-air and anti-submarine weapons, is another arms control problem. While increasing the Navy's survivability and flexibility, VLS significantly complicates future arms control possibilities for surface ships.⁷¹ Indeed, one of the acknowledged goals of the Tomahawk programme is to confuse the USSR. As Admiral Williams stated in 1981, "We...clearly recognize that their very presence out there and their survivable presence will provide to the Soviets a very difficult calculation process in assessing the United States' capabilities".⁷²

Given the potential strategic missions of the new SLCMs, their operational flexibility, and planned deployment in large numbers, they should clearly be included in the current arms control negotiations. By virtue of their range, SLCMs fall into the same category as air-launched cruise missiles that were controlled under SALT II. The development of SLCMs has moved forward, sidestepping arms control categories and the larger European missile debate, but now they have been deployed and both operational and numerical controls are required.

Notes and references

- 1. Department of Defense, FY 1984 Annual Report, p. 55.
- 2. Bethe, H. A. et al., 'Space-based ballistic missile defense', Scientific American, October 1984, p. 39.
- 3. Key Administration advocates include the President's Science Advisor, George Keyworth, and Defense Secretary Caspar Weinberger. Several prominent figures such as Zbigniew Brzezinski, Henry Kissinger and Richard Nixon have begun to give it serious consideration. See Wall Street Journal, 10 July 1984; New York Times Magazine, 27 January 1984, pp. 28 ff; Washington Post, 23 September 1984, p. C8; and Washington Post, 1 July 1984, p. A6.
- 4. See Hough, J., 'Could "Star Wars" foment a new Russian revolution', *Washington Post*, 6 January 1985, p. C1.
- 5. This is confirmed in polls. See Smith, H., 'Poll shows skepticism on arms pact', New York Times, 8 January 1985, p. A8.
- 6. Washington Post, 22 January 1984, p. A9.
- 7. New York Times, 29 March 1984, p. B-11.
- 8. Quoted in Time, 7 January 1985, p. 66.
- 9. House Appropriations Committee, FY 1985 Energy and Water Development Appropriations, Part 6, p. 102.
- 10. Senate Armed Services Committee, FY 1982 DoD, Part 7, p. 3237.
- 11. 'Circular error probable' is a measure of accuracy: the radius of a circle, centred on the target, within which 50 per cent of the weapons aimed at the target are expected to fall.
- 12. Spice, B., 'Sandia labs testing launchers', Albuquerque Journal, 31 October 1984, p. A12.
- 13. Aviation Week & Space Technology, 3 September 1984, pp. 44-45.
- 14. Senate Armed Services Committee, FY 1984 DoD, Part 5, p. 2524; Senate Armed Services Committee, FY 1985 DoD, Part 7, p. 3376.
- 15. Senate Armed Services Committee, Arms Control Overview, 13 June 1984, Senate Hearing 98-939, p. 68.
- 16. Congressional Record, 12 April 1984, pp. 4638-41; Department of Defense Authorization Act 1985, Conference Report, 98-1080, 26 September 1984, pp. 99-101.
- 17. SASC, FY 1985 DoD (note 14), p. 3419.
- 18. Defense Advanced Research Projects Agency, FY 1984 Research and Development Program, A Summary Description, April 1983, pp. 3-4.
- 19. Getler, M., 'British-based US planes keep watch', Washington Post, 31 December 1984, p. A10.
- Markham, J. M., '3 GIs die at German base when missile catches fire', New York Times, 12 January 1985, p. 3; Drozdiak, W., 'US missile unit likes Pershing II', Washington Post, 11 November 1984, p. A1; Pincus, W., 'Pershing IIs deployed faster than expected', Washington Post, 3 October 1984, p. A31. For a description of Pershing II operations, see Sankner, R. and Norris, P. H., 'One up on 1a', Field Artillery Journal, July-August 1984, pp. 16-19.
- 21. DoD Authorization Act 1985 (note 16), pp. 165-66.
- 22. SASC, FY 1985 DoD (note 14), p. 3634.
- 23. In addition, reports are required on Soviet compliance with arms control agreements; the requirements and costs of measures to verify compliance with the 1972 Biological and Toxin Weapons Convention (due on 15 March 1985); the adequacy of current US chemical stockpiles; and the need for production of new binary weapons (1 April 1985). See DoD Authorization Act 1985 (note 16), pp. 19-20, 94-102, 141-42, 315-16.
- House Armed Services Committee, FY 1985 DoD, Part 4, pp. 1097-164; SASC, FY 1985 DoD (note 14), Part 6; House Appropriations Committee, FY 1985 DoD, Part 5, pp. 665-955; Senate Appropriations Committee, FY 1985 DoD, Part 3, pp. 289-373; Senate Foreign Relations Committee, Strategic Defense and Anti-Satellite Weapons, Senate hearing 98-750; House Foreign Affairs Committee, Arms Control in Outer Space.
- 25. President's Commission on Strategic Forces, 21 March 1984, p. 8.
- 26. Carter, A. B., Directed Energy Missile Defense in Space, Background Paper, Office of Technology Assessment, 1984.
- 27. Extensive coverage of the reports was first given in Aviation Week & Space Technology, 17 October 1983, pp. 16–18; 24 October, 1983, pp. 50–57; and 31 October 1983, pp. 74–78. For portions of the reports and summaries, see SFRC (note 24), pp. 94–175.
- 28. Science, 4 November 1984, p. 673.
- 29. Oberdorfer, D., 'Ex Defense Chief calls "Star Wars" unrealistic', *Washington Post*, 15 December 1984, p. A14. Articles supporting and criticizing the scientific feasibility of develop-

ing a space-based ballistic missile defence system multiplied during 1984. See, for instance, Bethe, H. A., Garwin, R. L., Gottfried, K. and Kendall, H. W., 'Space-based ballistic missile defense', Scientific American, October 1984, pp. 39-49; Drell, S. D. and Panofsky, W. K. H., 'The case against strategic defense: technical and strategic realities', Issues in Science and Technology, Fall 1984, pp. 45-65; Drell, S., Farley, P. J. and Holloway, D., 'Preserving the ABM initiative', International Security, Fall 1984, pp. 51-91; Fletcher, J. C., 'The technologies for ballistic missile defense', Issues in Science and Technology, Fall 1984, pp. 15-29; Jastrow, R., 'Reagan vs. the scientists: why the president is right about missile defense', Commentary, January 1984, pp. 23-32; Orbis, summer 1984, whole issue; Payne, K. B. and Gray, C. S., 'Nuclear policy and the defensive transition', Foreign Affairs, spring 1984, pp. 820-42. An extensive treatment of Star Wars impact on the ABM Treaty is given in: Longstreth, T. K. and Pike, J. E., A Report on the Impact of United States and Soviet Ballistic Missile Defense Programs on the ABM Treaty, June 1984. A good introduction to the subject is Carter, A. B. and Schwartz, D. N. (eds), Ballistic Missile Defense (Brookings Institution, Washington, D. C., 1984).

- 30. Broad, W. J., 'Reduced goal set on Reagan's plan for space defense', New York Times, 23 December 1984, p. 1.
- 31. Yost, D.S, 'European anxieties about ballistic missile defense', *Washington Quarterly*, Fall 1984.
- 32. Indications of a Soviet numerical advantage were first mentioned in 1983 Congressional testimony by Dr Richard Wagner (Senate Armed Services Committee, FY 1984, Department of Energy, p. 19), but were contradicted by testimony of Mr Perle the same year (House Foreign Affairs Committee, Call for a Mutual and Verifiable Freeze on and Reductions in Nuclear Weapons, 1983, p. 45). A clear portrayal of a Soviet advantage of roughly 25 per cent appeared in figures accompanying 1984 testimony by Dr Wagner and Mr Weinberger (see note 9, p. 118; and SASC, FY 1985 DoD, Part 1, p. 123, respectively). Mr Reagan confirmed this advantage on 10 June in London (Kaplan, F., Boston Globe, 18 June 1984, p. 1), as did Mr Weinberger soon thereafter (CBS Morning News, 18 June 1984, manuscript p. 7).
- 33. Two charts presented by Dr Wagner and Mr Weinberger conflict, with Dr Wagner's indicating 1978 and Mr Weinberger's 1975 as the cross-over point (see note 32). For estimates of the historical US arsenal, see Cochran, T. B., Arkin, W. M. and Hoenig, M. H., *The Nuclear Weapons Databook: Volume 1, US Nuclear Weapons and Capabilities* (Ballinger, Cambridge, Mass., 1984), pp. 14-15.
- 34. See Arkin, W. M. and Sands, J. I., 'The Soviet nuclear stockpile', Arms Control Today, Vol. 14, No. 5, June 1984.
- 35. Department of Defense, Defense/84, May 1984, p. 5.
- 36. The President's Report on Continuing the Acquisition of the Peacekeeper (MX) Missile, March 1985, p. 2. The USSR reported in 1982 that the SS-X-24 would be the single new type of ICBM allowed under the SALT II agreement, and in response to US charges that the SS-X-25 is a new missile, the USSR indicated that it is a modification of the SS-13. Available evidence does not permit an unambiguous determination of whether the SS-X-25 is a new missile as defined by SALT II, although it is expected to feature significantly improved capabilities over the SS-13.
- 37. See, for example, Agres, T., 'Soviets testing new ICBMs, CIA reports', Washington Times, 18 September 1984, p. 1.
- See note 37; and Corddry, C. W., 'Soviets believed developing giant intercontinental missile', Baltimore Sun, 13 May 1984, p. 1
- 39. See note 35. When the third Typhoon Class submarine enters operational service, two Yankee Class submarines will be removed from service as strategic missile submarines, thus reducing the number of strategic missile submarines to 61 and the number of SLBMs to 924. However, the number of warheads on deployed submarines will increase. According to the Joint Chiefs of Staff, FY 1986, p. 19, this change may have already taken place.
- 40. Department of Defense, Soviet Military Power (1984), pp. 25-26; Defense Intelligence Agency, Unclassified Communist Naval Orders of Battle, May 1984, p. 1.
- 41. The President's Report (note 36), p. 2; DoD, 1984 (note 40), p. 25; House Armed Services Committee, FY 1985 DoD, Part 1, p. 770; Defense/84 (note 35, p. 9). Delta Class submarines moved into the North Atlantic in January 1984 as part of the response to US INF (intermediate-range nuclear forces) deployments (House Armed Services Committee, FY 1985 DoD, Part 3, p. 3).
- 42. Joint Economic Committee, Allocation of Resources in the Soviet Union and China, 1983, Part 9, p. 203.

- 43. Fifteen Bear Hs were reported to be in service in mid-1984 by Lt General James A. Williams, Director of the Defense Intelligence Agency, in 'The Soviet strategic threat' (note 35), p. 10. The Joint Chiefs of Staff FY 1986 statement notes 120 Bears and 45 Bisons as deployed (p. 19), thus indicating that 20 Bear Hs have been deployed.
- 44. The President's Report (note 36), pp. 2-3. The Soviet Ministry of Defence announced on 13 October 1984 that new long-range cruise missiles on "strategic bombers and submarines" had begun to be deployed (Doder, D., 'Soviets say new cruise deployed', Washington Post, 14 October 1984, p. 1). US intelligence believes these missiles to be the AS-15 on the Bear H bomber, and the SS-N-21 aboard attack submarines.
- 45. Press statement by the Chairman of the Standing Consultative Group, NATO Press Release, Brussels, 9 January 1985. The Soviet denial of additional deployments in 1984 was made in October in response to statements by Mr Weinberger that "substantial numbers" of additional SS-20 missiles are operational. See New York Times, 12 October 1984, p. A3; and 13 October 1984, p. A3.
- 46. Note 42.
- 47. NATO, NATO and the Warsaw Pact Force Comparisons, 1984, pp. 36-40; Joint Chiefs of Staff, FY 1986, pp. 40-41, 46.
- 48. Note 42, p. 197.
- 49. DoD, 1984 (note 40), pp. 30-31; Williams (note 43), p. 11.
- House Armed Services Committee, FY 1984 RDT&E, Part 5, pp. 232, 247; Aviation Week & Space Technology, 23 July 1984, p. 16; Pincus, W., 'US eyes Soviet rate of making bombers', Washington Post, 22 December 1984, p. A18.
- 51. DoD, 1984 (note 40), p. 55.
- 52. International Defense Review, No. 6, 1984, p. 685.
- 53. Jane's Defence Weekly, 11 August 1984, pp. 171-73.
- 54. Statement on the Defence Estimates 1984, Vol. 1 (HMSO, London, 1984), p. 24.
- 55. 'French propose defense budget of \$15.8 billion for next year', Aviation Week & Space Technology, 22 October 1984, pp. 29-30.
- 56. 'French government defines nuclear aircraft carrier', Aviation Week & Space Technology, 26 November 1984, p. 61
- 57. New York Times, 2 October 1984; Jane's Defence Weekly, 13 October 1984.
- 58. Jane's Defence Weekly, 10 August 1984, p. 223; New York Post (Reuters), 13 June 1984.
- 59. Note 42, p. 104.
- 60. House Armed Services Committee, FY 1985 DoD, Part 2, p. 371.
- 61. House Armed Services Committee, FY 1985 DoD, Part 3, pp. 754-55.
- 62. Note 60, p. 361.
- 63. House Armed Services Committee, FY 1980 DoD, Part 3, p. 755.
- 64. Note 60, p. 373.
- 65. Senate Armed Services Committee, FY 1983 DoD, Part 5, p. 3083.
- 66. Arms Control and Disarmament Agency, FY 1984 ACIS, p. 142.
- 67. Senate Armed Services Committee, Strategic Forces Modernization Programs, Hearings, 1981, p. 203.
- 68. Note 67, p. 170.
- 69. The President's Report (note 36), p. 2; see also note 44.
- Statement of Rear Admiral John L. Butts, USN, Director of Naval Intelligence, before the Seapower and Force Projection Subcommittee, Senate Armed Services Committee, 26 February 1985, p. 10.
- 71. See Arkin, W. M., 'Flying in the face of arms control', Bulletin of the Atomic Scientists, February 1984.
- 72. As Admiral Hostettler said in 1984, "By placing this versatile family of weapons on a wide variety of surface ships and submarines, we multiply our offensive force capability...It complicates Soviet planning by requiring them to consider every battlegroup ship a potential threat." House Armed Services Committee, FY 1985 DoD, Part 2, p. 372.

2. Nuclear explosions

RAGNHILD FERM

Superscript numbers refer to the list of notes and references at the end of the chapter.

I. Introduction

According to available data, the five nuclear weapon states carried out 53 underground nuclear explosions in 1984: the United States 15; the Soviet Union 27; the United Kingdom 2; France 7; and China 2 (see appendix 2A). In all, since 1945, 1493 nuclear explosions have been conducted; the United States and the Soviet Union are responsible for more than 85 per cent of these explosions (see appendix 2B).

The yields of the US and Soviet tests are reported to have been less than 150 kilotons, a limit established in the not yet ratified US-Soviet Threshold Test Ban Treaty of 1974. This threshold was also observed in the British tests. The French tests had yields of between 5 and 50 kilotons and the Chinese of about 100 kilotons.

II. US tests

Two accidents took place in Nevada in connection with US tests. On 15 February 1984, at least 13 technicians were injured (one critically) when the area directly over the site of the explosion collapsed. Reportedly, no radiation was leaked.¹ At the next test, which was conducted on 1 March 1984, the ground caved in two hours after the explosion. No injuries were reported and a spokesman for the Department of Energy stated that no radiation had escaped.²

Complaints were made about damages caused by tests carried out in previous years. In May 1984, in Salt Lake City, a federal district court judge ruled that 10 victims of cancer in Utah, Nevada and Arizona had contracted the disease because of exposure to radioactive fall-out from atmospheric nuclear tests in the 1950s.³ Only one of the victims is still alive; she and the families of the other nine victims were awarded nearly \$2.66 million. This was the first time that a federal court recognized a clear link between atmospheric nuclear testing and cancer. The judge said that the government had failed to adequately measure fall-out in the communities near the test site and had not warned people of the danger. In September 1984 new legislation was approved by

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Congress which freed government contractors from liability for any damages caused by the atomic testing programme.⁴

III. Soviet tests

As in the preceding years, a number of Soviet explosions (more than one-third) were conducted outside the known test sites (situated at Semipalatinsk in east Kazakhstan and on Novaya Zemlya in the Arctic Ocean), namely, in west Kazakhstan, in the region of the Ural Mountains and in Siberia. These may have been explosions for civil engineering projects, such as earth-moving, the creating of underground reservoirs, stimulating the production of oil and gas, and so on. Some time ago the Soviet Union actually made known that its nuclear explosions had been used for drilling underground chambers for natural gas. Since 1974 at least 72 explosions presumed to be for peaceful purposes have been conducted in the Soviet Union. The United States has made no such explosion for almost 12 years and, as far as is known, is not planning any.

IV. French tests

For almost 19 years France has conducted nuclear tests in French Polynesia, mostly on the Mururoa atoll, 1000 km south-east of Tahiti. The French test centre has announced that its Pacific testing activities will continue in 1985 at the same pace as in the preceding years, and that the 1984 experiments have allowed further development of the new TN-71 warheads for the M-4 submarine-launched missile.⁵

While all nuclear tests are criticized by certain governments and nongovernmental organizations, the French tests have been the subject of particular complaints by neighbouring countries and groups active in the protection of the environment, which allege that the explosions have done serious damage to the environment and health of the Polynesian people.

In response to this criticism, the French government invited the states in the region to inspect the Mururoa test site. The offer was accepted and the visit took place in autumn 1983. The inspection team, which comprised two radiation experts from New Zealand, a marine geologist from Australia and a biologist from Papua New Guinea, visited Mururoa for five days and laboratories in Papeete, Tahiti for six days.

The report of the team was published in July 1984.⁶ Its general

conclusions are that the maximum annual doses of radiation in the Pacific islands from radioactive fall-out from atmospheric tests are less than one-tenth of world average annual radiation exposure, and that radiation doses to the population from natural radiation and fall-out are lower than world average levels and do not lead to any expectation that radiation-induced diseases would be detectable. There is no geological evidence of short-term radioactive leakage from the current underground tests, but in a period of 500-1000 years leakage could occur from the detonation chambers. The coral limestones forming the upper section of the atoll have been damaged through fissuring, subsidence and submarine sliding, and the volcanic rock in which the tests take place has been severely altered around the detonation chambers. However, available data indicate that the overall integrity of the volcanic bedrock has not been impaired. Venting of fission products occurs at the time of detonation and dissolved plutonium is transferred from the lagoon to the ocean, but these phenomena are of minor importance. Small quantities of radioactivity are routinely discharged, but they are not radiologically significant. It was pointed out that sampling from the western and northern areas of the atoll and of lagoon sediments was not permitted by the French authorities.

Critics of these conclusions argued that the health statistics on which the team had to rely, and which were provided by the French authorities, could not be regarded as adequate, in particular because detailed information on the cause of death was, until recently, available only for deaths occurring in hospitals. The critics also regretted that the team had not been allowed to inspect all areas of the atoll and that they could not observe and monitor an actual test, which would have been the best way to ascertain leakage risks.⁷

Australia and New Zealand have been particularly critical of the French tests. (It was these two states which brought the case to the International Court of Justice in 1973.) In June 1983 the Australian government announced that it had decided to suspend shipment of uranium to France for as long as France continued nuclear testing in the Pacific. In September 1984 the Australian Minister for Resources and Energy told Parliament that there would be no exports of uranium to France for at least two more years because of continued French nuclear testing.⁸ Australia has long been suggesting that French tests, if considered necessary, should be conducted in metropolitan France. Indeed, at a meeting with journalists in November 1984, the Australian Minister for Foreign Affairs revealed that a report had been prepared by bodies in the public service to assess geological conditions in France for underground nuclear testing.⁹ The conclusion of the report was that there were no technical reasons militating against it. There exist lightly

populated areas where there are large and hydrologically favourable granite formations suitable for testing, and two places were specifically mentioned: Guéret and Mageride in the Massif Central. The report itself is a classified document and has therefore not been publicly released.

V. British tests

British tests are now conducted at the Nevada test site in the USA, but between 1952 and 1957 12 British atmospheric tests were conducted in Australia (on the Montebello Islands, off the north-west coast of Australia, and at Maralinga and Emu in South Australia).

Over the years there have been reports of sickness among British and Australian workers at the test sites. It has also been claimed that aborigines were present in the test zones despite steps taken to ensure that wide areas around the test sites were cleared. Because of a growing concern about the consequences of these tests, the Australian Federal Department of Health carried out studies on the matter in 1982–83. While an exceptionally high level of cataracts among those involved in cleaning up radioactive areas and handling contaminated materials was reported, and while it was alleged that the rates of infertility were 1.5 times higher than expected in such a group of people, the official conclusion was that no evidence could be found to link the ill-health to the British test programme of the 1950s.¹⁰ A study by the Australian Radiation Advisory Council also dismissed fears concerning inadequate safety precautions, but the conclusion of that report was questioned in an Australian government study.

In January 1984 a 30 year-old British document was released to the Public Record Office revealing, among other things, that the British Ministry of Defence had conducted experiments to study the effects of atomic explosions on service personnel, and that servicemen had been ordered to be within 2 kilometres of nuclear explosions.¹¹ The Ministry of Defence claimed, however, that dummies and measuring instruments were exposed to the effects of the nuclear explosion, not real people.

Another classified report, now released in an edited version, has provided information about waste burials, revealing that the final clean-up at the testing sites was not carried out properly.¹² Consequently, in July 1984 the Australian government recommended to the Governor-General-in-Council the establishment of a Royal Commission to inquire into the British tests in Australia.¹³ The focus of the Commission was to be on measures that had been taken for protection against the harmful effects of radiation, fall-out and waste arising from the tests and the so-called minor trials, which were experiments carried out alongside the nuclear tests. (These tests were officially called 'safety tests' and were meant to simulate the accidental detonation of plutonium weapons to see what would happen to a nuclear weapon if it was dropped or detonated accidentally. These experiments were not nuclear firings but led to plutonium being spread over hundreds of hectares of land.¹⁴) The Commission was to visit Britain to gather evidence. The hearings started in London in January 1985 with testimony by former British servicemen who took part in the tests as well as government representatives in charge of the tests at that time.

VI. Chinese tests

China conducted two underground explosions in 1984. (In 1979, 1981 and 1982 no Chinese tests were conducted at all.) The Chinese tests are carried out in the Lop Nor area, in the north-western part of China. China (like France) is not party to the 1963 Partial Test Ban Treaty, but has nonetheless not tested in the atmosphere since 1980. According to newspaper reports, however, facilities for tests in the atmosphere are still maintained at the test site.¹⁵

Notes and references

- 1. Washington Post, 16 February 1984.
- 2. New York Times, 2 March 1984.
- 3. Washington Post, 11 May 1984.
- 4. New York Times, 4 November 1984.
- 5. Le Monde, 19 December 1984.
- 6. Report of a New Zealand, Australian, and Papua New Guinea Scientific Mission to Mururoa Atoll (Ministry of Foreign Affairs, Wellington, New Zealand, 1984).
- 7. Pacific Islands Monthly, Vol. 55, No. 10, October 1984, pp. 29-31.
- 8. Nature, Vol. 312, No. 5990, 8 November 1984, p. 91.
- 9. Hayden, B., address to the Sydney Journalists Club, Sydney, Australia, 8 November 1984.
- 10. New Scientist, Vol. 100, No. 1389/90, 22/29 December 1983, p. 868.
- 11. New Scientist, Vol. 101, No. 1401, 15 March 1984, p. 5.
- 12. New Scientist, Vol. 102, No. 1409, 10 May 1984, p. 5.
- 13. Australian Foreign Affairs Record, Vol. 55, No. 7, July 1984, pp. 732-33.
- 14. Nature, Vol. 310, No. 5973, 12 July 1984, p. 90.
- 15. Financial Times, 2 November 1984.

Appendix 2A. Nuclear explosions, 1983 (revised data for the USA) and 1984 (preliminary data)

Notes

- 1. The following sources were used in compiling the list of nuclear explosions:
 - (a) US Department of Energy;
 - (b) Hagfors Observatory of the Research Institute of the Swedish National Defence; and (c) press reports.
- 2. Events marked with an asterisk * may be part of a programme for peaceful uses of nuclear energy in view of their location outside the known weapon testing sites.
- 3. m_b (body wave magnitude) indicates the size of the event; the data have been provided by the Hagfors Observatory of the Research Institute of the Swedish National Defence.

Date (GMT)	Latitude (deg)	Longitude (deg)	Region	m _b	
11 Feb	37.051 N	116.045 W	Nevada		
17 Feb	37.163 N	116.063 W	Nevada		
26 Mar	37.301 N	116.460 W	Nevada	5.3	
14 Apr	37.073 N	116.046 W	Nevada	6.1	
5 May	37.012 N	116.089 W	Nevada	4.7	
26 May	37.103 N	116.006 W	Nevada		
9 Jun	37.158 N	116.089 W	Nevada	4.9	
3 Aug	37.119 N	116.089 W	Nevada		
11 Aug	37 N	116 W	Nevada		
27 Aug	37 N	116 W	Nevada		
1 Sep	37.273 N	116.355 W	Nevada	5.5	
21 Sep	37.210 N	116.210 W	Nevada		
22 Sep	37.106 N	116.049 W	Nevada		
9 Dec	37 N	116 W	Nevada		
16 Dec	37 N	116 W	Nevada	5.3	

Table 2A.1. Revised list of US nuclear explosions in 1983
Nuclear explosions

Date (GMT)	Latitude (deg)	Longitude (deg)	Region	mb
USA				
31 Jan	37.113 N	116.122 W	Nevada	
15 Feb	37.221 N	116.181 W	Nevada	5.4
1 Mar	37.066 N	116.046 W	Nevada	
31 Mar	37.146 N	116.084 W	Nevada	4.8
2 May	37.189 N	116.016 W	Nevada	
16 May	37.091 N	115.994 W	Nevada	
31 May	37.103 N	116.048 W	Nevada	6.0
20 Jun	37.000 N	116.043 W	Nevada	
12 Jul	37.183 N	116.018 W	Nevada	
25 Jul	37.268 N	116.411 W	Nevada	
2 Aug	37.017 N	116.008 W	Nevada	
30 Aug	37.090 N	115.998 W	Nevada	
13 Sep	37.087 N	116.071 W	Nevada	5.5
10 Nov	37.000 N	116.017 W	Nevada	
15 Dec	37 N	116 W	Nevada	5.7
USSR	40.000 N	70 700 F		7.0
IY Feb	49.888 N	/8./88 E	E Kazakhstan	1.0
7 Mar	50.022 N	78.978 E	E Kazakhstan	6.6
29 Mar	49.934 N	79.013 E	E Kazakhstan	
15 Apr	49.766 N	78.185 E	E Kazakhstan	5.9
25 Apr	49.934 N	78.915 E	E Kazakhstan	7.0
26 May	49.949 N	79.060 E	E Kazakhstan	6.6
23 Jun	50 N	79 E	E Kazakhstan	
14 Jul	49.902 N	78.988 E	E Kazakhstan	7.2
21 Jul	51.366 N	53.253 E	W Kazakhstan	
21 Jul	51.384 N	53.271 E	W Kazakhstan	
21 Jul	51.366 N	53.276 E	W Kazakhstan	
11 Aug	65.079 N	55.287 E	Ural Mountains	5.1
25 Aug	61.889 N	72.149 E	W Siberia [*]	5.2
28 Aug	61 N	56 E	Ural Mountains	4.4
28 Aug	61 N	56 E	Ural Mountains [™]	4.4
9 Sep	49.873 N	78.208 E	E Kazakhstan	5.1
15 Sep	50 N	79 E	E Kazakhştan	5.2
17 Sep	55.835 N	87.408 E	C Siberia*	4.5
18 Oct	49.787 N	78.004 E	E Kazakhstan	
25 Oct	73.365 N	54.979 E	Novaya Zemlya	
27 Oct	49.950 N	78.842 E	E Kazakhstan	
27 Oct	47.044 N	47.919 E	W Kazakhstan [‡]	
27 Oct	46.843 N	48.023 E	W Kazakhstan [*]	
23 Nov	50 N	79 E	E Kazakhstan	4.5
2 Dec	50 N	79 E	E Kazakhstan	6.1
16 Dec	50 N	79 E	E Kazakhstan	
28 Dec	50 N	79 E	E Kazakhstan	7.3
UK				
1 May	37.106 N	116.022 W	Nevada	5.7
9 Dec	37 N	116 W	Nevada	5.6
France 8 May	22 S	139 W	Mururoa	
12 May	21 852 5	138 961 W	Mururoa	
12 Jun	22 8	139 W	Мигигоа	
16 Jun	21 933 5	138 992 W	Митигоа	
27 Oct	21.255 5	139 W	Mururoa	
2/ UU	21 004 5	130 003 W	Mururoa	
6 Dec	21.704 3	139.005 W	Mururoa	
o Dec	22 3	137 W	iviui ui va	
China 3 Oct	41 633 N	88 781 F	Lon Nor	57
19 Dec	11.022.11	00.701 L	Lop Nor	47
17 Dec			P 101	747

Table 2A.2. Nuclear explosions in 1984 (preliminary data)

Appendix 2B. Nuclear explosions, 1945–84 (known and presumed)

Table 2B.1. 16 July 1945 – 5 August 1963 (the signing of the Partial Test Ban Treaty)

USA ^a	USSR	UK	France	Total
331	164	23	8	526

Table 2B.2. 6 August 1963 - 31 December 1984

a = atmospheric

u = underground

	USA"		USSR		UK		Fra	France		China		lia	
Year	a	u	а	u	а	u	a	u	a	u	а	u	Total
6 Aug-	-	-			-								
31 De	с												
1963	0	14	0	0	0	0	0	1					15
1964	0	29	0	6	0	1	0	3	I	0			40
1965	0	28	0	9	0	1	0	4	1	0			43
1966	0	40	0	15	0	0	5	1	3	0			64
1967	0	28	0	15	0	0	3	0	2	0			48
1968	0	33 ^b	0	13	0	0	5	0	1	0			52
1969	0	29	0	15	0	0	0	0	1	1			46
197 0	0	30	0	12	0	0	8	0	1	0			51
1971	Ō	12	Ó	19	Ō	Ó	5	Ó	1	0			37
1972	ŏ	8	ŏ	22	õ	ŏ	3	ŏ	2	õ			35
1973	Ō	9	Ō	14	Ō	Ō	5	Ō	1	Ō			29
1974	õ	7	ō	19	ŏ	1	7	õ	1	õ	0	1	36
1975	Õ	16	õ	15	ŏ	ō	Ó	ž	Ō	ĩ	ŏ	Ō	34
1976	ň	15	ŏ	17	ŏ	1	õ	3	3 3	1	ŏ	õ	40
1977	õ	12	õ	16	ŏ	ō	õ	6	1	ō	ŏ	õ	35
1978	ŏ	12	ŏ	27	ŏ	ž	õ	7	2	ĩ	ŏ	õ	51
1979	ŏ	14	õ	29	ŏ	ĩ	õ	ý	õ	Ô	ŏ	õ	53
1980	ŏ	14	ŏ	21	ŏ	3.	õ	ú	ĩ	ŏ	ŏ	ŏ	50
1981	õ	16	ň	21	ň	1	õ	11	Ô	õ	ŏ	õ	49
1982	ň	180	ň	31	ŏ	1	ň	5	ŏ	õ	ň	õ	55
1093	ň	15	õ	27	õ	1	Ň	7	Ň	1	ŏ	ň	51
1084	ň	15	ň	27	Ň	2	. 0	, 7	ň	2	ñ	ň	51 53 ^d
Total	Õ	414	0	390	0	15	41	דר	22	7	Ő	1	967

^a Data for the USA take into account information in *Announced United States Nuclear Tests* (January 1983), prepared by the US Department of Energy in co-operation with Los Alamos, Lawrence Livermore and Sandia National Laboratories.

^b Five devices used simultaneously in the same test are counted here as one explosion.

Two devices used simultaneously in the same test are counted here as one explosion.

^d The data for 1984 are preliminary.

Table 2B.3. 16 July 1945- 31 December 1984

_	USA	USSR	UK	France	China	India	Total
	745	554	38	12 6	29	1	1493

3. Third-generation nuclear weapons

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Superscript numbers refer to the list of notes and references at the end of the chapter.

I. Introduction

Since 1945 nuclear physicists and engineers have continued to refine the methods by which explosive energy is extracted from the nuclei of atoms. The first successful attempt to do so was by fissioning, in a chain reaction, nuclei of uranium-235 or plutonium-239. This was the *first generation* of nuclear weapons, with energy releases of the order of 10-100 kilotons equivalent of TNT. Fission weapons presented an upper limit of explosive power since it is not possible to assemble enough fissionable material to reach higher yields without reaching criticality.

Even before the completion of the first fission weapon, physicists, most notably Edward Teller, realized that essentially unlimited amounts of explosive energy could be released by fusing together light nuclei such as those of hydrogen, deuterium and tritium in a process similar to the one that takes place on the Sun and provides its energy. Fusion weapons deliverable by aircraft or ballistic missiles became available in the mid-1950s. Their yields have ranged up to 68 megatons equivalent of TNT (in an experimental explosion set off by the Soviet Union), but most contemporary fusion weapons are designed to release 0.3-1 Mt of energy. These are the so-called *second generation* of nuclear weapons which have increased in sophistication and have undergone continuous improvement, mainly in their yield-to-weight ratio.

A nuclear detonation releases energy into the environment in different forms. The predominant form is X-rays in the 1–100 keV (kilo-electron volt) region, which are released in great profusion by the fission process.¹ Energetic neutrons are the dominant product of the fusion process in which the energy is released in the form of kinetic energy of the fission products and of the neutrons. A small fraction of the energy released leaves in the form of γ -rays and in kinetic energy of electrons. Thus while a fission explosion in the atmosphere creates intense blast and thermal effects due to the interaction of the X-rays with the atoms in the atmosphere, a pure fusion reaction will create intense prompt local radiation by neutrons. Since contemporary

weapons generate destructive energy in a fission-fusion-fission process in which the first fission is the 'kindling' for the actual energy-releasing reactions, the end-product of an explosion of such a weapon is a combination of blast and thermal effects from the fission process, prompt radiation and blast effects from the fusion process and delayed radioactivity from excited nuclei generated exclusively by the fissioning process. It is possible by judicious design of such weapons to attempt to enhance or suppress one or the other form of emitted energy of a nuclear explosion. For example, the so-called neutron bomb is a nuclear weapon in which the designer has attempted to enhance the flux of high-energy neutrons and minimize the emission of X-rays and the amount of radioactive nuclei produced during the detonation.

Weapons intended for use as deterrents against a nuclear attack need not have any special properties, since the mere scale of their destructive power compared with the size of the human habitat is their inescapable deterring quality. There have been at the same time advocates of the notion that nuclear weapons can be useable instruments of combat, especially if the indiscriminate character of their destructiveness were avoided while certain effects of the explosion were custom-tailored, so to speak, to specific military missions. As a consequence, both the advocacy of and the scientific work on such specialized weapons have been identified with the doctrine of nuclear war-fighting and the school of thought that considers nuclear weapons 'useful' for purposes other than deterrence.

Nuclear weapons designed to maximize certain of their properties and to suppress others are considered to constitute a third generation in the sense that their design goes beyond the basic, even though sophisticated, design of modern thermonuclear weapons. There have been proposals for several such specialized nuclear explosives, which this chapter will examine in some detail: the enhanced-radiation weapon, designed to maximize neutron flux and minimize radioactive fall-out and blast effects; the X-ray laser, designed to maximize along a narrow solid angle the X-ray flux derived by the detonation; and the EMP weapon, designed to maximize the size of the electromagnetic pulse and its effects generated by a nuclear detonation. Independently of their potential utility or feasibility, all these third-generation weapons will require considerable research and development by the weapon laboratories (for example, the Lawrence Livermore Laboratory in the USA is actively involved in X-ray laser research).² In turn this research will unavoidably entail a considerable number of tests of these devices that require the detonation of nuclear weapons in underground facilities. It follows logically then that those interested in developing these weapons are opposed to a comprehensive test ban treaty (CTB) that would put an end to all nuclear explosive tests. It is also clear that the weapon laboratories see in the third generation of nuclear weapons scientific and technical challenges that would occupy their scientists now that efforts to perfect the second-generation of weapons have reached the asymptotic region of diminishing returns.

In particular in the United States the effort to develop and perfect third-generation weapons has been encouraged by the policies of the Reagan Administration: the belief in and preparation for fighting a nuclear war of whatever intensity and length and the proposed Strategic Defense Initiative (popularly known as the 'Star Wars' proposal) have provided political impetus for this new category of nuclear weapons.

For convenience, the main conclusions of the arguments presented in the chapter are set out below. The main body of the chapter follows. Section II describes in some detail the physics of a second-generation nuclear weapon. Subsequent sections take up the physical principles of enhanced radiation, X-ray laser nuclear weapons and EMP amplification.

Conclusions

Third-generation nuclear weapons are variants of the common fission-fusion-fission weapons widely deployed by the USA, the USSR and other major nuclear powers. They do not incorporate any new physical principles or advanced methods of extracting more energy from a given amount of nuclear material. Their special designs aim at partitioning the energy released by the nuclear force in ways that are different from the energy partition in second-generation weapons, for the ostensible purpose of performing more efficiently for given military missions.

The analysis in this chapter suggests certain salient propositions, set out in more detail below. In sum, it is argued that the development of these weapons is strongly promoted by laboratories which are concerned to find new work to do in this field; that the developments will be—indeed already are—very damaging to major arms control objectives; and that they are of negligible military utility, particularly the use of the X-ray laser as an ABM weapon.

1. The overall effects on the environment, human habitat and human beings of a detonation of a third-generation nuclear weapon would vary little from those of a standard nuclear weapon. The shift in the forms in which the energy is released may enhance one particular physical effect of a nuclear detonation, but does not appreciably change the overall destructive effect of such a violent energy release.

2. Even though third-generation weapons may appear in principle to perform a given military mission more effectively than a regular nuclear weapon, the fundamental fact remains that they are nuclear rather than conventional weapons. As a result their use breaches the firebreak between nuclear and conventional weapons, an effect that many believe will lead to nuclear war. A nuclear power which is subjected to an attack by third-generation weapons is not going to, or may not be able to, make a distinction between their effects and those of a regular nuclear weapon, even if this were possible in the heat of battle. Consequently it is unrealistic to expect that these custom-tailored weapons can be used without precipitating a nuclear response and a rapid escalation to all-out nuclear war. Therefore, the central danger that thirdgeneration nuclear weapons pose to world peace and safety is that they will be misperceived by some military as being *useable* without the risk of nuclear escalation. Such a military judgement, based on the false premise that third-generation weapons are somehow fundamentally different, is a serious possible cause of unwanted nuclear war.

3. The development and testing of third-generation weapons make negotiations for a complete test ban on nuclear detonations more difficult to conclude. As a consequence these weapons are a major factor in the continuing nuclear arms race between nations. This is a disproportionately high price to pay for the marginal military advantage that such weapons appear to bestow on their owners.

4. The arguments in the sections and appendix which follow suggest that the operational difficulties that circumscribe the utility of any of the three types of weapon make them in fact worthless. The calculations set out in this chapter lead the author to the conclusion that the X-ray laser has no chance of working as an anti-ballistic missile weapon, given the fact that X-rays are strongly attenuated by the atmosphere. A missile that completes its boost phase within the atmosphere would be immune to such a weapon. Use of the neutron bomb would both prompt effective countermeasures on the battlefield and entail colossal collateral damage to the civilian population and friendly armed forces. There seems little chance that it can be effective against a tank invasion and at the same time politically acceptable and 'humane' enough to use. There is no doubt that its use on the battlefield would escalate a conflict from a conventional to a nuclear war. The enhanced EMP weapon, if intended for use on the battlefield, has similar drawbacks (both military and political) while it offers what to military commanders must seem unreliable and unexploitable results. Escalating a nuclear conflict in order to damage the opponent's C³I installations appears foolhardy at best. Ordinary nuclear weapons exploded at high altitude can cause such massive disruption to both civilian and to a lesser extent military communications that special EMP warheads seem superfluous, even if in principle more discriminating.

From the *locally rational* viewpoint of the nuclear weapon-design laboratories, third-generation nuclear weapons may appear a desirable opportunity to continue research, development, testing and evaluation of nuclear explosives. However, from a *nationally and internationally rational* viewpoint they are not only a waste of money and trained manpower, but more seriously a threat to world peace and a motive force that keeps the arms race going. Given the costs and benefits implicit in the pursuit of such weapons, they appear to be highly undesirable.

II. Second-generation weapons

Since all third-generation weapons are variants of the basic fissionfusion-fission design of the current (second) generation of nuclear warheads, this section describes the basic configuration and working principles of such explosive devices.

From the curve of binding energy (see figure 3.1) it follows that

Figure 3.1. The curve of binding energy

Both the fission and fusion processes tend to generate nuclei with higher binding energies per nucleon and thereby release nuclear energy into the environment.



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energy is not only released into the environment by the fissioning of heavy nuclei into two smaller ones, but also by fusing two light atoms such as hydrogen (H) and its isotopes deuterium (D) and tritium (T) into heavier ones. The protons contained in the nucleus of these atoms, however, repel each other, so in order to achieve fusion, 0.3 MeV of energy (1 MeV, mega-electron volt $= 1.6 \times 10^{-13}$ joules) must be provided to the fusing atoms to overcome the coulomb repulsion between two similar charges. This energy is provided to the reactants by raising their temperatures to about 100 million degrees centigrade.³ Under such conditions it is possible to fuse D and T together according to the reaction:

 ${}^{2}_{1}D + {}^{3}_{1}T \rightarrow {}^{4}_{2}He + {}^{1}_{0}n + 17.6 \text{ MeV of energy}$

The 17.6 MeV generated during the fusion is released into the environment as kinetic energy of the ${}_{2}^{4}$ He and n, with the former carrying away 3.5 MeV and the latter the remaining 14.1 MeV. In general it is the energy of the charged products of a nuclear reaction (in this case the ${}_{2}^{4}$ He) that go into the heat and blast of a nuclear explosion. The energy





carried away by the neutron does not contribute to these effects, a fact that is the central design principle of the neutron bomb.

In a modern, second-generation nuclear weapon the energy needed to fuse together the D and T atoms is provided by the fission of a certain amount of plutonium and/or uranium. Thus the weapon consists of two key components: the *primary* one, which is a small fission nuclear explosive (see figure 3.2); and the *secondary*, which is a mixture of D and T in some form, appropriately packaged and placed in the overall weapon to receive the energy from the primary (see figure 3.3).

The primary system

The fission explosive consists of several consecutive layers of materials. Uranium-235 and plutonium are the active materials that fission and produce the required energy for the fusion. While in their normal densities (δ -phase plutonium has a density of 15.9 g/cm³, and 98 per cent enriched uranium-235 has a density of 18.9 g/cm³) the amount of

Figure 3.3. Sketch of how a modern fission-fusion-fission nuclear weapon may be configured, showing the essential elements

More than one configuration may have been used as weapon developments proceeded to improve the yield-to-weight ratio and reduce the cost of the weapons.



plutonium and uranium contained in the primary do not form a critical mass and therefore do not explode, when compressed they reach criticality and begin the fissioning chain reaction. The compression is achieved in the following fashion. The detonators on the outside of the entire assembly ignite the outermost layer of shaped explosives. These form a concave spherical pressure wave that slams the thin aluminium shell onto the inner explosives layer. This uniformly imploding metallic shell shocks the inner layer of explosives and detonates it symmetrically. Thus the pressure wave generated by this second explosive implodes the beryllium-uranium-238 tamper into the Pu-U core, again symmetrically squeezing them to much higher than normal density and rendering them supercritical, that is, able to sustain a chain reaction. The enormous pressure generated by the entire implosion process superheats the D + T mixture inside the fissile core, causing them to fuse, thereby releasing a large number of neutrons that sustain the fissioning of the Pu and ²³⁵U nuclei of the core. Over the years several schemes that involve the participation of varying quantities of D and T (for example in the dial-a-vield tactical nuclear weapons) have been devised to 'boost' the fission process, improving the efficiency of the entire system, that is, fissioning a larger fraction of Pu and U nuclei than would be practically possible without the presence of the neutrons from the D + T reaction (and therefore releasing a larger amount of energy) before the explosion disassembles the entire primary. The imploding beryllium and depleted ²³⁸U tamper help keep the system together for as long as possible and reflect the neutrons emitted during the fissions back into the core assembly, further increasing the efficiency of the entire process. The D and T (which are gases under ambient temperature and pressure conditions) are probably stored in tiny glass microspheres which are in turn embedded in some form of foam, because such a configuration offers numerous advantages over any other way of storing D and T in the primary: it maintains spherical symmetry; it allows for recycling the T which has a half-life of 12 years and therefore must be replaced in stored weapons periodically; and the foam helps the implosion shockwave create the very high temperatures needed to ignite the D + T mix.

A few grams of D + T, about 1 kg of Pu and a comparable amount of ^{235}U are most probably needed to provide enough fission energy to initiate the fusion process of the secondary.

The secondary system

A modern nuclear weapon derives half the energy it releases from the fusion of D and T atoms and the other half from the fissioning of 238 U

nuclei in a mantle that surrounds both primary and secondary systems by the neutrons generated by the fusion process. Thus a megaton weapon releases roughly 500 kt TNT equivalent of energy generated by fusion. This is equal to 1.3×10^{28} MeV and, since each D + T fusion releases about 17 MeV of which only a fraction goes into explosive effects (a large portion is taken by the neutron that does not contribute directly to these effects), we can estimate that about 10^{27} fusions would have to take place between an equal number of D and T atoms. This amounts to about 1.5×10^3 gram moles of D and T, or 3 kg of D and over 4 kg of T in a megaton weapon.⁴ These are very large amounts of these difficult to obtain and therefore very expensive isotopes. In addition, these large quantities of D and T would have to be stored in the weapon in liquid form, which in turn would require massive cryogenic facilities. Instead, physicists recognized that tritium can be produced in the process:

$${}_{3}^{6}\text{Li} + {}_{0}^{1}\text{n} \rightarrow {}_{2}^{4}\text{He} + {}_{1}^{3}\text{T} + 4.6 \text{ MeV}$$

So the two isotopes are stored in the secondary in the form of lithium deuteride, ${}_{3}^{9}Li_{1}^{2}D$. If a source of neutrons is available to fission the lithium, then we have:

$${}_{3}^{6}Li + {}_{1}^{2}D + {}_{0}^{1}n \rightarrow {}_{2}^{4}He + {}_{1}^{3}T + {}_{1}^{2}D + 4.6 \text{ MeV}$$

and then the ${}_{1}^{3}T$ and ${}_{1}^{2}D$ fuse with the help of energy from the primary:

$$^{2}_{1}D + ^{3}_{1}T \rightarrow ^{4}_{2}He + 17.6 \text{ MeV}$$

The secondary then consists (see figure 3.3) of an amount of LiD (which is a salt-like powder) surrounding a plug of plutonium which fissions to produce the necessary neutrons to convert the lithium into tritium. Both are probably surrounded by a metallic tamper.

Another method of producing the necessary neutrons for the conversion of Li to T could be a small amount of T + D that would be ignited by the energy provided by the primary. Such T + D 'kindling' could autocatalyse the subsequent chain of tritium production from lithium and its fusion with the deuterium present by providing the necessary neutrons and energy to initiate the fusion process of the secondary. Such an approach, however, would result in a much more expensive weapon, since tritium is vastly more expensive than plutonium.

About 80 per cent of the energy generated by the primary is released in the form of X-rays. These X-rays impinge upon special reflecting surfaces in the interior of the weapon and are diffusely reflected onto the secondary. These X-rays are absorbed by a thin layer of the liner around the LiD. This layer is instantly vaporized. As the vapour moves out, the impulse generated by the need to conserve momentum implodes the liner, generates very high pressures and therefore very high temperatures inside, and initiates the fusion of D and T nuclei. Energy from this fusion sustains the process until the pressure generated by the enormous release of energy breaks apart the secondary system so that it can no longer sustain fusion.

The neutrons released by the fusion of T and D nuclei in turn impinge upon the outer shell of 238 U and fission it, releasing additional amounts of explosive energy in the form of charged nuclear fragments, neutrons and electrons. As they interact with each other, these fragments emit X-rays that cause the thermal and blast effects that accompany a nuclear detonation.

This typical fission-fusion-fission weapon is designed to release a large fraction of the energy produced by these nuclear interactions in the form of X-rays. The interaction of the X-rays with the atmosphere generates the fireball with its intense thermal and blast effects which in turn are the main agents of destruction of physical structures and of trauma to unprotected human beings. Such maximal destructiveness would be desirable in weapons intended to underpin the doctrine of deterrence, but may not be appropriate for other military missions. Indeed there have been proposals—to use specially designed nuclear warheads to destroy incoming warheads inside the atmosphere, to incapacitate tank crews on the battlefield or to attack the opponent's ballistic missiles during their boost phase—that would require weapons in which the explosive energy is predominantly released in forms other than X-rays. Three such 'special-effects' nuclear weapons are described in the following sections.

III. The neutron bomb

The concept of the neutron bomb or 'enhanced-radiation weapon' was first considered for application in the short-range endoatmospheric anti-ballistic missile (ABM) rocket that was designed as the second tier of defence of the US Sentinel ABM system. Before this system was abandoned in the early 1970s as unworkable, it was designed to present two layers of defence against incoming re-entry vehicles: an exoatmospheric nuclear detonation that would destroy the re-entry vehicle with an intense burst of X-rays and, since X-rays generated by nuclear detonation do not travel far in the atmosphere, a second layer of defence consisting of specially designed nuclear warheads that would produce an intense burst of energetic neutrons while minimizing the blast and heat effects of the detonation since it could take place not far above populated areas. The design of this enhanced neutron-producer weapon is based on two facts.

First, a single fission produces about 240 MeV of energy, of which about 200 MeV would go into blast and heat and, on the average, 2 neutrons with kinetic energies of about 1 MeV, while a fusion reaction produces 17.6 MeV of energy, including an energetic 14.1 MeV neutron.

Second, 80 per cent of the energy produced by the fusion is in the form of the neutron's kinetic energy. Therefore, per neutron produced, the fission would also release 100 MeV of energy, but the fusion only 3.5 MeV or so. Thus for the same *number of neutrons* produced, the fusion reaction would release about 25 times less blast and heat. When the ABM system was abandoned the concept of an enhanced neutron-producing nuclear warhead was applied to the mission of 'neutralizing' tank crews in a ground attack. While tanks are sturdy vehicles and any effort to destroy an advancing tank column with ordinary second-generation nuclear explosives would cause extensive collateral damage to the countryside by blast, heat and radioactive fall-out, it was thought that a neutron-producing weapon would incapacitate tank crews with an intense burst of neutrons that would penetrate the tank armour but cause much less collateral physical damage than ordinary nuclear explosives.

An additional advantage of an enhanced neutron weapon would be the near-absence of radioactive fall-out that would permit friendly troops to occupy and advance beyond the area affected by the neutronbomb explosions. This is so because the source of radioactive fall-out is the nuclear fragments of the uranium or plutonium nuclei split during the fission process. These fragments, which are highly radioactive, attach themselves to the dust and debris created by a nuclear detonation on the ground. These soil and other particles, laden with radioactive nuclei, return to the surface of the Earth and constitute the pathogenic fall-out created by a nuclear explosion.

The fusion process does not generate such fission fragments; consequently a fusion weapon would, in principle at least, generate minimal amounts of radioactive fall-out. Thus the 'neutron bomb' is a nuclear weapon designed to maximize neutron production and minimize blast effects and radioactive fall-out for a given amount of explosive energy released. Since blast and heat ultimately are generated by the interaction of X-rays with the atmosphere, and these in turn are produced by the charged products of a nuclear interaction, a neutron weapon must have as small a number of such charged products generated as possible. This immediately suggests three changes from the standard secondgeneration fission-fusion-fission weapons. First, the primary of the neutron weapon must be as small as possible. Second, in order to avoid the need for a Pu plug that would provide the necessary neutrons that produce T by reacting with ${}_{5}^{9}Li$, either the entire secondary must contain only D + T, or special D + T 'kindling' must accompany the LiD so that it could fuse and provide the needed neutrons. And finally, the ${}^{238}U$ mantle must be replaced with another material, probably very fine, paper-thin slivers of heavy material to reflect the X-rays onto the fusion fuel.

Judicious design of the primary could reduce the amount of fissile material to a few hundred grams and thus the amount of energy provided by fission to about 40 per cent of the total energy released by the detonation of a neutron bomb. This in turn implies that, for *equal numbers of neutrons*, an enhanced-radiation weapon would release 10 times less blast, heat and radioactivity than a standard second-generation nuclear weapon.

Even though this property of enhanced-neutron weapons indeed reduces the collateral damage they would produce to the area they were used in, it was found that their efficacy against properly shielded tanks was limited and consequently a very large number of them would have to be used to arrest even a modest tank attack.⁵ The collateral damage and the fatalities to civilians from prompt radiation produced by that many weapons would be devastating anyway.

IV. The X-ray laser

About 80 per cent of the energy released by a typical second-generation weapon is in the form of X-rays. Thus a 1 Mt detonation will release about 3×10^{15} joules of energy in the form of X-rays which leave the point of detonation isotropically, spreading out equally in all directions. It is commonly accepted that a ballistic missile can be destroyed by an intense pulse of X-rays that could vaporize a thin layer of its skin. and in that way generate a mechanical impulse that could shatter the missile. The amount of X-ray energy density needed for such a damage mechanism varies from a low of 2×10^3 J/cm² for an unprotected missile, to 10 times that amount for a missile designed to withstand attack from a directed-energy weapon.⁶ Given the fact that the energy from the explosion will spread out over a surface whose area is $4\pi r^2$, where r is the distance from the detonation, we find that a 1 Mt weapon could damage a 'soft' missile about 3 km away and a 'hardened' one about 300 m away. Clearly if it were possible to concentrate the flux of X-rays into a beam rather than let them spread out in a spherically symmetrical fashion, a nuclear detonation above the atmosphere could perhaps damage missiles at a much longer range. An X-ray laser is a device designed to do exactly that. The gain in distance that such a device could achieve depends on two factors: how well the X-rays from the detonation can be focused, and what fraction of their energy can be put into the laser output. Thus the gain in energy density produced by the X-ray laser is:

$$\mathbf{G} = \mathbf{E} \, \frac{4\pi}{\pi (\theta/2)^2}$$

where E is the fraction of the detonation energy appearing as laser energy and θ the small opening angle of the laser beam. Such a laser would have additional advantages: since the device would be powered by a nuclear warhead, it would be relatively light and compact. Since it has large energy stores and emits at a nanometre (10^{-9} m) wavelength region (a highly efficient region for destructive purposes), it can produce enough energy flux over an area large enough to permit relaxed requirements for aiming at a distant target. Since the burst of energy produced by the weapon would be released in a nanosecond (10^{-9} s) or so, there is no need for tracking the target. It would suffice to fire ahead of the missile to compensate for its motion during the time it would take for the X-rays to travel from the point of detonation to their target, i.e., the missile. It is worth examining then how such a device would work, what it would consist of, and whether it could constitute an operationally useful weapon

The X-ray laser is a modified second-generation nuclear weapon (see figure 3.4). The primary is the same, but is probably larger than the ones used to ignite the fusion in a fission-fusion-fission weapon. The entire secondary and the ²³⁸U outside mantle have been removed. The place of the secondary has been taken by a very thin fibre of some

Figure 3.4. Diagram of an X-ray laser

Another configuration would have many fibres surrounding a conical X-ray reflector in the middle.



material like copper, zinc or manganese, of thickness d and length l. There is no ²³⁸U mantle. The working principle is easy: the energy of the primary is focused by the diffused reflectors onto the thin metallic fibre. As a consequence the fibre vaporizes into a fully ionized plasma which, under the proper conditions, can support stimulated emission of radiation (the basic principle of the laser) in the X-ray region.⁷

The working principle of such a system, what the energy of the emitted photons would be, how much energy it could release, how much energy and power it would require in order to operate as a weapon and what its limitation, if any, would be are all explored in appendix 3A. It must be emphasized that the system described in this chapter is only one possible configuration of nuclear-powered X-ray laser weapons that utilizes one of several physical principles that could generate the necessary condition for lasing.

In appendix 3A it can be seen how a beam of soft X-rays can be produced by pumping a thin metallic fibre with a nuclear explosive. It appears that beam intensities of operational significance may be difficult to produce, but mechanisms of production consistent with the laws of physics clearly exist. Apparently there is some experimental evidence from underground tests performed by the Lawrence Livermore Laboratory that such a mechanism indeed has worked. A non-scientific journal has reported the device to have produced about 10³ joules of laser X-rays.⁸ That would be consistent with an X-ray laser such as the one described here, which does not cycle but instead produces one flash in a single pass.

Let us now consider the operational aspects of a ballistic missile defence system based on nuclear-pumped X-ray lasers that somehow have attained the 10^{11} joule output needed to make them effective at a range of D = 1000 km (see appendix 3A). In order to attack the missile in its boost phase, the X-ray laser must be either in low Earth orbit or popped up in time to attack the ascending booster.

From low Earth orbit the X-ray laser weapon has two disadvantages: (a) it can be attacked or mined by the opponent prior to the ICBM attack; and (b) since the weapon self-destructs once used, one must have over the Soviet Union's silo fields at any time of the order of 1 500 such weapons. Since the absentee rate for such a configuration is about 95 per cent,⁹ we must contemplate a minimum of 2×10^4 such X-ray laser platforms. The absentee ratio (A) is given by

$$A = \frac{4 \times r_{\rm E}^2}{a \times b \times R^2}$$

where r_E is the radius of the Earth and R the range of the weapon; a depends on the fraction of the orbit of the weapon which would be within range of the missile base (in the case of the USSR, $a \approx 2$), and *b* depends on the inclination of the weapon's orbit. With optimal inclination of 55°N, *b* is about 2.5, for $R = 10^3$ km. $A \approx 30$; that is, only 3 per cent of the weapons will be effective at any one time.

There is an additional risk that must be considered here, and that is the fratricidal effects of this weapon. Each X-ray laser must be pumped with a nuclear explosion of the order of 0.1 Mt (for at most every 10 rods). The EMP and charged-particle fluxes generated by such a detonation will in all probability damage or destroy other X-ray laser platforms orbiting within tens of miles or even farther. That generates a serious problem of deployment. If clustered in order to cover the 1 500 or so launchers of Soviet ICBMs in quick succession, the X-ray platforms run the risk of destroying each other when firing. If spaced far enough to lessen fratricidal effects, the coverage they will provide will be incomplete and the USSR may take advantage of launching windows in the defensive system above their silo fields.

Some of these problems (but by no means all) can be mitigated by popping up the X-ray lasers upon warning of attack. That approach avoids the vulnerability of orbiting platforms and may reduce somewhat the fratricide problem, but it has disadvantages of its own.

First, even if launched from launchers (sea-based or ground-based) as close as 1000 km from the Soviet silo fields, the lasers must reach a height of 500 km before they can attack, in a line of sight, the ascending Soviet ICBMs above the atmosphere. This creates a timing problem: modern Soviet ICBMs reach boost termination at about 200 seconds. A further generation of Soviet missiles could be designed to reach boost cut-off at 50 seconds.¹⁰ Calculation of the time required to detect a Soviet launch, decide to attack the missile, communicate the messages to the X-ray laser launcher, launch the missile and allow the laser to reach 500 km show that the pop-up manoeuvre will require at the very least 200 seconds and probably twice that. Especially if the X-ray lasers are based on submarines (which must be submerged in order to be invulnerable), the time required for launch will far exceed the time a Soviet ICBM needs to reach boost cut-off, depending on the type of communication link with the submarine and the characteristic time of launching from under water.

Second, if the X-ray laser weapon is launched from US territory, the required height for line-of-sight attack on Soviet missiles increases to several thousand kilometres, and the time needed to reach that height increases accordingly, to say nothing of the energy requirements.

Finally, it is possible for the Soviet Union to deploy missiles that reach boost-termination in 50 seconds while within the atmosphere. Given the relatively low energy of the X-ray laser photons ($\sim 1 \text{ keV}$) it is easy to calculate that the X-ray flux will be attenuated tenfold as it penetrates to 100 km above the Earth even if fired vertically downwards. At a 10° angle to the horizon, this height increases to 120 km. It is now feasible for the Soviet Union to develop and deploy ICBMs which can terminate their boost phase and start the MIRVing process below those altitudes, with only 15 per cent loss of throw-weight capability.

It appears then that even though the X-ray laser represents an ingenious third-generation nuclear weapon, its operational utility, at least for the mission for which it is advertised, is nil. Development of such a weapon would require a large number of underground (and probably also atmospheric) nuclear detonations that not only would make the signing of a CTB very difficult but would in all probability have to violate the Partial Test Ban Treaty of 1963 and the Threshold Test Ban Treaty of 1974 that limits underground nuclear detonations to 150 000 tons equivalent of TNT or less. Thus development of the nuclearpumped X-ray laser would be to the serious detriment of past and future arms limitation agreements, since its testing or deployment would be a violation of the 1967 Outer Space Treaty and the 1972 ABM agreements.

V. The EMP weapon

About 0.3 per cent of the energy released by a nuclear detonation is carried away by an initial pulse of γ -rays. This pulse, that lasts about 10 microseconds or so,¹¹ contains γ -rays predominantly generated by the inelastic scattering of energetic neutrons (generated by the fission process, but mainly by the fusion process, during the detonation) with the bomb debris. A substantial amount of γ -rays are emitted by the highly excited fission products but these rays are almost completely absorbed by the debris of the weapon before they can leave the point of detonation. Since a megaton weapon releases 3×10^{28} MeV of energy into the environment, we can expect that about 10²⁶ MeV will be emitted in the form of γ -rays, the vast majority of which will have energies of 1-2 MeV. These γ -rays largely undergo Compton scattering off the electrons of atoms they encounter as they leave the point of detonation. In Compton scattering the γ -ray interacts with a bound electron imparting some kinetic energy to it. The electron as a consequence detaches from the atom and flies away in the same general direction as the γ -ray that hit it. Since the γ -rays are, in principle at least, emitted isotropically from the point of detonation, and since the Compton electrons move in the same general direction as the incident γ -rays, the resulting flux of electrons is also isotropic (i.e. spherically symmetric) about the point of detonation.

Each Compton electron as it travels in the atmosphere knocks additional electrons off the atoms of the air by simple ionization. In all, each Compton electron generates about 30 000 electron—ion pairs before it loses all its kinetic energy. Since about 1 per cent of the γ -rays generate Compton electrons, the process generates a spherical distribution of about 10^{28} electrons around the point of detonation.

If nothing disturbs the spherical distribution of γ -rays and electrons, this charge distribution—positive, heavy ions, left near the point of detonation, and electrons flying away in all directions—will not radiate any electromagnetic energy. But if the perfect sphericity of the electron charge distribution is disturbed by any means, the charges form the equivalent of a dipole antenna that radiates away pulses of electromagnetic waves. This is one source, or production mechanism, of the electromagnetic pulse, that almost always accompanies a nuclear detonation. This is because either the ambient conditions at the point of detonation provide the mechanism for the creation of an asymmetric charge distribution, or because the weapon itself can be configured to generate such an asymmetry.

In the case of an ordinary second-generation nuclear weapon, the emission of a powerful EMP is induced by one of four major mechanisms:

1. For a ground-level detonation, the Earth absorbs the γ -rays and electrons that move towards it, while those that move away from the Earth generate an effective current which radiates like a dipole antenna (see figure 3.5).

2. The weapon debris absorbs γ -rays and electrons asymmetrically, generating such a dipole independently of the altitude of detonation.

3. The fact that the atmospheric density decreases with altitude causes an asymmetrical absorption of γ -rays: in the case of an endoatmospheric detonation high above the ground, those γ -rays that travel towards the sky have much less matter to interact with than those that move towards the Earth and encounter much more dense air.

4. Finally, for detonations at exoatmospheric altitudes, say 300-500 km above ground, only those γ -rays that move towards the Earth generate any Compton electrons. Therefore the charge distribution is highly asymmetrical. In addition, Compton electrons that are generated at the top of the atmosphere can travel very far before they slow down. In the process they are bent by the ubiquitous geomagnetic field. Since electrons travelling in curved trajectories emit electromagnetic radiation, these electrons constitute an additional source of the EMP.

The characteristic strength, or amplitude, of this EMP is a function

Figure 3.5. Diagram of the mechanism of generation of the EMP that accompanies a nuclear detonation on the ground

100

Neutron excitation of γ -rays produces the γ -ray flux which rapidly generates the outgoing Compton electrons. In turn, these cause, by ionization, additional numbers of slower secondary electrons that in effect constitute a net electric current flowing away from the ground. A magnetic field flows clockwise in a plane perpendicular to this current. As the electrons eventually return through the conducting ground back to the point of detonation, magnetic fields are formed inside the ground.



of the yield of the weapon, the asymmetry of the distribution, and the mechanism that produces the pulse. In any case such an EMP becomes less intense as one moves away from the point of detonation. Depending on the mechanism of generation and this distance, EMP can damage or disturb electrical devices such as communcations equipment, radars, motors and other electrical facilities.

The range at which an endoatmospheric or ground nuclear detonation can cause such damage via the EMP varies from 10 to a few tens of kilometres; the range of damage for an exoatmospheric detonation can be as much as a few thousand kilometres.¹²

Because of these disruptive effects of the EMP, there have been proposals to configure new types of nuclear weapon that would maximize the strength of the EMP created by their detonation. The difference from a second-generation weapon would be that the EMP device would be configured first to release as much energy as possible in the form of energetic neutrons, since about 10 per cent of their energy would end up in the form of γ -rays, and second to release this burst of neutrons, or γ -rays, as asymmetrically as possible. One could then imagine that such a weapon would be predominantly a fusion device with a strong neutron or γ -ray absorber surrounding half of the fusion fuel. The utility of such a custom-made EMP weapon would be to explode it endoatmospherically over the rear echelons of an opponent in order to disturb his command, control and communications equipment; its exoatmospheric use would have indiscriminately catastrophic effects over very large areas. Its advocates theorize that if no substantial lethal damage results from such a weapon, either to the combatants of the opponent or to the civilian population in the area, it could be possible to use such a device without provoking a retaliatory nuclear response from the opponent and without killing innocent civilians while achieving a substantial military goal, that is, the disruption of the opponent's vital command and control capabilities. Technically such expectations are unfounded: a 1 Mt ground nuclear detonation generates damaging levels of EMP over an area of 15 kilometres radius. Even if the custom-made EMP weapon could be made 10 times as efficient in its generation of EMP, it would still take a 100 kt weapon to disrupt communications over such an area. A 100 kt weapon is 6 times more powerful than the Hiroshima bomb. Therefore, there is little prospect that collateral damage to civilian population would be minimal and no casualties, other than his command and control system, would be sustained by the opponent. Under these predictable circumstances, the probability is vanishingly small that an EMP weapon is useable because it is not going to breach the nuclear firebreak and lead by nuclear escalation into all-out nuclear war.

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Appendix 3A. The X-ray laser

To first settle on the dimensions of the lasing fibre and, through that, on the size of the opening angle of the beam, the determining consideration is to keep the emission angle as small as possible while avoiding diffraction losses. So

$$\theta_{\text{diff.}} \simeq 1.22\lambda/d$$
 (1)

But since an X-ray laser has no mirrors, the geometric spreading of the beam will be $\theta = d/l$, where l is the length and d the diameter of the fibre.

For the optimum emission angle, we set

$$1.22\lambda/d = d/l$$

$$d = (1.22\lambda l)^{\frac{1}{2}} \quad \text{and} \quad \theta = (\lambda/l)^{\frac{1}{2}}.$$
(2)

so

We will examine a device that can produce laser light of about 1 keV photons; so $\lambda = 1.2 \times 10^{-7}$ cm.

For reasons that we will discuss below, d cannot be larger than about 50 μ m so from equation (2) upon squaring: $1.2 \times 10^{-7} l = 25 \times 10^{-6}$ so $l \simeq 200$ cm. It follows that

$$\theta = (\lambda/l)^{1/2} \simeq 2.5 \times 10^{-5} \text{ rad.}$$
 (3)

We will be examining the lasing properties of fully ionized zinc atoms (for Zn, Z = 30, A = 63, $\varrho = 7.13$ g/cm³) in order to find E, the conversion efficiency, and to calculate the overall performance of the weapon. Let us consider a zinc rod 50 μ m thick and 200 cm long. The volume of such a rod will be $200\pi(25 \times 10^{-4})^2 = 4 \times 10^{-3}$ cm³, and its weight will be $(7.13 \text{ g/cm}^3) (4 \times 10^{-3} \text{ cm}^3) = 3 \times 10^{-2} \text{ g}$. So the total number of atoms in the rod will be $(3 \times 10^{-2} \times 6 \times 10^{23}/63) = 3 \times 10^{20}$ atoms. Since these 3×10^{20} atoms have to produce many photons during the time the zinc rod can sustain stimulated emission, each atom must be cycled, i.e., participate in the stimulated emission of a photon many times.

Figure 3A.1. Partial energy states diagram of an almost fully ionized zinc atom, showing the relevant transitions

The lasting transition is the one from the -0.5 keV state to the -1.4 keV energy state.



The exact cycling requirements are determined by the degree of population inversion, that is, effective population inversion density N^* , and the time during which the fibre can lase.¹

Now we must assume a specific atomic configuration in order to calculate σ_e (the lasing cross-section) and N^* . Consider multiple ionized zinc atoms (1 electron left).

Let us assume that 10 per cent of all the energy gets into the rod and that the efficiency of converting this energy to 0.9 keV X-rays is 10^{-2} . So $E = 10^{-3}$, and the gain G is

$$G = 10^{-3} \frac{4\pi}{\pi (2.5 \times 10^{-5})^2} \equiv 0.64 \times 10^7$$
(4)

Since the range of the weapon improves as the square root of the gain, a 1 Mt detonation obtained by using an X-ray laser such as the one described here could in principle damage a 'soft' missile 12000 km away and a 'hard' one 1200 km away. That could be a remarkable weapon indeed, but the properties of matter do not support this idealized performance.

The energy density of radiation at the end of the primary's detonation (assuming a ~ 10 cm radius sphere radiating) is:

$$4 \times 10^{14} \text{ J/3 000 cm}^3 = 1.3 \times 10^{11} \text{ J/cm}^3$$

7.6 × 10⁻¹⁵ T⁴ = 1.3 × 10¹¹ J/cm³ so T = 1.8 × 10⁸ K

The photon distribution as a function of energy at these temperatures would be as in figure 3A.2.

Exposed to this radiation, the fibre will be transformed into a fully ionized plasma column. μ/ϱ of Zn, where μ is the absorption coefficient, is about 30 for 10 keV X-rays, so

$$I = I_{0(e)} - 30 \times 7.1 \times d/2 \tag{5}$$

Since the rod must be fully ionized, $0.1 < I/I_0 < 1$; let us set $I/I_0 = 0.5$, then $d = 50 \times 10^{-4}$ cm, which is the size assumed at the outset of this section. As we shall

Figure 3A.2. Distribution of photons radiated from a 'black body' of temperature $10^8\,\mathrm{K}$

This distribution approximates very closely the distribution of photons emitted by the primary of the laser weapon at the end of the fission process.



calculate, there is enough energy at 12 keV and above to empty the ground state of the zinc ion as many times as required by cycling.

Since the lower lasing state has a radioactive lifetime of 10^{-15} seconds,² population inversion is possible in the plasma during its non-equilibrium state immediately after its formation. So in principle the X-ray laser described here is physically possible.

Conditions of temperature and ion and electron concentrations that can support an inverted population can last for a time $\tau_c \simeq r_p/u$ where r_p is the radius of the plasma and u the velocity of expansion of its boundaries.³ For $r_p \simeq 25 \,\mu\text{m}$ and $u \simeq 5 \times 10^6 \,\text{cm/s}, \, \tau_c \simeq 1$ nanosecond. Since the upper lasing state of our example has a radioactive decay time of $\tau = 10^{-13}$ seconds, it is possible *in principle* to recycle each atom in the zinc fibre at most 10^4 times provided that: (a) the upper state is repopulated faster than 10^{13} times per second by some mechanism; and (b) the stimulated emission cross-section is larger than the absorption cross-section of the lasing photon.

Collisional recombination, and dielectronic radiationless recombination to the upper lasing level of our example, can have rates of 10^{13} /s or better, provided the plasma is confined for times comparable to τ_c . With these assumptions in mind we can now calculate whether it would be possible to build a working X-ray laser.

The stimulated emission cross-section is:

 $\lambda = 1.4 \times 10^{-7}$ cm;

$$\sigma_{\rm e} = \frac{\lambda^2}{4\pi^2} \frac{1}{\tau_{\rm rad} \,\delta\nu} \tag{6}$$

where

and So $\delta \nu = 30 \text{ eV}$ due to Stark effect; = 7.2 × 10¹⁵ Hz; $\tau_{rad} = 10^{-13} \text{ s}$

 $\sigma_{\rm e}=7\times10^{-19}$

By comparison the absorption cross-section σ_a per atom will be smaller by a factor $\nu/\delta\nu$ or, in our case, ~30. But all electrons bound with energies less than 0.9 keV will be potential absorbers.

So the fraction of atoms in the fibre that can support lasing is:

$$\frac{N^*}{N} \simeq \eta_e \, \delta \nu / \nu \simeq 10^{-1} \tag{7}$$

where η_e = number of potential absorbers, in this case 3.⁴

Since we have 3×10^{20} atoms in all the fibre, we need $N^* \sim 3 \times 10^{19}$. So the total gain per unit length is $G = N^* \times \sigma_e \sim 10$, or more than enough for super-radiant operation of the laser.

How much power would we need to maintain this inverted population?

The power needed is
$$P_{\text{pump/atom}} = \frac{12 \text{ keV}}{10^{-15} \text{ s}} \sim 1 \text{ watt}$$

We need ~ 10^{19} watts (W) in 10^{-9} s = 10^{10} joules worth of photons of 12 keV and upwards.

So we need 10^{26} 12 keV protons absorbed in 10^{-9} s by an assembly of $\sim 10^{20}$ atoms to maintain a population inversion of 10 per cent over that time. This is a very large amount of energy, all contained in a very small amount of matter. While it is difficult to imagine how such power and energy densities $(2.5 \times 10^{21} \text{ W/cm}^3 \text{ and } 2.5 \times 10^{12} \text{ J/cm}^3$, respectively) can be achieved by any pumping mechanism other than

a nuclear detonation, it is clear that a nuclear detonation can generate such conditions for a very brief period of time (\sim nanosecond range). The question now is whether the system can cycle enough times to produce the desired energy output.

Since the limiting radiative transition is $\sim 10^{-13}$ s, the system has a chance to cycle at most $\sim 10^4$ times. So it appears that a single fibre could produce at most 10^8 J of 1 keV X-rays *independently of the amount of energy available to it by the nuclear detonation*. But in order to attack a missile 12 000 km away even with an opening angle of $\theta = 2.5 \times 10^{-5}$ rad, the needed energy would be about 5×10^{12} J, which is four orders of magnitude larger than what the laser can produce. Inversely we can calculate the distance at which such a laser would be effective against a soft missile:

 $10^8 \text{ J} = 2\pi \ (\theta d)^2 \ 10^3$

giving D = 50 km. Clearly such a weapon would not be useful against a ballistic missile. There are remedial steps that can be taken to improve this range somewhat. For example: (a) multiple fibres of zinc could be used in an X-ray laser weapon all aimed at the same target; and (b) the confinement time during which the plasma could support stimulated emission could be increased, say, by an order of magnitude by a cylindrical compression wave.

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4. Global consequences of a nuclear war: a review of recent Soviet studies

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Superscript numbers refer to the list of references at the end of the chapter. The Russian language references are given below this list. A bibliography of world literature published in English appears in appendix 4A.

I. Introduction

Intense studies of the global consequences of nuclear war have been undertaken in recent years. These studies are not a mere abstract scientific endeavour. Today, in a period of acute international tension, the problem of the use of nuclear weapons affects wide sections of the population. In this context, the efforts of scholars in many countries and various scientific fields, trying to investigate thoroughly and expose the results of a nuclear conflict, are a logical continuation of the anti-war activities of scientists. These studies are not merely a development of scientific work undertaken several decades ago; the investigation of the global conseqences of war reflects scientists' concern about the universal nature of nuclear conflict. Producing new, scientifically based evidence of the impossibility of a 'limited' nuclear war, they show the mechanisms that will inevitably operate to expand the effects of nuclear arms to global dimensions.

II. A global catastrophe

Soviet scientists have always paid great attention to the meteorological, climatological and ecological effects of nuclear explosions. Several monographs published in the USSR in the 1970s concentrated on the problems of the spread and fall-out of radioactive products, the impact upon the stratospheric ozone layer, the ecological consequences of radioactive fall-out and destruction of ozone as well as the possibility of a global ecological catastrophe due to nuclear war.

A new impetus to such studies was given by the All-Union Conference of Scientists for the Elimination of the Threat of Nuclear War that took place on 17–19 May 1983 in Moscow. Participating in the Conference were more than 500 Soviet scholars representing different branches of science. Among 50 foreign guests were world-renowned scientists from 20 countries, such as B. Lown, D. Pal, D. Hodgkin and J. Rotblat.

Many of those who took part in the debate raised the issue of the global consequences of nuclear conflict. For example, Academician E. P. Velikhov pointed to its impact on the delicate balance of the Earth's biosphere and the genetic basis of life, and the way nuclear explosions can affect the ozone layer and the transparency of the atmosphere; the latter is likely to deteriorate drastically because of the huge quantity of aerosol that would rise into the atmosphere as a result of explosions and fires caused by blasts.

The President of the Academy of Medical Sciences of the USSR, Academician N. N. Blokhin, stated that "the disastrous consequences of a nuclear war for mankind are caused not only by the direct influence upon men of the destructive factors of nuclear arms but also by the emergence on the territories subjected to an attack and on the planet as a whole of new environmental conditions unfavourable for life". The global effects would result from the fact that the attacks targeted on surface oil-tanks, including those in ports, along with the spreading of oil over the surface of seas, oceans and soil, would "cause a growing pollution of the biosphere by the products of combustion of giant fires".

Corresponding Member of the Academy of Sciences of the USSR L. P. Feoktistov noted that the direct effects of a nuclear explosion can be increased many times by the choice of target. The light radiation from the explosion of a bomb of 1 Mt above large tracts of forest could start an immediate fire in an area up to 1000 square kilometres, containing about 10 million cubic metres of wood. The heat produced by the fires would be dozens of times greater than the energy of the explosion itself. The fire would be accompanied by powerful winds caused by the updraft of the heated air into the upper layers of the atmosphere and the sucking in of cold air from the periphery.

It was calculated that the bombs in the arsenals of the USA alone are enough to burn down 10 million square kilometres of forest. The overall heat release in this case would be comparable to the energy consumed by mankind throughout several decades. The smoke of the fires, if elevated into the upper layers of the atmosphere, would significantly attenuate the flow of solar energy to the Earth's surface.

Academician A. M. Obukhov and Corresponding Member of the Soviet Academy of Sciences G. S. Golitsyn pointed out the processes in the climatic system which would cause a reorganization of the thermal and dynamic regime to result from nuclear explosions and fires connected with them. They were the first to note that the aerosol that finds its way into the stratosphere as a result of the explosions and fires may significantly slow down the process of restoration of the ozone layer damaged by nitric oxide produced by nuclear blasts. The estimates that they presented show that forest fires covering 1 million square kilometres would produce thermal energy comparable to the overall kinetic energy of the winds on the entire surface of the Earth $(6 \times 10^{20} \text{ J to } 7 \times 10^{20} \text{ J})$. The release of such an amount of energy in the course of approximately a month is likely not only to create very strong local winds but also to notably reorganize the atmospheric circulation. They also indicated that the atmosphere could warm up because of the heavy absorption of solar radiation by smoke and the accompanying loss of heat by the Earth's surface (a similar effect is observed during the global dust storms on Mars).

The heating of the air would lead to lower relative humidity. This in turn would mean that the atmospheric lifetime of smoke and dust particles would be significantly increased and that the exchange of heat and moisture between the atmosphere and the underlying surface would be reduced.¹

Corresponding Member of the Soviet Academy of Sciences A. A. Gromyko drew attention to the particular danger that a nuclear war presents to the developing countries, most of which are situated in tropical and desert areas or on ocean islands: "The research shows that the blasting of nuclear explosives in these regions will disturb their ecosystem that was created throughout millions of years, for these ecosystems are fragile and unstable and any interference may cause most serious damage to them."

Studies of the global consequences have evolved along the following directions: (a) numerical modelling to show how 'nuclear winter' might set in, based on models of atmospheric general circulation; (b) ascertaining the physical processes through which climatic changes occur; and (c) the specification of biological and ecological consequences of a nuclear winter, radioactive pollution and the destruction of ozone.

Ozone levels

The changes of the ozone content of the stratosphere after the injection of nitric oxides due to a series of nuclear explosions have been examined in detail in *Meteorologia i Hydrologia*.² The analysis shows that the detonation of explosives in the megaton range with an overall explosive force of 10^4 Mt would destroy 30–60 per cent of the total amount of ozone in the northern hemisphere. High injection rates are likely to considerably enhance the concentration of ozone below the level of injection owing to an increase in ultraviolet radiation caused by the destruction of the ozone in the upper layers of the stratosphere.

Izrael³ describes the main large-scale consequences of a nuclear war and their influence on ecological systems. The large-scale spread of radioactive products affects ecosystems by radiation and changes in electrical characteristics of the atmosphere. The pollution of the atmosphere by radioactive products and dust alters the radiation characteristics of the atmosphere, changes weather and climate, and causes deterioration of ecosystems because of the reduction of solar radiation. The climate is also affected by changes in the gas composition of the atmosphere brought about by nitric oxides, ozone, methane ethylene and the formation of tropospherical ozone and other gases which significantly affect the thermal exchange in the atmosphere. Changes in the albedo (radiation reflection capacity) of the Earth's surface owing to fires can also cause changes in climate.

It is furthermore noted by Izrael⁴ that surface explosions would send up to 5 000 tonnes of rock per kiloton of nuclear explosion power into the atmosphere, of which about 1 000 tonnes would be made up of particles up to 3 μ m in size. The average size of aerosol particles formed by explosions in air is a fraction of a micrometre.

The joint effect of the injection into the atmosphere of nitric oxides and aerosol is examined at some length by Obukhov and Golitsyn.⁵ Described in particular is the effect observed in 1978 by a Soviet cosmonaut, G. M. Grechko: while on board an orbital station, Grechko noticed blue stripes above the horizon, inside which could be seen thin layers of a lighter shade. Calculations carried out in the Institute of the Physics of the Earth's Atmosphere of the Soviet Academy of Sciences showed that the stripes are formed by light passing through these layers and that the emergence of the lightercoloured interval is due to the reduced concentration of ozone at these altitudes because of its destruction by aerosol particles.

As we know, ozone molecules colliding with aerosol particles interact with the active centres on their surface and as a result the molecules can be destroyed. The joint effect of nitric oxides and aerosol in the stratosphere may destroy up to 80-90 per cent of the ozone. The destruction of ozone 'opens up' a window in the spectral range of 240-320 nm (nanometres). The solar radiation in this ultraviolet part of the spectrum is carcinogenic in large doses. The spectrum between 240 and 280 nm is especially dangerous; the mutagenic and lethal doses here are of the order of 1-1000 J/m². If 10 per cent of the ozone were to remain in the atmosphere, exactly 1 000 J/m² in the range 240–280 nm would annually reach the surface of the Earth in the tropics.

III. The nuclear winter

In 1983 Soviet scientists published a number of papers devoted to the elaboration of the nuclear winter hypothesis—that is, of a strong drop

in the temperature of the Earth's surface caused by the global spreading in the atmosphere of tiny particles of smoke from mass fires of a nuclear explosion.⁶

According to these studies one can assume that a nuclear winter would result from the following sequence of basic physical processes in the climatic system. In normal circumstances the energy radiated by the Sun is absorbed by the land surface, by the ocean, and to a lesser extent by the atmosphere. The radiation of the Sun warms them up nonhomogeneously in different latitudes and in different seasons of the year. Uneven heating sets the atmosphere and ocean layers into motion and is responsible for the climate to which ecological communities and man have adjusted. Natural and anthropogenic changes (due to the development of the world economy) in climate occur rather slowly—in the course of several decades or more. But in a global catastrophe such as a nuclear war the alteration of the atmosphere and surface of the Earth would occur much more rapidly.

The estimates show that the use of even a small portion of the stockpiled nuclear explosives (10–20 per cent) would cause forest fires over an area of the order of 1 million km^2 . Cities, industrial enterprises, and oil and gas tanks would also be aflame. An immense amount of dust would immediately be raised into the atmosphere by the explosions. Smoke, dust and soot would saturate it to such an extent that the sunlight near the surface of the Earth would be tens or hundreds of times dimmer. 'Nuclear night' would fall upon the Earth. Crutzen and Birks were the first to pay attention to this phenomenon.⁷

On the basis of data supplied by the US Forest Service, they showed that forest fires covering approximately 1 million km^2 eject into the atmosphere 200–400 million tonnes of smoke and soot particles. This quantity of aerosol would drastically dim the sunlight.

Why the temperature drops

Why is nuclear night followed by nuclear winter? It is common knowledge that the Sun's rays warm up the land and the oceans, which in turn heat up the atmosphere. It is also known that the Earth's atmosphere is much more transparent to solar radiation than to the thermal radiation emitted by water and land surfaces. As a result, the Earth's atmosphere is some 30° C warmer than it would be if the atmosphere were equally transparent to solar and thermal radiation. These 30° constitute the so-called 'greenhouse' effect of the Earth's atmosphere.

Filling the atmosphere with particles which scatter the solar radiation (dust) and absorb it (smoke) decreases sharply the amount of solar

energy reaching the surface of the Earth. In addition the absorbing aerosol renders the atmosphere about as transparent to solar radiation as it is to thermal electromagnetic radiation. Thus, when it is saturated with aerosol, the greenhouse effect of the atmosphere is decreased.

The thermal effect of aerosol is, in certain respects, similar to the effect produced by clouds. As is known, clouds in daytime (or in summer) cool the land by reflecting part of the solar radiation, but at night (or in winter) they moderate temperature falls by constraining the thermal emission of the surface. Aerosol tempers fluctuations of temperature in time and space in the same manner, regulating fluxes of solar and thermal radiation in the atmosphere. The effect depends on optical properties and the height or location of an aerosol cloud. For instance, sulphuric aerosol and dust particles find their way into the Earth's stratosphere after major volcanic eruptions and, staying in it for a year or two, cause a decrease of the surface temperature.

Smoke, soot and especially such products of city fires can virtually bar energy from reaching the surface of the Earth. As a result, solar radiation is absorbed solely by the atmosphere. In this case, the surface is warmed by thermal emission of the atmosphere, not by solar radiation. The temperature of the surface drops by tens of degrees centigrade, coming close to the temperature of the aerosol layer which has absorbed the solar radiation. As a consequence, the greenhouse effect becomes disabled, leading to nuclear night and nuclear winter.

Smoke warmed by the Sun spreads upwards and sideways from the sources of the fire. In about one month, a huge cloud of smoke and dust may envelope the northern hemisphere and begin spreading into the southern hemisphere. Over the oceans the smoke cloud perceptibly raises the temperature of the lower layers of air. Smoky atmosphere over the oceans absorbs both solar radiation and heat emission of a cooling ocean, and thus has its temperature raised even more.

Such contrasting temperatures between ocean and land produce a situation well known to meteorologists: winter monsoon of the dry season in southern and south-east Asia. City and forest fires will proceed for about a week, and in one month a dense cloud of microscopic particles of smoke and dust will cover both hemispheres. Land temperatures in the interior of the continents, even in the tropical belt, will go down to 0° C.⁸

Pollution by forest fires

Some additional information on natural fires is given below. Russian chronicles contain data on large fires in northern Russia beginning in the year 1092. According to *The Nikon's Chronicle*, during huge forest

fires in 1371, a person standing in the thick smoke that lasted for two months could see spots on the Sun with an unaided eye. Not only woods but dried swamps were also burning. Wild animals, having lost their scent, wandered among people; birds lost their orientation and fell to the ground.⁹ Arkhangelsk province was afflicted by a storm of forest fires during the entire summer of 1881; smoke spread over Arkhangelsk and hampered breathing. During giant fires in Siberia in 1915, an area of 120 000 km² was scorched. Because of heavy smoke the cereals ripened two weeks late, giving small, puny grain. In some places the smoke shroud was so thick that buildings five to six steps away could not be seen.¹⁰

Large fires (covering more than 200 hectares) bring the greatest losses to the forest; they last for a long time, take on the dimensions of natural disasters and are extinguished mainly by natural precipitation.¹¹ According to visual estimates, the smoke layer (with an eroded upper boundary) attains a height above the ground of approximately 3.5 km, and reduces the visibility at the atmospheric boundary layer to about 500 m.

The smoke plumes from recently initiated small fires are 10-100 km in length. More extensive old fires have plumes of up to 200 km. During mass fires, according to satellite observations, smoke plumes can reach up to 300-400 km. At some distance from the fires the plumes coalesce forming a single, ribbon-shaped cloud.¹²

We may note that the most common height of smoke plumes rising from large forest fires is 2-3 km; greater heights are rather rare. This can probably be explained by the fact that fires usually take place in dry weather and as a rule are connected with anticyclones. In the central latitudes, where one finds anticyclones, large-scale downward motions take place which appear to limit the height to which the smoke rises.

Smoke output estimates are given below. The stock of dry combustible material in the most productive forests of middle latitudes of the northern hemisphere is $25-30 \text{ kg/m}^2$. Approximately 15-20 per cent of this material is easily inflammable and can be burnt up completely moss, dead twigs and leaves.¹³ In pine woods the stock of needles is 0.6 kg/m^2 ; in cedar woods it is $0.2-1.1 \text{ kg/m}^2$; in broad-leafed forests the fallen dry matter is nearly 0.3 kg/m^2 . The stock of dry combustible material in the timber of, for example, pine woods totals from 8 to 30 kg/m^2 . In forests of low productivity, the stocks of dry material are not large—just below 1 kg/m^2 . The average stock of dry timber is about 15 kg/m².

Observations of forest fires suggest that twigs up to 4 cm in diameter burn out completely, and, overall, 15-20 per cent of timber burns out. The fallen dead material burns out completely as a rule.¹⁴ The propor-

tion of burnt-out peat varies greatly. Thus, excluding peat, the average figure for burnt-out material in forests is $5-10 \text{ kg/m}^2$. The smoke output for the burnt-out dry timber is approximately 2 per cent by mass. This result was derived from a special experiment on estimated smoke output according to LIDAR (light detecting and ranging) data from burning out a stock of timber. The stock, with the dimensions $6 \times 6 \times 2.5$ m and a weight of 9 tonnes, gave 160 kg of smoke, which is 1.8 per cent of the initial weight.¹⁵

Smoke estimates made by Golitsyn, ¹⁶ based on Soviet data on forest fires, showed that the quantity of aerosol particles getting into the atmosphere from fires covering 1 million km² may total 150 million tonnes in summer, with lower estimates for the rest of the year. This amount of smoke can be instrumental in changing the regular structure of atmospheric temperatures and cause significant cooling of the land masses.

In addition to forest fires, the phenomenon of nuclear winter can be brought about by city, gas and oil fires. In major cities the quantity of combustible materials goes up to hundreds of kilograms per square metre. According to $Ambio^{17}$ and successive publications, fires in inhabited areas produce at least double the amount of smoke and soot in the atmosphere compared to forest fires. One should further bear in mind that particles produced by burning oil products and plastics absorb solar radiation more intensively than those from forest fires.

Natural analogues: volcanoes, Martian storms and 'asteroidal winter'

Specialists in atmospheric physics and the theory of climate in the USSR, the USA and other countries have, over the past 10-15 years, paid ever-growing attention to the effect that atmospheric aerosols have on shaping the climate of the Earth and other planets. Notable among these pieces of research are those covering the impact of industrial aerosols and major volcanic eruptions on the climate. The development of nuclear winter theory has been significantly aided by studies of the climatic effects of global dust storms on Mars and of feasible high concentrations of dust in the Earth's atmosphere as a result of a hypothetical collision of the Earth with an asteroid approximately 10 km in diameter, 65 million years ago.¹⁸

Further development of these lines of research by Soviet and US climatologists have shown that nuclear night will be followed by nuclear winter. The basic research on this phenomenon was carried out in 1983. Outstanding work was done by a group of US scientists who utilized a model developed to study the climatic aftermath of an asteroid impact on the Earth to estimate the trends in temperature of

the Earth's surface resulting from fires initiated by nuclear war. They came to the conclusion that a concentration of dust in the upper layers of the atmosphere and smoke in the lower layers following a full-scale nuclear war would push the temperature of the land surface down by $40-50^{\circ}$ C for a period of up to several months.

In parallel, the Computing Centre of the Soviet Academy of Sciences produced a digital forecast of nuclear winter, proceeding from a model of the general circulation of the atmosphere.¹⁹ The Institute of Atmospheric Physics studied the physical mechanisms of the development of atmospheric and climatic changes due to a nuclear conflict and performed a comparative analysis of the nuclear winter phenomenon and of dust storms on Mars.²⁰ Comparison of these studies with the research done by US scientists²¹ shows that, despite differences in nuance and detail, both groups agree that the fires caused by nuclear war are capable of bringing land temperatures down by $20-50^{\circ}$ C in various regions.

When the nuclear winter theory is discussed, a question usually arises: do phenomena even partly resembling nuclear winter exist in nature? As mentioned above, dust storms on Mars provide a real and well studied global analogue of the climatic aftermath of a nuclear war. These Martian storms cause the surface of that planet to cool and its atmosphere to warm in the same fashion as is postulated for a nuclear winter on Earth.²²

Dust storms on Mars have been traced by means of astronomical observations since the end of the 18th century. They were usually spotted during great oppositions, when Mars is at its shortest distance from the Earth and the Sun. In such periods, Mars receives 20 per cent more solar energy than average, owing to the marked elliptical character of its orbit. Dust clouds form, as a rule, at those latitudes of the southern hemisphere of Mars which on Earth are subtropical to temperate, at the end of spring. In a few days dust covers this whole zone, then starts spreading in a meridional direction, and in a week or two covers the whole planet. By absorbing solar radiation, the dustfilled Martian atmosphere is heated up by $20-30^{\circ}$ C and becomes even warmer than the surface, which during a dust storm cools to $10-15^{\circ}C$ below the usual temperatures. On Mars the veil of dust goes beyond annihilating the greenhouse effect and creates the so-called antigreenhouse effect, which makes the surface of the planet somewhat cooler than the atmosphere. This picture of a global dust storm on Mars was pieced together on the basis of measurements made by Soviet and US interplanetary stations, including the US Viking stations.²³

During the history of human civilization, the Earth has not, evidently, experienced the drastic global aerosol pollution that is common on Mars. But the possibility cannot be discarded that some 65 million years ago the Earth collided with an asteroid some 10 km in diameter and that so much dust went up into the atmosphere that an 'asteroidal night' descended, followed by an 'asteroidal winter'. Many scientists believe that such a climatic catastrophe could have taken place, causing the extinction of dinosaurs and other major animals.²⁴

Notable among the events that are borne in the memory of humanity are volcanic eruptions. The destructive power of volcanoes is enormous. Thus, the eruption of a volcano on the island of Santorini in about 1500 BC destroyed the island completely. Some scientists link this eruption with the disappearance of the legendary Atlantis and the biblical "darkness that befell Egypt".²⁵

In the last century, the largest eruption was that of the Tambora volcano in Indonesia in 1815. The next year was called "the year without a summer" in northern America and western Europe. In New England, summer 1816 saw falling snow in June and freezing temperatures in July and August.

One of the sequels of the Tambora eruption could be the epidemic of cholera in Bengal that took place against the background of the poor harvest, hunger and unusual cold of 1816. In 1823 cholera reached the Caucasus and in 1830–32 it swept Europe and northern America. Such pernicious ramifications could be produced by a drop in temperature of several degrees during one summer.²⁶

Ecological and economic consequences

The main ideas regarding nuclear night or nuclear winter were developed during 1983. Research proceeded in different directions: analysis of ecological and economic consequences of nuclear winter; and more precise definition of physical processes which occur in the atmosphere and on the surface of the Earth because of multiple nuclear explosions and resulting fires. The report of the Committee of Soviet Scientists Against Nuclear War, called 'Global consequences of nuclear war and developing countries',²⁷ is an example of research in the first direction. The report states that although modern science is incapable of making an evaluation of all the fatal consequences of nuclear winter and other aspects of nuclear war for the ecological systems, agriculture and economies of tropical zones, what is already known is enough to conclude that tropical agriculture in Africa and in most tropical countries of Asia and Latin America would cease to exist. Tropical crops will not only be destroyed as a result of the cold and darkness but will also not be revived because of the termination of deliveries of insecticides, other pesticides and chemical fertilizers from the developed
countries. Tropical forests, which are one of the main sources of oxygen and a sustainer of organic life on Earth, will be destroyed by even a short period of darkness and cold because they can survive only within a narrow climatic range and cannot endure dramatic fluctuations of the temperature and light levels. Nuclear war would doom the majority of the population in the developing countries to cold, hunger, illnesses and in the long run to possible extinction.

Global climatic and ecological consequences of nuclear war, as well as local, regional and world effects of multiple nuclear explosions, are being discussed by scientists in the USSR, the USA and some other countries at meetings, seminars and symposia organized on a bilateral and multilateral basis in the course of a number of international scientific projects. An example is the project 'Environmental effects of nuclear war' (ENUWAR), which is being carried out by the Scientific Committee on Problems of the Environment (SCOPE) of the International Council of Scientific Unions (ICSU). This project was undertaken upon the recommendation of the General Assembly of the ICSU in 1982 in order to prepare an objective and competent report on possible nuclear war effects on mankind and the whole biosphere of the Earth. Seminars and meetings under the SCOPE/ENUWAR project have so far beeen held in Stockholm, Delhi, London, Leningrad and Paris.

It is worth dwelling at some length on the results of the seminar 'Climatic effects of nuclear war and their influence on the biosphere' which was held in Leningrad in May 1984. Twenty scientists from eight countries (Australia, Denmark, France, Japan, Spain, Sweden, the UK and the USA) and 30 Soviet scientists participated in this seminar.

There were three reports by Soviet scientists given at this seminar apart from reports by R. Turco (USA) on nuclear war scenarios, P. Crutzen (FR Germany) on nuclear war fires, and A. Summerfield (UK) on psychological effects of nuclear war.

The report²⁸ on the ecological effects of nuclear war indicated the main processes which lead to the degradation of ecological systems as a result of multiple nuclear bursts:

1. Radiation shock. In the areas affected by massive use of nuclear weapons the level of radiation will be $500-1\,000$ rad which is lethal for most mammals and birds and sufficient to radioactively contaminate trees, especially coniferous ones, to a serious degree.

2. Fires. Ignition and spread of fires will cause, according to some estimates, about 20 per cent of the forests, 15 per cent of the plains and 50 per cent of the agricultural areas of the northern hemisphere to burn.

3. Nuclear winter. Sharp temperature fall will cause freezing of plants over large areas and death of many animal populations.

4. Radioactive contamination. The radioactive contamination level, due to the destruction of nuclear energy plants and the resulting scatter of nuclear fuel stockpiles, will be equal to a chronic radiation dose of 0.3-3 rad per day.

5. Acid rain. This may cause an average fivefold increase in the acidity of the soil because the possible injections of nitric and sulphur oxides, as a result of nuclear bursts and fires, are estimated to be equal to 10 times the contemporary annual anthropogenic injections.

6. Ozone. Destruction of the ozone layer will cause an increase in ultraviolet radiation after the nuclear winter. This may hamper photosynthesis and harm bacterial flora of the soil surface layer as well as weaken the immune systems of animals.

Other research

It was noted in one report²⁹ that three-dimensional models describe most completely the processes taking place in the atmosphere, although they take up a lot of computer time. At present the question of modelling the smoke and dust transport, taking into account feedback between it and flow dynamics, has not been sufficiently studied. The main priority should be given to sharpening our knowledge of the optical characteristics of polluted atmospheres: developing models of medium-scale processes in the presence of strong temperature contrasts, for example in coastal areas of a cooled continent and still warm ocean.

In discussing potential but as yet unstudied atmospheric effects of nuclear explosions it was suggested that larger than expected amounts of nitric oxides might develop, especially as a result of high-altitude nuclear bursts.³⁰ Not only can nitric oxides destroy the ozone layer, but they can also absorb large amounts of solar energy, thus leading to the substantial fall (by several degrees) of the average temperature of the Earth's surface.

Several meetings took place in August 1984: a meeting of Soviet and US scientists devoted to the problem of global consequences of nuclear war (Computer Centre of the Academy of Sciences of the USSR, Moscow), the fourth international seminar on nuclear winter (Erice, Italy), and a Soviet–US seminar on minor gas tracers (Vilnius, USSR) at which there was a special SCOPE/ENUWAR seminar on 'Geophysical aspects of possible nuclear burst effects and the problem of precipitation scavenging'.

Izrael³¹ pointed out two categories of direct effects of bursts on the

atmosphere. The first has to do with a change in the aerosol content of the atmosphere and the second with electrical characteristics. The latter involves a change in radioactivity and gas composition of the atmosphere and the albedo of the underlying surface. About 50 per cent of the particles which are emitted into the atmosphere during ground and low-altitude air bursts are made up of aerosol particles with a radius of 1 μ m; the total mass of these particles is equal to 2 per cent of the total mass of the produced aerosol. A month after a full-scale nuclear conflict involving primarily megaton-size weapons, about 10⁶ tonnes of dust would remain in the stratosphere. Absorption of solar radiation in the first two weeks would produce a substantial increase in the atmospheric temperature. A cooling down of the land surface by 30° C, on average, would then begin. The gas composition of the atmosphere would be noticeably transformed. Specifically, nuclear bursts and fires produce nitric oxide which, after the atmosphere has been cleared of aerosol mixtures, may create a pronounced greenhouse effect, increasing the surface temperature by 5-70 $^{\circ}$ C.³²

Budyko³³ described possible ecological effects of serious aerosol pollution of the atmosphere after a catastrophically powerful volcano eruption and a hypothetical fall of an asteroid to the Earth. These effects are compared with the global consequences of nuclear war.

Buetner and Shabanova³⁴ described the changes in seasonal temperature levels near the Earth's surface which occur if about 100 million tonnes of optically active particles pollute the stratosphere. Comparison of empirical data on aerosol lifetimes in the stratosphere and typical temperature relaxation times of the land and ocean surfaces show that, regardless of when during the year a nuclear conflict broke out, the next vegetative season would be practically lost; thus the cultivation of most agricultural crops would be impossible.

An earlier model³⁵ was improved by taking aerosol transport into account.³⁶ It shows that at the beginning this transport would not noticeably influence the climatic system. This influence would manifest itself about a month after the nuclear bursts and fires, and would be especially pronounced in the tropical areas and in the southern hemisphere. The transport of aerosol would result in a less dramatic temperature fall in the northern regions; if one compares this result with the model which assumes a uniform distribution of aerosol,³⁷ then one observes an additional fall in temperature of about 10° C in the central regions of Africa and South America. The global transfer of aerosol results in the clearing of the lower layers of the atmosphere, and accumulation of aerosol in the upper troposphere, where it can remain for several months. This mechanism prolongs the nuclear winter.

The vertical development of a horizontally homogeneous smoke

layer over a large-scale forest fire was studied.³⁸ In a burning forest smoke may rise to approximately 5 km for a period of about a month. Taking account of the absorption of sunlight by particles of burning products, the upper boundary of the developing smoky convective layer may reach the tropopause (about 11 km up) in about two weeks. Ginsburg and Golitsyn³⁹ presented estimates of the rate at which the smoky atmosphere heats as a result of its absorbing solar energy, and the rate of the air temperature change in the cloud of smoke.

Theoretical and laboratory study was done on the possible mechanism of atmospheric cyclone activity suppression.⁴⁰ The authors showed that the main cause of such a change in atmospheric circulation is a strong increase of the vertical stability of the smoky and dusty atmosphere as a result of its heating by solar radiation and the surface cooling. This reveals one more parallel between nuclear winter and Martian dust storms. In normal conditions Viking stations registered regular changes of cyclones and anticyclones, while during dust storms cyclone activity on Mars stopped.

Most Soviet research findings on the global effects of nuclear war completed by mid-1984 are collected in a book to appear at the beginning of 1985: *The Night After: Climatic and Biological Consequences of a Possible Nuclear Conflict.* Published by Peace Printing House in Russian and English, this book presents articles and opinions by several leading Soviet scientists on these problems.

Articles on these issues were published by the central Soviet press organs⁴¹ and by the Scientific Council on Peace and Disarmament Problems.⁴²

Soviet scientists work in close contact with scientists from other countries on the problem of the global consequences of nuclear war. An example is the US-Soviet article in *Ambio*.⁴³ The problems of co-operation between Soviet and US scientists are discussed by Alexandrov and Moiseyev.⁴⁴

IV. Conclusion

This review of Soviet research on the global consequences of nuclear war shows that most of this activity was undertaken in recent years. Results essential to explaining the role of those physical processes of the Earth's climatic system that cause nuclear winter were obtained. Corroborative assessments of Earth surface cooling, as a result of the atmosphere filling with the burning products of 'nuclear firestorms', were based on climatic models greatly differing in various complex details. All the main aspects of the climatic consequences of nuclear war have been analysed in detail, that is: what would burn and where; how much smoke would form; the height and distance it would spread; the time it would remain in the atmosphere; how the atmosphere would heat and the Earth's surface would cool; what changes it would cause in precipitation and in the general circulation and which feedbacks would start working in this complex system.

Quantitative estimates may be given for some of these problems. Others can be analysed only qualitatively. On the whole the problem is so complicated—and the possibility of climatic catastrophe due to nuclear war is so real—that co-ordinated international efforts are needed to carry out further systematic research.

Both Soviet and foreign scientists have concluded that the effects of nuclear war would reach the most remote areas of the world. Thus it is clear that ideas of using nuclear weapons even in regional and local crisis situations and equipping 'rapid deployment forces' with nuclear ammunition represent a threat to all mankind. By revealing the climatic consequences of nuclear conflict, scientists from different countries have shown the inconsistency of the concept, still held in some circles, that it is possible to 'wait out' a nuclear war, far from its core. Today it is becoming more and more evident: "Should nuclear fire start, it will spare no one".⁴⁵

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Appendix 4A. Nuclear winter: a bibliography

ARTHUR H. WESTING

Literature citations in section I are given in section III.

I. Introduction

It was suggested in 1982 that a large-scale nuclear war might inject dust and especially soot into the atmosphere sufficient to prevent a high proportion of the sunlight from reaching the ground which would, in turn, reduce the ambient temperatures to well below the freezing point on a hemispheric (if not global) scale for a period of up to several months (Crutzen & Birks, 1982). This possible weather anomaly soon became known as the 'nuclear winter' (Sagan, 1983).

Subsequent support for the possibility of such a nuclear winter came from three more or less independent computer simulations (Aleksandrov & Stenchikov, 1983; Covey *et al.*, 1984; Turco *et al.*, 1983). These simulations were based on existing highly simplified models of atmospheric circulation upon which were imposed the assumed (guessed) emissions into the atmosphere from a number of possible sorts of major nuclear war. A recent careful evaluation of these exercises—the only serious ones that have been published to date—suggests that their predictions are within the realm of reason (Carrier *et al.*, 1985).

The derivative literature has not only recounted these initial studies in one form or another, but has also provided discussions of the human, ecological and policy implications of the possible nuclear winter. This literature has ranged from the straightforward to the speculative and beyond, from the supportive to the critical, and from the responsible to the fanciful. What follows in section III below is a non-selective compilation of the world literature on the nuclear winter that has appeared to date in English. This will permit the reader to sample the existing literature in this new and burgeoning area. The author would appreciate being referred to, or receiving copies of, items that have been overlooked. The list of references in section III, dealing specifically with the nuclear winter, are preceded (in section II below) by a brief selection of background references on the effects of nuclear war in general.

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Part II. Space weapons and CBW

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Chapter 5. The military use of outer space

Summary and conclusions / Satellite issues and developments in 1984

Chapter 6. Chemical and biological warfare: developments in 1984

Introduction / Strengthening the international anti-CBW regime / CW armaments / Infractions of the international anti-CBW regime / Other events during 1984 / Bibliography

5. The military use of outer space

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Superscript numbers refer to the list of notes and references at the end of the chapter.

I. Summary and conclusions

The outer space environment has been militarized for over two and a half decades. Since 1958 a total of 2219 satellites with actual or potential military uses have been launched. This number constitutes at least 75 per cent of all satellites, including those for peaceful purposes, launched during the 'space age'. In 1984 alone, at least 105 satellites that can perform military missions were launched by the United States, the Soviet Union, the People's Republic of China and European NATO countries (see appendix B, tables 5B.1–5B.8).

With the increasing use of satellites to improve the fighting efficiency of military forces on Earth, the two superpowers have naturally come to regard satellites as important military targets. They have therefore now developed, tested and even deployed some anti-satellite (ASAT) weapons. Even more recently, ballistic missile defence (BMD) systems—claimed to be defensive in nature, but in fact easily capable of being used as ASAT weapons against an opponent's satellites—have been the focus of a heated public debate. These developments have further complicated the already difficult task of negotiating arms control measures to ban the use of ASAT weapons, since the defensive systems for BMD cannot be distinguished from offensive ASAT weapons until they are actually in use. Any weapon which could attack a ballistic missile could also attack a satellite, and the development of defensive weapons entails mastering the technology of offensive ASAT weapons first.

Appendix 5A surveys the various types of weapon with potential applications against satellites and missiles. There is not only an ASAT-BMD overlap, but the technological base is also common to many other applications. For example, high-energy lasers are being used in inertial confinement experiments which by and large are performed to study the mechanism of nuclear weapons; there are other applications for communication with submarines and material process-ing. High-velocity electromagnetic launchers, which may be used to launch projectiles in space, are also a technology which may have

applications in the study of the nature of nuclear explosions and inertial confinement fusion. Thus there is considerable overlap between different weapon systems, and their ultimate purpose cannot necessarily be established at the development stage.

The early ASAT missiles developed by the United States were crude and indiscriminate in their destructive capabilities. Soviet ASAT satellites were subsequently improved so that they could destroy an intended target. The US ASAT missiles now being tested are not only more efficient and accurate, but also carry non-nuclear warheads. And with the development of high-energy lasers, the US and Soviet systems could overcome two disadvantages: the long time it otherwise takes to reach and destroy a satellite, and the short range over which the weapons are effective. In March 1983 President Reagan announced the US intention of rendering nuclear weapons obsolete by using space weapons to create a shield against an opponent's intercontinental ballistic missiles (ICBMs), so that they could not reach their targets. He reconfirmed this intention in his inaugural address on 22 January 1985. US BMD weapons will be not only land-based but also space-based. and the outer space arms control debate in 1984 concentrated on these issues. The development and eventual deployment of ASAT or BMD weapons jeopardize not only the negotiations but also a number of arms control agreements now in force (see SIPRI Yearbook 1984, chapter 10).

Negotiations

In August 1983 the Soviet Union submitted to the United Nations a multilateral draft treaty on the prohibition of the use of force in outer space and from space against the Earth. While the non-use of force has already been enshrined in the UN Charter, there has still been an enormous proliferation of both weapons and conflicts. Prohibiting only the "use of force" does not necessarily prohibit the possession of weapons. While the Soviet draft treaty does make further provisionsfor example, that the parties would undertake not to test or create new weapon systems, to destroy existing ones and not to deploy any spacebased weapons-all the provisions are "in accordance with Article 1", which refers to the ban on the use of force. Moreover, force is often used and subsequently justified as a defensive action. It is therefore doubtful whether such measures would prevent the use of defensive weapons against missiles. The 1983 Soviet draft treaty was subsequently referred to the Conference on Disarmament (CD, then the Committee on Disarmament) and remains on the CD agenda for discussion in a working group.

While arms control in outer space has been discussed in the CD, which recognizes that this arms race is no longer of concern only to the two principal space powers, by the beginning of 1985 they were still unable to set up the working group to negotiate a treaty.

Several draft resolutions were presented to the United Nations during 1984. For example, on 26 November a number of countries presented a draft resolution to the United Nations on "the prevention of arms race in outer space". It urged the USSR and the USA "to initiate immediately and in a constructive spirit negotiations aimed at preventing an arms race in outer space" and called upon "all states, in particular those with major space capabilities, to contribute actively to the objective of the peaceful use of outer space". They also requested the CD "to intensify its consideration of the question of the prevention of an arms race in outer space in all its aspects". The resolution was adopted in the General Assembly by a vote of 150 in favour, with only one country abstaining, the United States. The USA abstained particularly on the article dealing with the CD, perhaps indicating its preference for bilateral US–Soviet negotiations.¹

However, the role of the CD has been emphasized by a number of nations. For example, France echoed the concern of other countries in the CD.² Moreover, in August 1984 France reiterated to the CD four points on which "a concerted international effort should be made".³ It was proposed that there should be a "very strict limitation of anti-satellite systems, including in particular the prohibition of all such systems capable of hitting satellites in high orbit". This formulation assumes that only certain satellites are important while in fact most military satellites are integral parts of existing nuclear weapons systems.

Moreover, while weapons capable of destroying satellites in high orbits ("high orbits" are not defined) are specifically mentioned to be banned, such a prohibition may not apply to weapons which could attack satellites in low orbits. This proposal also focuses on the prohibition of the deployment on the ground, in the atmosphere or in space of beam weapon systems capable of destroying ballistic missiles or satellites at great distances. Only beam weapons are specified, but as is shown in appendix 5A, there are other types of weapon which could destroy missiles and spacecraft. Furthermore, while the French proposal is for a concerted effort by the international community, and therefore presumably aimed at a multilateral agreement to prevent an arms race extending into outer space, it seeks a pledge from the USA and the USSR "to extend to the satellites of third countries provisions concerning the immunity of certain space objects on which they have reached bilateral agreement between themselves". Two other issues stress the importance of multilateral negotiations. For example, how would a ballistic missile defence system that substantially reduces the number of Soviet nuclear missiles reaching the USA in a potential attack affect the security of western Europe? It is argued that if both the superpowers built an effective defensive system, they would no longer live in fear of nuclear retaliation. They would be tempted again to resolve their differences in a conventional or even a nuclear war in Europe. Another concern is that the small French and British nuclear forces would not be effective against a Soviet BMD system.

The military uses of outer space were also a major concern of the nations of the Western European Union (WEU), and France in particular. On 7 February 1984 President Mitterrand, speaking to the Netherlands Parliament, said that if Europe launched "its own manned space station, allowing it to observe, transmit and consequently avert all possible threats, it would have taken a big step towards its own defence". In this speech he also hinted at a possible European BMD system. These concepts were later echoed by the WEU.⁵ The subject has been assigned to a special working group of the Council of Europe.

The latter concern could also apply to China. Some of the European arguments would also apply to Japan and many other non-nuclear weapon states. Therefore, discussions on space weapons have to be broadened to include China and some non-nuclear weapon states. Moreover, space is common to all nations; many nations are beginning to use it, and the effects of a nuclear war would be global. Thus it is pertinent to include these nations in the negotiations.

On 7-8 January 1985 the two superpowers held preliminary discussions and agreed to start negotiations on space weapons in parallel with the bilateral nuclear weapon talks; it was subsequently decided that they would begin negotiations in Geneva on 12 March 1985. What can be expected from the talks? At most, the two powers may agree to halt further development of their ASAT weapons. Even small measures may help improve crisis stability, but they may not be useful unless defensive space weapons are also controlled. Therefore, further development of ASAT weapons should be prohibited, and a moratorium on testing of both ASAT and BMD weapons should be observed. A treaty should also include a declaration of no-first-use of ASAT weapons, which could be an important confidence-building measure.

A limited ASAT treaty might at this point in time present verification problems since, for example, an F-15 deployed in an ASAT weapon mode may be difficult to distinguish from that deployed for other purposes. It may be possible to overcome such difficulties by including provisions such as those contained in the 1972 ABM Treaty in which ABM systems which are allowed are confined to specific areas. Such a provision would be facilitated by observations from space.

II. Satellite issues and developments in 1984

The Korean Airlines incident

On the night of 31 August/1 September 1983 a Korean Airlines Boeing 707 aircraft was shot down in Soviet airspace by the Soviet Union. During 1984 there was considerable discussion of a link between this incident and the presence of a US electronic reconnaissance satellite in orbit above the area where the aircraft was shot down. Electronic reconnaissance satellites carry equipment designed to monitor and detect radio signals generated by another country's military activities. An article in the Soviet daily *Pravda* first publicized the link between these two events and published the ground tracks (the projected path traced out by a satellite over the Earth's surface).⁶ Although the satellite was not identified, it appears to be satellite 1982-41C. Figure 5.1 shows the ground tracks of this electronic reconnaissance satellite at the time the Korean Airlines aircraft was over the Kamchatka Peninsula and over Sakhalin island.

These ground tracks show that the times at which the satellite was over the region of interest correspond to those mentioned in the *Pravda* article. However, the locations of the tracks are somewhat different, and the separations of the three tracks are narrower than those in figure 5.1. The *Pravda* article would indicate that the satellite was orbiting at a greater speed. The characteristics of the tracks in figure 5.1 however, are typical for such satellites.

It has been reported that during this time, the US space shuttle STS-8 was also in the region, acting possibly as a command post.⁷ Ground tracks of the STS-8 are also shown in figure 5.1. It can be seen that, on 31 August 1983, STS-8 was south of the region during its 21st, 22nd and 23rd orbits. The shuttle had already passed (21st orbit) south of Japan about half an hour before the first pass of the electronic reconnaissance satellite over the Bering Sea. STS-8 had again preceded the two subsequent satellite passes and the Korean Airlines aircraft when it overflew the Soviet territory on two occasions—over Kamchatka Peninsula and Sakhalin. Figure 5.1 shows a better correlation between the times when the aircraft entered the Soviet airspaces and the approach of the satellite.

The United States stopped releasing the orbital parameters of certain military satellites in June 1983, so the computation of the ground tracks

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Figure 5.1. Ground tracks (x) of the US electronic reconnaissance satellite 1982-41C, launched on 11 May 1982, during orbits 6949, 6950 and 6951; and the tracks of the US space shuttle STS-8 (•), launched on 30 August 1983. The tracks were made on 31 August 1983. The figures indicate the Moscow Standard Time for various positions of the spacecraft



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is based on the last orbital elements which were published for this satellite by NASA in June 1983. The Soviet Union has never published any information on its own satellites or those of any other country. Analysts must now rely solely on data gathered by amateurs.⁸

Soviet oceanographic satellites

A Soviet oceanographic satellite, Cosmos 1500, was announced at the time of launch as performing oceanographic missions to investigate sea, ice and wind conditions. Immediately after launch it was effective in providing imagery which enabled the freeing of Soviet merchant ships trapped in the ice by a sudden freeze in the Arctic Ocean. It has subsequently been reported that the satellite was equipped with side-looking radar. This is the first time a Soviet oceanographic satellite has carried this type of radar.

As early as on 13 November 1983, amateurs reported receiving imagery characteristic of Meteor-Priroda satellites, but with side-byside images, one of which was 'cloud-free'. In August 1984 a series of observations from Italy identified Cosmos 1500 as the source of these transmissions. The image received at Ravenna on 10 August is reproduced in figure 5.2.

Cosmos 1500 was south-bound over the Caribbean Sea at that time. Inverting figure 5.2 allows the Yucatan Peninsula to be immediately recognized, with the dark patch of Lake Izabal in Guatemala. The Peninsula was in darkness at the time, as can be seen from the visible swath with the clouds throwing long shadows due to low solar elevation just after sunrise. The observation demonstrated a storage and playback capability.

The side-looking radar on board Cosmos 1500 operates at a wavelength of 3.15 cm, providing 1.5-2 km resolution over a viewing field of 460 km.⁹ An improved low-resolution multispectral scanner provides imagery in four bands. The viewing field from the height of 650 km is 1930 km, with 1.5 km ground resolution. The side-looking radar and multispectral scanner can function simultaneously, having the same line scanning at the Earth's surface. The satellite information system is capable of performing either direct transmission or preliminary recording by the memory and subsequent reproduction within radio-range of the receiving centres. The memory can store 6.5 minutes of data, providing image-strips 2750 km in length at the swathwidths quoted above. This permitted the production of maps of the Arctic and Antarctic ice-caps.

Cosmos 1602 was also announced as an oceanographic satellite. Similar imagery to that received from Cosmos 1500 has been recorded

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Figure 5.2. Side-looking radar and visible APT (Automatic Picture Transmission) from Cosmos 1500, 1558 UTC (Universal Co-ordinated Time) on 10 August 1984. The numerical edge-code decodes to give 1435–1438 Moscow Standard Time, or some 265 minutes prior to the reception time. Loss of signal at the top of the picture, as the satellite set below the northern horizon from Ravenna, Italy, initially caused problems in identification of the land mass. Inverting the picture will make the Yucatán Peninsula recognizable in the radar image (*Photograph: M. Righini*)

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in New Zealand and in Europe. On 5 December 1984 both satellites were being used to produce a map of the summer Antarctic ice-cap. When the Soviet capability to fire submarine-launched ballistic missiles (SLBMs) through the Arctic ice-cap was revealed in late 1984, this emphasized the importance to the Soviet Union of such detailed information about the ice-caps. This new capability enables Soviet missile-firing submarines to escape detection by hiding under the north polar ice, where the USA has little or no ability to detect and counter them.¹⁰

Soviet navigation satellites

Soviet navigation satellites experienced a number of difficulties during 1984. Two of the nine Cosmos navigation satellites which were launched during the year were replacements for satellites in the civilian Tsicada system (see table 5B.7). Cosmos 1574 carried COSPAS search and rescue equipment.

Most problems occurred in the No. 3 position. For example, Cosmos 1333, which had taken identity No. 7 when replaced by Cosmos 1428 as No. 3 in 1983, continued to transmit the data in its memory on 6 July 1983.¹¹ Moreover, its time transmissions are no longer synchronous with Moscow Standard Time. It can only be concluded that the satellite has failed and that it has proved impossible to switch off its transmitter. Consequently, Cosmos 1333 is always included in the parameter blocks of operational satellites.

Soviet photographic reconnaissance satellites

Significant trends, pointing to an upgrading of capability in the field of photographic reconnaissance, became apparent during the year. More reliance was placed on fourth- and later-generation satellites with extended-duration missions. Continued failure to detect recovery beacons at the end of these flights points to de-orbiting on command and, by implication, digital image transmission of data and imagery, possibly with geosynchronous satellite delay, during the missions.

Orbital periods of less than 90 minutes continued to be used by satellites for which Earth resources missions were announced. Of the nine launched (see table 5B.1), only two were not stated to be reporting to the Priroda (Nature) Centre. Only four third-generation satellites flew with similar periods with mission durations of 9, 12 and 14 days. Three flew at an inclination of 73° , but one of the 14-day missions was at the less usual 63° .

Ten satellites manoeuvred to a circular orbit close to 350 km at the

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end of their first day in orbit, where they remained until recovery on the 13th, 14th or 15th day of the mission. Cosmos 1587 and Cosmos 1613 were peculiar in that they manoeuvred to the higher, circular orbit on the 11th day of the mission and were monitored by the Kettering Group after the change of orbit, but the only signals intercepted before the changes were from Cosmos 1587 on the day it was launched.¹² This, together with the standard 14-day period in the higher orbit, prompts speculation that the satellites were tested as on-orbit spares, after initial checkout, until lighting conditions became suitable, rather than performing a combined mission.

Cosmos 1511, a fourth-generation satellite, was already in orbit at the start of the year and was de-orbited after 44 days. Fourthgeneration satellites provided almost continuous coverage throughout the year, with only three gaps between consecutive missions, the largest of which was two days between the de-orbiting of Cosmos 1532 and the launch of Cosmos 1539. The trend to extended duration was apparent within this sub-set of missions. The first four launches had mission durations between 41 and 45 days, whereas the next three satellites had mission durations of 56 or 59 days; and Cosmos 1611, still in orbit at the end of the year, had exceeded 50-days' duration at the time of writing.

Three flights, from which no signals at all were intercepted by the Kettering Group, at 63° , 65° and 70° inclinations, may belong to a newer generation of reconnaissance satellite. Most interesting of all was Cosmos 1552 which, after a lengthy period of intense manoeuvring following its launch, was raised to a higher orbit after 119 days from which it decayed naturally until it was de-orbited on the 173rd day of its mission. The other two flights were terminated after 26 and 33 days.

Notes and references

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- 12. Wakelin, P., private communication.

Appendix 5A. Space weapons

Superscript numbers refer to the list of notes and references at the end of the appendix.

Space weapons can be divided into two basic groups: kinetic-energy and directedenergy weapons. Kinetic-energy weapons derive their destructive energy from the momentum of a propelled object, that is, from its speed. Some of these weapons may even carry chemical explosives. In directed-energy weapons, energy in the form of beams propagated with the speed of light is itself used to destroy a target. These weapons can in principle be Earth-based, space-based or, as in the case of an Earthbased laser, can have mirrors in space to reflect the destructive energy to the target.

I. Kinetic-energy weapons

Kinetic-energy or impact weapons are propelled by either chemical rockets or electromagnetic forces. An example of the former is the US F-15 aircraft-launched ASAT warhead propelled by a short-range attack missile (SRAM). The United States tested the aircraft and missile part of the system on 21 January 1984 and conducted the first flight of the warhead on 13 November 1984. While the warhead was not aimed at a specific target, its infra-red guidance system was tested against a star. For ballistic missile defence (BMD) a kinetic-energy warhead launched by a Minuteman I missile was tested on 10 June 1984. Tests of solid-fuel rocket motors indicate that missiles could achieve speeds in excess of 1.5 km/s.^1 Such missiles are about 10 cm in diameter and weigh about 20 kg.

The Soviet ASAT system could be categorized as a rocket-propelled kinetic-energy weapon. Some 20 tests have been conducted in which, instead of a rocket-propelled warhead, satellites have been put into orbit which would then destroy the target by either direct impact or by exploding nearby.

Two types of electromagnetic gun using electromagnetic forces are being investigated—the so-called mass driver and the electromagnetic railgun. The concept of the mass driver was proposed in 1966: a travelling magnetic wave is used to accelerate a mass which has to be electrically conducting and preferably ferromagnetic or superconducting.² The mass is accelerated through a series of coils, each of which could be connected to its own capacitor. As the mass passes down the line, each charged capacitor is switched into its coil causing a current to flow round the coil which in turn creates a magnetic field at the centre of the coil causing the mass to move forward. The projectile mass is in dynamic magnetic levitation. Problems are the modest acceleration achieved at each step, necessitating many coils and therefore increasing the size of the accelerator needed. For example, to accelerate a mass of 0.1 g to a velocity of 150 km/s would require a 2 km long accelerator.² If the weight of the accelerated material were increased to 100 g, a velocity of 450 m/s could be achieved if the accelerator length were 100 m,³ which is clearly too long for any space-based weapon.

A more promising device is called the railgun, in which an electric current is allowed to flow down two parallel rails and a partially short-circuiting object called an armature is placed between and perpendicular to the rails. The projectile is located in front and between the rails. The current thus flowing through the system creates a magnetic field which interacts with the armature current to create an outward electromagnetic Lorentz force on the armature directed along the direction of the rail axis.

While this technique has been under investigation since World War I, acceptable performance was established only in 1978, when 12.7 mm plastic cubes were accelerated to velocities of 6 km/s.⁴ It is interesting to compare this with the conventional chemical explosives with which maximum velocities achievable are in the range of 1-2 km/s. The high current (a few hundred kiloamperes) needed was provided by a so-called homopolar generator. A problem with such a device is that the mass of the accelerating armature limits the speeds achieved. Reducing the mass does not help since below a certain level the armature would melt when high currents flowed through it. The second problem is that of maintaining good electrical contact between the armature and the rails, especially at higher velocities. In fact, difficulties become apparent at velocities as low as 1-3 km/s.⁵

These problems were overcome to some extent by using an electrical discharge arc (i.e., a plasma) as the armature across the rails.⁶ In this case a projectile is pushed ahead of the plasma by the Lorentz force on the discharge current. While the contact problems could be reduced by this method, serious problems caused by heating exist; for example, the arc erodes the rails, particularly when the projectile and plasma are moving slowly or are stationary and the resistive heating and other phenomena in the plasma limit the acceleration. Extensive research is now under way to resolve these problems. Examples include the use of erosion-resistant materials for rails or hybrid solid/plasma armatures.⁵ In another type of railgun, a magnetic flux compression generator is used so as to increase the thrust considerably.⁷

A high current is allowed to pass through two rails of a magnetic flux compressor generator, creating an initial magnetic field. A detonator ignites an explosive along one rail, pushing it against the other and driving the magnetic flux from the flux compressor into the armature region behind the projectile. The increased current vaporizes the armature, turning it into a plasma. The electric current in the plasma interacts with the magnetic field, providing the thrust to the projectile (described above). Velocities of about 10 km/s with 3 g polycarbonate projectiles have been achieved.⁷ The accelerator length was 1.8 m. A projectile weighing 2.5 g and travelling at a speed of 8.6 km/s has been tested against missile components and found to have penetrated steel plates 6.5 mm thick.⁸

Further improvements have been proposed in which accelerating forces are applied at different points along the path of the projectile in sequence as it travels. Such a railgun is called a 'distributed railgun'.⁹ In this scheme, the projectile travelling through the barrel of the railgun passes through a number of regions in which the accelerating magnetic field is switched on when the projectile approaches and switched off when the projectile leaves the region. The accelerating forces are synchronized so that the velocity of the projectile is increased on each passage through the region. A theoretical study indicates that a velocity of 50 km/s could be achieved for a 2.5 g projectile. In this case the length of an accelerator would be about 11 m and it would use 34 accelerating stages. While in more conventional types of railgun the theoretical efficiency (ratio of kinetic energy of a projectile to the input electrical energy) of 10-30per cent was not realized, it has been suggested that this could be increased to about 80 per cent in a distributed railgun.¹⁰

By and large, the electrical-to-kinetic energy conversion efficiency has not exceeded 10 per cent. This means that if a 3 g projectile is accelerated to a velocity of 10 km/s,

the energy of the projectile is about 150 kJ (kilojoules). This compares favourably with the equivalent chemical energy stored in a 40 g explosive. The initial power source, therefore, would have to provide at least 2 MJ (megajoules).

The velocity of 10 km/s is impressive, but if an ASAT railgun is based on Earth the projectile has to travel through the atmosphere so that much higher velocities are needed to overcome the atmospheric drag. If, however, such a weapon is based in space and if the projectile is travelling against a satellite, its velocity need be much less than 10 km/s. Since satellites themselves have velocities in the region of 8 km/s, the relative speed of the projectile would be great.

Thus it can be seen that while chemically propelled rockets could accelerate objects such as an MHV of 20 kg to velocities of about 1.5 km/s, with electromagnetic launchers considerably larger velocities (about 10 km/s) would be attained but with smaller projectiles (about 3 g). The energy of the former would be about 20 MJ while for the latter it would be about 5 kJ. Against satellites the latter energy would be sufficient for damage. However, for long-range interceptions, for example, satellites in a geostationary orbit, higher velocity and therefore higher energy projectiles would be needed. For this reason and for reaching a target at long ranges in the shortest time possible, directed-energy weapons potentially offer the best solution. Therefore, in the following section some laser concepts are briefly discussed.

II. Directed-energy weapons

The effectiveness of any weapon is usually measured in terms of the energy required to destroy a target. When discussing directed-energy weapons, and particularly laser weapons, it is important to realize that for a potentially hard target such as a missile or a missile warhead, the destructive energy is the number of joules that must be delivered to the target to cause melting or ablative shock fracture of the target surface. For a soft target such as a satellite, a much smaller amount of energy is needed to cause damage. For example, just enough energy to disrupt the heat balance could be adequate for the destruction of a satellite. If we assume that at least 10 times the energy of the natural background radiation is required, then just over 1 W/cm^2 might be sufficient to make an unprotected satellite inoperative (the solar constant is taken to be 0.1368 W/cm²).¹¹

Amongst the directed-energy weapons, lasers with short wavelengths are preferred. The types of such laser considered for ASAT as well as BMD applications are briefly reviewed below.

Short-wavelength high-energy lasers

Chemical laser

While chemical lasers are relatively well developed and understood, the fuels used are difficult to handle owing to their high toxicity and reactivity. An advantage of such lasers is shorter wavelengths (about $2.7-4.0 \mu m$, micrometres) and potential for high energy (chemical reaction produces energy of about 225 kJ/kg fuel). The efficiency obtained with, for example, a hydrogen-fluorine (HF) laser is about 5 per cent so that the laser output energy is about 10 kJ. An HF laser should emit light at wavelengths

between 2.7 and 3.0 μ m but for a deuterium fluoride (DF) laser this range is between 3.6 and 4 μ m. At these wavelengths the atmosphere is highly transparent, clearly an advantage.

The energy density from a DF laser with output optics of 3 m in diameter would be about 0.5 J/cm^2 . To obtain the energy density of 1 W/cm^2 , the beam would have to illuminate a satellite for 5 seconds, allowing for 50 per cent absorption in the atmosphere.

Among the chemical lasers, the chemical oxygen iodine laser (COIL) seems suitable as a weapon. The COIL transmits at shorter wavelengths $(1.3 \ \mu m)$. In such a laser, energy is transferred from excited oxygen molecules produced by a chemical reaction.¹² An advantage of such a laser is the ease with which liquid fuel could be handled. Plans to build a 50 kW COIL are under way.¹³

Excimer laser

In this type of laser, a bound molecular state is produced from the combination of an atom in its ground state and another atom of the same or similar kind (the excimer) in an excited state. An excimer is a pair of atoms which are bound together to form a molecule when the latter is at an excited energy level. Molecules containing a halogen atom such as fluorine or chlorine and a rare gas such as krypton or xenon are the favoured ones. This is because the rare gases convert relatively easily the energy from, for example, a high-energy electron beam to a specific narrow band of excited electronic state. This excess energy is then transferred to acceptors.

A krypton fluoride laser emits light at a wavelength of $0.25 \,\mu$ m, one-tenth of the value for wavelengths of HF or DF chemical lasers. In an excimer laser, the input energy is converted into a laser beam with an efficiency of the order of 5–10 per cent. Yet another type of laser which uses an electron beam as the initial source of energy is the so-called free-electron laser.

Free-electron laser

While an excimer laser is related somewhat to chemical lasers (it depends on a reaction between two atoms), a free-electron laser (FEL) depends entirely on the conversion of the kinetic energy of a beam of electrons into laser radiation. In an FEL, a beam of electrons is accelerated to high velocity in an accelerator and then passed through a magnetic field which is so arranged that its polarity alternates along the path of the electron beam. This changing magnetic field causes a change in the velocity of the electrons causing emission of coherent laser radiation. The wavelength can, in theory, be selected from a range between microwave and the ultraviolet. In principle such a laser could generate peak power of a few MW/cm². In practice, however, an FEL with a wavelength of $3.4 \,\mu$ m has produced an average power of 360 mW and a peak power of 7 kW. While possibility for high efficiency exists (around 20 per cent), so far an efficiency of no more than 0.5 per cent has been achieved.¹⁴ The potential for further development is considerable. However, the size, cost and complexity of its accelerator make weapon applications difficult.

X-ray laser

A considerable amount has been written on this subject, so only a few brief remarks are made here.¹⁵ X-ray lasers are attractive because of their very short wavelengths, a consequence of which is some 100–1000 times more energy in each radiation quantum (photon) than other types of laser discussed so far. Two factors complicate the application of X-ray lasers. One is that X-ray transitions occur between one energy level of electrons near the nucleus of an atom containing several protons and a second energy level much farther away from the nucleus. This means that a considerable amount of energy is initially needed to raise enough electrons to higher energy levels to produce a population inversion. Second, the probability of stimulated emission decreases sharply as the wavelength of radiation decreases. This is because the change of stimulated release of energy is proportional to the cube of the wavelength. Thus the use of a copious source of high energy radiation to generate X-rays is needed. For example, the required pumping power for zinc has been calculated to be 5×10^{15} W/cm².¹⁶

A further complication is that the lifetime of excited states is proportional to the square of the wavelength. This means that atoms would remain in excited states for only 10^{-13} seconds. Thus the excited atoms would have to be stimulated into emission before this time if spontaneous emission of energy is to be avoided. The necessary laser pumping conditions can best be created by a powerful pulse of X-rays generated from a nuclear explosion.

In a concept discussed in the scientific literature, a single or a few small rods of the lasing material are placed axially surrounded by a cylindrical X-ray reflector to concentrate X-rays produced from a nuclear explosive placed at one end of the cylinder. The efficiency of such a laser is questionable, suggesting the use of large-yield nuclear explosions.¹⁵ However, it has recently been argued that the efficiency might be improved if sufficient care is taken in the design of the physical arrangement of the nuclear explosive and the laser material in an X-ray laser.¹⁷ In the suggested concept, the lasing rods are placed within a rod of nuclear explosive (such as plutonium-239) of the same length. The ²³⁹Pu rod is then imploded radially producing a nuclear explosion. In this way the lasing rods are irradiated from all sides by a very intense flux of X-rays. It has even been suggested that the fissile material may contain fusion materials to increase the nuclear reaction rate during the main period in which the energy is released. In this way a more clearly defined X-ray energy would be expected. An advantage of this type of arrangement is that a strong bundle of parallel X-ray beams could be produced in the direction of the target. (A critical analysis of the use of X-ray lasers is presented by Kosta Tsipis in chapter 3.)

Microwave beam weapons

Yet another type of directed-energy weapon, which has received relatively little attention, is the high-power microwave beam. The microwave region lies between the far infra-red and the conventional radio-frequency region of the electromagnetic spectrum. The wavelengths of microwaves thus stretch between 1 mm and 30 cm. At these wavelengths the atmosphere is mostly transparent so that a ground-based microwave beam of suitable energy could be a potential ASAT weapon.

A microwave beam, like a high-energy laser beam, has a number of applications. In the mid-1970s it was discovered that an intense beam of microwaves can raise plasma temperatures sufficiently for fusion to take place. Microwaves are even more fundamental for radar, communications and for many types of electronic warfare. Thus such

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beams are being investigated for their application in fusion research as well as communications and remote sensing. An important application in electronic warfare, for example, is to jam the enemy's radio transmissions. Microwave beams can be made strong enough to be applicable as directed-energy weapons. For this purpose they may be more useful against satellites than against missiles. As mentioned earlier, it does not need a great amount of energy to damage soft targets such as satellites. In particular, satellites do have antennas through which microwave radiation could reach sensitive electronic circuitry within the satellites causing overloading or damage. Such a device is often referred to as a non-nuclear electromagnetic pulse (EMP) weapon.

A number of devices exist, for example, the travelling-wave tube, magnetron and klystron, which generate microwaves. Basically, in all of these, the interaction between an energetic stream of electrons and the magnetic field through which they travel is used to generate microwaves. An important recently developed type of microwave generator is a gyrotron which efficiently produced high-power microwaves with shorter wavelengths than conventional devices. In a gyrotron, a beam of electrons is injected along a metal tube in which a strong magnetic field is maintained along its axis. In addition to a magnetic field, the electron beam generator imparts to the electrons a velocity perpendicular to the magnetic field. This results in electrons travelling through the tube in a helical path.

The spiralling electrons around the magnetic field interact with it, radiating electromagnetic energy at a frequency proportional to the magnetic field strength. Depending on the field strength, frequencies over 100 GH (gigahertz) (corresponding to a wavelength of 3 mm) have been obtained.¹⁸ Power of some 200 kW at 60 GH has been generated in the USA, and in the Soviet Union over a megawatt at 100 GH has been obtained.¹⁸ The efficiency of gyrotrons is high, about 20 per cent. A gyrotron with 400 kW at 34 GH is under development for deep-space surveillance. With such high power levels and low atmospheric absorption, even with relatively wide beam divergence, microwaves could become effective against spacecraft. For example, a pulse of electromagnetic energy can damage micro-electronics in several ways but primarily by inducing damaging overvoltage. Such an effect is known as the electromagnetic pulse. The strength of an EMP generated by a beam of microwave pulses will depend on the energy of the beam and its interaction with the atmosphere through which it travels. In passing through the atmosphere, the microwave beam will accelerate naturally occurring free electrons. If the beam is intense enough and energetic enough, the electrons may gain sufficient energy to ionize the air molecules, producing more electrons. This process results in a cascading avalanche which can absorb a significant amount of the microwave beam energy. However, if the beam is pulsed, since it takes time to get the avalanche started, most of the peak power is transmitted through the atmosphere.¹⁹

A second generation of the long-wavelength FEL is now emerging in which peak power output of several tens of megawatts has been observed. Moreover, high conversion efficiencies of electron-beam energy to microwaves have been achieved.²⁰ Much of the impetus is being derived from improving accelerators which generate electrons with high energies and high currents (i.e., high intensity beam). An example of such a device is the US 50 MeV, 10 kA Advanced Test Accelerator (ATA) and the 5 MeV, 10 kA Experimental Test Accelerator (predecessor to the ATA).²¹ The ATA is 85 m long. While this programme began as a part of the feasibility study for the use of intense charged-particle beams, as endoatmospheric weapons to defend missile silos, recently the application of the ATA to generate free-electron lasers particularly in the millimetre wavelength region has emerged. In such devices, the electron beam energy is efficiently converted into pulses of millimetre-wave radiation in the so-called wiggler. The latter is an array of magnets which generate periodic magnetic fields. In a number of experiments, microwave beams have been produced with peak power and wavelengths ranging from 0.5 MW to 75 MW and 0.4 mm to about 4 cm respectively.²² An efficiency of up to 12 per cent for such devices have been achieved.

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Appendix 5B. Tables of satellites launched in 1984

			· · · ·	
Country,	Launch	Orbital	Perigee	
satellite	date and	inclination	and apogee	
name and	time	(deg) and	heights	
designation	(GMT)	period (min)	(km)	Comments
USAF	17 Apr	96	127	High resolution: manoeuvrable: film
(1984-39A)	1912	89	311	recovery type: in orbit at the end
(1)0(3)11)	1712	07	511	of December 1984
USAF	25 Jun	96	170	Lifetime 115 days: Big Bird Satellite:
(1984-65A)	1843	89	263	manoeuvrable
USAF	3 Dec	97	300	In orbit at the end of December 1984
(1984-122A)	1800	94	650	
USSR				
Cosmos 1530	11 Jan	73	357	Lifetime 14 days: medium resolution
(1984-02A)	1229	92	416	
Cosmos 1532	13 Jan	67	166	Lifetime 44 days: high resolution:
(1984-04A)	1438	90	351	fourth generation
Cosmos 1533	26 Jan	70	349	Lifetime 14 days: medium resolution
(1984-06A)	0853	92	416	
Cosmos 1537	16 Feb	82	261	Lifetime 14 days: Earth resources:
(1984-17A)	0824	90	274	high resolution; data received by Priroda (Nature) Station
Cosmos 1539	28 Feb	67	168	Lifetime 41 days: high resolution:
(1984-20a)	1355	90	340	fourth generation
Cosmos 1542	7 Mar	70	350	Lifetime 14 days: TF: medium
(1984-25A)	0810	92	416	resolution
Cosmos 1543	10 Mar	63	217	Lifetime 26 days: high resolution:
(1984-25A)	1702	91	394	manoeuvred: no signals received by
(24		the Kettering Group: probably
				similar to Cosmos 1426 and 1516
Cosmos 1545	21 Mar	73	236	Lifetime 15 days: medium resolution
(1984-30A)	1102	91	398	······································
Cosmos 1548	10 Apr	67	165	Lifetime 45 days; high resolution;
(1984-36A)	1410	90	331	fourth generation
Cosmos 1549	19 Apr	73	359	Lifetime 14 days; TF; medium
(1984-40A)	1146	92	415	resolution
Cosmos 1551	11 May	73	212	Lifetime 12 days; high resolution
(1984-44A)	1258	89	259	-
Cosmos 1552	14 May	65	181	Lifetime 173 days; first long-lived high
(1984-45A)	1355	89	310	resolution; similar to Cosmos 1543
Cosmos 1557	22 May	82	213	Lifetime 13 days; Earth resources;
(1984-48A)	0838	89	249	data received by Priroda (Nature) Station
Cosmos 1558	25 May	67	169	Lifetime 44 days; high resolution;
(1984-50A)	1131	90	326	fourth generation
Cosmos 1568	1 Jun	73	357	Lifetime 13 days; medium resolution
(1984-54A)	1355	92	416	-
Cosmos 1571	11 Jun	70	348	Lifetime 15 days; medium resolution
(1984-58A)	0838	92	416	
Cosmos 1572	15 Jun	82	261	Lifetime 14 days; Earth resources;
(1984-60A)	0824	90	275	data received by Priroda (Nature) Station

Table 5B.1. Photographic reconnaissance satellites launched during 1984

Country, satellite name and designation	Launch date and time	Orbital inclination (deg) and period (min)	Perigee and apogee heights	Commente			
			(KIII)				
Cosmos 1573	19 Jun	73	232	Lifetime 9 days; high resolution			
(1984-61A)	1102	90	310				
Cosmos 1575	22 Jun	82	259	Lifetime 15 days; Earth resources;			
(1984-64A)	0735	90	277	data received by Priroda (Nature)			
Cormon 1576	26 Jun	67	160	Station Lifetime 50 days, high resolution:			
(1084 664)	20 Jun 1524	07	240	fourth generation			
(1704-00A) Cosmos 1580	1550 20 Jun	63	270	Lifetime 14 days: high resolution			
(1084-704)	1507	90	229	Encline 14 days, ligh resolution			
(1904-70A) Cosmos 1582	19 Jul	83	255	Lifetime 14 days: Earth resources:			
(1984-74A)	0838	90	281	data received by Priroda (Nature)			
Cosmos 1583	24 Int	73	357	Lifetime 15 days: medium resolution			
(1084-754)	124 Jul 1243	92	416	Encline 15 days, medium resolution			
Cosmos 1584	27 Jul	82	182	Lifetime 14 days: Farth resources			
(1984-76A)	0907	90	366	Enternite 11 days, Earth resources			
Cosmos 1585	31 Iul	65	174	Lifetime 59 days: high resolution:			
(1984-77A)	1229	89	300	fourth generation			
Cosmos 1587	6 Aug	73	197	Lifetime 25 days; medium resolution;			
(1984-82A)	1355	90	367	moved to higher orbit after 11 days			
Cosmos 1590	16 Aug	82	263	Lifetime 14 days; TF, Earth			
(1984-87A)	0950	90	273	resources; data received by Priroda (Nature) Station			
Cosmos 1591	30 Aug	82	262	Lifetime 14 days; TF, Earth resources;			
(1984-92A)	1019	90	274	data received by Priroda (Nature) Station			
Cosmos 1592	4 Sep	73	226	Lifetime 14 days; high resolution			
(1984-94A)	1019	90	290				
Cosmos 1597	13 Sep	82	213	Lifetime 13 days; Earth resources			
(1984-99A)	1033	89	246				
Cosmos 1599	25 Sep	67	180	Lifetime 56 days; high resolution;			
(1984-102A)	1438	90	327	fourth generation			
Cosmos 1600	27 Sep	70	349	Lifetime 14 days; medium resolution			
(1984-103A)	0810	92	417				
Cosmos 1608	14 Nov	70	198	Lifetime 33 days; similar to Cosmos			
(1984-116A)	0735	89	251	1543			
Cosmos 1609	14 Nov	73	358	Lifetime 14 days; medium resolution			
(1984-117A)	1229	92	415				
Cosmos 1611	21 Nov	65	173	Lifetime 52 days; high resolution;			
(1984-119A)	1033	90	349	fourth generation			
Cosmos 1613	29 NOV	73	198	Lifetime 25 days; similar to Cosmos			
(1984-121A)	1410	90	330	1587			
People's Republic of China							
China 16	12 Sep	68	175	Lifetime 17 days; a capsule was			
(1984-98A)	0546	90	399	returned to Earth on 7 September 1984			
Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments			
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USA							
USAF (1984-65C)	25 Jun 1843	96 99	690 710	Satellite was ejected from the Big Bird			
(1904-05C)	1045	3 7	/10	spacecraft (1964-65A)			
USSR							
Cosmos 1536	8 Feb	83	636	Lifetime 60 years			
(1984-13A)	0922	98	60/	Lifetime (O week			
(1084 27A)	15 Mar	83 09	030	Lifetime 60 years			
(1984-2/A) Cosmos 1603	1702 29 Son	98 71	951	Satallita managurad artansiyalu			
(1984-106A)	1410	102	857	orbital plane changed from initial 52° to 67° and finally 71°; largest spacecraft launched; new satellite orbited using an SL-12 Proton booster—the largest Soviet booster; the orbit is such that the ground tracks over the USA are repeated every 24 hours; each orbital change meant satellite went out of sight for about an hour"			
Cosmos 1606	18 Oct	83	633	Lifetime 60 years			
(1984-111A)	1746	98	666				
Cosmos 1612	27 Nov	83	141	Failed due to incomplete burn, at			
(1984-120A)	1424	98	1217	perigee, producing high elliptical orbit; short-lived			

Table 5B.2. Possible electronic reconnaissance satellites launched during 1984

^a Source: 'Soviets orbit large new military electronic satellite', Aviation Week & Space Technology, Vol. 122, No. 2, 14 January 1985, pp, 19–20.

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)		Comments				
USA	-			_					
NOSS-6	5 Feb	63	1052						
(1984-12A)	_	108	1172						
JD-1	5 Feb	—	_						
(1984-12C)	—			L	Navy ocean-surveillance satellites;				
JD-2	5 Feb	—		ſ	orbits of the three sub-satellites not				
(1984-12D)	—				disclosed				
JD-3	5 Feb	_	—						
(1984-12F)	_			J					
USSR									
Cosmos 1567	30 May	65	432		Passive satellite with ion thruster				
(1984-53A)	1843	93	442						
Cosmos 1579	29 Jun	65	251		Nuclear-powered radar; moved into				
(1984-69A)	0029	90	265		higher orbit on about 27 September 1984				
Cosmos 1588	7 Aug	65	429		Passive satellite with ion thruster				
(1984-83A)	2248	93	446						
Cosmos 1607	31 Oct	65	251		Nuclear-powered radar; still				
(1984-112A)	1229	90	265		operational at the end of 1984				

Table 5B.3. Ocean-surveillance and oceanographic satellites launched during 1984

Table 5B.4. Possible early-warning satellites launched during 1984

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USSR				
Cosmos 1541	6 Mar	63	600	Replaced Cosmos 1278
(1984-24A)	1717	718	39750	-
Cosmos 1547	4 Apr	63	597	Replaced Cosmos 1382
(1984-33A)	0141	718	39 749	-
Cosmos 1569	6 Jun	63	589	Replaced Cosmos 1518
(1984-55A)	1536	718	39 762	-
Cosmos 1581	3 Jul	63	626	Replaced Cosmos 1317
(1984-71A)	2136	718	39 720	
Cosmos 1586	2 Aug	63	609	Replaced Cosmos 1456
(1984-79A)	0838	718	39739	
Cosmos 1596	7 Sep	93	615	Replaced Cosmos 1348
(1983-96A)	1912	718	39 725	
Cosmos 1604	4 Oct	93	604	Replaced Cosmos 1367
(1984-107A)	1955	717	39 720	

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USA				
NASA/NOAA-9 (1984-123A)	12 Dec 1042	99 102	846 867	Replaced NOAA-7; carries search and rescue equipment ^a
USSR				
Meteor 2-11 (1984-72A)	5 Jul 0336	83 104	945 962	In higher orbit like Meteor 2-8; only ones in operation are Meteors 2-8, 2-10 and 2-11

Table 5B.5. Meteorological satellites launched during 1984

"NOAA-6 reactivated following failure of NOAA-8.

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USA				
DSCS 3-02	31 Jan	—	-	DSCS trans-stage failure?
(1984-09A)	0014			
DSCS ?	14 Apr	1	35 530	Possibly a DSCS launched by Titan
(1984-37A)	1648	1 423	35 530	34D launcher; probably a back-up for 1984-09A
USAF SDS-9	28 Aug	63	380	Satellite Data System; orbital
(1984-91A)	—	704	39315	parameters approximate
USN Leasat 2	30 Aug	3.5	35 691	Launched from STS-41D on 31 August
(1984-93C)	1243	1 434	35783	at 1312 hr; US Navy lease transponders on this communica- tions satellite
USN Leasat 1	8 Nov	3.3	33 469	Launched from STS-51A
(1984-113C)	1229	1 381	35924	
USA	22 Dec	3.4	36190	Launched by Titan 34D
(1984-129Å)	0002	1 446	35915	
USSR				
Cosmos 1522-	5 Jan	74	1 442	Octuple launch
Cosmos 1529	2010	115	1 475	•
(1984-01A-H)				
Cosmos 1538	21 Feb	74	77 9	Possibly store-dump communications
(1984-19A)	1536	101	811	satellite; replaced Cosmos 1420
Molniya 1-60	16 Mar	63	623	Replaced Molniya 1-51
(1984-29A)	2331	735	40 574	•
Cosmos 1546	29 Mar	1	36071	No mission announced; presumably
(1984-31A)	0600	1 452	36110	military
Cosmos 1559-	28 May	74	1 442	Octuple launch
Cosmos 1566	2150	115	1 485	-
(1984-52A-H)				
Cosmos 1570	8 Jun	74	791	Possible store-dump communications
(1984-56A)	1131	101	810	satellite; replaced Cosmos 1452
Molniya 1-61	10 Aug	63	424	Replaced Molniya 1-53
(1984-85A)	0000	735	40797	-
Molniya 1-62	24 Aug	63	455	Replaced Molniya 1-54
(1984-89A)	0824	718	39 900	-
Molniya 1-63	14 Dec	63	452	Replaced Molniya 1-55
(1984-124A)	2038	737	40 848	
NATO				
NATO 3D	14 Nov	6	35253	
(1984-115A)	0029	1 428	36 005	
· ·				

Table 5B.6. Communications satellites launched during 1984

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USA				
USAF/Navstar 9	13 Jun	63	20318	Ninth in a network of 18 satellites
(1984-59A)	1146	730	20 620	
USAF/Navstar 10	8 Sep	63	20 27 1	Tenth in a network of 18 satellites
(1984-97A)	2150	731	20713	
Nova-3	12 Oct	90	1 1 59	Second in the Nova series
(1984-110A)	0141	109	1 209	
USSR				
Cosmos 1531	11 Jan	83	985	Replaced Cosmos 1386; No. 2
(1984-03A)	1800	105	1013	•
Cosmos 1535	2 Feb	83	958	Replaced Cosmos 1428; No. 3
(1984-10A)	1731	105	1019	-
Cosmos 1550	11 May	83	978	Replaced Cosmos 1535; never
(1984-43A)	0614	105	1014	transmitted
Cosmos 1553	17 May	83	965	Replaced Cosmos 1383; No. 1
(1984-46A)	1438	105	1 010	
Cosmos 1577	27 Jun	83	960	Replaced Cosmos 1464; No. 5
(1984-67A)	0448	105	1 013	
Cosmos 1610	15 Nov	83	970	Replaced Cosmos 1531; No. 2
(1984-118A)	0643	105	1015	•
Cosmos 1598	13 Sep	83	972	Replaced Cosmos 1535 and 1550;
(1984-100A)	1550	105	1 018	No. 3
Cosmos 1605	11 Oct	83	953	Replaced Cosmos 1459; No. 4
(1984-109A)	1438	105	1 021	

Table 5B.7. Navigation satellites launched during 1984^a

^a In 1984 two more sets of triple GLONASS satellites, Cosmos 1554-1556 and Cosmos 1593-1595, were launched. The last set was placed in the same plane as the first two sets, which is 120° out of phase with the plane containing the third and fourth sets. These, and Cosmos 1574, which also carried COSPAS search and rescue instrumentation, are from the civil navigation system and are omitted from this table.

Country, satellite name and designation	Launch date and time (GMT)	Orbital inclination (deg) and period (min)	Perigee and apogee heights (km)	Comments
USA		ii		
STS-41B	3 Feb	29	275	Lifetime 7.87 days: first landing at
(1984-11A)	1258	90	293	Kennedy Space Center; carried West German SPAS-2 but not launched; among payloads launched were Westar 6 and Palapa 4 satellites; STS-10 was cancelled
STS-41C	6 Apr	29	494	Lifetime 6.99 days: launched Long
(1984-34A)	1355	94	495	Duration Exposure Facility (LDEF-1); repaired Solar Maximum Mission (SMM, 1980-14A) and re-orbited: STS-12 cancelled
STS-41D	30 Aug	29	295	Lifetime 6.04 days: launched Leasat 2
(1984-93A)	1243	90	312	and Telstar 3C communications satellites
STS-41G	5 Oct	57	345	Lifetime 8.23 days: launched ERBS
(1984-108A)	1102	92	359	(Earth Radiation Budget Satellite); also carried SIR-B (Shuttle Imaging Radar) and OSTA-3 (Office of Space and Terrestrial Applications)
STS-51A	8 Nov	29	304	Lifetime 7.98 days: Palapa 4 and
(1984-113A)	1229	91	312	Westar 6 were recovered on 12 and 14 November respectively and returned to Earth; launched Telesat 8 and Leasat 1
USSR				
Cosmos 1614 (1984-126A)	19 Dec 0405	51 88	173 223	Test of a subscale winged space craft; recovered from the Black Sea after one orbit

Table 5B.8. Reusable space launcher flights during 1984

6. Chemical and biological warfare: developments in 1984

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Square-bracketed numbers, thus [1], refer to the bibliography at the end of the chapter.

I. Introduction

This chapter records developments in the field of chemical and biological warfare (CBW) during 1984, supplementing similar reviews published in the past three *SIPRI Yearbooks* [239, 240, 241]. The information cut-off date is 31 December 1984. The perspective is again that of a Western observer, and the focus continues to be on developments affecting the prospects for world-wide CBW disarmament.

Governments are negotiating to this end within the Conference on Disarmament (CD) in Geneva. Since the conclusion of the 1972 Biological and Toxin Weapons Convention, the Geneva body has been working for a complementary chemical weapons convention that would provide for comprehensive chemical-warfare (CW) disarmament.

Public attention to this effort and to wider issues of CBW armament seemed, from the sheer volume of publications on the subject, to reach an unprecedented level during 1984. Besides extensive mass-media coverage, several new books and monographs appeared that were intended for a wide readership [e.g., 218, 223, 225, 234, 253, 261]. There was continuing growth in specialist literature dealing with defences against CBW attack [e.g., 25, 34, 35, 37, 140, 200, 204, 205, 210, 224, 245, 249, 332], this reflecting the increasing investment now being made by more and more governments in the anti-CBW protection of their armed forces and, but to a much lesser extent save in countries such as Sweden and Switzerland, in the protection of their civilian populations. The adequacy of such national measures of CBW preparedness began to emerge in some countries as an issue for public debate [e.g., 203, 401].

Events during 1984 likely to influence the outcome of the Geneva negotiations may be grouped into three main categories: (a) developments in the negotiations themselves; (b) national CW arma-

ment activities; and (c) reported infractions of the international anti-CBW regime which the negotiations are seeking to extend. Each category is reviewed in turn in the pages which follow. The penultimate section of the review briefly describes other developments during the year which may affect attitudes influencing national policy making on CBW. The review closes with a bibliography which both identifies the documentation cited in the review and records other notable publications, including ones received too late for mention in *SIPRI Yearbook* 1984.

II. Strengthening the international anti-CBW regime

Current international law places tight constraints on the policies for CBW weapons which governments may choose to implement. These constraints are embodied primarily in the 1925 Geneva Protocol, which requires that CBW employment policies exclude at least the initiatory use of CBW weapons, and the 1972 Biological Weapons Convention, which requires that CBW preparedness policies exclude development, production and stockpiling of germ and 'toxin' weapons. Under Article IX of the Convention, states parties have undertaken to negotiate in good faith for complementary measures of CW disarmament. Efforts to strengthen and extend this regime during 1984 were stimulated in no small measure by reports alleging, as in earlier years, serious infractions of the regime.

First and foremost among these efforts was the negotiation for a global chemical weapons convention, proceeding within the CD in Geneva. The progress made during the year is recorded in the Committee's report to the CD [1, 2]. This is reviewed in chapter 13, as are the efforts that continued within the UN for developing procedures for investigating CBW-use complaints.

Bilateralism and regionalism

A welcome development during 1984 was the resumption of bilateral talks between the USA and the USSR on the margin of the CD [84, 138]. While the CD has in the past been suspicious of such private superpower contacts, instances are bound to arise where progress on the multilateral front excites security concerns peculiar to particular CD members and which may therefore best be allayed bilaterally or regionally.

Nor are such concerns likely to be confined to the superpowers. The predicament of the two German states is an obvious case in point. The civilian population of both stand to suffer enormously were CW ever to occur in Europe; and while both have espoused policies of nonpossession of CW weapons, they are apparently both also repositories of CW weapon stocks controlled by their major alliance partners. A special significance therefore attaches to the bilateral German talks which got under way at the party political level during 1984: between the Socialist Unity Part (SED) on the eastern side and the Social Democratic Party (SPD) on the western, to discuss, *inter alia*, chemical weapon-free zone concepts for central Europe. There were three rounds of talks during the year [36, 307, 308, 309, 318].

The institutional reforms adopted in principle by the Council of the Western European Union (WEU) in October extended to the WEU Armaments Control Agency[16], but did not directly affect the controls on West German CBW armament that have been in place since 1956 [238].

Attention to the possibilities and drawbacks inherent in regional, rather than global, approaches to CW disarmament had been stimulated early in the year by a proposal from Moscow that NATO and the WTO should confer together on possibilities for "ridding Europe of chemical weapons" [14]. This proposal coincided with the reconvening in Stockholm of the Conference on Confidence- and Security-building Measures and Disarmament in Europe, where the US Secretary of State shortly afterwards announced that the USA would soon be putting forward a draft global CW disarmament treaty [361], an announcement reported to have caused surprise in Washington [415]. NATO governments have been dismissive of the Soviet regional proposal, portraying it as a diversion from the Geneva endeavour; but it has nonetheless been reiterated in communiqués from WTO meetings [15] and, in one form or another, is likely to figure on the working agenda of the Stockholm Conference during 1985. Perhaps the manner in which regional approaches may complement the global one-with respect to confidence-building, for example, or to the precise modalities of mutual withdrawal of forward-deployed CW forces-will then receive more positive consideration. And such approaches may, as a Canadian commentator has observed [262], have value in regions other than Europe.

Review of the 1972 Biological Weapons Convention

There were developments during the year with regard to the 1972 Biological Weapons Convention. In March and September the governments of France and China, respectively, acted to initiate the procedures for French and Chinese accessions to the treaty [17, 24, 319, 345]: France acceded on 27 September; China on 15 November.

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During the summer the acrimonious controversy surrounding the proposal for a special conference of states parties to establish compliance-verification procedures—a proposal that had been endorsed by the 37th General Assembly voting 124-15-1 in the wake of the Yellow Rain accusations—was resolved by the reaching of agreement among the states parties on the convening of a second ordinary review conference, and the establishment of a preparatory committee for it. In December the General Assembly endorsed this agreement and authorized the Secretary-General to assist. The review conference is to be held in 1986, probably in September [4, 272]. How exactly the conference treats the compliance-verification issue will be a matter of considerable sensitivity, not only in view of past allegations of non-compliance, but also as regards the CW negotiations. The present signs are that the US Administration, spurred by the Congress, will be pushing heavily [88, 152a].

III. CW armament

Developments in national CW armament during 1984 are reviewed here under four headings: the USA and NATO; the USSR and the WTO; proliferation; and new technology. As usual most of the information available for review is from or about the United States. This circumstance, created by the restrictive information practices of other states, must be born in mind as a caveat against whatever overall impression may thereby be conveyed.

The United States and other NATO countries

In the United States, the Reagan Administration had gone to remarkable lengths during 1983 in its resumed attempts to persuade the Congress to support its CW rearmament programme [219]. But notwithstanding the extensive testimony on the US CW posture taken from Administration witnesses [especially 143, 146, 149, 150], the Congress had ultimately declined to fund the transition from R&D into fullscale production of the new binary nerve-gas munitions requested in the fiscal year (FY) 1984 budget; it had, however, authorized the FY 1984 programme subject to certain provisos and, back in 1981, had voted funds enabling the US Army to start building a factory for massproducing one of the new weapons [241b].

The struggle was resumed early in 1984 with the submission of the President's budget for FY 1985. In contrast to the previous year's rejected request of (initially) some \$158 million for procurement of an

initial supply of binary munitions and additional production capacity, the FY 1985 budget provided only \$105 million for these projects [165]. This, the Administration explained, would not suffice for the production of actual binary munitions but only of 'long lead time' items for them, so it would allow the Congress further opportunity for pre-production scrutiny of the overall programme when the request for the additional \$100 million required later came to be submitted [103]. On the schedule current at the beginning of 1984 the first 155-mm GB2 artillery projectiles were due off the production line in autumn 1986, and the first Bigeye VX-2 spraybombs in mid-1987 [91]; the programme would be delayed by a further year if the Congress once again rejected the request [109]. The justificatory statements provided to the Congress alongside the budget by the Joint Chiefs of Staff [113] and the Defense Secretary [90] dwelt, as in previous years, on the importance of deterring the threat posed, above all, by Soviet CW capabilities. They maintained, also, that the programme would, through 'leverage', increase the chance of a new CW arms control agreement being reached with the USSR. A fuller rendering of this 'bargaining chip' contention-which, later in the year, was to find its most subtle expression yet in a paper by a British academic [252]-was contained in the President's arms control impact statement also accompanying the budget [82]. The Secretary of the Army told the Congress that 'binary modernization' was needed in order to establish compatibility between the US CW retaliatory capability and his department's new AirLand Battle doctrine [118].

It was from these positions that the Administration argued its case before the Congress over the next three months. The service chiefs, their chairman and the commanders of at least three of the specified and unified commands, including that of the Rapid Deployment Force, individually made personal representations to Congressional leaders [158]. So did the Defense Secretary and the President himself, the latter describing the binary programme as "absolutely essential" [78], the former saying that there was "no more serious deficiency in our defense posture today" [92]. Presidential advocacy of the programme was also displayed during the great advance publicity given to the Vice-President's tabling in Geneva of the US draft Chemical Weapons Convention in April [77], this display also serving, so it now seems, to quench an internal Administration dispute over the content, even the submission, of the draft treaty which hardliners in the Defense Department were reported to have been fuelling [417, 425, cp. 415]. The views of the Army Chemical Corps, which had tri-service responsibilities for the programme, were readily to hand, dogmatically supportive of the programme [120].

Congressional action on the budget request was influenced, however, by the imminence of the 1984 Presidental and Congressional elections. The House of Representatives rejected the recommendation of its Armed Services Committee [162a] and voted in favour of an amendment deleting the binary production programme from the defence authorization bill [158], this for the third year in succession. But then, in a striking volte-face, the Senate Armed Services Committee voted to delete the programme from the Senate bill too; it reported that it had done so "very reluctantly" but "in recognition that it is unlikely that the Congress will take a more favorable position on this program in an election year" [156]. Thus it was that by late May commencement of US CW rearmament had been held off for a further year. No attempt was made to restore the authorization from the floor of the Senate; nor, it followed, was any funding provided for the programme at the appropriations stage of the year's defence legislation, save for the R&D component of the programme. Even that came under threat when, as had happened before, the House Appropriations Committee came out [160] against the Army's projected advanced development of binarywarhead concepts for the Multiple Launch Rocket System, a weapon that is now being acquired by five NATO countries. Half of that appropriation was, however, restored in the subsequent House-Senate conference [153].

As the year went on, the issue of NATO-wide CW rearmament became more exposed. Long an important factor in Congressional opposition to the programme, the US Administration was still unable to tell the Congress that any European government had agreed to accept storage of additional US CW weapons (notwithstanding Soviet reports of both Britain and Italy having consented [173]), though it did say that such commitments had been gained from certain unspecified governments outside Europe [104]. In June the US Defense Secretary sent to Congress his report on the improvements needed in NATO's conventional capabilities [93], a report which included strong language on deficiencies in CW retaliatory capabilities [94]. Thereafter, what appears to have been a concerted attempt at modifying European opinion ensued.

Early in July the latest of what was by then a long succession of public statements by the NATO Supreme Commander in Europe (SACEUR) on the importance of NATO CW retaliatory capability [338] received unusually wide press coverage and editorial comment. In August it was reported that senior US and British officers serving in FR Germany had "launched a campaign" for supplies of CW weapons [399]. The following month, in a conspicuous departure from normal reticence in public on such matters, the general officer commanding 1 (British) Corps, then on manoeuvres in northern FR Germany [300], said at a press conference: "If you ask me, as a soldier, if we should have a retaliatory capability, I would say yes" [75]. Although the general went on to express support for the Geneva CW negotiations, his remark stood in some contrast to the firm statements of commitment to the negotiations which the British Foreign Secretary had made the day before [71]. This was, however, overshadowed almost immediately by SACEUR directing the attention of the press to a related but much more fundamental matter: he contrasted the existence of formal procedures for political consultations within NATO prior to release of nuclear weapons with the absence of any such procedures, save within the US command structure alone, in the case of CW weapons; SACEUR accordingly called upon NATO political leaders to confront and resolve the issue [12].

Later that same day, the defence ministers of Britain and FR Germany, accompanying one another on a tour of the manoeuvres, both spoke against any need for immediate NATO CW armament. The British minister said that, while he was aware of the "military preoccupation", his government did not take only the military judgement into account [74]. There had been reports in the press that CW weapon policy had been the subject of top-level governmental review in Britain since the spring [343]. The West German minister said he thought that his government's position was the same as the British [32]. His ministry had indeed, in response to SACEUR's public remarks in July, also differentiated between the military and political considerations involved [33], just as the government of the Netherlands had done in a detailed statement on CW policy to its Parliament in 1983 [66]. The Federal Defence Ministry spokesman had in July gone on to say that NATO's attitude towards additional CW armament was a political question which had not yet arisen [33]. At least as regards public debate. SACEUR had now raised it.

It remains to be seen whether, within the formal councils of NATO, the issue will ascend from the purely military level, where it has long been, to the political one. There had been reports during 1983 that the civilian leadership within the US Defense Department had been blocking service moves to this end. If so, that was no doubt because it perceived that a European political response favouring CW armament was most unlikely to be forthcoming then. Now, given the signs of movement discernible during 1984 in the attitudes of the British and West German administrations, and in view also of the obvious cogency of the political-control questions raised by SACEUR, that perception may be changing. The communiqué issued from the ministerial session of the North Atlantic Council during 13–14 December addressed the problem of CW armament, but said only that the "best approach" to it was arms control [436].

How NATO acts at the political level during 1985, if it does so at all, will largely depend on how the Administration of President Reagan, as he enters his final term of office, addresses the Congressional impasse on the binary programme. With the Republican majority in the Senate now reduced, the steam-rollering tactics of 1983 could prove even less dependable. The Congress, in its defence legislation for 1985, has itself advanced one approach [152b, 162b]: that national bipartisan consensus on the future of the US CW posture be sought through a blue-ribbon panel of wise men, rather along the lines of the Scowcroft Commission on Strategic Forces. The legislation requires the President to establish a Chemical Warfare Review Commission and to report to Congress on its recommendations. At the time of writing, the Commission is still being convened, and is scheduled to report in April 1985 [302, 305]. Meanwhile, the managers of the binary programme are moving to improve those of its features unlikely to impress external reviewers. Preparations for open-air testing of lethal chemical munitions, illegal since the late 1960s, appear to be under way [106, 122, 128, 303], for example: designs of air-deliverable binary munitions technically superior to the controversial Bigeye spraybomb [101, 164, 271, 371] are apparently being accelerated through the R&D cvcle [304]; and the judgement of the US scientific community has been received on how best to get rid of the CW munitions which binaries are to replace [141]. The recommendations of the Review Commission would presumably also be sensitive to the government of a NATO ally-Britain, say-giving advance notice that it would accept forwarddeployment of US binary munitions onto its soil.

Figures released by the US Defense Department during 1983 for the capacity required to airlift CW munitions to Europe [102] are given in table 6.1.

France is the only NATO member-state other than the USA to possess militarily significant stocks of CW weapons, said to be comparable in size to the supply held under US control in FR Germany. The US stocks in FR Germany appear to comprise some 435 tons of weaponized CW agent [80]—in the region, it may be estimated, of 7 500 tons of artillery projectiles—despite the existence of Soviet reports which state that 4 million litres of the nerve gases GB and VX are held in US Army depots in Hessen, Rheinland-Pfalz and Baden-Württemberg [e.g., 169]. There have been signs in recent years of increased interest on the part of the French administration in engaging non-governmental attention to CW preparedness [e.g. 25, 27]. An article published on this subject in May 1984 by the long-standing direc-

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tor of the French CW analysis and development programme concluded with words attributed to Joseph Stalin: "In a scientific war, he who prepares only for the defensive digs his own grave" [26]. French CW rearmament was advocated in a book by a well-known general published immediately after his resignation from the French air force as Deputy Chief of Staff [208].

Munition	Number of rounds that could be airlifted per C-141B sortie to Europe ^a	Number of C-141B sorties required to airlift rounds holding 100 tons of chemical fill ^b	Estimated US world-wide holdings ^c (tons of agent fill)
155-mm howitzer shell, unitary GB and VX	504	67	1 300 (36% GB)
155-mm howitzer shell, binary GB	608 (500)	48	0
8-in howitzer shell, unitary GB and VX	246	57	500 (77% GB)
750-lb aircraft bomb, unitary GB	66	14	1 000
160-gal aircraft spray tank, unitary VX	6	25	700 <i>°</i>
500-lb aircraft spraybomb binary VX (Bigeye)	60 (53)	21	0
500-lb aircraft bomb, unitary GB (Mk 94)	60 ^{<i>d</i>}	31	150
500-lb aircraft bomb, unitary GB (Weteye)	60 ^d	10	150

Table 6	5.1 .	Airlift	of	US	nerve-gas	munitions	to	Europe:	capae	city re	quirements
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^a For the binary munitions, additional airlift capacity would be needed to transport the separate canisters of binary reactant. The figures given in parentheses, calculated from the original source data, allow for this.

^b Firing tables for GB and VX munitions typically prescribe expenditures in the range 0.8 to 40 kg of nerve gas per hectare of target area (100 ha = 1 square kilometre); a company-sized target might occupy some 25 ha. Observe that, for the binary munitions, 100 tons of chemical fill would not yield more than about 65 tons of actual nerve gas.

^cOf the total US world-wide holdings of CW agent filled into munitions (as opposed to stored in bulk containers), mustard gas as well as nerve gas, 12.6 per cent by weight of agent is on Johnston Island in the Pacific, 3.8 per cent in FR Germany, and the remainder in the United States [80]. Of the total holdings of weaponized CW agent, it seems that the 10 munition types identified in this table account for about 34 per cent by agent weight: little more than 12 per cent of the entire US CW-agent stockpile.

^d Data not given in the original source, so asumed here to be the same as for Bigeye.

^e This reusable munition was designed for refilling in the field at least twice. It was presumably for this purpose that the US Air Force procured 1443 tons of bulk VX in its FY 1964-67 programmes.

Sources: The C-141B capacity figures, from US Defense Department data submitted for the record of the Senate Armed Services Committee after a subcommittee hearing on 7 April 1983 [102]. The holdings estimates, by sequential inference from collated fragments of information on the US CW stockpile released over the years by US officials, especially during Congressional testimony [242].

The Soviet Union and other WTO countries

The Soviet government and its agencies released numerous commentaries on CW armament during 1984 but, as has long been customary, none of them addressed Soviet activities, save as regards anti-chemical protection [e.g., 170, 171, 172]. Much attention was given to US programmes [169, 173, 183, 186, 187, 188, 189, 190]; and the US negotiating stance in the Geneva CW talks was depicted as camouflage for the US binary programme [167, 169, 175, 183, 184, 185, 186, 190], in much the same manner as US commentators depicted the Soviet stance.

From supposedly well-informed sources in the West, there emerged portrayals of Soviet CW armament activities similar to those of previous years, but with added detail. From the US Army Chemical Corps came, once again, the assertion that "Soviet doctrine clearly states that chemical weapons will be used whenever it is advantageous" [120]. A US defence analyst who has written extensively on CW, and who was reported to have had interviews with a "very high level" Soviet defector having knowledge of Soviet CW programmes [222], wrote as follows about Soviet CW targetting doctrine:

Chemical weapons might make the Soviet high-speed offense work, because they could disable NATO defenses quickly and effectively without posing a severe logistical burden on the Warsaw Pact. The principal chemical targets would be NATO airfields (both military and civilian), supply depots, port facilities, command-and-control facilities that do not have chemical-protective filters, NATO nuclear missiles, ground forces, logistic choke points, forward-defense points, forward-defense positions, and cities. [212].

In some of its particulars, this account coincides with what is known of official US perceptions of Soviet CW doctrine [e.g., 82]. Special concern has attached to the vulnerability of NATO air bases to CW attack [110] and of depots in Europe containing prepositioned stores for US reinforcement units (POMCUS sites) [119]. There is also the opinion of the US Defense Department that "the Soviet Union today possesses a decisive 'war stopping' military advantage because of its chemical capabilities" [95].

It is to be noted, however, that it was only during 1984 that detailed studies got under way within the US defence community that aimed to estimate the relative effectiveness of CW and conventional weapons against targets such as those listed above. No findings have yet been published, but, in the case of the tactical air base study, they are said to indicate that CW is a far less cost-effective form of attack than had previously been supposed. According to the US Joint Chiefs of Staff, the Soviet Union has continued to develop its CW capabilities in such a way as to aggravate still further an imbalance between NATO and the WTO [113]. Updated summaries of the US intelligence community's net assessment were provided to the Congress in classified and unclassified forms [e.g., 113], the latter showing some changes from earlier assessments [cp. 114]; details are given in table 6.2.

As to technological developments, further details were releasedpresumably from Western intelligence sources-about what were said to be the newer types of Soviet CW weapon. They included the 500 kg CW cluster-bombs reportedly used as armament for Su-17 aircraft in Afghanistan [336]; CW warheads for the BM-27 heavy multiple rocket launchers introduced around 1977 [108a, 330]; CW warheads of both sub-munition and bulk-fill types [108a] for the battlefield and theatre missiles which the USA designates as SS-21, SS-22 and SS-23 [120, 329, 337], missiles which reportedly were first deployed in, respectively, 1976, 1978 and—though this remains unconfirmed—1984 [13]. There was a British publication of unknown authority which traced the putative Soviet emphasis on CW guided-missile systems to "the Politburo's 1965 ruling that one in three of Soviet missiles should carry a CW warhead" [299]. It was reported in January that the CIA had observed Soviet testing of a ballistic missile re-entry vehicle apparently designed to tumble when re-entering the Earth's atmosphere; an explanation to which publicity was given was that the tumbling was intended as a mechanism for spraying CW agent over a wide area [281]. Later in the year it was reported that the Mod-4 variant, with 3-6 re-entry vehicles, of the SS-11 intercontinental ballistic missile was a CBW weapon [382]. (But the last time that the SS-11 Mod-4 had been referred to in the open literature as a CBW delivery system, in 1979, it was described as a weapon whose flight testing, begun in 1974, had never been completed [269].) Mustard gas and related blister agents were said to comprise the category of CW agents stockpiled by the USSR in greatest variety-six types [113]-alongside three types of nerve gas according to one source [111], four types according to others [113, 114], phosgene, hydrogen cyanide, at least one toxin agent and, "probably", an incapacitant. One figure put during the year on the size of the Soviet CW agent stockpile was 150000 tons [144]; another was more than a million tons [199]. A part of the stockpile was said by the US Defense Department to have been manufactured before World War II [108a]. There were reports that nine storage locations for CW weapons and protective items had been identified within the USSR [108a]; one was said to be near Buyanki, some 100 kilometres from the Chinese border [313].

CW posture	USSR	USA
Protective capabilities		
Personnel dedicated to CW protective missions	85 000	7 000
Number of large mobile decontamination and reconnaissance devices	20 000 ^a	1 000
Collective anti-CW protection installed in vehicles and ships	Yes	Few
Collective anti-CW protection installed in key facilities	Yes	Few
Deployment of reconnaissance vehicles for CW-agent detection and warning	Yes	No
Number of military chemical schools	4	1
Length of longest CW education/training course	5 years	6 months
Hours of formal chemical training per year	100-400	16-100
Number of field training areas	78	0 ^{<i>b</i>}
Conduct of CW defence exercises	Yes	Yes
Offensive/retaliatory capabilities		
Number of different CW agents held	12, probably more	3°
Tonnage of CW agent held ^d	150 000-750 000 ^e	Less than 50000 ^f
Deliverable CW munitions held ^d	80 times US holdings ⁸	
CW-agent production facilities	14 ^{<i>h</i>}	0 ^{<i>i</i>}
Types of CW-agent delivery systems held:		
Landmines	Yes	Yes
Artillery and mortar	Yes	Yes
Multiple rocket launchers	Yes	No
Tactical rockets	Yes	No
Ballistic missiles	Yes	No
Aircraft bombs	Yes	Yes
Aircraft spraytanks	Yes	Yes
Air-to-ground rockets	Probably	No
Aircraft cluster-bombs	Yes	No

Table 6.2. Chemical-warfare posture comparison: USA and USSR (the US view)

^a 20 000-30 000 in the 1982 net assessment; 8 000-12 000 in the 1981 [114].

^b1 in the 1982 net assessment [114].

^c In fact, 6: GB, VX, HD and HT plus the as-yet-undestroyed stocks of the incapacitants DM and BZ.

^d Figures, presumably from a Defense Department source, quoted on the floor of the Senate on 8 November 1983 [144].

^e The range of estimates quoted by the Defense Department in 1982 was 30 000-700 000 tons [107].

⁷A figure of 31 000 tons was quoted in 1982 by a former US official [211].

⁸ In the view of the US Air Force Intelligence, the USSR has "about 100 times more chemical munitions than the United States" [116].

^h In the view of the US Air Force Intelligence, the USSR has "between 19 and 50 chemical munitions production plants" [115].

ⁱ In fact, 3. They are all in standby status, requiring much restoration prior to reactivation. Source: Except for the italicized entries, the US intelligence community's 'net assessment' as of 1 January 1984. In: USA, Organization of the Joint Chiefs of Staff, United States Military Posture FY 1985 (the unclassified version submitted to Congress on 31 January 1984).

How reliable the foregoing information may be cannot here be estimated. As of 1983 the current US perception of Soviet CW capabilities was said to rely particularly on "highly credible human sources" [111]. A US Special National Intelligence Estimate (SNIE)

that year [135], purported quotations from which appeared several times in the press during 1984, stated that "historically, both collection and analysis of intelligence on chemical and biological warfare have suffered from persistently low priorities. Not until after the 1973 Yom Kippur War did the issue receive some recognition". In 1975 the US National Security Council reportedly assigned "Priority 3" to intelligence on Soviet CBW capabilities, raising this to "Priority 2" in 1977 and then to "Priority 1" in 1981. Commenting on the still continuing lack of firm knowledge, the SNIE reportedly said that collection was only a part of the problem: "on the analytic side, the intelligence effort still suffers from many years of neglect" [429]. A press report predating the leaking (if that is what it was) of this SNIE offers some corroboration: "A few years ago, US intelligence agencies conducted a major effort to learn more about Soviet [CW] capabilities, but, says one former CIA analyst involved in the study, 'We really don't know a thing-about how many weapons they have, what sort of delivery capability. Anyone who says otherwise is kidding himself' " [283].

Wider proliferation

The confirmation in March 1984 by a team of UN investigators that Iraq had indeed been using lethal chemical weapons in the Gulf War (see below) stimulated attention world-wide to the proliferation of CW weapons. It had the effect of publicizing an aspect of CW which has long been evident in its history: that the military attractions of CW weapons bear an inverse relationship to the level of technology at the disposal of those against whom the weapons might be used. This theme, and that of the threat which the Iraqi action posed for the international CBW arms control regime as a whole, was developed in a rare commentary on CW matters from within the Indian defence community:

Politically, the Iraqi use of chemical weapons poses great challenges to the non-aligned movement. If the political costs of using chemical weapons are seen as minimal, and as affordable, the military incentives for chemical weapons would multiply globally... Once the chemical weapons spread and are seen as legitimate, the advanced and interventionary powers...would most certainly use them in their conflicts with the third world. [231]

In other commentaries, the CW armament programmes of the 'advanced powers' themselves were seen as powerful stimuli of proliferation. A US Congressional study warned that one possible effect of the highly visible US binary munitions programme might be to validate the otherwise questionable worth of CW armament and thereby to set a fashion which hitherto uninterested armed services around the world might feel they ought to emulate [166]. Other US commentators [e.g., 320] seemed more impressed by what they had been told about Soviet CBW armament: "The larger the Soviet biochemical arsenal grows, the more NATO countries, China and every other state on the Eurasian periphery will be driven to produce their own".

Exactly how many countries nowadays possess militarily significant supplies of CW weapons is not known. Iraq's previously clandestine CW armament suggests that the number may be larger than is commonly supposed. Prior to 1984 the USA, the USSR and France were the only confirmed possessor states, but for at least 20 other countries that status had been alleged in reports published over the previous decade (cited in earlier SIPRI publications [e.g., 239, 240]) that varied very greatly in their credibility and reliability. Some could certainly be dismissed as fabrication. Others might have reflected genuine misperceptions. For example, a state seeking only to provide its forces with an adequate level of anti-chemical protection might well have cause for manufacturing CW agents, albeit in small quantities, even devices simulating the effects of actual CW weapons; or it might seek supplies of such matériel from alliance partners.

By the end of 1984 the number of alleged possessor states had risen to at least 30. In May US officials began to release hitherto secret intelligence on the subject. At the time of the floor-vote in the House of Representatives on the future of the binary programme, Defense Department officials were reported to have told the press that 14-16 countries had acquired CW weapons in recent years [367]. The possessor states identified in this release were Egypt, Iraq, Viet Nam and North Korea, in addition to 2-3 other Asian states and 'several' east European allies of the USSR, all unidentified; there were, however, said to be no countries in the western hemisphere that could yet threaten US forces with CW attack-this standing in contrast to the numerous press reports since 1982, continuing throughout 1984 [e.g., 348], of Cuban CW armament. Later that month, the Director of the US Arms Control and Disarmament Agency told the Senate that "at least 15 countries have a chemical weapons capability" [84]. In July there began a still-continuing succession of articles in the press [e.g., 313, 314, 427, 428, 429] purportedly quoting from recent CIA reports, one being the SNIE referred to above [135], that identified further countries as possessor states: Syria, Libya, Israel, Ethiopia, Burma, China and Taiwan, and, apparently [201], Cuba and Peru also. In December the previous month's rumours of Nicaragua having received actual CW weapons among the publicized supplies of anti-chemical protective matériel from Cuba and the USSR [429] were denied by US Defense Department officials [348]. Elsewhere, Libya was said to have received a ton of Tabun nerve gas from France [225], and Ethiopia a supply of nerve gas from the USSR [334].

There continued to be reports of non-governmental organizations moving to acquire CBW weapon capabilities: both SWAPO, in Namibia, and the PLO were reported to be receiving CBW training [225]. The USSR, in several commentaries released by TASS and other agencies, vehemently rejected charges of involvement in CW proliferation, and issued accusations of its own. Thus, the "counterrevolutionary rabble" in Afghanistan was said, again, to have been equipped with CW weapons by the USA [176, 191, 275]; and the Chilean defence industry was reported to be manufacturing "bombs with nerve-paralyzing gas" [182].

The following remarks were contained in the US CIA reports, so it was said:

The past decade has seen an ominous proliferation of chemical weapons acquired by Third World states [which shows a] momentum greater than heretofore appreciated. Soviet military assistance has been a common source and major stimulus to this momentum.

Much of the action has been centered in the Middle East, but other areas—parts of Southeast Asia and the Horn of Africa—are increasingly at risk. The attraction of chemical weapons for Third World forces, combined with a multiplicity of open market sources of chemical materiel, provide further nourishment for this growth. As more nations join the chemical club, a heightened sense of vulnerability is bound to manifest itself. We therefore expect a continued upsurge in chemical warfare activities.

While the evidence is not yet sufficient to conclude that we are witnessing the onset of a serious chemical arms race, forces and ambitions have been set in motion that would be difficult to arrest.

In deciding how much credence may be attached to the 1984 publications, the possibility of deliberate disinformation must of course be considered, the more so when the burden of implication or accusation falls particularly heavily on one or the other of the superpowers or their major allies. The skein of information, misinformation and disinformation, if that is what it is, becomes especially hard to untangle as regards the origin of the CW weapons used by Iraq. What currently appears most probable is that the weapons included ones of indigenous Iraqi manufacture [395]. What is not at all clear is the extent to which other countries have also been involved, either as suppliers of complete weapons or of chemical precursors, plant equipment or know-how for manufacturing them. At one time or another over the past year,

	Significance of the chemical(s) as precursor for CW agent(s)				Countries ^{<i>a</i>} where governmental controls have been place on export of the chemical(s) bound for any destination, or bound for Iraq or Iran only								
		No. of production	Availability of		6				EC countries imposing further controls			ing	
Controlled chemical(s)	CW agent(s)	from it (them)	precursors ^c	AUS	CAN	USA	JAP	EC ^b	NL	DK	GB	IRL	
2-Chloroethanol	Mustard gas	2	Yes								11	1	
Dimethylamine	Tabun nerve gas	2	No								11	1	
Potassium fluoride	Sarin family nerve gases	1	Yes		đ	\square	11				())]	
Thiodiglycol	Mustard gas	1	Yes			111	11,						
Phosphoryl chloride	Tabun family	2	No			111	111						
Methylphosphonyl difluoride	Sarin family	1	Yes			11	111						
Dimethyl methylphosphonate	nerve gases	2-3	Yes			111	111						
Methylphosphonyl dichloride		2	Yes				11						
All P-methyl and P-ethyl compounds	All nerve gases except the Tabun	0-4	No										
Methyl and ethyl phosphites	family	3	Yes										
NN-disubstituted-2-aminoethyl-X (X: -OH, -SH, -Cl, -Br or -I)	VX family nerve gases	1-2	No										
Phenyl-, alkyl- and cycloalkyl- glycollic acids	Some BZ family incapacitants	1	No										
3- and 4-piperidyl compounds	Some BZ family incapacitants (not BZ)	1	No										
Pinacolyl alcohol	Soman nerve gas	1	No										

Table 6.3. Countries imposing new export controls on particular chemicals following the verification of the Iraqi use of CW

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^a The lists of countries and chemicals here may well be incomplete. The sources of information relied upon for details of the export controls were as follows: [301] for Australia (AUS), [353] for Canada (CAN), [89] for the United States (USA), [353, 64] for Japan (JAP), [11] for the European Communities (EC), [67] for the Netherlands (NL), [353] for Denmark (DK), [76] for the United Kingdom (GB) and [353] for Eire (IRL). The lists do not reflect the CW-related export controls which some governments (e.g., that of the USA) had in place already.

^bComprising Belgium, Denmark, Eire, France, FR Germany, Greece, Italy, Luxembourg, the Netherlands and the United Kingdom. Implementation of the EC Foreign Ministers' collective decision on export controls requires domestic legislation by each member state.

^c By which is meant: are there realistic alternative ways of making the CW agent(s) concerned that do not go via the controlled chemical(s)?

^dExports to the USA are not controlled.

allegations on these matters were directed against the following: Brazil [397], Chile [291, 339], Czechoslovakia [416], Egypt [350, 352], France [350, 416], FR Germany (private sector) [356, 357, 363, 393, 416, 428, 435], German Democratic Republic [312, 416], Italy (private sector) [316, 376], the United Kingdom [41, 57, 59] (and private sector [365, 418]), the USA [60, 61] and the USSR [280, 321, 403, 411]. Most issued formal denials. During the summer, in a development of major significance for the Geneva CW negotiations, governments of OECD countries having major chemical industries placed export controls on particular chemicals, supplies of which could ease production of some CW agents. Switzerland was not among those countries, although the Swiss press reported that the Executive Federal Council might eventually take action [433]. The West German government placed controls not only on specific chemicals but also, later in the year, on a wide range of chemical equipment as well [317, 422]. Countries outside the OECD where special export controls were also imposed included Australia. Some details are given in table 6.3. The majority of the controlled chemicals have commercial significance as industrial commodities or intermediates. So do the chemicals most conspicuously absent for some or all of the national control lists: methyl and ethyl phosphonous dichlorides, thiophosphoryl chloride, phosphorus pentachloride and the mono- and di-chlorides of sulphur.

Technical change

Analysis of the technical factors that currently operate to limit the military value of CW weapons in high-technology warfare suggests one area in particular of conceivable technical change that might have a major effect on the attractions of CW armament. It is the possibility of some new development emerging which would enable the existing primary means of protection against CW attack, namely air filters (as in respirators or collective shelters) and protective clothing, to be breached or circumvented without adding greatly to the logistical burden of mounting a CW attack. Were that to happen, the present lowly status of CW weapons within the overall capabilities of the major military powers could alter abruptly. Of the various other ways in which CBW weapon technology might develop over, say, the next decade or so—new agents and new delivery devices, for example, or exploitation of recombinant DNA technology—none seems likely to have more than marginal significance.

In several countries, candidate mask-breakers, clothing-penetrators and the like have long been under surveillance. The archetype is chlorine trifluoride, which was studied in the German CW weapon programme during World War II as a means for burning through charcoal air-filters [394a]. But only recently has any government published anything hinting at significant advances [108a, 134]. Those of the technical possibilities that are public knowledge all appear to have major operational shortcomings, as did chlorine trifluoride. One example is perfluoroisobutene, which is an unexpectedly toxic filtersaturant. Another is said, for reasons that remain obscure, to be phosgene oxime.

As to novel CBW agents, Soviet work in the field of silicon chemistry, organofluorine compounds, peptides and neurotoxins, including toxins of algal and marine origin, is apparently seen as significant by the US intelligence community [430]. The latter is said [140a], contrary to some assertions [e.g., 163], to have no evidence indicating Soviet development of binary munitions analogous to the US ones, but there are bizarre rumours of Soviet development of a 'dual binary': a chemical that, upon combination with an alcohol, releases both a nerve gas and phosgene oxime [140a, 224a]. A GDR authority suggests that the weapon possibilities of peptides and of the toxic bicyclic organophosphates are being studied in the US CW programme [39]. An otherwise unidentified chemical agent bearing the US Army symbol GX, which has not previously appeared in open publications, was recently listed, alongside GA, GB, GD, GF, VX, H and L, among the small supplies of CW agents held at the principal US CBW provingground [122].

The CBW potential of recombinant-DNA technology attracted wide comment during 1984 [e.g., 222, 257, 260, 266, 267, 391]. That such a potential exists is undoubtedly true [38, 123, 264], but the contributions it might make to armament seem most unlikely to be realized over the coming decade at least: the relevant science is advancing very rapidly, however. Three factors in particular promoted the concern. One was the controversy, noted above, surrounding the convening of a new Biological Weapons Convention review conference: the governments of all three depositaries-the UK, the USA and the USSR-were on record as affirming that the treaty extended to recombinant-DNA technology, but charges had nonetheless been made of violations involving it [108b, cp. 139]. A second and associated factor was a series of much publicized articles in the Wall Street Journal alleging major Soviet military interest in gene-technology weapons [413]. The series, which later came to be heavily criticized [e.g., 207, 226], had been preceded by a press report purporting to quote a secret CIA study estimating that the USSR might be only 3-5 years away from deploying such weapons [462], though the existence of any conclusive evidence to that effect, as opposed to speculation, was subsequently denied

[112]. A third factor was evidence of increasing US military interest: evidence which, however, extended no further than that cited against the USSR in the Wall Street Journal in substantiating a specifically weapon-related interest. The US Defense Department makes no secret of its programme to develop military applications of recombinant-DNA and related techniques, for example in the provision of better vaccines against biological warfare agents [97, 121]; but reports that direct weapon applications are also being sought by the US government can, for the present, be discounted [226, 237, 392]. Yet there is no doubt that, as the technology matures, so will its application to CBW weaponry become increasingly practicable. While this justifies a watching brief on the part of CBW defence laboratories, even efforts to develop specific forms of protection against the weapons that might conceivably emerge, so too may the increased practicability promote the application, the more so if biological warfare research teams are already engaged. Various proposals have been mooted for remedying the situation during the Biological Weapons Convention review conference in 1986 [88, 260, 265, 380]. More are needed.

IV. Infractions of the international anti-CBW regime

Alleged violations of the 1972 Biological Weapons Convention

Development and production of biological or toxin weapons are outlawed by the 1972 Biological Weapons Convention. In this section, all allegations of infraction of that Convention which have been encountered during 1984 are noted. This in no way implies endorsement of the allegations. Indeed, none of them have been verified, and in general the credibility of these reports seem low. There is a separate discussion of the Yellow Rain issue.

An allegation against Iran, apparently emanating from Iranian émigrés in Paris, told of experimental work in an Iranian factory on warheads charged with cholera bacteria for short-range missiles [381].

Allegations against the USSR of biological weapon development were made by the US government in a report by the President to the Congress in January [81] and then in a succession of publications of which the most detailed, issued in April, was by the Defense Department [108]. This report stated unequivocally that the "Soviet Union has an active R&D program to investigate and evaluate the utility of biological weapons and their impact on the combat environment... [which] violates the Biological and Toxin Weapons Convention of 1972" [108b]. The report told of "at least seven biological warfare centers in the USSR ... under the strictest military control". A

subsequent article in the US press, purporting to quote from a recent US intelligence report, said that "major BW-related research and production installations" had been identified at Sverdlovsk and Zagorsk, with six others being "suspected" at Omutninsk, Aksu, Pokrov, Berdsk, Penza and Kurgan, plus a "a storage depot" in the town of Malta [382]. During the previous year, photographs had been said to exist which indicated dual-purpose activity at "Soviet agricultural plants"-production both of "agricultural products" and of "biological agents" [151]. The alleged biological warfare installation at Sverdlovsk was the one from which a cloud of anthrax spores is widely believed by the US government to have been released in an accidental explosion in 1979 and then to have initiated the anthrax epidemic in the local population which Soviet authorities subsequently attributed to consumption of tainted meat [239a, 240a, 241a]. The US Defense Department report included a release of new information about the reasons for that belief [108b], as did other publications [126, 413e].

There were allegations against the USA concerning use of biological weapons or preparations to do so, some of which implied violation of the Convention. They were repetitions of ones made in earlier years. In April the Soviet army newspaper accused the USA of having used biological weapons in Cuba, Pakistan and India in the previous 13 years; the epizootic of swine fever that had killed nearly half a million pigs in Cuba during 1971 was said to have been initiated during a clandestine CIA operation; so was the epidemic of haemorrhagic dengue fever which affected 344 000 Cuban people, killing 156, during 1981 [174]. The latter accusation was repeated in September by a senior Cuban official speaking in Canada [18]. No substantial evidence was adduced, however, to show that these episodes were anything other than of natural origin [222, 257]. In Managua during June the Health Ministry issued a warning about the "possibility that the US government may use bacteriological weapons in the war that has been unleashed against Nicaragua since mid-1982" [68].

Allegations during the year against Iraq succeeded sporadic rumours over the previous three years that, in addition to CW weapons, Iraq had also acquired biological weapons [312, 396]. Actual use seems first to have been alleged during the second week of March 1984 with attribution to Israeli sources referring to anthrax germs [358, 359] and to Austrian sources referring to mycotoxins [277]. Because of their parallel with the Yellow Rain charges from South-East Asia (see below), the mycotoxin report immediately attracted world-wide notice. It was found to rest solely on findings by a Belgian toxicologist [409] who had been examining biomedical samples taken from Iranian war casualties sent to Vienna for hospital treatment [287, 410, 412]. He withheld precise details of his findings and his analytical methods until the 'First World Congress: New Compounds in Biological and Chemical Warfare: Toxicological Evaluation' which he chaired in Ghent at the end of May [368]. What he then disclosed did not, however, constitute substantial evidence, or anything like it, of Iraqi use of mycotoxin (as opposed to mustard gas) weapons [288, 289, 290, 414].

The other allegations during 1984 of violation of the Biological Weapons Convention were part of the continuing controversy surrounding the Yellow Rain charges described below.

Reported instances of chemical warfare

There were a number of reports of chemical weapons being used in 1984. Iraq's use has been verified, and is dealt with separately. The other reports have not been verified on the evidence publicly available. They are summarized in table 6.4, together with allegations first heard during 1984 relating to earlier years or to unspecified periods.

Whether of mycotoxins or other toxic agents, the use reports from Kampuchea appear to have been much less numerous during 1984 than 1983, and to have faded away altogether as regards Laos. For Afghanistan, however, the trend seems to have been the reverse, but it cannot be stated here whether this should be taken as a trend in counter-guerrilla warfare practices or in, for example, pro-guerrilla publicity campaigning. In February 1984 the US government said that none of the "several" reports of CW it had received from Afghanistan

Alleged user ^b	Area of alleged use	Source [168, 176, 191]					
Afghan guerrillas (US-supplied)	Afghanistan						
El Salvador	El Salvador	[193]					
Iran (tear gas)	Iran/Iraq border	[63]					
Iraq	Iran/Iraq border	See appendix 6A					
Philippines	Mindanao	[69, 307, 344]					
South Africa (herbicides)	Namibia	[186]					
USA	Grenada, 1983	[310]					
USSR	Afghanistan	[62, 85, 294, 333, 377, 386, 431, 432]					
Viet Nam	Kampuchea	[20, 21, 22, 385]					

Table 6.4.	1984	allegations	of	use of	chemical	weaponsa
THOIC VITE	1/04	wite Sectority	v	and of	chennem	neapons

^a The purpose of this table is to collect allegations of use of chemical weapons which were made during 1984. Citation in this table in no way implies endorsement of the allegations.

^b In March and April there were rumours of imminent use of CW weapons by Ethiopian forces in Eritrea [383], denied by the Ethiopian government [273], associated with reports of Soviet nerve-gas weapons having been shipped into Assab [334]. The use of chemical herbicides for deforestation in northern Brazil was characterized in Soviet and many other publications around the world as a US CW-weapon test programme, one that had killed more than 7 000 people [176, 180, 192, 193, 354]. This was rejected by Washington as "classic Soviet disinformation" [137]. during 1983 (contrasting with the "several dozen" reported attacks during 1982) had been confirmed as valid from two or more types of source [133], but in July it said there had been 'confirmed reports' during 1984 [85]. Soviet forces in Afghanistan were said to have used "a variety of lethal CW agents, including nerve agents and toxins" since 1979 [136]. Insofar as open publications are a guide, the chief suppliers of information about the Afghan CW reports, apart from 'national technical means', appear until rather recently to have been refugees, guerrilla-fighters, 'travellers', low- and middle-rank Afghan army deserters and defecting Soviet conscripts [215]. To these have now been added, or so it is reported [136, 333], at least one soldier of the Soviet Chemical Troops and a senior Afghan chemical officer. Soviet commentaries on the Afghan CW reports laid a heavy emphasis during 1984 on the 'fabrication' of evidence and its planting by US special services operating out of Pakistan [168, 176, 191].

The use of chemical weapons by Iraq against Iran

Iranian governmental agencies have alleged that by the autumn of 1984 Iraq had used CW weapons in more than 130 instances since the beginning of the Gulf War in 1980, killing or injuring at least 3 500 people, including non-combatants. About one-half of the attacks and four-fifths of the casualties were said to have occurred during 1984. A documented record of these allegations is given in appendix 6A.

Controls in Iran over, for example, movement of foreigners, and the brittle state of Iran's international relations, had the effect of impeding independent corroboration of the reports. The sole source of information on about 100 of the reported CW attacks was, and still remains, the Iranian government itself. However, for at least some of the other 30-40 reported attacks additional sources have been available. They are identified in appendix 6A. Most of them resulted from actions by Iranian authorities that allowed controlled access by foreigners to selected patients, purported victims of CW attacks, numbering some hundreds in all. These facilities were provided both in Tehran and in medical aid stations and hospitals elsewhere to visiting medical specialists, journalists and the diplomatic corps. In addition, some 70 of these patients were flown to nine countries (Austria, Belgium, France, FR Germany, Japan, the Netherlands, Sweden, Switzerland and the UK [45]) for hospital treatment, the majority of them during March 1984. The degree of verification thereby achievable was significant, but limited. Through such actions, however, Iran was eventually able to mobilize international investigatory machinery. By the end of March UN inspectors had established beyond reasonable doubt that, at

the very least, there had been one Iraqi attack in which mustard-gas bombs had been used [9].

By UN General Assembly resolution 37/98D, the Secretary-General had since December 1982 been empowered to investigate, with the assistance of qualified experts, any CBW-use complaint that might be lodged with him that he was able to recognize. Iran had several times since November 1983 requested an investigation of its CW charges [50] but, although it referred to the empowering resolution in a statement at the Conference on Disarmament in February 1984 [48], it did not formally request an investigation under it until 8 March 1984 [51]. That was one day after the International Committee of the Red Cross had issued a statement, based on observations by its delegate in Tehran, that did much to corroborate the Iranian charges in the eves of the outside world [328], and three days after the US State Department had announced the US government's conclusion that Iraq had indeed been using lethal chemical weapons [131], this conclusion reflecting the consensus of its several foreign-intelligence agencies. The UN Secretary-General had throughout been under strong political pressure not to act on a mandate that had been conferred by the General Assembly against the fierce opposition of, among others, a permanent member of the Security Council [274], namely the USSR. He did not do so. Instead, in a courageous action on 8 March, he announced that he had decided to dispatch an investigatory mission to Iran [5], not under Resolution 37/98D, but "conscious of the humanitarian principles embodied in the Charter and of the moral responsibilities vested in his office" [6].

The team he convened comprised experts from Australia, Spain, Sweden and Switzerland. They were in Iran during 13–19 March and submitted their report to the Secretary-General on 21 March.

The procedure which the UN investigation followed departed somewhat from that recommended for such inquiries by the Group of Qualified Consultant Experts [8] established under Resolution 37/98D. Had the investigating team had more time at its disposal in Iran, its findings could no doubt have been more extensive. In particular, the degree of verification which it provided concerning the reports that Iraq had employed the nerve gas Tabun might then perhaps have become as great as that for the reported, and now confirmed, employment of mustard gas. Material has subsequently been released by Iranian authorities which suggest something of the additional observations which the UN team might have felt itself justified in reporting [46, 47].

On the accumulated evidence, and despite its protestations to the contrary, Iraq stands exposed as a violator of the 1925 Geneva Protocol, an international criminal. But the political expediencies of the Gulf War have protected Iraq from formal condemnation and sanc-

tion. The UN Security Council, like the General Assembly later in the year, adopted no resolution reflecting the Secretary-General's findings; instead, it allowed its president to issue a short statement condemning, not Iraq, but the use of CW weapons in the Gulf War [3]. It was left, again, to the Secretary-General to do what he could to redress the failure of the United Nations, more particularly the permanent members of the Security Council, to protect the CBW arms control regime more forthrightly. On 29 June, the day after he had received a report from Iran [52] alleging 20 further CW attacks since the time of the Security Council statement, he requested the governments of Iraq and Iran to furnish him within three days with written declarations reflecting their respective undertakings, as solemn commitments, not to use chemical weapons of any kind for reason. Iran, which had already declared its decision not to retaliate in kind against Iraq [49], duly complied [53]. Iraq did not; an obduracy which is reported to have blocked at least one peace initiative [327], albeit not a resumption of diplomatic relations with the USA.

In November US officials said that the depleted Iraqi stocks of CW weapons had now been replenished [279].

Yellow Rain

The US government believes that lethal chemical and toxin weapons have been used by Laotian and Vietnamese forces "operating under Soviet supervision" in Laos since 1976, and by Vietnamese forces in Kampuchea since 1978 [136]. Of the toxic agents believed to have been used, US officials say that only certain epoxytrichothecenes have been identified. These are poisons which some species of mould fungus found world-wide are capable of generating; hence their label 'mycotoxins'. They are now commonly described in US defence literature as 'Yellow Rain' agents.

In February 1984 the US government made a further submission to the UN in support of its belief [133]. The submission comprised a summary of "new preliminary findings for 1983". It stated that the level of use of toxic weapons in Kampuchea during 1983 seemed to have been essentially the same as during 1982, but that in Laos it had been lower. In addition, it said that the lethality of the reported attacks seemed to have declined in both countries, suggesting that this indicated "use of nonlethal incapacitating or riot control agents", and that there had been "far fewer descriptions of trichothecene toxin type effects". A submission to the UN by Democratic Kampuchea stated that more than 600 people in Kampuchea had been affected by Vietnamese chemicals between 25 December 1982 and 19 August 1983, 64 of them having died [19]. No reports from South-East Asia of toxic warfare during 1984 have been referred to in official US publications.

At the uppermost levels of US government, belief in the truth of what it had been charging showed no diminution during 1984, and, to expressions of scepticism in the mass media, officials seemed to have no hesitation in responding contemptuously and publicly [e.g., 86, 87, 99]. The basis for the belief likewise appears to have remained essentially the same. The Assistant Secretary of Defense for International Security Policy told the Senate in March that the evidence was "very good" [98]. "We have high confidence" in it, he said; it "consists of a wide range of data from open and sensitive sources. The evidence in many cases is corroborated by other source data and sample analysis."

There were, however, indications that the significance of some of the criticism of the evidence that had been voiced from within the non-governmental scientific community [241c] was beginning to be recognized at political levels of the US Administration. Thus, the February 1984 submission to the UN stated that, in Laos, "some deaths associated with toxic attacks occurring in 1983 resulted from secondary effects, such as from eating contaminated animal products after an attack. In some cases, deaths occurred only among the infirm..." [133]. And when in July the director of the Arms Control and Disarmament Agency was asked at a press conference whether purported victims might be mistaking the defaecations of swarms of bees for toxic-agent attacks, he responded: "Yes, I think there is not only confusion on that score, there is confusion on Yellow Rain attacks from just bad water and normal disease... That is something that our team has to investigate and look at" [85]. The team to which he was referring was the three-man data-collection group operating out of the US Embassy in Bangkok that had been established at the end of 1983 [276].

The attitudes of other Western governments towards the Yellow Rain reports were the subject of an article in the European press which purported to quote from a secret American-eyes-only report issued by the Director of Central Intelligence with the concurrence of the nine principal US foreign-intelligence agencies [314]. The report was evidently the same Special National Intelligence Estimate of September 1983, mentioned above, from which several other extracts and paraphrases had appeared in the press [135]. It appears, on the assumption that the report was indeed a leak and not a forgery, that the US President had been told the following by his chief intelligencer:

1. The French government has evidence confirming the US belief, acquired independently, but has chosen not to release it publicly in

order to avoid domestic political controversy, preferring quiet diplomacy.

2. The West German government also has independently acquired confirmatory evidence, but is withholding it.

3. The British government privately supports the US position but in public displays a reluctance to comment similar to that of the French and West German governments.

The report gave several explanations as to why these and other governments were not reacting "in a concerted and politically significant way", the overall conclusion being that the European allies could not be trusted to help the USA if it alleged violation of arms control agreements by the USSR.

An alternative explanation is that the Americans concerned have been mistaken in supposing their allies to have 'confirmatory' evidence. That there are people in the intelligence communities of NATO countries who see merit in the particular pattern of inference which has been constructed by the US evaluators—a pattern drawn from what, in the nature of things, can have been no more than data that may or may not have been misreported, open to interpretation in several ways, circumstantial evidence, suggestive indications, and speculation therefrom—is probably true. But whether those countries have hard evidence—from, for example, the sample analyses which their defence laboratories are known to have been conducting—is an altogether different matter. The indications are that they do not.

At the hard-science end of the US evaluation, evidence that originally appeared impressive came to look substantially less so during 1984 as more and more detail of the laboratory work entered the public domain [217, 248, 258, 286, 289, 290, 347, 366]. In particular, it became clear that the reports of epoxytrichothecenes in environmental and biomedical samples associated with alleged toxic-warfare attacks lacked adequate controls to rule out the possibility of the toxins having been produced naturally by toxic moulds in foods and the environment. Although some evidence was adduced against it during the year [206, 216], the latter possibility still remained wide open. And there remained room for conjecture, increasing in plausibility as the year went on, that the reports of epoxytrichothecenes had actually been in error, or else that they had resulted from contamination not present in the samples at the time of their collection in South-East Asia. Although these conjectures, too, were attacked during the year [243, 244], they also remained tenable. Within the scientific community, including defence laboratories, it is now widely accepted, partly on the basis of new findings reported during 1984 by non-governmental investigators

[227, 228, 235, 250], that at least some, and quite possibly all, of the environmental samples that have been turned in by Hmong refugees and other collectors in the belief that they were residues of Yellow Rain agent attacks, including samples in which the presence of epoxytrichothecenes has been reported, are in fact the excrement of honey-bees.

Where, then, does that leave the softer end of the US evaluation that part of the overall intelligence estimate which relies, not on laboratory findings, but on the 'sensitive sources' to which the Assistant Defense Secretary referred, including satellite imagery, signals intercepts, defector reports and suchlike? The outside world cannot know whether these sources are still capable of supporting the overall estimate now that the corroboration provided "in many cases" by sample analysis appears to be failing. For, as the leaked SNIE put it, the "special nature and secrecy requirements of sensitive intelligence are such as to impose severe limitations on the ability of governments to present intelligence findings in a publicly compelling way".

The Defense Department told the US Senate in June that the US government's case on Yellow Rain was "a reflection of many different types of evidence. It is always easy to take a thin slice of the total body of evidence and say that it does not prove the case, but the US government is not saying that any one thin slice proves the case" [100]. In one sense the new findings referred to above, which some commentators have incorrectly portrayed as invalidating the US government's entire case, do indeed focus only on one "thin slice" of the evidence, for the train of inquiries from which they resulted was stimulated by a literally microscopic datum: an observation of pollen in a Yellow Rain sample; a datum which first became available in January 1982. But the new data which were then gathered in a quest to explain it now constitute not a thin slice but a large chunk of evidence, one which weighs heavily against the existing explanation of the Yellow Rain phenomenon in terms of mycotoxin warfare. An attempt was made during 1984, the latest in a succession, to explain away the pollen, this time as a "collection artefact" [124], that is, people have been gathering the wrong samples. But a theory much more defensible than this is needed if the pollen findings, and the bee-excrement hypothesis which they support, are justifiably to be ignored in any overall evaluation. Should such a theory not be forthcoming, at least the mycotoxin-warfare charges would no longer be supportable with any confidence in the US government's case.

In fact, but for sporadic reports of Vietnamese soldiers in Kampuchea having been sighted wearing gas masks [e.g., 402], and but for the impressive volume of testimony from refugees reaching Thailand, no sort of toxic-warfare charge, mycotoxin or any other, would any longer seem supportable, not least—though by no means solely because of the failure of the many people who have been looking to find a single spent or dud round of toxic-agent ammunition, even after eight years of supposedly extensive use. (There have been recurrent rumours of such things being discovered, most recently from Kampuchea in January 1984 [284], but they have all, apparently, proved false.) Taken together, the refugee testimony points to deaths, injuries and human misery on a hideous scale, much larger than Iranians, for example, have been suffering at the hands of Iraq.

Yet might it not be possible that the refugees who have given this testimony, perhaps being aware of the stories of 'poison from the sky' that have been recurrent in South-East Asia for more than 20 years, have mistaken something-perhaps the defaecations of swarms of bees-for toxic warfare and have associated it with real or rumoured illness? Such a theory may seem too absurd to contemplate; yet, to support it, there are precedents from, for example, accounts given of US herbicide-warfare operations in Viet Nam by exposed montagnards, and there is also a growing body of evidence [227, 228, 236, 256]. There is no doubt that the interviewing techniques which were applied to refugee populations during the height of the Yellow Rain episodes were faulty [240b, 241c]. The degree to which this may have created an erroneous perception of what the refugees had in fact experienced has been the subject of some attention by professional sociologists and anthropologists [e.g., 213, 255], but clearly there is room for much more. Available for re-analysis are English-language summaries of approximately 200 interviews conducted during 1979-82 by US, Canadian and UN personnel with Hmong refugees, Khmer Rouge soldiers and Thai villagers purportedly describing toxic-agent attacks; and some additional controlled questionnaire-derived information gathered during 1983, as part of an epidemiological survey of a refugee population in Thailand conducted under private US auspices, is also becoming available [209].

Public debate of the Yellow Rain remained active during 1984, but by the end of the year it had begun to fade. If interest continues to diminish with so many controversial matters of evidence still unresolved, it will leave behind it, just as the publicity given to the Sverdlovsk anthrax epidemic of 1979 did, a still-unjustified residue of belief in past CBW arms control treaty violation; yet another obstacle that could otherwise have been avoided in the path of further arms control.

V. Other events during 1984

Agent Orange

The herbicide warfare conducted by the USA and its allies in Indochina during the 1960s continued to display its malign aftermath during 1984, strengthening still further the case for including chemical herbicides within the scope of the projected Chemical Weapons Convention. Knowledge of the nature and extent of the chronic ecosystemic and other damage suffered by Viet Nam was extended during the year by the publication in book form of a partial rendering of the proceedings of an international scientific symposium on the subject held in Ho Chi Minh City [263].

Veterans on the US side of the Viet Nam War who believe that the disabilities from which they or their progeny have been suffering are due to exposure to one of the herbicides used—Agent Orange—have since 1978 been seeking redress from their governments and from the manufacturers of the agent. In May an action for compensation, brought as a product-liability case in the USA on behalf of US, Australian and New Zealand veterans against seven Orange manufacturers, was settled out of court for a sum of \$180 million; controversy continues [79, 202, 259, 268, 285, 346, 388, 389]. How firmly causations may be established between chronic illness and prior exposure to Agent Orange remains the subject of detailed scientific inquiries that will take several years yet to complete; further preliminary findings from continuing studies by US governmental agencies were published during 1984 [117, 129].

Reports were again heard during 1984 from Brazil, where herbicides similar to Agent Orange have been used in deforestation programmes in the Amazon basin, that ascribed mass-poisonings and birth deformities among local populations to the herbicides [192, 373, 374, 375].

The Bhopal disaster

At Bhopal in India on 3 December 1984 there occurred an accident at a chemical factory owned by a transnational corporation in which some 30 tons of methyl isocyanate—possibly contaminated with production intermediate or degradation product—killed at least 2 500 people and injured perhaps 50 times that number over an area of 60-70 square kilometres in which maybe 200 00 people were living. The chemical, a liquid of high volatility, was being held in pressurized bulk storage for the manufacture of carbamate pesticides. It was apparently discharged
over a period of about 45 minutes into meteorological conditions favouring persistence at ground level of the resultant cloud of vapour, which drifted on a gentle breeze over the sleeping local population [355, 400]. As present-day industrial intermediates go, methyl isocyanate is not abnormally toxic. A modern nerve gas is 100 times more deadly.

Although this terrible episode suggests something of what the consequences of CW might be, it is highly unlikely that it had anything whatever to do with chemical warfare, despite the allegations to the contrary that have been made [297, 298, 379]; but it is directly relevant to the CW negotiations nonetheless. For if the likelihood of any repetition of such accidents is to be reduced in the future, one mechanism is clearly through tighter regulation of chemical manufacturing enterprise. The implementation of controls to that end could also facilitate the monitoring of compliance with a ban on production of CW chemicals.

Old stocks of chemical weapons

The disposal of old CW weapons remains a problem for several countries, probably for a larger number than is yet public knowledge. In one category are unexploded dud CW munitions remaining where they had fallen on the sites of past battlefields, some now retrieved and awaiting disposal, others still undiscovered. Belgium, for example, has been accumulating such munitions from World War I sites at a rate of tens of tons per year. In a second category are World War II supplies inadequately disposed of after the war by land or sea burial, or simply held in storage (in caves or old mines, for example) pending disposal. FR Germany has, near Münster in Lower Saxony, a furnace which during 1984 was continuing to destroy munitions retrieved from old landburial sites, which it is capable of doing at a rate of up to 2-3 agenttons per week; the furnace is expected to remain in operation for at least another five years. It was visited during June, at the invitation of the West German government, by a party of people from the CD for a workshop on the destruction of CW weapons [30]. Italy and Hungary are apparently among the other countries confronted by this second category of disposal problem. Old sea-burial sites in the Baltic remain a continuing hazard to fishermen; the several new cases of mustard-gas burns among trawlermen reported during 1984 have redirected attention to the possibility of systematically clearing the sea bed [270, 292, 398, 434]. Japan, too, has had to deal with inadequate sea-burial in shallow waters; and Australia, also, may soon have to do so.

In the USA, initial funding was requested of the Congress for construction of two full-scale chemical demilitarization facilities, one on Johnston Island in the Pacific, the other at Pine Bluff Arsenal, Arkansas, for the disposal of obsolete CW weapons [96].

Historical matters

The historical record of past CBW activities, in the form in which it is widely available, received several notable additions during 1984. Since current CBW activities are so heavily conditioned by their past, this extension of knowledge has a significant, if indirect, bearing upon the Geneva enterprise.

The new information concerned past CBW activities on the part of Britain, the United States and Japan: for Britain, activities during and immediately after World War I (including preparedness for use of CW weapons in Afghanistan) and World War II (including the use of chemical herbicides during the early 1950s in the 'Malayan Emergency') [221, 246, 251, 351]; for the USA, CW programmes during World War II [233], field-trials of biological weapons during the 1960s [187], and the consideration given to use of mustard gas during the Viet Nam War [408]; for Japan, the use of CW weapons in China during 1938–42 [198] and the biological-weapon R&D programme of the same period [125, 254]. An important new study of the biologicalwarfare allegations during the Korean War was also published [127].

Regrettably, the historical record still remains sparse in one area that could be particularly beneficial to CBW disarmament endeavour, namely that of the USSR. Although the publicly available literature on past Soviet CBW programmes has recently been expanded by the declassification of what is reported [413g] to be a 675-page study, 'Soviet Chemical Warfare and Biological Warfare Preparations and Capabilities', written during 1946–50 for the US government by the former head of the German Wehrmacht's CW programme, Walter Hirsch—a report which has come to be quoted by US officials and others in connection with the putative Yellow Rain weapons of the USSR[382]—it is evident from German documents on the British CBW programmes of the time that German CBW intelligence was both weak and easily misled: a consideration which bears on what the Hirsch Report says about the Soviet programme.

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Listed here are the published sources of information cited in this chapter, together with other noteworthy publications on CBW that

have appeared or been received since the time of the review published in *SIPRI Yearbook 1984*[241]. The bibliography leans heavily towards English-language publications. Readers are cordially invited to inform the author of omissions. For its future work, SIPRI would also greatly appreciate receiving advance notice of forthcoming publications on the subject or copies of publications of which it might otherwise remain unaware.

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Appendix 6A. An analysis of the reports of Iraqi chemical warfare against Iran, 1980-84

This analytical review of the available information on Iraqi CW in the Gulf War is in two linked parts. The first is a tabulation of all the CW attacks reported by Iranians or Iranian government agencies. The second is a survey of information sources that seem to present at least some degree of corroboration. There is a concluding section on the reported casualty figures.

Excluded from the analysis is any close consideration of the accounts available of the injuries and medical condition of people reported to have been exposed to CW attack. This is because the information available is at present too fragmentary, save for a small fraction of the reported attacks. It is clear that many Iranians associated with some of the reported attacks had suffered the effects of mustard gas; and that there were also cases of what could well have been tabun nerve-gas poisoning. Beyond that, a fuller picture cannot yet be drawn. The Iranian government has anounced—at the CD in Geneva (CD/PV.262 of 26 April 1984, p. 8)—that it intends to convene another medical conference on the subject.

I. Documented tabulation of the reported Iraqi CBW attacks

Reported CW attacks by Iraq on Iranian positions^j Reported casualties Information sources^e Total Dead tending to Location: region^b and place Reference^c number only CW weapons reportedly used^d corroborate Reference^a Date 22 Sep 1980: Iraq invades Iran—thrusts in all three regions, primarily S [1] Late 1980 S Hovevzeh • • 2 Late 1980 S Shalamcheh Nerve gas 3 Late 1980 С Mevmak 4 [2] 16 Nov 80 S Aircraft bombs Susangerd 5 28 Dec 80 С Between Halaleh & Nev-Khazar Artillerv 7 - 10End Dec 1980: Iraqi offensive halted, having gained c. 14000 km² of Iranian territory [3] 9 Jan 81 S Ahwaz 6 Aircraft bombs 7 Early 81 S Hovevzeh Mortar, nerve gas 1 . . 8 S Allah-o Akbar Heights Artillerv 3 Jun 81 9 22 June 81 С Naderi Bridge Mortar 28 Sep 1981: Iranian offensive in S lifts the siege of Abadan 10 20 Nov 81 Khorramshahr Artillery S 11 I Jan 82^f N/Iraq **Bayveh** Pass 5 Artillery 25 Jan 82^f 12 Ν Kurdestan Artillery Manv 13 8 Feb 82^f C/Iraq Sharhani Artillery 24 Feb 82^f North of Shalamcheh 14 Artillery S . . 21 Mar 1982: Iranian offensive ('Undeniable Victory') launched in C and S 12 July 82: Iranian offensive launched against Basra in S-blocked by Irag, now largely withdrawn from Iran 15 [4] Jul 82 Tear gas 16 29 Sep 82 S Abadan • • • • 1 Oct 1982: Iranian offensive ('Moharram al-Harram') launched in C 17 22 Oct 82 N Artillerv Savoii 18 27 Oct 82 С Musian Artillerv 20 4 (continued)

Table 6A.1. Reported Iraqi CBW attacks

Table 6A.1. (Continued)

Reported CW attacks by Iraq on Iranian positions ^j				Reported casualties				Information	
Reference ^a Date Location: region ^b and p		: region ^b and place	Reference ^c	Total number	Dead only	CW weapons reportedly used ^d	tending to corroborate		
19		Late Oct 82	C/Iraq	Height 175			<u> </u>	Mortar, mustard gas	
20		Late Oct 82	C/Iraq	Height 175			\mathbf{i}	Artillery, nerve gas	
21		Late Oct 82	C/Iraq	Height 175			{	Artillery, nerve gas	
22		21 Nov 82	S	North of Shalamcheh	L			Mortar	
23		19 Dec 82	N/Iraq	Tangab		Several	••	Artillery	
24	[5]	Dec 82	с.	Naft-e Shah area				Artillery	••
25		23 Mar 83	С	Fakkeh				Mortar	
26		26 Mar 83	-	Near Moslem Negabi	base			Mortar	
27		29 Mar 83	Ċ	Sumar		4		Artillery	
28		8 Apr 83	č	Sumar		Several		Artillery	
29		11 Jun 83	č	By Doirai River		Several	••	Artillery	••
-		11 500 05	U	by bonuj kitor		Severa.		Lub 1092. Lanian offensive (Wal Fai	···
20		0 4	N	Tamanahin			22	July 1965: Trantan Offensive (Vai Faji	2) iaunchea in N
30		8 Aug 83	N	I amarchin Shisses sh			••	Aircraft bombs	★
21		8 Aug 83	IN NI (Tura u	Shiverash Hali Omran		24	••	Aircraft bombs, vesicant	
32		8 Aug 83	N/Iraq	Hajj Omran			••	Aircraft bombs, vesicant	
33		9 Aug 83	N	Piranshahr		\ ¹⁰	••	Aircraft bombs	A
34		9 Aug 83	N	Tamarchin		39	••	Aircraft bombs, mustard	
35		9 Aug 83	N	Tamarchin		J	••	Aircraft bombs, mustard	1
36		9 Aug 83	N	Near Piranshahr		118	2	Aircraft bombs	<u>•</u>
37		14 Aug 83	N	Qamtareh Heights		200	2	Artillery, vesicant	• •
38		15 Aug 83	N	Savoji		• •	••	Artillery	••
39	[47]	18 Aug 83	N/Iraq	Hajj Omran		14		Aircraft bombs	••
40		29 Aug 83	N	Sar Dasht				Artillery	••
41		2 Sep 83	С	Sumar		••		Artillery	••
42		24 Sep 83	С	Bazi-Deraz Heights		4		Artillery	••
							. 19	Oct 1983: Iranian offensive ('Val Faji	· 4') launched in N
43	[9]	c. 20 Oct 83		Benijan		2.00	2	Mustard and arsenicals ^k	,
44	[9]	c. 20 Oct 83		Shahrooneh		{25	some	Mustard and arsenicals ^k	
45	i9i	21 Oct 83	N	Bademian		·	11	Aircraft bombs	
46		21 Oct 83	C/Iraa	Kharrat-na				Aircraft bombs	
47	[10]	21 Oct 83	N/Irag	North of Penjwin				Artillery (20-plus rounds)	
48	ini	22 Oct 83	N/Irac	North of Peniwin		11+		Artillery, nitrogen mustard ^k	
49	1-11	23 Oct 83	N	Near Baneh		•• •	••	······································	••
		15 Oct 05	N	Mariyan		••	••	Mortor	••

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51		25 Oct 83	N	Sar Dasht		3		Artillery (84 rounds [12])		
52		25 Oct 83	N/Iraq	Savved-lu				Artillery		
53	[13]	25 Oct 83	N	Piranshahr area		6		Artillery		
54	iiii	25 Oct 83	N	Bavanjan	*[14]	Many	9+	Bombs		
55		26 Oct 83	N	Sardush	r = .1			Artillery		
56		27 Oct 83	N	Bademian village		30	_	Aircraft bombs		
57		28 Oct 83	N	Near Baneh			↑			
58		30 Oct 83	N	Baneh				••	••	
50	[9]	30 Oct 83		'Front line'		Ū		Artillery	••	
60	[2]	1 Nov 83	N	Near Mariyan		16	4 -	Artillery	••	
61		3 Nov 83	N	Bayanian		10	Ĩ,	Vesicant		
62		3 Nov 83	N	Bayanjan		••		Vesicant	\uparrow	
63		3 Nov 83	N	Bayanjan Bayanjan		••		Vesicant	B	
64	[11]	7 Nov 83	N/Iraa	Near Shiler Diver		··· 70 +	¥	Aircraft hombs	Ļ	
65	[12]	7 NOV 83	S S	Khorramshahr area		70 +		Alteralt bollios		
65	[13]	C. 6 NOV 65	S N/Irog	Nior Denimin				 Aircraft hombs	· · ·	
60	[1/]	9 NUV 03	N/Iraq	Denimin		60	17	Marua ana	C	
0/		13 NOV 83	N/Iraq	Correct		40	17	Nerve gas	••	
68		13 NOV 83	N/Iraq	Garmad		40	••		••	
70		25 NOV 83	N	Paven Dise 12 Abs day		•••	••	Artillery	••	
70		29 Dec 83	5	Pier 12, Abadan		1	••	Mortar	••	
/1		5 Jan 84	S	Al-Husseiniyen		T	••	· ·	••	
72		14 Feb 84	S/Iraq	Arvand River bank		••	••	Artillery	••	
				16 F	eb 1984:	Iranian offens	ive ('Fatim	a al-Zahra') launched in C. the intial t	hrust of 'K	'havhar'
				22 F	eb 1984:	Iranian 2-pro	nged offens	tive ('Val Fair 6') launched in C and so	on widene	d into S
73	[44]	25 Feb 84	S	Hur ul-Hovevzeh		3 000 ^h		A/c bombs, 'mycotoxic mustard'		
74	1	26 Feb 84	S/Iraq	Al-Ozair region				A/c clusters, not mustard [14]	•••	
75		26 Feb 84	S	Shatt-e-Ali area				Aircraft bombs, mustard		↑ ↑
76		26 Feb 84	š	Shatt-e-Ali area				Aircraft bombs mustard		D
77		26 Feb 83	Š	Shatt-e-Ali area		1 100	••	Aircraft bombs, mustard		↓
78	[20]	27 Feb 84	Š	Shatt C / M ulca		1100	••	Aircraft hombs		
70	[20]	27 Feb 84	ŝ	Hur ul-Hovevzeh bank		••	••	Aircraft bombs mustard		_
80		27 Feb 84	s	Hur ul Hoveyzeh bank			••	Aircraft hombs, mustard		↑
0U 91	[14]	27 Feb 84	5	Shotte e Ali area			••	Aircraft bombs		ÈÌ
01	[14]	27 Feb 84	5	Shalle-e-All alea		••	••	Aircraft poskete	F	↓
02	[25]	27 FCU 04	5	Ive al Llovewach		••	••	Aircraft Fockets	г С	- 1
63	[20]	20 Feb 84	5	Tur ul-Hoveyzen		61	••	Aircraft Dombs	U T	
84		29 Fed 84	3	Talayen region		Several	••	Artillery	н	
82	(00)	2 Mar 84	5	Talayen region	[28]	{1 000 ⁱ	••	Artillery		Ļ
80	[28]	3 Mar 84	2	ralayen region	1)	••	Artillery		<u> </u>
									(cor	ntinued)

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Z Tabl	e 6A.1.	(Continued)
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Reported CW attacks by Iraq on Iranian positions ^j			an positions ^j Re	Reported casualties				Information	
Reference ^a	Date	Location	region ^b and place R	eference ^c	Total number	Dead only	CW weapons reportedly used ^d	tending to corroborate	
		· · · · ·			6 Mar 19	984: Iraai	counterattacks in S. recapturing part of	Mainoon Islands	
87	6 Mar 84	S/Iraq	Majnoon Islands				Aircraft bombs	- -	
88 [36]	6–8 Mar 84	S/Iraq	Majnoon Islands		Dozens		Aircraft bombs	јÎ	
89	9 Mar 84	S/Iraq	Majnoon Islands		543		A/c bombs/rockets [37], mustard	K	
90	10 Mar 84	S/Iraq	Majnoon Islands		20+		Aircraft rockets [38], mustard	L	
91 [40]	12 Mar 84	S/Iraq	Majnoon Islands				Aircraft bombs	M	
92 *	12 Mar 84	S	West of Jofevr				Artillery		
93	13 Mar 84	S/Iraq	Al-Ba'iza region		153				
94	13 Mar 84	S/Iraq	Majnoon Islands bank	[41]	Tens			<u>*</u>	
95 [24]	13 Mar 84	S	Hur ul-Hovevzeh area				Aircraft bombs, mustard	N	
96	14 Mar 84 ⁸	S	Al-Husseiniveh	* [14]	50	4	Artillery	0	
97 *	15 Mar 84	Ċ	Near Mehran	• •			Artillery		
98 *	15 Mar 84	C/Iraq	Hill 175, Nahre Anbar a	rea]		Artillery		
99 *	15 Mar 84	C/Iraq	Hill 175, Nahre Anbar an	rea	{ ¹⁰⁺		Artillery		
100	17 Mar 84	S	Jofevr region	[24]	c, 400		Aircraft, tabun [14]	P	
101	17 Mar 84	S/Iraq	Al-Ba'iza region	(= ·)	550		Aircraft bombs, tabun [14]	-	
102	17 Mar 84	S/Iraq	Kawthar region		<u> </u>		Aircraft bombs, tabun [14]		
103 *	19 Mar 84	C/Iraq	Kharrat-na area				Artillery		
104	20 Mar 84	S/Iraq	Hur ul-Hovevzeh region	*[14]	370	8	Aircraft bombs, nerve gas		
105	26 Mar 84	S/Iraq	Mainoon Islands	1	14		Artillery		
106 [14]	28 Mar 84								
107	29 Mar 84	S	Jofevr area				Aircraft bombs		
108	29 Mar 84	ŝ	Jofevr area		23+		Aircraft bombs		
109	29 Mar 84		Sait Hakepiroozy area		15		Aircraft bombs		
110 [14]	30 Mar 84		···						
111	1 Apr 84	S/Iraq	Near Mainoon Islands		12		Aircraft bombs		
112	1 Apr 84	S	West of Jofevr		20		Aircraft bombs		
113	I Apr 84	Š	Khatam-ul-Anbia headou	arters	40	4	Aircraft bombs	••	
114	3 Apr 84	S/Iraq	Mainoon Islands		10		Aircraft hombs	••	
115	6 Apr 84	S/ may	Chazzabeh		2	••	Artillery	··· າ	
116	11 Apr 84	S/Irag	Mainoon Islands, north 1	nart	-		Aircraft bombs	ŕ	
117	11 Apr 84	S/Iraq	Mainoon Islands, north	nart			Aircraft bombs		
118	11 Apr 84	S/Irao	Mainoon Islands, north	part			Aircraft bombs	6	
119 [14]	12 Apr 84				Many	Many	Neither mustard nor Tabun	×	

120		13 Apr 84	S/Iraq	Majnoon Islands, north part	Several	• •	Aircraft bombs	••
121		14 Apr 84	S/Iraq	Majnoon Islands, north part			Aircraft bombs	
122		14 Apr 84	S/Iraq	Majnoon Islands, north part	••		Aircraft bombs	
123		15 Apr 84	S/Iraq	Majnoon Islands, north part	••	••	Aircraft bombs	
124		15 Apr 84	S/Iraq	Majnoon Islands, south part	••		Aircraft bombs	
125		19 Apr 84	S/Iraq	Majnoon Islands, north part		••	Aircraft bombs	
126		19 Apr 84	S/Iraq	Majnoon Islands, south part	••		Aircraft bombs	
127		24 Apr 84	S/Iraq	Majnoon Islands		••	Aircraft bombs	
128		25 Apr 84	S/Iraq	Majnoon Islands	Several	Some	Aircraft bombs	
129		1 May 84	N	Marivan	Yes	••	Artillery	••
130		20 May 84	S/Iraq	Majnoon Islands	Several	••	Artillery	
131	[44]	25 May 84		••	••	40	Artillery, nerve gas	
132		29 May 84	••	Chazzabeh area		••	Artillery cluster-shell	
133	[45]	9 Aug 84	S	Abadan	••	••	Bombshells	••

"Reference to the publication reporting the CW attack from which the data bibliography below. The absence of an entry in this column means that the source material used was one or the other of two official Iranian publications: either (a) the 32-page illustrated A4-sized pamphlet published during summer 1984 in a joint Arabic. English and Farsi edition by the War Information Headquarters of the Supreme Defence Council, Use of Chemical Warfare by Iragi Regime ! (Tehran, n.d.); or (b) the 'Table of chemical attacks carried out by the Iraci army against civilian and military targets in the Islamic Republic of Iran' conveyed to the UN Secretary-General by letter dated 28 June 1984 and published in UN documents A/39/333 and S/16652 of 29 June 1984. The table in (a)lists 65 attacks to 20 March 1984—updating, amending and therefore taken here as superceding, tables published by the War Information Headquarters in earlier pamphlets [11,12,54; cp. 30,44]. Listed in (b) are 24 additional attacks during the period 12 March through 29 May 1984. An asterisk (*) in this column indicates those of the attacks reported for the period 12-20 March 1984 for which the data tabulated were taken from list (b). Where multiple "deployments" occur in the (a) list, referred to in the (b) list as "number of shell [ing]s", each one is tabulated here as a separate attack.

^b The three regions differentiated in this column correspond roughly to the three primary theatres of military operations: 'C' for the central region, namely the Iran–Iraq border area lying between the 32nd and 35th parallels approximately;

^a Reference to the publication reporting the CW attack from which the data 'N' and 'S' for the border areas north and south, respectively, of the central tabulated here were taken. The literature thus cited is identified in the region. '/Iraq' indicates that the attack was reportedly experienced on the Iraqi bibliography below. The absence of an entry in this column means that the side of the border; but the absence of such an entry does not necessarily mean source material used was one or the other of two official Iranian publications: that the reported attack was experienced on the Iranian side (though usually it either (a) the 32-page illustrated A4-sized pamphlet published during summer 1984 in a joint Arabic, English and Farsi edition by the War Information Head-

^c Reference to the publication reporting the casualty data tabulated here. The absence of an entry in this column means that the published source material relied upon was identical with that used for the report of the CW attack itself (see note *a* above). An asterisk (*) is used to indicate the reference source that reported the figure for the tabulated number of dead in instances where the principal source does not do so. Additional casualty data, and their reliability, are treated in section III below.

^d Literature citations are made only where the information tabulated is not taken from the source used for the report of the CW attack itself (see note a above).

^e The information sources noted here as 'A'-'Q' are identified and described in section II below.

^f Confusion exists in the available source material as to the date on which this purported CW attack occurred. Typographical errors, failures of memory or record, or the use of different calendars, may have been among the factors responsible. See also note ^j below.

⁸ The attack referred to in the subsidiary source used here [14] — was stated to ⁱ It is not clear from the available source material whether this huge figure of have occurred during the night of 13/14 March.

was the source cited for almost all of the other casualty data tabulated here, but by the Message of the Islamic Revolution (Soroush) "in cooperation with the War Information Headquarters". It was given in a list of CW attacks having 48 ^j Due perhaps to confusions as described in note f or to sparseness in the reported Iranian 'Khavbar' offensive began on 26 February [56]. On the assumption, in fact conflates several reported attacks. then, that this figure is actually a conflation of data relating to some or all of * These identifications of arsenicals and nitrogen mustard are more recently attacks nos 74-130, it is excluded from the total given in section III below.

1000 casualties was meant to relate only to reported attacks nos 85-86 or to *This figure was published not by the War Information Headquarters, which earlier ones as well. The latter seems the more probable since only 20 artillery rounds are reported as having been responsible [52]. The figure has accordingly been excluded from the total given in section III below.

entries prior to 25 February 1984 but only one entry after that date, on 25 May. geographical information, there may well be instances where a single reported Further, Iranian authorities have since stated that Iraq's CW attacks against the attack is in fact listed more than once in the table or where a single tabulation

reported to have been speculative and unsubstantiated ones only [56].

II. Corroborative information sources

A. Reported attacks nos 30-36 (8-9 August 1983)

- A1 An interview, photography and filming facility made available to domestic and foreign reporters on 24 August 1983 at a Tehran hospital to which 41 of the "more critical" casualties of these attacks were said to have been transferred [6,7].
- A2 Iranians sent for hospital treatment in FR Germany, apparently casualties either of these reported attacks or of no. 66 [8]. One of them was reportedly injured on 8 August 1983 [55].
- A3 Purported samples of CW agent from these attacks said to have been sent to FR Germany for analysis [8]. Official Iranian sources report that, in a sample examined at Tehran University, mustard gas was detected [6].

B. Reported attacks nos 61-64 (1-7 November 1983)

B1 Two Iranians, said to have been casualties of an Iraqi CW attack on Iranian lines at Baneh during this period, interviewed in Tehran by a British reporter 19 days later. One of them was examined by a British neurologist [16].

C. Reported attack no. 66 (9 November 1983)

- C1 A west European ex-army doctor who examined patients hospitalized in Qom (so it is reported) said to be casualties of this attack, the doctor later being quoted in the British press as believing chemical weapons to have been used [8,17], specifically sulphur mustard gas [18].
- C2 An Iranian hospitalized in Tehran said to be a casualty of this attack, interviewed by a British reporter [17].
- C3 A video film of on-site casualties which was shown, alongside related presentations [47] and displays, at an international medical conference in Tehran during the last week of November 1983 convened by the Iranian Ministry of Health, attended by several hundred people from 65 countries [8,17,19].

D. Reported attacks nos 74-77 (26 February 1984)

- D1 One of three chemically burned Iranians who had arrived in London on 12 March 1984 for hospital treatment, Hassan Taghizadeh [21]. There is variation in the dates recorded from interviews with him for the occasion of his injuries; according to the Medical Department of the Islamic Revolution Guards Corps (IRGC), the date was 26 February 1984 [56].
- D2 The report of the UN investigating team [24] implies that nine of the chemically burned patients which the team examined in a Tehran hospital on 15 March 1984 (cases 9–15, 18 and 19) had sustained their injuries on 26 February 1984.

E. Reported attacks nos 79-82 (27 February 1984)

E1 Another of the chemically burned Iranians referred to in note D1, Hussain Khideih [21,22]. There is variation in the dates recorded from interviews with him for the occasion of his injuries, but the IRGC Medical Department gives the date as 27 February [56].

E2 The report of the UN investigating team [24] implies that one of the chemically burned patients which the team had examined in a Tehran hospital on 15 March (case 20) had sustained his injuries on 27 February.

F. Reported attack no. 82 (27 February 1984)

F1 One of the five chemically burned Iranians who had arrived in London on 19 March 1984 for hospital treatment, Ahmed Esmaili [22]. The date given here for the occasion of his injuries, derived from reported interviews with him, has been confirmed (if only by default) by the IRGC Medical Department [56].

G. Reported attack no. 83 (28 February 1984)

- G1 Another of the chemically burned Iranians referred to in note D1, Hassan Bahrami [21].
- G2 Another of the chemically burned Iranians referred to in note F, Ali Lotsi [22].
- G3 The ICRC delegate in Tehran. His inspection of war casualties in several Tehran hospitals on 6 March 1984 was the basis for the statement issued the following day by the ICRC in Geneva, a statement which referred to 160 of the casualties having suffered chemical burns eight days previously that could be presumed due to the "recent use of substances prohibited by international law" [27].

H. Reported attack no. 84 (29 February 1984)

H1 The report of the UN investigating team [24] implies that one of the chemically burned patients whom the team had examined in a Tehran hospital on 15 March (case 21) had sustained his injuries on 29 February.

I. Reported attacks nos 75-86 (26 February - 3 March 1984)

- 11 Another of the chemically burned Iranians referred to in note F, Bahman Amani [22]. To interviewers in London, he described the circumstances of his injuries as having been the first of a series of air-delivered CW attacks in the Majnoon Islands area, delivered at about noon on 27 (26?) February; and he said that other casualties from it had been sent to Sweden for hospital treatment.
- 12 One of the five chemically burned Iranians who had arrived in Sweden on 3 March 1984 for hospital treatment, Muhammed Reza Asadi. He told reporters that he had been injured on 27 February in Basra province [29]. In a publication by the Iranian Embassy in Sweden [30], Asadi was said to have been injured in the Jofeyr area by an attack during the early morning of 27 February. In this same publication it is reported that another of the five Iranians hospitalized in Sweden, Majid Bandardokht, had received his injuries on 26 February in the same operational theatre. The other three Iranian hospitalees in Sweden do not appear to have been interviewed by reporters prior to their deaths; it is stated [56] that two of them had been injured on 26 February.
- 13 The five Iranians hospitalized in Sweden were from a party of 15 chemical-burn cases that had arrived in Austria on 2 March [31], of which the other 10 were hospitalized in Vienna; according to their Viennese medical attendants, they had all been evacuated from the southern front on about 27 February [32].

- I4 The UN investigating team reported [24] that it had examined six cadavers returned from Sweden and Vienna in a Tehran mortuary on 16 March.
- 15 A facility made available to foreign reporters at a Tehran hospital on 29 February to visit patients described as CW casualties; journalists from China, France, Italy, Japan and several Arab countries are reported to have attended [33].
- I6 A facility made available to the Tehran diplomatic corps at a Tehran hospital on 5 March to visit patients described as CW casualties and for briefings by Iranian medical authorities; diplomats from 65 countries are reported to have attended [34]. The British Head of Chancery was reported to have been shown 30-40 chemical burn cases [35].

J. Reported attack no. 88 (6-8 March 1984)

J1 The report of the UN investigating team [24] implies that one of the chemically burned patients examined in a Tehran hospital by the team on 15 March (case 16) had sustained his injuries on 7 March.

K. Reported attack no. 89 (9 March 1984)

- K1 The report of the UN investigating team [24] implies that, of the chemically burned patients examined by the team, 5 of those examined on 14 March at hospitals in Ahwaz (cases 4–8) had been injured on 9 March at Majnoon, and also that one of those examined on 15 March at a Tehran hospital (case 17) had been injured on 9 March.
- K2 Case 4 described in the report of the UN investigating team [24] appears to have been the Mohammed Abbasi who was one of the five chemically burned patients noted at F above [22]. He told interviewers in London that he had been examined by the UN team.
- K3 The report of the UN investigating team records that the team witnessed an autopsy performed at the Ahwaz University hospital on 18 March, but does not describe it. The autopsy is, however, described in a report by the IRGC Medical Department [14]. The cadaver was later said to have been the victim of an attack on 9 March [56].

L. Reported attack no. 90 (10 March 1984)

- L1 An interview facility made available to foreign reporters on 30 March at a field hospital in Ahwaz (the Takhti Infirmary) where chemically burned soldiers were under treatment [39].
- L2 The report of the UN investigating team [24] implies that nine, possibly ten, of the chemically burned patients examined in a Tehran hospital on 15 March (cases 22-31) had sustained their injuries on 10 March.

M. Reported attacks nos 86-94 (3-13 March 1984)

M1 The report of the UN investigating team [24] records information provided by Iranians that the particular marshland area at Shatt-e-Ali surveyed by the team on 14 March had been subjected to several air attacks during the previous several days. The team examined seven partly damaged aerial bombs, whose casings were empty, which were among those that it had found within a 10 000 m² survey area.

Their appearance and marking were similar to those of the bomb remains found in a second survey area (see note N1 below).

N. Reported attack no. 95 (13 March 1984)

- N1 The report of the UN investigating team [24] records information provided by Iranians that the particular desert area by Hur ul-Hoveyzeh surveyed by the team on 14 March (the second of its two survey areas) had been subjected to an air attack some 26 hours prior to the arrival of the team. Among the bomb remains found there by the team was a dud, samples of the filling of which were subsequently drawn under the team's supervision. The team's analysts in Sweden and Switzerland subsequently showed the sampled liquid to be high-quality mustard gas [24]. Details of the Swedish analysis have since been published by the laboratory that performed it [42].
- N2 The report of the UN investigating team also records the team as having examined, on the evening of 14 March, hospital patients in Ahwaz described as casualties of the attack; no details are recorded in the report, however [24].

O. Reported attack no. 96 (14 March 1984)

- O1 A report by the IRGC Medical Department states that cases 1-3 described in the report of the UN investigating team—patients examined in a field hospital in Ahwaz on 14 March—originated in this attack, which the report states was delivered during the night of 13/14 March [14]. The patient described in the UN report as case 1, Hamid Reza Rezayee, appears to be one of the five chemical-burn cases that arrived in London on 19 March for hospital treatment (see note F above); the accounts which he subsequently gave in London of the circumstances of his injuries [e.g., 22] contain details which correspond in most respects with those recorded both in the IRGC report and in the UN report.
- O2 According to that same IRGC report [14], case 2 of the UN report, Mustafa Hezardastan, died on 24 March while in hospital in Ghent, Belgium.

P. Reported attack no. 100 (17 March 1984)

- P1 The report of the UN investigating team [24] records observations made during the examination of six patients (in an Ahwaz field hospital on 18 March) who said they had received their injuries during this attack (cases 32-37), all of whom displayed signs of anticholinesterase poisoning.
- P2 The report of the UN investigating team records the submission to the team by Iranian military personnel of a sample of liquid described as having been drawn from a dud bomb dropped during this attack. The team's analysts in Sweden and Switzerland subsequently showed the liquid to contain a high proportion of the anticholinesterase agent (nerve gas) tabun [24]. Details of the Swedish analysis have since been published [42].

Q. Reported attacks during early April 1984

Q1 On-site coverage of the purported aftermath of one of these atacks by a British television programme, during the filming of which a cameraman received minor

chemical burns while an unexploded round (an artillery projectile, not an aircraft bomb) was being opened [46]. Samples of munition fragments are reported to have been brought back to England.

III. A note on the tabulated casualty figures

No government of a country at war can be expected to be completely candid or completely guileless in its releases of information about the casualties its subjects have suffered at the hands of the enemy, for, to the latter, such weapon-effectiveness data could constitute valuable military intelligence, especially when they relate to individual attacks. This is not to say that all information so released is bound to be valueless. On the contrary, there may well be countervailing pressures acting upon the government in favour of candour. Given the political background of the Gulf War, such countervailing pressures are likely to have been substantial, though perhaps not always dominant, in the special case of the CW casualties inflicted upon Iran. In the information about them which the Iranian government has chosen to release—and the very tight news-media control exercised by Tehran means that other sources of information are rare, save perhaps the intelligence-gathering assets of other governments—both exaggeration and attenuation have no doubt been interspersed.

Aggregate span	_	Aggegate CW casualties announced by Iran ^b				
Theatre	Period	All ^a	Dead	Source		
Val Fajr 2 & 4	Prior to 19 Nov 83	177 (735 +)	11 (54+)	[1]		
All theatres	Prior to 16 Feb 84	Hundreds (775+)	109 (75+)	[49]		
All theatres	Prior to mid-Mar 85	5 000 (2 637 +)	1 200 + (75 +)	[50]		
Khaybar only	Prior to 11 Mar 84	1 000 (1 689 +)		[51]		
Khaybar only	16 Feb – 14 Mar 84	1 748 (1 912 +)		[14,56]		
Khaybar only	Prior to 19 Mar 84	2000 + (2472 +)		[52]		
Khaybar only	22 Feb – 20 Mar 84	2 700 (2 842 +)	40 (16+)	[53]		
All theatres	March 84	3 500 + (3 699 +)	(91 +)	[53]		
<i>Khaybar</i> only	26 Feb – 30 Apr 84	3 500 (2 974 +)	70 (20+)	[14,56]		
All theatres	May 84	3 000 + ^a (3 743 +)	50+ (131+)	[44]		

Table 6A.2. Aggregate Iranian CW casualties

" 'Deeply injured'.

^b Figures in parentheses are the corresponding aggregate from table 6A.1.

That, in aggregate, the two may have balanced out is not a completely unreasonable supposition. It might follow, then, that figures released for total CW casualties were valid ones (within the limits of record-keeping capacities). But figures differentiating severities of injury—e.g., fatally as opposed to non-fatally injured casualties—would still warrant scepticism.

The figures in the casualty data tabulated in section I sum to a minimum of about 3 700 dead and injured. Sumarized in table 6A.2 are aggregate casualty figures released by Iranian authorities; the figures given in parentheses are the corresponding aggregates from section I.

Note that only rarely does the available source material indicate how severely gassed a person has had to have been in order for him or her to have been counted as a CW casualty. The implicit criterion appears to be actual hospitalization. All the aggregate casualty figures just quoted with attribution to the IRGC Medical Department [14,56] related only to chemically injured soldiers who were hospitalized at Takhti Infirmary in Ahvaz. During the period concerned, that infirmary was being run by the IRGC Medical Department, which states that it "was then used as a centre for categorizing the incoming chemical patients according to the severity of their wounds. Even patients with minor chemical wounds were at first hospitalized at that centre" [56].

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- 53. Iran. Supreme Defence Council, War Information Headquarters. Preface to a reprint of the report of the UN investigating team [24] (Tehran, n.d.).
- 54. Iran. Supreme Defence Council, War Information Headquarters. A Summary Report on Chemical Weapons Deployment by the Iraqi Regime [n.d., but prior to 14 Nov 1983].
- 55. Hamburg University Hospital. Medical report on Kanan Alvan-Obour dated 24 Oct 1983, as distributed in the CD by the Iranian delegation during Feb 1984.
- 56. Comments dated 29 Dec 1984 on a draft of this Appendix received by SIPRI from the Medical Department of the Islamic Revolution Guards Corps, Tehran.

Part III. World armaments

Chapter 7. World military expenditure and arms production

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7. World military expenditure and arms production

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Superscript numbers refer to the list of notes and references at the end of the chapter.

I. Introduction

Total world military expenditure (on provisional figures) rose 4 per cent in real terms during 1984, twice as fast as growth in 1983. Rates of growth vary a good deal from year to year; however, longer-term comparisons confirm that there has been an acceleration in recent years. The average annual growth rate over the past four years has been 3.6 per cent—well above the trend of 2.4 per cent in the previous four years.

NATO (especially the USA), and to a lesser extent the Warsaw Treaty Organization (WTO), account for this more rapid rise in world military spending. If NATO and the WTO are excluded from the calculation, military spending is estimated to have fallen slightly in 1984. The Third World's share of military spending grew alarmingly from 6 per cent in 1965 to a peak of 20 per cent in 1982, but dropped back to a provisional 18 per cent in 1984. It is the industrialized countries which now dominate the growth in military expenditure (see figure 7.1).

The past few years have seen very big fluctuations in exchange-rates: as a consequence, a current figure for world military expenditure denominated in the currency of a single country can be misleading. As a result of the rise in value of the US dollar in recent years, the current dollar value of military spending in a number of other countries shows quite a sharp fall. One way of producing an estimate for world military spending is to take the 1984 dollar figure, at 1980 prices and exchangerates, and adjust it for the increase in prices in the USA between 1980 and 1984. This gives a figure of approximately \$800–820 billion.¹

The purpose of SIPRI's estimates of world military spending is to provide a measure of the resources used annually by individual countries for military ends. This measure is given for 127 countries in local



Figure 7.1. Trends in world military expenditure: four-year moving averages for $1973-84^a$

^a Four-year moving averages of military expenditure figures, in US \$, at 1980 prices and exchangerates. For example, the points plotted for 1982 refer to the years 1981–84.

currency at current prices and as a share of national income (appendix 7A, tables 7A.4 and 7A.5). Converted into dollars, the military spending of many countries may seem small compared to the gargantuan military budgets of the USA and the USSR. But no matter how trivial in dollar terms, the burden of military spending is a matter of concern for each individual country. It entails expenditure or investment forgone in other fields which might have contributed more to the welfare of the country's inhabitants.

Correcting the local currency series for inflation and using the dollar exchange-rate for a single base year produces a constant dollar series which allows us to examine trends in military spending (appendix 7A, tables 7A.1-7A.3). The relative growth or decline of military expenditure offers a warning signal or a certain optimism about both international and domestic stability. Military expenditure figures say little
about relative military strength. They say nothing about a country's ability to mobilize additional resources domestically or from its allies nor of the multifarious non-economic factors which contribute to the outcome of a conflict.

This introductory section sets military expenditure against an economic background and looks at the competing claims for resources. For this purpose it is most suitable to look at countries in their economic, rather than their regional, groups. In recent years, two topics have tended to dominate economic activity in many countries: the world recession and the problem of debt. For some countries, the latter has been particularly the problem of foreign debt and for others, the problem of internal budget deficits. Some countries have both debt problems, since they are linked (see chapter 12). As a consequence of these developments, government expenditures in many countries have been restrained, frozen or reduced. This has been at a time when the demands for social welfare provisions have been rising: these demands will continue to rise—particularly, for example, with the need to make provision in many countries for the welfare problems posed by an ageing population.²

Industrial market economies

For this group as a whole, there was a substantial economic recovery in 1984, with a growth rate of about 4.8 per cent, after 2.6 per cent in 1983 and no growth in 1982.³ However, it has been a most uneven recovery, dominated particularly by the USA (with an estimated rise in real GNP of 6.75 per cent in 1984)⁴ and to a lesser extent by Canada and Japan. In spite of this apparent prosperity, the USA provides a classic example of the conflict between spending on the military sector and spending on social welfare: in an attempt to reduce the budget deficit, the US Administration is again proposing to reduce substantially spending on welfare provisions, while allowing military expenditure to continue to rise rapidly in real terms (see section III).

In the remaining countries of this group, recovery has been much more muted. In western Europe it has been insufficient to check the rise in unemployment, which was 11 per cent in 1984 and was expected to continue to rise in 1985.⁵ In spite of the widespread preoccupation with budget deficits, public spending in those countries now takes a larger share of national income than it did at the end of the 1970s.⁶ Because of the recession, more money is needed for unemployment benefits; the revenue base is smaller; and as a consequence of past budget deficits, government interest payments—at 4 per cent of GNP—are now twice as high as they were in 1979.⁷

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In industrial market economies, the competition between military and social welfare spending has become more apparent. This will continue to be the case. The demands created by an ageing population must be accommodated, as, for example, in Japan, where the size of the over-65 age group is expected to grow by 85 per cent by the end of the century.⁸ Unless standards are to fall, a bigger share of national resources must be devoted to these and other social needs.

It is all the more remarkable, therefore, that military expenditure took as much (or more) of national resources in 1984 as it did in 1980, in all the countries of this group for which data are available⁹ (table 7A.5).

Non-market economies

Much less is known of the economic performance of the non-market economies, and their levels of development are too disparate to permit generalizations. However, many are facing similar problems of slow growth, ageing population and (in certain cases) difficulties with the repayment of foreign debt. In the early 1970s, growth rates in eastern Europe (excluding the USSR) were high—averaging 8 per cent a year. They were helped by a substantial credit inflow from Western banks. This was also a period when military spending was static (table 7.1); throughout the 1970s it was rising more slowly than the national product. By the early 1980s foreign debt had risen to an estimated \$60 billion; faced with debt servicing problems and an inability to raise new credit, the countries of eastern Europe have been forced to cut imports. Growth rates have fallen sharply. A recent survey concluded that heavy investment programmes and productivity changes were needed if previous growth levels were to be regained.¹⁰ Yet military spending has started to rise faster, and since 1981 has clearly increased its share

	197175	1976–80	1980	1981	1982	Estimate 1983	Projection 1984
Net material product							
Eastern Europe"	8.0	3.5		-2.0	-1.0	3.0	2.5
Eastern Europe, excl. Poland	6.5	4.0	3.0	2.5	2.0	2.5	2.0
Military expenditure							
Eastern Europe ^a		2.2	0.8	1.3	3.3	6.1	2.7

 Table 7.1. Eastern Europe: economic activity and military expenditure, 1971–84

 Figures are per cent change, in constant prices.

^a Bulgaria, Czechoslovakia, the German Democratic Republic, Hungary, Poland and Romania. Source: World Economic Outlook 1984 (International Monetary Fund, Washington, D.C., 1984), table 5.1; and SIPRI sources. of the national product. The burden of military spending is becoming more apparent in eastern Europe.

In China, growth rates in recent years have been relatively high—an average of 5 per cent annually in real terms between 1979 and 1983.¹¹ It is hoped to quadruple the national output by the end of the century. The demands to be put on this increase in output are also very high. China's policy objectives are phrased as the four modernizations: industry, agriculture, science and, in fourth place, modernization of the military sector. Official figures suggest that military demands are receiving relatively low priority. As a share of the government budget, military expenditure has fallen in recent years and social expenditure has risen (see section V). As a result of policy measures to reduce the growth of population, China faces the particular problem of a demographic shift in which the proportion of the population in the over-65 age group will rise exceptionally quickly in the remaining years of the century. Currently China has made little provision for care of the aged, since this has traditionally been a family matter. As a result of the policy of one-child families, the aged will become increasingly a burden on the state.¹² There will have to be a continuation of the policy of giving low priority to the military sector if China's development and welfare goals are to be met.

Major oil-exporting countries

Some major oil-exporting countries had a period in the mid-1970s when they could afford both guns and butter—rapid increases in military spending and extensive social provisions. That period is now over. Their combined balance of payments on current account has moved from a surplus of \$111 billion in 1980 to a deficit of \$16 billion in 1983. Some oil producers can bridge these deficits by drawing on their foreign assets; others—Algeria, Indonesia, Nigeria and Venezuela—have serious foreign debt problems. The International Monetary Fund (IMF) reports that "An almost universal response [to the fall in oil revenue] has been a cutback in the growth of public sector expenditure"¹³ and in most of these countries, military spending is no longer rising fast. For the group as a whole, military spending fell significantly in 1983, and on the basis of the provisional estimates for 1984, spending is currently at about the 1981 level.

The rest of the world

Military spending in all three groups classified by their *per capita* income in 1982 fell in 1984 (table 7A.1). These non-oil developing

countries have generally suffered most from the combined effects of high oil prices and the world recession. They had built up very large debts, and the downturn of world commodity prices has accentuated the difficulties of servicing them. Countries which have had to borrow from the IMF have been under strong pressure to cut back on public expenditure. The IMF appears, however, to require cuts in civil expenditures while military expenditure goes untouched.

Circumstances have forced budget restraint on a great many of these countries and as a consequence military expenditure has fallen—the fall is most pronounced in Africa. However, there are few cases among the non-oil developing countries where governments are committed to a definite policy of restraining military expenditure, nor is there much evidence of governments switching resources to other uses. In most countries, even where military expenditure has fallen in real terms, its share in the national product has in general been maintained (table 7A.5).

II. NATO

The acceleration in total NATO military expenditure over the past four years is mainly a consequence of the steep upward trend in US military spending. In the rest of NATO Europe, the trend has been roughly stable at around 2 per cent (figure 7.2). However, growth rates have also accelerated in Canada, Italy and the UK.

Over the past 10 years there have been discussions within NATO about the need to make a major effort to strengthen NATO conventional capabilities in Europe. There is now a general consensus among governments about the need to do so, but disagreements persist over the emphasis and scale of required force improvements, and over the resources nations can afford to allocate for this purpose. The Long Term Defence Programme agreed to in 1978 was directed mainly to basic conventional force improvements in areas such as readiness, reinforcement and reserve mobilization. It was estimated to require annual real military expenditure increases in the region of 3 per cent for each member country. The NATO Force Goals for the 1983-88 period presupposed annual rises of 4 per cent. Only 70 per cent of these programmes were, however, actually adopted by NATO parliaments.¹⁴ The new Force Goals for the 1985–90 period, approved in May 1984, are based on a lower growth rate of 3.2 per cent. General Bernard Rogers, Supreme Allied Commander Europe, has consistently expressed dissatisfaction with the unwillingness of NATO members to spend more money on the armed forces, arguing that unless conventional



Figure 7.2. NATO military expenditure, 1950-84^a

^a At 1980 prices and exchange-rates.

forces are drastically improved, he would have to request the release of nuclear weapons within only days of an attack on western Europe. According to his assessment in 1984, adequate NATO Force Goals for the next six-year period would require military expenditure increases of 7 per cent per year above the rate of inflation. The implication is that by the year 1990 NATO military spending would be about \$160 billion higher than in 1984, in 1984 prices.

Expenditure trends

Apart from the United States (see section III), three NATO countries have increased their military expenditure at an average annual rate of 3 per cent or more since this target was first set in 1977 (table 7.2). These are Canada, Italy and the UK.

The *Canadian* defence budget for FY 1984 (fiscal year 1984/85)¹⁵ is more than 3 per cent higher in real terms than that for the previous year. Capital expenditures represent 26 per cent of the total, the highest

	Annual, or average annual percentage increases							
Country	'Pre-target': from 1972–74 average to 1976–78 average	'Post-target': from 1976-78 average to 1984	1982	1982 1983 1984 <i>ª</i>				
North America								
USA	-2.0	5.7	6.9	9.0	7.1	11.5	100	
Canada	3.9	3.3	1.8	9.8	-0.1	10.0	3	
Europe								
UK	0.3	3.8	- 5.7	5.0	10.1	4.6	15	
France	3.8	2.2	2.4	2.1	1.7	-0.7	14	
FR Germany	1.0	0.9	1.2	-1.3	0.8	0.4	13	
Italy	-0.3	4.9	2.1	7.0	2.2	7.0	6	
Netherlands	3.3	0.8	1.1	-0.4	-0.9	1.7	3	
Belgium	5.1	0.6	0.9	- 3.3	- 3.8	1.3	2	
Turkey	17.6	-0.3	23.5	9.3	-3.7	-3.8	2	
Greece	14.3	0.5	18.3	2.0	- 9.0	8.4	I	
Denmark	3.4	1.5°	1.2	2.9	0.8		1	
Norway	4.1	2.6	1.0	3.9	4.3	0.3	I	
Portugal	- 14.1	-0.8	-0.4	0.1	- 3.9	- 8.3	0.5	
Luxembourg	5.8	4.7	3.4	1.0	2.3	2.5	Negligibl e	
NATO Europe (excl. Italy and UK)	3.2	1.3	2.9	0.7	0.3	0.3		
All NATO Europe	2.1	2.3	0.7	2.3	2.8	2.0	58	
Total NATO	-0.3	4.3	4.2	6.3	5.3	7.9		

Table 7.2. NATO countries: estimated volume increases in military expenditure

^a Data for 1984 are uncertain. NATO normally revises latest year data extensively after one year. ^b Based on 1984 military spending figures, at 1980 prices and exchange-rates.

^c From 1976-78 average to 1983.

Note: Information in this table is based on NATO-defined military expenditure for calendar years and differs from the material taken from domestic sources discussed in the text.

Source: Appendix 7A, table 7A.2.

share since FY 1959. The current equipment programme includes the refitting of 16 destroyers for completion by 1987, the construction of 6 patrol frigates for deployment between 1988 and 1992, the procurement of 138 CF-18 fighter aircraft over the next four years, and a life-extension project for the C-130E Hercules transport aircraft fleet. The new conservative government elected in the summer of 1984 pledged itself to increase military spending by 4 per cent annually and to raise the number of military personnel by 10 per cent. The rising trend initiated by the previous government is expected to continue.

In the 1985 Italian defence budget,¹⁶ proposed military authorizations are 13.6 per cent higher in nominal terms than actual authorizations for 1984. A 3 per cent growth rate would require a reduction in the inflation rate by one percentage point, or actual allocations in excess of budgeted, which has been normal in recent years. Planned nominal increases for 1986 and 1987 are, however, much lower-3.5 and 5.1 per cent respectively. The 10-year modernization programmes which were adopted in 1975 for the Navy and in 1977 for the Army and the Air Force are experiencing considerable delays. By the end of July 1984 the original cost estimates had been exceeded by more than 100 per cent, and only slightly more than half of the costs had been financed.¹⁷ All three programmes are therefore being stretched out to the end of the year 1990. New procurement projects are being financed separately. Thus a law of August 1984 approved R&D funds for the AM-X fighter aircraft, the EH-101 helicopter and the CATRIN C³I system.

The FY 1984 defence budget of the United Kingdom shows a 3 per cent real increase "with a further addition for Falkland costs".¹⁸ Procurement represents 50 per cent of the total; one-quarter of the procurement budget is devoted to R&D activities. Current public expenditure plans provide for zero real growth in FY 1985 and reductions of 1.2 per cent in each of the two subsequent years.¹⁹ Real increases are also unlikely for subsequent years.

Funding restraint is, however, not accompanied by restraints in commitments. For example, some of the cuts in naval forces decided in 1981 have been reinstated, and the number of front-line aircraft is to be increased by 15 per cent. Annual costs in the late 1980s for the Trident programme are expected to exceed £1 billion; with 45 per cent of the Trident budget to be spent in the USA, movements in the dollar-sterling exchange-rate have raised the estimated total cost from £6 billion in September 1980 to £10.7 billion in January 1985. These expenditures have to be accommodated in a defence budget currently of the order of £17 billion. Delays in major programmes, such as the procurement of Nimrod AEW and Tornado multi-role combat aircraft, and the modification of C-130 Hercules transport aircraft, are expected to generate considerable cost increases. In 1983 development was started on several major projects, three of which—the EH-101 helicopter, Mechanised Combat Vehicle variants, and the air-launched Anti-Radiation Missile—have a combined total cost of about £1.7 billion. In order to maintain the defence effort without additional funds, the Ministry of Defence has initiated a savings policy of managerial reforms and promotion of greater competition in arms procurement. It is, however, very doubtful whether these measures will be sufficient.²⁰ Ministry of Defence forecasts for the 1985–95 period show a gap of £9.5 billion between future commitments and funding.²¹ Reductions in the UK defence programme seem inevitable.

Military spending in the other two major NATO countries in Europe—France and FR Germany—has in recent years been increasing at a rate of 2 and 1 per cent respectively, in real terms. In 1983 France adopted a military programme for the 1984-88 period with emphasis on nuclear forces. Priority is also given to military equipment (42 per cent of total expenditure) and R&D (25 per cent of equipment expenditure) over ordinary expenditures such as personnel. In response to the relatively poor economic performance of France over the past two years, the 1985 defence budget²² was reduced by 0.8 per cent from the provisions in the long-term programme.²³ All cuts fall on equipment budgets, shared equally between nuclear and conventional forces. The 5.7 per cent nominal increase over 1984 will probably turn out to be a volume reduction, since the inflation forecast of 5.8 per cent is considered optimistic. Manpower levels will continue to fall, as planned. Military and civil personnel will be reduced by approximately 9000 men in 1985. The Force d'Action Rapide, consisting of 47 000 professional and conscript soldiers, will become operational in mid-1985.

The West German government presented in 1984 medium- and longterm procurement plans for the 1985–88 and 1989–97 periods. Some of the major weapon systems planned for the future are: 250 tactical fighter aircraft for the 1990s, ²⁴ 212 anti-tank helicopters, ²⁵ 4467 armoured vehicles, 6 frigates, ²⁶ 18 Type-211 submarines, 12940 surface-to-air missiles, and 2910 air-to-air missiles.²⁷ Purchases of ammunition are given high priority, with a 57 per cent increase between 1984 and 1988. It is believed that total financing requirements over the entire period will amount to somewhat more than DM150 billion at 1984 price levels, and that these can be accommodated within an annual military spending growth rate of 1–2 per cent. According to the Social Democrat opposition party, however, the plan cannot even come close to being financed.

The draft defence budget for 1985 represents a 3.7 per cent nominal

increase over 1984, which under current inflation assumptions amounts to a 0.8 per cent volume increase. Allocations for procurement show an absolute reduction due to the declining shares of current major weapon projects nearing completion, such as the Leopard-2 main battle tank, the Tornado multi-role combat aircraft, and the Bremen Class frigates. Having absorbed 71 per cent of procurement spending in 1983, the share of these major projects dropped to 51 per cent in 1985. Requested R&D expenditure shows a dramatic rise of 29.2 per cent in order to permit funding for projects envisaged for the 1990s.

A plan to counter the adverse impact on future West German military manpower levels of the declining birth rates since the end of the 1960s was also presented in 1984. FR Germany's manpower policy provides for a total of 495000 active duty servicemen. In order to maintain this size, the government has decided to increase the conscription period from 15 to 18 months beginning in 1989, and to introduce several other measures, including a higher ratio of called-up reserves.

Long-term defence plans for *the Netherlands* and *Norway* were approved in 1983. These provided for real growth rates in military expenditure of 2 and 3.5 per cent respectively for the next few years. In *Denmark* an agreement was made in 1984 between the coalition government and the opposition party to freeze military spending over the years 1985–87.

Current prospects are that annual real growth rates in total NATO Europe military spending are likely to be much below 3 per cent, in spite of exceptions for individual countries.²⁸ Although procurement shares of total military allocations are being increased at the expense of personnel, and operations and maintenance, the procurement programmes appear excessive in relation to the finance likely to be available.

Infrastructure

The sustainability of NATO conventional forces is currently estimated at between only 7 and 10 days, mainly as a result of inadequate war reserve stocks. Another area which is considered urgent by NATO planners is the improvement of air base facilities for the 1 500 US tactical fighter aircraft which are to reinforce Europe within the first 10 days of mobilization. These two programmes received priority in the NATO common infrastructure programme for the 1985–90 period. The new programme will provide for over 70 per cent of the requirements for tactical air reinforcements, including hardened aircraft shelters. Other priority programmes are communications systems, command, control and intelligence systems, and the oil pipeline network.

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The NATO infrastructure fund provides the facilities that are necessary to support NATO military forces and which are intended for common use. Although small in relation to total NATO military spending—less than 1 per cent—the internal discussion of this programme during 1984 provides an illustration of the divergent views within NATO on the balance between requirements and resource use. NATO military commanders had requested a sum corresponding to \$15 billion for the 1985–90 period.²⁹ FR Germany and most other countries favoured a sum of \$5 billion, while the United States considered \$10 billion a minimum. At the May 1984 meeting of the Defence Planning Committee, defence ministers failed to reach an agreement. Bilateral negotiations between the United States and FR Germany, each of which provides a 27 per cent share of total infrastructure funding, produced a compromise of about \$7.8 billion, which was approved at the following defence ministerial meeting in December.

New technologies

A controversial issue currently under study and debate in NATO is the introduction of new conventional weapon systems incorporating advanced emerging technologies, often referred to as ET. The idea of using emerging technologies for conventional defence originated in the United States, where most of the research and development efforts in this field are taking place, and was suggested to NATO defence ministers in May 1982, the so-called Weinberger initiative.

European NATO members have shown, at least initially, considerable scepticism towards the large-scale introduction of emerging technology systems. Apart from operational and doctrinal implications, the discussion about these systems has concerned their effectiveness, their costs and the sharing of defence industrial contracts between Alliance countries.³⁰ Although no firm cost estimates have been presented by NATO so far,³¹ it is clear that emerging technology systems will be expensive.

There is therefore the fear that the funding of sophisticated and expensive systems will be at the expense of basic conventional improvements and front-line defence. One main factor in European reluctance has been the concern that the European arms industries would be excluded from the economic benefits accruing to any forthcoming military contracts, due to the US technological lead in this area. In April 1984 the European countries presented a list of almost 200 items developed or under development in Europe, which were proposed as candidates for inclusion in any forthcoming NATO high technology procurement plans. The NATO Conference of National Armaments Directors (CNAD) has studied potential new technology conventional weapon programmes for NATO procurement. Eleven systems have been selected and recommended for first-priority development.³² The only systems included were ones which could be deployed by the year 1990 or soon thereafter. Several of the systems involved technologies being developed by the European arms industries.

It appears likely that NATO planning will be directed towards a qualitative rise in Alliance conventional force capabilities, although, at least initially, focusing on less distant technologies and more incremental changes in procurement patterns, force structures and doctrines than originally envisioned by the US Department of Defense and NATO military commanders.

Burden sharing

The plans for enhanced NATO conventional capabilities have given impetus to heated discussions in the US Congress about burden sharing between the United States and European NATO countries. In 1984 a proposal was made by senators Nunn and Roth, known for their strong support for conventional force improvements in Europe, to tie continued US military presence in Europe firmly to greater European efforts. They proposed an amendment to the Defense Authorization Bill for FY 1985 (FY 1984/85), calling for a reduction in the number of US servicemen stationed in Europe by 30 000 men each year between 1987 and 1989-a one-third reduction in all-unless European NATO countries had met specific requirements by 1986. These were that they should either meet the 3 per cent target, or fund two particular programmes at an estimated cost of \$6 billion: the increase of ammunition war-reserve stocks to a 30-day standard, and the improvement of air base facilities for US reinforcements to Europe. The amendment was narrowly defeated. Congress did, however, decide to put a ceiling of 326 414 US troops in Europe, and requested the President to seek commitments from the Allied countries along the lines of the defeated amendment. Continued efforts in this direction can be expected.

European countries, on the other hand, are concerned about the high share of their procurement budgets spent on contracts in the US arms industries, the resulting loss of jobs and technology, and the adverse impact on their balance of payments. The balance in arms trade between NATO Europe and the United States, the so-called two-way street, is difficult to assess, since no reliable statistics exist. Quoted ratios range between 2:1 and 10:1 to the US advantage. Data from the US Department of Defense, presented in table 7.3, indicate an imbalance of 2.4:1 in FY 1982, deteriorating to 6.7:1 in the next

	US sales (\$ mn)		US purcha	ses (\$ mn)	Trade balance US sales: purchases		
Country	FY 1982	FY 1983	FY 1982	FY 1983	FY 1982	FY 1983	
Belgium	69	1 008	240	113	0.3:1	8.9:1	
Denmark	35	49	64	44	0.6:1	1.1:1	
France	88	202	14	34	6.3:1	6.0:1	
FR Germany	481	427	174	248	2.8:1	1.7:1	
Italy	222	168	29	45	7.7:1	3.7:1	
Luxembourg	2	2	_	_	11.5:1	5.8:1	
Netherlands	436	375	48	33	9.0:1	11.3:1	
Norway	60	107	55	37	1.1:1	2.9:1	
Portugal	45	147	_	_	_	_	
Spain	115	2256	5	33	25.3:1	67.9:1	
UK	732	2212	315	451	2.3:1	4.9:1	
Total	2 284	6 953	943	1 0 3 9	2.4:1	6.7:1	

 Table 7.3. Arms trade balance between the USA and NATO Europe, fiscal years 1982

 and 1983

All figures are rounded.

Source: Armed Forces Journal International, August 1984, p. 36.

fiscal year. A large share, almost one-third in FY 1983, of US purchases from Europe consists of sub-contracts.³³ While these help European economies, they contribute little to the technological development of its arms industries.

Arms co-operation

Joint research, development and production of weapons, an issue in NATO since it was created, has received renewed interest in recent years. This led to several concrete steps taken in 1984. In addition to a number of bilateral co-operation agreements of a general nature between European countries, memoranda of understanding (MoU) were signed on specific weapon projects.

FR Germany and France have signed an MoU for the development of an anti-tank helicopter for the 1990s. The West German requirement is for 212, and France plans to procure 215 helicopters. The first deliveries are scheduled for 1992. The MoU approved funding of \$700 million for the development phase, and the total cost is estimated to be \$3.8 billion, or \$8.9 million per unit, at 1983 prices.

Defence ministers of five European NATO countries (France, FR Germany, Italy, Spain and the UK) decided in July 1984 to start a feasibility study for joint development and production of a European Fighter Aircraft (EFA). Production of between 800 and 1 000 aircraft is foreseen, with development to start after March 1985 and the first aircraft to be operational a decade later, if everything goes according to plan. Some controversial issues remain, such as work-sharing formulae, timing, and the choice of engine and radar for the aircraft. In the autumn the Netherlands government announced that it would join the programme with a purchase of about 200 aircraft to replace their F-16 fighters still in production. The total cost of the EFA programme is currently estimated at around \$20 billion at end-1983 prices and the unit cost at \$25 million.

In April 1984 eight NATO countries initiated a feasibility study for the NATO frigate replacement (NFR) for the 1990s. The signatories are Canada, France, FR Germany, Italy, the Netherlands, Spain, the UK and the USA. Belgium and Norway withdrew from the project at an earlier stage. The plans call for production of about 100 ships of around 3 500 tons displacement. Several variants are envisaged, but primarily an ASW role is planned. The feasibility study should be completed before the end of 1985, and the first ship should enter service in 1994. If carried out, the NFR project would be the largest arms co-production venture undertaken within NATO. The very size and importance of the project have, however, led many observers to question whether it will progress beyond the feasibility phase. This impression was strengthened by the objections presented by the United States just before signing the MoU. These were reported to have mainly concerned technology transfer issues and the principle of equal project shares for all participating nations. After intervention from the US Secretary of Defense, the MoU was signed a few weeks later.

In European countries the main attraction of joint research, development and production ventures is the cost advantage³⁴ compared to parallel national arms projects. The major arms-producing countries in Europe find it increasingly difficult to maintain competitive arms industrial bases. Stagnating Third World arms markets have also contributed to the revived interest in co-operation (see chapter 11). It is hoped that less duplication, especially at the R&D stage, will counteract the steep upward trend in unit costs of weapons.

Much of the work in this direction is undertaken within the Independent European Programme Group (IEPG), an informal association of all European NATO members except Iceland. It is emphasized that the aim is not full technological independence: "For the foreseeable future military production will partly be based on advanced American technology, mainly because the resources spent on R&D in the United States by both industry and the Government are far larger than those spent by the European members of the Alliance".³⁵ One of the aims is rather to create the conditions for Europe to become a genuine trade and co-operation partner of the United States.

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At the first ministerial meeting of the IEPG in November 1984, defence ministers agreed on basic principles and concrete measures for the promotion of greater co-ordination in arms procurement, in particular in R&D activities. They also decided to initiate studies on three major weapon systems for European collaboration. These were a transport aircraft, a medium-range surface-to-air missile system, and a next-generation main battle tank. The decisions were said to mark "a fundamental change in European defence procurement systems".³⁶

Increased co-operation in the field of armaments is also one of the objectives of the reactivation of the Western European Union³⁷ in October 1984 following a French initiative. (The major aim of this organization is, however, of a broader security policy nature.)

There has now been some experience, from the development stage, of inter-European arms co-operation. The number of such projects may well increase in the future in an attempt to narrow the gap between procurement ambitions and budgetary prospects in NATO Europe. The very size of current and future weapon projects demands combined effort. Arms production is, however, also perceived as a means to support employment and technology policies. This is one of the reasons for the hitherto rather modest scale of actual arms co-operation in spite of its having long been a NATO goal. The even cheaper alternative of full-scale specialization between countries is currently not politically feasible.

In the United States there is some support for co-operation with NATO allies in arms procurement—including co-development—because of US threat perceptions and the interest in European conventional force improvements. At least in the Pentagon it is realized that the Weinberger initiative cannot be sold to the Europeans unless they are allowed to share the economic and industrial benefits, including US technology: "To regain our military capabilities..., it is imperative that we work with ... our allies to commit increased resources toward improving manpower skills, technological advancements, and budgetary allocations... We anticipate that participation in armaments co-operation programmes could lead to increased contribution to the common defense".³⁸

Government-to-government co-operation, such as in the family-ofweapons concept, is no longer considered attractive. The United States instead pushes for industry-to-industry co-operation without much involvement by governments. One example is the international teaming arrangements of the type used for the development of the Terminal Guided Warhead for the Multiple Launch Rocket System. In order to facilitate co-operation, European countries are urged to organize and invest in their military R&D, arms industries and markets on a scale more nearly comparable to that of the United States. That implies large investments. Today the combined military R&D expenditure of European NATO countries is less than half that of the USA.

There are indications of a greater US willingness to buy European equipment for its armed forces. Although no data are as yet available, the imbalance in transatlantic arms trade was probably reduced in 1984, and Europe will probably be able to increase its military exports to the USA in the coming years. This may not hold true for major weapons, however. The US Congress and armed services are traditionally very reluctant to purchase foreign systems. The Europeandesigned Roland short-range air defence system was once seen as the first step towards increased mutuality. US licensed production of this system was estimated to save the United States \$800 million and 10 years of development work. In 1982, however, the US Congress decided to cancel US production on grounds of cost and other problems involved in changes to US requirements and in technology transfer. Further, when it comes to joint development, which is currently the issue, the major obstacle is US sensitivity to the transfer of advanced technology. Leading officials in the Pentagon now express the view that fear of technology leaks to the East should not prevent co-operation in high-technology areas. The suggested path is simultaneously to strengthen the barriers against technology leakage. and to "hasten the rate at which the West incorporates its technology into alliance weapon systems".³⁹ The conflicting views within the US government on this issue have, however, not been resolved.

While interest in arms co-operation has been revived on both sides of the Atlantic, it appears that the objectives are contradictory. On one side the major aim is cost reductions and access to US military technology. On the other side, however, the purpose is to engineer the increases in west European military expenditures that are considered necessary for improvements in NATO conventional forces.

III. The United States

The FY 1986 budget

In 1985 military spending will again be at the centre of the budget debate in the United States. Secretary of Defense Weinberger has requested a total of \$322.2 billion in budget authority for national defence. This equals real growth of roughly 6 per cent after inflation, or \$29.6 billion over the FY 1985 (US fiscal year 1984/85) appropriation. National defence outlays (or real spending in FY 1986) would rise \$31.9 billion over the estimated outlays for FY 1985, reaching a total of \$285.7 billion (see table 7.4).

Weapon spending continues to absorb the largest share of the military budget. In FY 1986 this 'investment' category will absorb 50 per cent of total budget authority. Strategic nuclear weapons dominate the increase in investment spending. According to data compiled by the President's Office of Management and Budget, Defense Department spending for strategic weapons alone (including R&D, construction and classified programmes but excluding related personnel expenditures) have risen from \$9.4 billion in FY 1980 to a requested \$38.1 billion in FY 1986 (an increase of 305 per cent).⁴⁰

The MX missiles (\$4.0 billion) and the Strategic Defense Initiative (SDI) (\$3.7 billion) are the most prominent elements in the nuclear programme. SDI is clearly pushing up overall Defense Department research and development spending, which will grow by \$7.8 billion in FY 1986, the largest single-year increase since FY 1980.

Meanwhile, the share of military funds which provides for the operation and maintenance of military equipment and installations has fallen from 32.2 per cent of national defence budget authority in FY 1980 to 25.6 per cent in FY 1986.

The budget projects a deficit of \$179 billion in FY 1986 and \$168.2 billion and \$148.7 billion respectively in the two subsequent years. In late 1984 David Stockman, Director of the Office of Management and Budget (OMB), presented a plan for reducing the budget deficit, including cuts of \$58 billion in DoD outlays over the fiscal years 1986–88. While President Reagan at an early stage decided to make sizeable cuts in non-military items, the cuts for DoD were pruned to \$25 billion. Projected non-military spending for FY 1986 was reduced by \$38.8 billion and military programmes by \$8.7 billion. For FY 1986, nominal reductions are proposed for 8 out of 13 federal government departments, including those of Agriculture, Education, Energy, and Housing and Urban Development.

A number of key issues will be debated during consideration of the FY 1986 defence spending proposal. Discussions will cover first the rate of growth in the defence budget, as part of the struggle to control the federal budget deficit, and second, arms control, weapon systems and procurement waste.

Many Members of Congress, Republican and Democrat alike, are expected to resist the White House FY 1986 military spending request, and the forecast is that Congress will finally approve real growth in the military budget of roughly 4 per cent.

Arms control will be another key issue in the congressional debate. The FY 1985 Defense Authorization Act required the White House to

Table 7.4. US Administration budget estimates for fiscal years 1985–90 (as of February 1985)

Figures are in \$ billions.

	1985	1986	1987	1988	1989	1990	
Total budget authority							
Total national defence, " current prices	292.6	322.2	363.3	411.5	448.9	488.1	
Total Department of Defense, current prices	284.7	313.7	354.0	401.6	438.8	477.7	
Total Department of Defense, constant (1986) prices ^b	296.1	313.7	339.4	369.5	388.0	406.7	
Percentage change	5.9	5.9	8.2	8.8	5.0	4.8	
Outlays ^c							
Total national defence, current prices	253.8	285.7	321.2	358.4	392.3	428.6	
Total Department of Defense, current prices	246.3	277.5	312.3	348.6	382.3	418.3	
Total Department of Defense, constant (1986) prices	256.1	277.5	299.0	319.3	336.1	353.8	
Percentage change	7.5	8.4	7.7	6.8	5.3	5.3	

^a National defence: A broader concept than Department of Defense activities, including military activities financed outside the DoD budget, mainly the design, testing and production of nuclear weapons (budgeted for under Department of Energy) and military construction.

^b The inflation factors used to calculate constant dollars come from Office of the Assistant Secretary of Defense, Comptroller, National Defense Budget Estimates for FY 1986 (US Government Printing Office, Washington, D.C., 1985).

^c Outlays: The actual spending of money in cash or cheques during a given year. Includes net lending. Outlays are seldom identical to budget authority in any fiscal year because funds spent during a year may be drawn partly from the budget authority conferred in previous years.

Sources: Department of Defense, Annual Report to the Congress, FY 1986 (US Government Printing Office, Washington, D.C., 1985); and Office of Management and Budget, Historical Tables, Budget of the United States Government, FY 1986 (US Government Printing Office, Washington, D.C., 1985). submit no fewer than 14 reports on arms control topics, several of them on major strategic weapons and arms control issues.⁴¹ These reports are discussed in chapter 1.

The MX and SDI reports are particularly significant. The FY 1985 Defense Authorization Act provides that FY 1985 funds for 21 new MX missiles will be released only after the report has been received. In addition, both houses of Congress must agree to authorize and appropriate the necessary money. This will mean eight separate congressional votes on the controversial MX programme in 1985: four to release FY 1985 funds and four to approve funds for FY 1986. The FY 1985 funds were released in March 1985.

FY 1986 funding for the much debated SDI programme (estimated at \$3.7 billion—nearly three times the FY 1985 appropriation of \$1.4 billion) will also be controversial. In addition, Congress will debate nuclear testing moratoria, including a call for a comprehensive test ban and proposals for moratoria on US warhead and missile flight-testing.

Congress will also continue to debate procurement policy and defence spending waste. Legislation enacted in 1984 required a variety of reforms in DoD buying practices: greater access for small businesses to military contracts, government rights to technologies developed with the help of DoD funds, greater competition for spare parts purchases, warranties on weapon purchases, greater use of independent cost estimates by the Pentagon, and full operation of a new Pentagon office for operational testing of weapon systems.

Congress is expected to follow the implementation of these reforms closely. It will also debate legislation concerning contractor cost estimates, what costs are allowable against defence contracts and how to control the "revolving door" between the Pentagon and its contractors.⁴²

The FY 1985 budget

In February 1984, the DoD requested \$313.4 billion in FY 1985 budget authority for national defence, or 13 per cent real growth over FY 1984 budget authority of \$265.2 billion. Approval of this request would have meant a real dollar increase of 43 per cent in national defence budget authority over the FY 1980 figure of \$167.7 billion. Moreover, the budget authority request meant that the Defense Department's actual outlays of \$264 billion in FY 1985 would be higher in constant dollars than for any year since 1946, including peak spending years during the wars in Korea and Viet Nam (see figure 7.2).⁴³

Since 1981, the Reagan Administration has generally succeeded in obtaining the military spending it believed it needed. According to a spring 1984 study by the Congressional Research Service (CRS),

defence budget authority has grown at an average of roughly 9 per cent a year in real dollars since 1981.⁴⁴ Properly adjusted for actual lower rather than higher anticipated inflation, the CRS reported that the Administration has received 97.5 per cent of the funds it anticipated needing in 1981 when it first projected its defence spending requirements.

Moreover, military spending has been taking up an increasing share of total federal spending and of the US GNP. The national defence share of the federal budget rose from 22.7 per cent in FY 1980 to 26.5 per cent in FY 1985. By FY 1990 national defence is projected to be 36 per cent of US federal spending. The defence share of GNP rose, in the same period, from 5.2 per cent to 6.6 per cent, a one-third increase.

Strategic nuclear programmes were to grow in nominal terms at 20.2 per cent in FY 1985 after a nominal rise of 33.5 per cent in the previous financial year. The significant programmes in this category included the MX missile, the purchase of 34 B-1B bombers, continuation of research on and production of air-, sea- and ground-launched cruise missiles, and the further deployment of the Pershing II missile in western Europe. The DoD planned spending for space weaponry (the SDI) was \$1.8 billion from the DoD budget and another \$300 million through the Department of Energy budget, with some further strategic spending included in the DoD's "intelligence and communications" account.

The Administration's request for "investment" (funds for weapon procurement, research and development, and military construction) has been the fastest growing sector of military spending. In FY 1980, the combined authority for DoD procurement, research and development and military construction, and for nuclear warheads in the Department of Energy, constituted 37.7 per cent of the national defence function in the budget. In FY 1985 this share rose to 48.2 per cent of total national defence spending.

Investment accounts are spent over future years, when costs tend to rise. Defence spending, as a result, has increasingly been driven by weapon purchases. In contrast, the operations and maintenance (O&M) account (which funds operation, upkeep and repairs for facilities and weapons) and the military personnel (and retirement) benefit accounts have grown far more slowly than procurement. Together, the O&M and personnel share of the defence budget has dropped from 60.8 per cent in FY 1980 to an estimated 50.1 per cent in FY 1985. Many feel that the large number of new weapons in the inventory is not being matched by adequate funding to operate and maintain them.⁴⁵

Budget authority requested for each of the armed services grew significantly in the FY 1985 request. Air Force budget authority was to grow 21.2 per cent in real terms. Major items of Air Force funding were the B-1 bomber (\$8.2 billion), the MX missile (\$5 billion), the F-16 fighter aircraft (\$4.2 billion), the C-5B cargo plane (\$2.2 billion) and the F-15 fighter aircraft (\$2.3 billion). The only significant reduction from previous Air Force spending was the decision not to buy any more E-3A Airborne Warning and Control Systems (AWACS).

Navy budget authority was to grow by 19.3 per cent in real terms in FY 1985. Major Navy programmes included the Aegis CG-47 cruiser (\$3.2 billion), the SSN-688 nuclear attack submarine (\$3.0 billion), the F/A-18 fighter aircraft (\$2.7 billion), start of production on the new Trident submarine (\$1.8 billion), the DDG-51 destroyer (\$1.3 billion), the F-14 fighter (\$1.9 billion) and the AV-8B fighter aircraft for the Marines (\$0.9 billion).

Real growth in the Army budget authority was to be 20.9 per cent. Major Army programmes included: the M-1 main battle tank (\$1.9 billion), the AH-64 attack helicopter (\$1.3 billion), and the Patriot air defence missile (\$1.3 billion).

Congressional action

Congress rejected out of hand the Administration's requested increase for defence. The Budget Committee in the House of Representatives, which is controlled by the Democrats, endorsed slower growth, ultimately producing a budget resolution that provided for 3.5 per cent average real growth for fiscal years 1985–87 in budget authority for national defence. The Republican leadership in the Senate, meanwhile, negotiated a complicated budget compromise with the White House, providing for 7 per cent average real growth for the same period.

Although Senate Republicans accepted the 7 per cent figure as the absolute floor on defence funding, the subsequent debate in both Houses further reduced the amount, as had been the case in each of the previous three years. The Defense Authorization Act, passed in autumn 1984, provided for \$297.3 billion in budget authority. The Appropriations Committees carved out a compromise in late autumn 1984, agreeing to appropriate even less, \$292.6 billion, for national defence. This was equivalent to a 5 per cent real increase. The armed services and the various budget categories shared relatively equally in this slower rate of growth.

Debate on the budget authorizing and appropriating bills involved arguments over the direction of the US military programme.⁴⁶ The MX missile programme was by far the most controversial item; it has been particularly vulnerable since the Scowcroft Commission recommended that the missiles should be based in existing silos.⁴⁷

In three separate 1984 votes, the House barred MX production funds until spring 1985 for the 21 missiles requested by the Administration. The funds could then be released but only after two affirmative votes by each House of Congress. The Republican Senate voted against a similar amendment, but in the House/Senate conference the House position was generally accepted. Only \$1 billion of MX production funds were released for the 21 missiles already approved for FY 1984 and for some advanced procurement in FY 1985. Another \$1.5 billion in production funds were to be released after 1 March 1985 but only if the President certified the need for the MX, and Congress approved two joint resolutions authorizing and appropriating the money.⁴⁸ They have now done this. (For further discussion, see chapter 1.)

Space systems were the second major weapon-related controversy during debate on the FY 1985 defence budget. The House amended the Defense Authorization Act, barring tests against an object in space (ASAT) unless the President certified that the USSR had already conducted such a test.

The Senate passed an amendment which banned ASAT weapon testing until the President certified: (a) that the USA was seeking to negotiate with the USSR a mutual and verifiable agreement restricting tests; (b) that tests were "necessary to avert clear and irrevocable harm to national security"; and (c) that testing was consistent with the ABM Treaty.

The appropriations conferees accepted the Senate's intentions and restricted the Pentagon to three tests against an object in space no sooner than the President's certification described above or by 1 March 1985, whichever came first. Since this legislation was passed, the Air Force has conducted one ASAT test, although not against an object in space.⁴⁹

In addition to ASAT, Congress actively debated the Administration's proposed SDI programme. In the final appropriations bill the \$1.8 billion SDI funding requested by the Administration was reduced to \$1.4 billion, and the Administration was required to file a separate report on the elements that would go into the programmes.

For the third year in succession, Congress turned aside Adminstration efforts to resume production of new binary chemical weapons in Pine Bluffs, Arkansas (see chapter 6).

Congress took specific action with respect to nuclear weapons in Europe. In 1983 Congress had avoided dealing with this issue, rejecting a proposed cut in funding for the Pershing II missile. In 1984, however, Congress called for two new reports from the White House on European-based nuclear weapons. The first, to be submitted 90 days after a decision about theatre nuclear force plans is made, requires the President to report to Congress on plans to withdraw tactical nuclear weapons.

The second report, due on 19 January 1985, would make recommendations on the modernization of US theatre nuclear forces in Europe. Specifically, the report will recommend whether NATO should reduce its reliance on short-range battlefield weapons, such as atomic demolition bombs and 155-mm and 8-inch nuclear artillery shells, and whether it should lessen its dependence on dual-capable fighter aircraft. The report will also explore whether NATO should consider creating a single separate command for nuclear weapons in Europe. This command would have control over a refurbished, longer-range force of weapons based close to the rear periphery of the NATO member countries. With these changes, Congress seemed to be suggesting that theatre forces would be less subject to a 'use 'em or lose 'em' decision in case of armed conflict. At the same time, Congress reversed its vote on the FY 1984 budget and authorized funding to produce the 155-mm nuclear artillery shell, to replace tactical nuclear warheads in Europe.⁵⁰

Spending for conventional weapons received somewhat less attention during the 1984 congressional defence debate. The only major system which was closely scrutinized was the Sgt York Division Air Defense (DIVAD) gun. A total of 132 units were requested in the FY 1985 budget. The testing programme, however, uncovered problems which have led to an eight-month delay in production start-up. Because of these problems, Congress doubted "the advisability of continued financial support". Congress finally voted to eliminate all production funding for DIVAD until full testing had been completed, the Pentagon had reported on the testing and DoD had certified that testing was appropriate. At that point, Congress would then consider a supplemental FY 1985 request for funds.⁵¹

Apart from DIVAD, Congress did not reduce the Administration's defence request through actual cuts in weapon systems. Instead, Congress adopted its usual strategy of slowing (or 'stretching') the procurement of a number of systems, in some cases with the agreement of the Pentagon. Systems that were stretched out included: (a) Army programmes—the M-2 Bradley (MICV) fighting vehicle (from 720 to 655 units), the Patriot missile (585 to 440), the Aquila target drone (144 to 44), the Pershing II (104 to 93) and the DIVAD (132 to 90); (b) Navy programmes—the HARM missile (1 674 to 1 559), the Mk 48 torpedo (144 to 108), the TAGOS ship (3 to 2) and the Phoenix missile (400 to 265); and (c) Air Force programmes—the F-15 fighter (48 to 42), the Maverick missile (4 600 to 2 600), the AMRAAM missile (174 to 20) and the C-5B cargo plane (10 to 8).

Overall, the appropriations bill reduced the Defense Department's

request for procurement spending by \$10.8 billion, much of it through stretch-outs, trims in funding for the same number of weapons, and reductions in support and spare parts.⁵²

Procurement waste

In 1983 and 1984 repeated disclosures of waste and overcharges in Defense Department procurement spurred major congressional efforts to reform the weapon-spending process. Repeated reports of overcharges for spare parts, such as \$436 for claw hammers and \$9600 for Allen wrenches, stirred lawmakers' concern and prompted passage of several pieces of new legislation. Congress required the DoD to encourage small businesses to enter the spare parts market, to require increased competition for these contracts, and to establish competition advocates in the DoD procurement bureaucracy. The bill also provided for commercial pricing of spare parts in economic quantities, for direct subcontractor and manufacturer sales to the DoD, and for increased DoD rights to technical data on parts it had purchased from private contractors, among other items.⁵³

On the other hand, Congress weakened the 1983 law requiring contractors to provide warranties on weapon systems. The new warranty requirement stipulated that any system with a total procurement cost of at least \$10 million that has reached "mature full-scale production" (after the first 10 per cent of total production) must contain a warranty.⁵⁴

Congress also took steps to require the Defense Department to establish fully the Office of Operational Test and Evaluation. Congress created this office in autumn 1983, but the Pentagon never appointed a director or established the office's organizational structure. Congress had urged the creation of this office in order to remove operational testing responsibilities from the contractors who manufacture weapons. In 1984, Congress restricted to \$20 million all expenditures by this office until the DoD appointed the required civilian director and clarified the structure of the office.⁵⁵

Readiness

Despite the rapid pace of the Reagan arms build-up, Congress and the media have raised questions about the readiness of the nation's military forces for actual military engagements. The military's readiness and combat effectiveness had already been debated in 1983 in the wake of the attack on the Marine barracks in Beirut, Lebanon, and in the aftermath of the problem-ridden US invasion in Grenada.⁵⁶

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In March 1983 questions were raised about the state of readiness of the US armed forces. Leaked Pentagon reports suggested that the number of Army units certified "ready for combat" had fallen by 25 per cent between 1980 and 1983, while ready Air Force units in the same state had fallen by 15 per cent. Only the Navy had progressed, doubling the numbers of ready units over the same time period. ⁵⁷ Senator Sam Nunn noted that "readiness has not improved in proportion to the numbers of dollars we've put in", ⁵⁸ while defence analysts noted that growth in weapon-spending had far outstripped accounts that provide for training, operating and maintaining the new equipment. ⁵⁹

The readiness debate continued in July 1984 with the release of a House Defense Appropriations Subcommittee's 18-month staff survey of military readiness. The staff study concluded that US readiness and ability to sustain combat had declined in 1982 and 1983, that "the Army does not have the men and material to sustain combat operations in a major contingency", and that Naval forces could not sustain full-scale war with the USSR beyond one week.⁶⁰

Economic impact of military expenditure

The FY 1985 defence budget was criticized because of its contribution to the US budget deficit. On the expenditure side of the federal budget, military spending has been the only major programme to grow in real dollars. The 1981 tax cut and the US recession, of course, also contributed to the deficit, which reached \$175 billion in FY 1984. The Adminstration argued that every \$1 reduction in military spending would result in a deficit reduction of only 50 cents. Tax revenues generated by military spending would be lost and additional expenditure required for the resulting rise in unemployment.⁶¹ Further, the cancellation of a weapon project results in small savings in the first years, since spending is spread out over several years. On the other hand, long-run deficit reduction strategies could benefit from weaponspending reductions, for which future outlays rise significantly.

The longer-range impact of military expenditure on the economy is subject to some disagreement. More than two million US workers, as well as whole communities, rely on defence contracting for their economic livelihood. It is sometimes argued that federal dollars spent on non-military programmes would create more employment than military spending does.⁶² Recent analyses have suggested that once secondary and multiplier jobs are counted, the numerical impact of military spending on employment is not substantially different in its impact on the economy to other forms of federal spending.⁶³ The jobs generated by military expenditure are, however, different from those in the average manufacturing industry: the weapon industry employs a larger proportion of technically skilled workers and a lower proportion of production workers. While the unemployment rate for the latter group has been very high during recent years, it has been much below average for the former. During the 1980 recession, demand by military contractors for engineers was so great that their salary levels continued to rise.⁶⁴

Ultimately, the question of the economic impact of military spending is a matter of policy choice: are the Administration and Congress choosing to increase military rather than civil spending? Does the government opt for military over civilian technology? Do policy makers want to create jobs for highly skilled defence workers rather than jobs for the long-term unemployed?

The key problem: controlling military spending

The critical spending problem of 1984 was one that is likely to be even more pressing in 1985: the increasing difficulty the Pentagon and the Congress will face in controlling spiralling military spending. The OMB reported in 1984 that the share of national defence spending which it calls "uncontrollable" (already obligated to current commitments) rose from 27.2 per cent in 1980 to an estimated 35.8 per cent in FY 1985. The 'backlog' of appropriated funds at the Defense Department confirms that these 'uncontrollable' funds are likely to grow in the future. Funds already appropriated, but as yet unspent, or in some cases obligated, have risen from \$92.2 billion in FY 1980 to an estimated \$243.4 billion in FY 1985. Basically, the success of the Administration's budget strategy in FY 1982 and FY 1983 is that a large amount of money already appropriated still remains to be spent.

In February 1984 the Defense Department projected that its budget growth would slow in FY 1987 and beyond,⁶⁵ but the FY 1986 budget request revealed that faster growth is now planned for FY 1987 and FY 1988 (see table 7.4). Since most military spending growth has been for weapons, future needs are unclear. First, inadequate growth in operations and maintenance may spur a greater need in the future for these funds to keep ready the large amounts of new equipment in the inventory.⁶⁶ Second, underestimation of weapon costs has begun to plague this Administration, as it has previous ones. The General Accounting Office (GAO) noted in a 1984 report that the Defense Department's five-year cost projections for 97 major weapons were probably underestimated by as much as \$173 billion to \$324 billion.⁶⁷

Finally, as systems enter peak production, it becomes increasingly difficult to cancel a programme. Cancellation means that the DoD

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would lose its investment in the system. Moreover, broad constituencies of contractors, towns and cities with military bases, Congressmen and Pentagon officials support these weapon systems and have a stake in their survival.⁶⁸ A large number of weapon purchases are now nearing the point at which they become very difficult to reverse. These include: the B-1 bomber (Rockwell International), the AH-64 helicopter (McDonnell Douglas), the AV-8B Harrier jump jet (McDonnell Douglas), the C-5B cargo plane (Lockheed), the Patriot missile (Raytheon), and the Pershing II missile (Martin Marietta). Clearly, Congress could find it more difficult in 1985 than ever before to pinpoint ways of controlling US military expenditure.

IV. The Soviet Union

The military budget

On 16 November 1984, President and Party Chairman Chernenko called for a strengthening of the country's defence capabilities. On the occasion of the regular Politburo meeting of the Communist Party of the Soviet Union (CPSU) to discuss the drafts of the State Plan for the Economic and Social Development of the USSR and the State Budget of the USSR for 1985, he stated:

We cannot ignore the growing aggressiveness of imperialism and its attempts to gain military advantage over the socialist community. Our country does not intend to attack anybody. That is clear to any soberminded person. But we shall strengthen our defence potential, protecting the peaceful work of the Soviet people and upholding the cause of peace throughout the world.⁶⁹

On 27 November 1984 the Supreme Soviet heard Minister of Finance V.F. Garbuzov spell out the consequences: "The state budget for 1985 has 19,063 million roubles allocated for defence, which is 4.9 percent of the total outlays projected under the budget".⁷⁰ This figure represents an increase of almost 12 per cent over the figure announced for 1984. Before that, the single figure for 'defence' in the Soviet State Budget had remained almost constant, even falling (figure 7.3).

In academic and political circles in the West, the announced Soviet figure is not given much credence.⁷¹ There are several estimates of Soviet military expenditure which are all substantially higher (see figure 7.3). The size of the build-up of Soviet forces in the 1970s and early 1980s cannot be reconciled with the trend or level of the official Soviet figure. The 1985 figure, if converted at official exchange-rates, comes to about \$23 billion, and is in the range of the military expenditures of

Figure 7.3. Indices for figures on Soviet military expenditures



17.9 billion roubles = 100.

^a US estimate in constant 1970 roubles. For the years 1970–76, the average of values given in US Congress, Joint Economic Committee, USSR: Measures of Economic Growth and Development, 1950–80 (US Government Printing Office, Washington, D.C., 1982) was used. For 1976–82, the growth rate reported in US Congress, Joint Economic Committee, Subcommittee on International Trade, Finance, and Security Economics, Soviet Defense Trends, A Staff Study (Washington, D.C., September 1983), was applied. Figures for 1982 and 1983 are estimated from press reports; see, e.g., Wall Street Journal, 31 October 1984.

^b The figures in this series are rough estimates only (see SIPRI Yearbooks 1974, appendix 8B, and 1979, chapter 1). More trust can be placed in the trend than in the absolute level.

the UK, FR Germany or Saudi Arabia. There is no indication as yet that the Soviet leaders intend to publish a figure more in line with established facts about Soviet armed forces.⁷² Disaggregated figures for personnel, procurement, operations and maintenance, and research and development expenditure are badly needed.

The main purpose of the announced increase is probably political. It is a signal to NATO and to the US Administration that the Soviet Union will not surrender the military parity which it believed it had established. It is also a signal to the Soviet population that resources will have to be diverted from civil uses. In a rare piece of public discussion of the trade-off between military expenditures and civil consumption in the Soviet Union, an automobile production worker from the city of Gorki was quoted as saying: "It cannot be denied, forced expenditures for defense do not allow us the means for the time being to improve our welfare to the extent we would like".⁷³

Procurement

There are good reasons to assume that the economic burden of military expenditures has been high for many years. Procurement is the bulk of Soviet military expenditure (since conscripts cost so little). US intelligence estimates of Soviet weapon output show a flat or slightly declining trend in numbers (table 7.5). Allowing for product improvement and cost increases, the real cost of procurement has probably been constant in the late 1970s and early 1980s.

Recent US estimates predict a new surge in procurement figures.⁷⁴ The US Department of Defense claims to have identified 200 such new Soviet systems to be fielded in the 1980s, about 50 of which were estimated to have initial operational capability in the mid-1980s.⁷⁵ This latter category includes strategic systems (the SS-X-24 ICBM, the SS-X-25 ICBM, the SS-N-20 SLBM and the SS-NX-23 SLBM), cruise missiles (ALCMs, GLCMs and the SS-NX-21 SLCM), aircraft (the Blackjack bomber, the Bear H bomber, Su-27 interceptor aircraft, MiG-29 aircraft, Condor transporters, Candid tankers, and a new helicopter), ships (Typhoon NBMS, Y Class NCMS, Oscar Class NCMS and the Slava Class cruiser), tactical missiles (the SA-10 SAM, ABM missile interceptors, the SS-X-23 SRTNM, the SA-X-12 SAM, a new ASM, the SS-N-19 AShM, the S-N-22 AShM, a new ShAM and a new millimetre-wave ATM), radars, bombs, artillery systems and an AWACS-type early-warning system. The status of many of these programmes is unclear. Due to Soviet secrecy, the US Department of Defense is the most prolific source of information on Soviet weapon programmes, but has a record of misinformation.⁷⁶

Research and development (R&D) is assumed to be the most dynamic portion of Soviet military expenditure. The overall growth in these expenditures was a consequence of big increases in R&D spending.⁷⁷ The fielding of US intermediate-range nuclear systems in Europe and the Strategic Defense Initiative of the Reagan Administration led to a concentration of resources in fields where Soviet science has been weak in the past, for example, electronics (see table 7.6).

Resources are also put into areas where there are hardware problems. The Soviet Army has still to field a newly designed battle tank. It is still relying, as the mainstay of its forces, on the T-72 and its derivatives (the T-74, and possibly the T-80 and/or the T-81). The T-72 was developed

	Average ^b	Average ^b		
Item	1972-76	1977-81	1982	1983
Tanks	2 200	2 500	2100	2 400
Other armoured fighting vehicles	4 600	4 900	3 800	4 000
Towed field artillery	700	1 200	1 650	1 625
SP field artillery	500	800	1 050	1 050
Multiple rocket launchers	400	400	450	650
SP AA artillery	200	100	0	50
Towed AA artillery	100	0	0	0
Bombers	20	30	35	35
Fighters/fighter bombers	800	800	700	700
Transports ^c	400	300	250	250
Trainers	60	50	25	25
ASW aircraft	10	10	10	5
Helicopters ^c	1 200	600	600	625
ICBMs	210	240	175	150
IRBMs	15	100	100	100
SRBMs	100	220	300	350
SLBMs	170	200	175	200
ASMs	800	800	850	875
SAMs ^d	26 000	52 000	53 000	55 000
ATGMs ^d	27 000	42 000	63 000	70 000
Submarines	10	11	8	8
Major combatants	10	9	6	9
Minor combatants	50	30	35	35
Naval support ships	15	20	10	20

Table	7.5.	US	Defense	Intelligence	Agency	estimate	of Soviet	procurement	of	selected
items,	1972	2-83	3 <i>a</i>							

" Including imports for armoured vehicles and ships.

^b Rounded to maximum two significant digits.

Including civil production.

^d Including exports.

Source: Congressional Record, Senate, 10 August 1984, pp. S 10387-89.

in the 1960s, combining elements of the T-64 tank developed in the late 1950s and early 1960s and the T-62, itself an offspring of the T-34 tank type originally designed before World War II. The T-72, for instance, still uses the engine design of the T-34, though much modified and upgraded (called the V-64).⁷⁸ The T-72 is also a comparatively light tank (41 tons). The new MBTs of the NATO forces (the Leopard II, 55 t; the Chieftain, 55 t; and the M-1 Abrams, 53.4 t) are much heavier.

Another problem is shipbuilding. The long-rumoured aircraft carrier, the first similar in size to US carriers of the Nimitz Class (estimated displacement is around 75 000 t), is under construction at the Black Sea yard at Nikolayev.⁷⁹ Delivery of the ship with all systems functioning is

	USA	Soviet
Computers and software	Lead growing	
Robotics & machine intelligence	Lead holding	
Life sciences ^a	Lead holding	
Signal processing	Lead holding	
Signature reduction/stealth	Lead holding	
Submarine detection	Lead holding	
Telecommunications ^b	Lead holding	
Production/manufacturing ^c	Lead holding	
Electro-optical sensors	Lead slipping	
Guidance and navigations	Lead slipping	
Materials ^d	Lead slipping	
Micro-electronic manufacturing	Lead slipping	
Optics	Lead slipping	
Propulsion	Lead slipping	
Radar sensors	Lead slipping	
Aerodynamics	Eq	ual
Conventional warheads	Eq	ual
Lasers	Eq	ual
Nuclear warheads	Eq	ual
Power sources	Eq	ual

Table 7.6. US Department of Defense view of US-Soviet technology balance in 20 areas of basic technology that most affect the military

^a Human factors and genetic engineering.

^b Including fibre optics.

^c Including automated control.

^d Lightweight, high strength, high temperature.

Source: US Congress, House of Representatives, Committee on Armed Services, Hearings on H.R.5167, Department of Defense Authorization of Appropriations for Fiscal Year 1985, Part 4, Research, Development, Test and Evaluation—Title II (US Government Printing Office, Washington, D.C., 1984), p. 63.

not expected before 1993–94, when the USA will have put three new Nimitz Class carriers into service. In July 1984 the cruiser *Frunze*, the second ship of the Kirov Class, was put into service. It is very large, with a displacement of 22 000 tons, but its weaponry and electronics are similar to those of the US Ticonderoga Class cruisers,⁸⁰ which are less than half the size of the Kirov Class ships. In addition to the production problems, there are problems with the adaptation of new missile systems and electronics. Some warships were put into service before their defensive electronics systems functioned; others had to be modernized very shortly after delivery.⁸¹

Future trends

There are areas besides space weapons, tanks and ship construction where the Soviet Union lags behind and where more money might make a difference. There may now be more resources available since the Soviet economy is picking up momentum again after a difficult year in 1982. If there is, as many studies suggest, a close connection between the performance of the Soviet economy and military expenditures,⁸² these latter can rise in line with the overall economy without upsetting the balance between sectors.

The signs are clearly in the direction of increased growth of military expenditures. The rationale given is the increased US effort. As Minister of Finance Garbuzov stated: "The Soviet Union does not seek military superiority, but it will not allow anybody to tip the achieved military and strategic equilibrium".⁸³

The SIPRI estimate of Soviet military expenditure is only an informed guess based on available material and estimates of Soviet military expenditure. More confidence is therefore attached to the trend of the figures presented in appendix 7A, tables 7A.1 and 7A.2, than the absolute level. The indication is that the rise will now be faster than in the past 10 years.

V. China

Military expenditure

Details of reforms which aimed at modernizing Chinese armed forces dominated news reports in 1982 and were still topical at the end of 1984.⁸⁴ Reformers, led by Chairman Deng Xiaoping who heads both the Military Commission of the Party's Central Committee and the Central Military Commission, are aiming at a streamlined force of professional soldiers who are well-equipped and trained and without political ambitions. Official reports claim that more officers are now graduates of military academies⁸⁵ and military academies are receiving more funds⁸⁶ but it is still officially admitted that resistance to planned reforms exist. In political terms, this is blamed on "leftist ideas and forces of outmoded habit";⁸⁷ the economic constraints on reform are more difficult to identify since the military expenditure figure given in the budget probably covers only operating costs with an unknown amount devoted to procurement and to research and development.⁸⁸ It seems probable, however, that an unidentifiable amount of other military expenditure occurs both within and outside of the official State Budget.⁸⁹

In terms of the official budget, no more resources were devoted to the armed forces in 1984 than in recent years. Since the size of the army is not reported to have diminished, ⁹⁰ the plan to cut dead wood may not as yet have made much progress. Officially, the military have been

Table 7.7. China's State Budget and expenditures, 1977-84

	1977	1978	1979	1980	1981	1982	1983	1984
State Budget	84.4	111.1	127.4	121.3	109.0	115.3	129.3	136.9
Official military expenditure	14.9	16.8	22.3	19.4	16.8	17.9	17.7	17.9
Share of budget (per cent)	17.7	15.1	17.5	16.0	15.4	15.5	13.7	13.1
Culture, education, science & public health expenditure		••		15.6	17.2	19.7	22.4	23.5
Share of budget (per cent)				12.9	15.8	17.1	17.3	17.2

Figures are in billions of yuan, at current prices.

Sources: State Budget: International Financial Statistics, November 1984 (International Monetary Fund, Washington, D.C., 1984). Military expenditure 1977–82: SIPRI military expenditure tables. Culture etc. 1980: Zhao Ziyang, China's Economy and Development Principles (Foreign Language Press, Beijing, 1982). Culture etc. 1981: Far Eastern Economic Review, 10 December 1982.

Remaining information is from the report of the Final State Accounts for 1983 and the Draft Budget for 1984, delivered at the Second Session of the Sixth National People's Congress on 16 May, 1984, Xinhua News Agency, Special Issue, 7 June 1984.

receiving a declining share of the central budget since the conflict with Viet Nam.

In terms of known resource allocation, the share can be compared with operating expenses for culture, education, science and public health services, given as a single item in the budget (table 7.7). These have been allowed to grow rapidly in recent years, but are still not adequate enough to meet pressing needs at secondary and tertiary levels of education. Indeed one of the aims of the 1984 State Budget is to make primary education universal "in rural areas ... at an early date".⁹¹ Although of paramount importance to the success of China's modernization plans, reformists have been unable to swing adequate funds from other established sectors to the social services, in particular to education.

Procurement

The permanent Vice-Chairman of the Party's Military Commission wrote in the theoretical journal *Red Flag* that China must depend on its own efforts to modernize its national defence rather than rely on imported weapons "since the country cannot afford an enormous military expenditure".⁹² Numerous 'window-shopping' excursions

have taken place, both in the USA and Europe, but little has been bought (table 7.8).

Table 7.8 does not include all the weapon systems China has expressed interest in or actually purchased, but it shows a predominance of interest in aeronautical items. Certain electronics, aircraft, helicopters and missiles are being purchased from both the USA and France (see appendix 11B). China is seeking technical knowhow and has, for example, signed an agreement with France to assemble 50 SA-365 helicopters. However, a more important method by which technology will be acquired is the import of complete plants, an increasingly common method limited only by China's general shortage of hard currency.⁹³

Indigenous arms production

In October 1984 China celebrated its 35th National Day with the first major military parade since 1969, including a number of new, modified weapon systems. The climax was the display of China's four missile types: the first system, whose components were carried on three trucks, was believed to be the CSS-4 ICBM, which was introduced in 1981; another missile was the new CSS-NX-4 SLBM, which has already been test-fired underwater from a Xia Class submarine; the Hong Jian-73 anti-tank missile (ATM), an upgraded version of the Soviet AT-3; and the Hong Ying-5, a copy of the Soviet SA-7 portable surface-to-air missile (SAM).⁹⁴

Most of the displayed ground-force equipment has been developed and considerably improved from Soviet models provided before the Sino-Soviet schism of the late 1950s. Some 400 vehicles were on show, including the T-59 and the modernized T-69 main battle tank (MBT) as well as the T-77 armoured personnel carrier (APC), self-propelled artillery and anti-aircraft guns.

One of China's goals in displaying military technology is to demonstrate its growing technological independence. But despite impressive quantitative advances in arms production during the past 30 years, the Chinese arms industry is still encumbered by the technology established during the massive construction period of the 1950s which was supervised by the Soviet Union. Since the withdrawal of Soviet technicians in 1960, only minor improvements have been made to the technological base of this industry. However, in an effort to restructure the arms industry, the five Ministries of Machine Building (previously responsible for weapon manufacture) were reorganized and renamed as of 1980.⁹⁵ This shift was probably made in order to promote efficiency and in the long run also to improve the ability to adapt to Western technology.

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Country	Items examined ^a	Items purchased (x)
Australia	Ikara ASW torpedoes	_
Egypt	MiG-23 aircraft (USSR) ^b T-62 MBT (USSR) ^b SA-6 Goa SAM (USSR) ^b SA-6 Gainful SAM ^b Fire control radar	
France	Mirage-2000 aircraft AS-332 helicopters SA-365 helicopters Super Frelon helicopters AMX-30 AV Crotale AAM Hot ATM Milan ATM Roland ATM Radar systems ASW torpedoes	x x x
FR Germany	Bo-105 helicopters Leopard MBT Marder APC Armbrust AT rockets Mobile artillery Radar systems Small arms	x
Italy	Agusta helicopters Aspide AAM Indigo SAM AA guns Sonar equipment	
Sweden	Viggen aircraft Submarines	
Switzerland	AA guns Engines (ship) Electronics	x x
United Kingdom	Harrier aircraft Spey engine (aircraft) Westland helicopters Chieftain MBT Khalid MBT Sea Dart ShShM ^c Swingfire ATM ASW optical equipment Artillery Small arms	x
United States	C-130 Hercules aircraft P-3 Orion aircraft DC-10 aircraft T-34 aircraft	 x

Table 7.8. Foreign military equipment examined by China, 1973-84

Country	Items examined ^a	Items purchased (x)
	Model-212 helicopters	x
	S-70 helicopters	x
	Trucks	x
	Communication gear	_
	Laser equipment	

Table 7.01 (Continued)	Table	7.8.	(Continued)
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^a "Items examined" means that an expected purchase has been mentioned in military journals and other press reports.

^b Received samples in exchange for repair of jet engines in 1973.

^c The Sea Dart ShShM had been ordered but the order was later cancelled.

In order to increase the inflow of military know-how into the Chinese arms industry, a general opening to the West will continue. Current investment in infrastructure, basic industries, technology absorption capabilities and personnel training will support the defence modernization process. The Chinese policy seems to be gradually to integrate Western components into existing equipment rather than build new designs. Much foreign equipment and know-how is used to fill identified technology gaps: China's current emphasis on importing dual-use Western electronics and computer technology are some examples. Dual-use technologies may be acquired under civilian auspices and later adapted to military applications; and vice versa, or concurrently.

China has produced military weapons and equipment of relatively low sophistication during the past six years (table 7.9). The main advanced fighter programme initiated in the 1970s is the newly revealed J-8 fighter aircraft. This is a stretched, twin-engined derivative of the J-7, the Chinese-built MiG-21.

The other 'new' combat aircraft under development is the J-12, often described as a large twin-engined multi-role fighter.⁹⁶

The biggest problem lies in the sophisticated technologies associated with jet engine design and the production of special alloys for airframe construction, i.e., non-ferrous metals such as aluminium, magnesium, titanium, cobalt and nickel.⁹⁷ The future of China's aircraft industry as well as its ability to design indigenous, advanced aircraft will depend largely on the country's ability to obtain and assimilate technologies available from foreign countries.

China produces over 35 ground-force combat systems ranging from tanks to rifles. Only some of the systems are shown in table 7.9. Production of the Type-69 MBT is continuing together with the Type-531 APC. Even though hardware remains unsophisticated, the Chinese are modernizing progressively. A continued trend in artillery production is the emphasis on multiple rocket launchers (MRL) that are

Type of weapon	1978	1979	1980	1981	1982	1983
Aircraft						
Medium-range bomber	30	50	40	25	_	_
Intermediate bomber	5	5	5	5	5	5
Fighter/bomber	200	275	250	125	150	175
Mil. and civil helicopters	50	10	_	_	_	20
Mil. and civil transport	5	5		—	10	10
Armoured vehicles						
Medium and main battle tanks	700	1 000	500	600	1 200	1 500 +
Light tank	100	100	100	50-75	50-75	50
Armoured personnel carrier	100	200	500	500	300	300
SP artillery (> 100 mm)	20	50	50	50-100	50-100	50-100
Towed artillery (> 100 mm)	300	200	250	400	450	450
Towed artillery (< 100 mm)	100	100	100	100	_	_
Artillery-type rocket launcher (MRLS)	400	450	450	450	450	450
Towed artillery:						
total	1 900	2100	2 000	1 500	1 500	1 500
55 mm and 100 mm only	(1 000)	(1 300)	(300–400)	(450)	(450)	(450)
Ships						
Major combatant	2	6	4	2	1	1
Minor combatant	30	45	20	20	10	10
Attack submarine	5	5	5	5	3	3
Support ship	_	—	5	—	—	1

Table 7.9. China's arms production programmes, 1978-83

Sources:

Information for 1978-82 from Allocation of Resources in the Soviet Union and China, 1983, Hearing before the Subcommittee on International Trade, Finance and Security Economics of the Joint Economic Committee, US Congress, 98th Congress, first session, part 9, June and September 1983 (US Government Printing Office, Washington, D.C., 1984), pp. 177-79. Information for 1983 from Asian Defence Journal, No. 11, November 1984, pp. 63 and 69. See also SIPRI arms production registers.

mounted on trucks or APCs. Both Steyr–Daimler–Puch of Austria and AMC Jeep of the USA concluded licensed-production agreements with China in 1984 for vehicles—Steyr for 10000 trucks and AMC for 15000 CJ-6 jeeps annually⁹⁸—which may be used for this purpose. It has also been confirmed that China is designing a new MBT in the 40–50-ton range, but this is not expected to enter production until the end-1980s.

Little information on China's current naval construction programme is available, and the shipbuilding programme appears to be slow. Dependence on foreign technology will be a reality in the years to come. A delegation of Chinese Navy specialists together with civilian technicians visited the United States at the beginning of 1985 to examine in detail the possible purchase of marine gas turbines and a variety of new naval equipment, including the ASW Mk 46 torpedo and the Phalanx close-in weapon system (CIWS).⁹⁹ Continued reliance on Western
technology is also evident in the co-operative ventures that exist between China's Shipbuilding Corporation (CSSC) and foreign firms. (For example, for marine diesel engines, co-operative agreements have been signed with Sulzer, Switzerland; for low-speed and medium-speed engines with Pielstick, France and also with the West German firm MAN).

Some sources discuss a new 2 200-ton frigate programme to be built in the late 1980s, with the new design already completed. It seems, however, that although experiments with newly developed shipboard electronics and propulsion have been noted, significant technological advances in naval ship designs and weapons will take a considerable time.

Future trends

Military modernization is likely to remain slow. The most fundamental problem will be incorporating new Western design and manufacture facilities into a pre-existing industrial infrastructure which, despite its size and complexity, is still based almost wholly on Soviet designs. To close the qualitative gaps requires far more than funding, training of scientists, building the industrial infrastructure or manufacturing advanced equipment. It requires design innovation, which means that China will have to engage in basic scientific research.

At present, Chairman Deng Xiaoping is engaged in making radical managerial, institutional and economic changes aimed at fostering innovation. These changes may become the most profound of all the factors affecting military modernization in the years to come.

VI. Central and South America

While tension continued to grow in Central America in 1984, there is some evidence that the countries of South America are finding nonmilitary solutions to their domestic and intra-regional problems. Little has come of the Contadora peace initiative by four Latin American countries¹⁰⁰ which sought to mediate in the disputes between Costa Rica, Honduras, El Salvador, Guatemala and Nicaragua. The level of domestic military spending for these five isthmus states grew in real terms by a total of 60 per cent between 1979 and 1983. No reliable estimate can be made of their military spending in 1984; it is doubtful whether any progress has been made towards the objectives agreed upon in September 1983 under the aegis of the Contadora Group to stop the arms race and to limit stocks of weapons and the number of troops.¹⁰¹ Regional efforts to promote security, peaceful co-existence and co-operation are complicated by continued foreign interference in regional affairs. During the calendar year 1983, the combined military expenditure of Costa Rica, Guatemala, Honduras and El Salvador was more than matched by the volume of security assistance given to them by the USA. Domestic military budgets amounted to an estimated \$390 million, and US security assistance in the same year was approximately \$550 million.¹⁰²

Military spending in South America continued to decline from the exceptional levels of 1982, the year of the Falklands/Malvinas conflict. Military regimes were replaced by elected governments in a number of countries so that, by spring 1985, only two military dictatorships remained. Civilian governments have been left to face enormous economic and social problems, such as heavy external debt, runaway inflation and *per capita* levels of income which have fallen below the 1980 level in all South American countries.¹⁰³ Nor has it proved easy for civilian governments to dismantle the very large military establishments they inherited, as the case of Argentina illustrates.¹⁰⁴ In some instances, such as Peru, military rule seems simply to be in abeyance and military spending continues to take a growing share of domestic resources.

A formal peace treaty between Argentina and Chile over the disputed Beagle Channel territory was signed in 1984. This easing of tension now affords both countries the opportunity to reduce their military spending.

VII. South Asia, the Far East and Oceania

Military spending has grown more slowly over the past two years in the first two of these regions, following a burst of spending in 1981 and 1982. However, Oceania has returned to the average growth level of the past five years (4 per cent), after a pause in 1983.

Compared to the revised estimates for Indian military spending in FY 1983, no real spending increase was planned for FY 1984. However, a supplementary allocation in FY 1983, which increased military spending that year by 6.3 per cent over the budgeted figure, may have anticipated some of the expenditure requirements for FY 1984. Military spending takes 16 per cent of the total budget and interest payments a further 13 per cent.¹⁰⁵

Reports suggest that India is still seeking modern equipment for all three branches of the armed forces but that foreign currency restraints are obliging it to look again to the USSR for supplies. In the mid-1970s, when its foreign-exchange position was sound, India bought weapons from Western arms producers as well as the USSR. The balance-ofpayments position deteriorated in the 1980s as a result of severe droughts which hit agricultural output, coinciding with the recession in world trade. Although the domestic production of oil is cutting the energy import bill, foreign debt and the growing demand for imported raw materials as the economy picks up are putting the hard currency payments position under pressure again.¹⁰⁶ Opportunely, the USSR is now offering both the soft loan terms and the more advanced technology that India has been seeking in the West.¹⁰⁷

Military expenditure in Pakistan was budgeted to grow by 20 per cent nominally in FY 1984—twice as fast as the growth of the central budget.¹⁰⁸ Together with debt servicing, military spending was to take 76 per cent of the non-development current expenditure in the same period. Development expenditure was budgeted at the same level as FY 1983, a curtailment in real terms. Growth rates in both the agricultural and industrial sectors have fallen below the targets for the first years of the sixth plan, and Pakistan has serious balance-of-payments problems.¹⁰⁹

Both countries seem currently absorbed by domestic difficulties which for Pakistan include fundamentalist Muslim reforms and the Soviet presence in Afghanistan, while India is contending with demands for greater independence by the Sikh community.

Domestic difficulties are also troubling Sri Lanka, and in view of the current disturbances between racial groups on the island, a rise in military spending can be anticipated in the immediate future.¹¹⁰

Military spending has slowed even further this year for the countries of the Far East. Serious economic problems have forced constraint on the Philippines and to a lesser extent on Malaysia, and strict budgetary controls have led to a slight drop of military spending in South Korea. North Korea, Singapore and Thailand have sustained high levels of growth in their military budgets for the past four years.

Japanese spending has grown at about 4 per cent annually in recent years but seems likely to increase in 1985 by over 5.5 per cent, if current forecasts of minimal inflation hold true.¹¹¹ A ruling Liberal–Democratic Party sub-committee on defence was appointed by Prime Minister Nakasone in May 1984 to review the 1976 decision to restrict military spending to 1 per cent of GNP.¹¹² This committee reported in December that circumstances have changed since 1976, citing the increase in Soviet military potential and Japan's inadequate defence efforts since the mid-1970s, and concluded that a ceiling on the national defence budget was no longer acceptable.¹¹³ The issue is still politically sensitive and the FY 1985 budget is constructed so as not to breach the 1 per cent ceiling. Instead, procurement worth \$5 billion is to be bought on a deferred payment basis.¹¹⁴

VIII. The Middle East

Figures for military spending in the Middle East in 1984 are uncertain. The estimates for Iran and Iraq are particularly unreliable; the real increase in their military expenditures is possibly over 15 per cent. The Iranian Prime Minister Mousani has stated that Iran's military spending was five times greater in 1984 than in 1979.¹¹⁵

Iraq had an inflation rate of about 30 per cent in 1984, and its oil production fell to about 20–30 per cent of the 1979 output.¹¹⁶ However, Iraq reportedly receives a considerable amount of economic and military assistance from the Arab world, as well as from Western countries and the Soviet Union. The help consists of loans and grants as well as credits for weapon purchases.¹¹⁷

Iran receives little known financial or other support from outside, and the burden of the war must be borne by the domestic economy. At the end of 1984 Iran was reportedly having difficulty exporting its oil, because of Iraqi threats to Gulf shipping.¹¹⁸

Military spending has declined slightly among the other countries of the region. Saudi Arabia, for instance, spent less in real terms in both 1983 and 1984. However, in 1984 it still had one of the highest figures for *per capita* military spending in the world. The decline in Saudi military expenditure is mainly the consequence of falling oil revenues, which limited total budget expenditure.

Egypt increased its military expenditure in real terms by 3 per cent in 1984. It received \$1 365 million in military aid (\$465 million in grants and \$900 million as loans) from the USA in US FY 1984. For FY 1985, \$1 175 million in US military aid (now all as grants) and an additional \$815 million in economic aid have been approved.¹¹⁹

Israel faced a severe economic crisis in 1984, with an estimated inflation of approximately 1000 per cent. Debt servicing will take almost 40 per cent of the total budget in 1985. In an effort to control inflation, the government was reportedly seeking savings of \$80 million in the FY 1984 military budget, with further cuts in the two subsequent years.¹²⁰

In US fiscal year 1984, Israel received \$1.7 billion in military aid and \$910 million in economic support funding (half as a loan and half as a grant). For US fiscal year 1985, Congress approved \$1.4 billion in military aid and \$1.2 billion in economic support funding, both as grants.¹²¹ Of the military aid, \$250 million will be spent in Israel for

the development of the Lavi fighter aircraft.¹²² In November 1984, after the decision to withdraw from Lebanon, Israel requested a further \$800 million in emergency aid for US fiscal year 1985.¹²³ Israel is seeking a record military and economic aid package of \$4.1 billion for US fiscal year 1986, of which 60 per cent is expected to be military assistance.¹²⁴

Overall, mainly because of the reduction in military spending in Saudi Arabia, there was possibly a slight fall (less than 1 per cent) in total military spending in the Middle East in 1984.

Military expenditures in Africa are discussed in chapter 9.

Notes and references

- 1. If the total for 1984 is estimated using 1984 dollar exchange-rates, the figure is lower. One major reason for this is the strength of the dollar. Measured against all other major currencies, the dollar rose in value by over 25 per cent between 1980 and 1984.
- 2. Demographic problems received special attention at the UN Conference on Population held in Mexico in August 1984 and are the main development issue discussed in *World Development Report 1984* (World Bank, Washington, D.C., 1984).
- 3. OECD Économic Outlook, No. 36, December 1984 (OECD, Paris, 1984), table 7, p. 43.
- 4. OECD, 1984 (note 3), p. 87.
- 5. OECD, 1984 (note 3), table 14, p. 51.
- 6. OECD Economic Outlook, No. 34, December 1983 (OECD, Paris, 1983), table 5, p. 32.
- 7. OECD, 1983 (note 6), table 11, p. 36.
- 8. World Development Report 1984 (note 2), p. 66.
- 9. Comparing 1980 with 1983, years for which data are available for all the countries of this group, only two countries, Ireland and Switzerland, reduced military expenditure relative to GDP.
- World Economic Outlook 1984, Occasional Paper No. 27 (International Monetary Fund, Washington, D.C., 1984), pp. 146-51.
- 11. International Financial Statistics, Vol. 37, No. 11, November 1984 (International Monetary Fund, Washington, D.C., 1984).
- 12. World Development Report 1984 (note 2), pp. 104 and 178.
- 13. World Economic Outlook 1984 (note 10), p. 48; and World Economic Outlook 1983 (International Monetary Fund, Washington, D.C., 1983), p. 46.
- 14. According to General Rogers, Atlantic News, 31 May 1984.
- 15. Defence Estimates 1984/85, Minister's Statement, House of Commons, Standing Committee on External Affairs and National Defence (Ottawa, 1984).
- 16. Camera dei Deputati N.12, Disegno di Legge, Stato di previsione del Ministero della Difesa per l'Anno Finanziario 1985 (the Italian defence budget bill for 1985).
- 17. Defence budget bill for 1985 (note 16), appendices 10-12. The assistance of research staff at IRDISP, the Italian Research Institute for Disarmament, Development and Peace, in the interpretation of data, is gratefully acknowledged.
- 18. Statement on the Defence Estimates 1984, Cmnd 9227-I, Vol. 1 (HMSO, London, 1984), p. 10.
- 19. The Government's Expenditure Plans 1985-86 to 1987-88, Cmnd 9428-1, Vol. 1 (HM Treasury, London, 1985), table 1.7, p. 10.
- 20. See, for example, Freedman, L., 'Economy rules at MOD', Defence Attaché, No. 4, 1984.
- 21. Atlantic News, 27 November 1984.
- 22. Throughout, the term 'defence expenditure' refers to outlays (*crédit de paiement*) and not to authorizations. The defence budget excludes military pensions.
- 23. A nominal cut of 1 300 million francs. Real changes are different. When considering the higher than expected rate of inflation for 1984 and the higher inflation forecast for 1985, the real-level defence expenditure was 2 000 million francs lower than planned in 1984 and 3 200 million francs lower in 1985. Sénat, France, *Rapport Général*, No. 69, Tome III, Annexe no. 44, Défense, 1984, p. 46.

- 24. The planned number of tactical fighter aircraft has subsequently been reduced to 200.
- 25. Collaboration with other NATO countries is being considered for these two types of aircraft. See the sections on EFA and anti-tank helicopters.
- 26. Collaboration project considered, but uncertain. See the section on NFR-90.
- 27. This number includes the Patriot and Roland missiles procured under an agreement with the United States.
- 28. This was also the conclusion reached at a recent meeting of the North Atlantic Assembly, of which 184 parliamentarians from all NATO countries are members; see *Washington Post*, 21 November 1984.
- Over the 1950-84 period total infrastructure costs amounted to 3 827 million Infrastructure Accounting Units, IAU, or about \$10 billion at current exchange rates. See Thompson, J.B., 'NATO infrastructure at a crossroads—a perspective', NATO Review, Vol. 32, No. 1, 1984.
- 30. For comprehensive reviews of the issues involved in a conventionalization of NATO's force posture, see for example the reports of the North Atlantic Assembly, Military Committee, Sub-Committee on Conventional Defence in Europe; and Berg, P. and Herolf, G., "Deep Strike": new technologies for conventional interdiction', World Armaments and Disarmament, SIPRI Yearbook 1984 (Taylor & Francis, London, 1984), chapter 8, pp. 291-318.
- 31. 'Cost estimates will be made after a more accurate assessment of the forces required and their make-up.' Jane's Defence Weekly, 8 December, 1984. The only cost estimates available are from a non-NATO assessment, according to which the cost of the conventional forces initially required for the execution of four major mission areas—including deep strike and counter-air—would amount to \$10-30 billion over a 10-year period in addition to current military spending plans. See Strengthening Conventional Deterrence in Europe: Proposals for the 1980s, Report of the European Security Study Group (ESECS) (St Martin's Press, New York, 1983), and a summary thereof in Komer, R., 'A credible conventional option: can NATO afford it?' Strategic Review, Spring 1984.
- 32. For summaries of these 11 systems, see Aviation Week & Space Technology, 16 April 1984; and Armed Forces Journal, December 1984.
- 33. For a disaggregation of the arms trade balance in FY 1983 into US government Foreign Military Sales and commercial sales, and into contract and sub-contract purchases, see NATO's Sixteen Nations, September-October 1984, p. 46.
- 34. Assessments of cost implications of joint arms projects vary widely. A recent study based on interviews with 46 officials in 20 European and US arms manufacturing companies suggests that joint ventures will involve a 30 per cent increase in R&D costs and production inefficiencies in the region of an additional 1-10 per cent for a given output compared with a national project. Compared with two parallel and equal-sized projects, however, cost savings are at least 35 per cent on R&D and up to 10 per cent in production costs. See Hartley, K., NATO Arms Co-operation (Allen & Unwin, London, 1983), p. 161.
- 35. Houwelingen, J. van, Contribution to the First International Armament Transition/ Conversion Symposium, Williamsburg, USA, 25 October 1984, p. 5.
- 36. Washington Post, 24 November 1984, quoting Michael Heseltine.
- 37. The WEU was established in 1955. The original Brussels Treaty Organization was set up in 1948 and included Belgium, France, Luxembourg, the Netherlands and the UK. In 1955 the treaty was modified and extended to include also FR Germany and Italy.
- DeLauer, R.D., Prepared statement before the House Armed Services Committee, Hearings on Department of Defense Authorization of Appropriations for Fiscal Year 1985, February and March 1984 (US Government Printing Office, Washington, D.C., 1984), p. 124.
- 39. Interview with DeLauer, R.D., in NATO's Sixteen Nations (note 33), p. 49.
- 40. Office of Management and Budget, '1986 budget background primer', Washington, D.C., 2 January 1985, unpublished. All data and conclusions on US military expenditure in this section are based on US-defined defence spending, briefly described in table 7.4. SIPRI data, given in appendix 7A, follow the NATO definition for NATO military expenditure. The main reason why the two series differ is because NATO statistics are given on a calendar-year basis and include expenditures for military aid programmes.
- 41. See Conference Report, Department of Defense Authorization Act, 1985, Report 98-1080, House of Representatives, 26 September 1984, pp. 19-20, 94-102, 141-42, 315-16.
- 42. A report to Congress from the Pentagon is also due by 30 April 1985 on the feasibility of an annual report that would estimate the employment impact of major strategic weapon programmes (MX, B-I, Pershing II, ground-, sea- and air-launched cruise missiles, the Trident I and II, the Trident submarine and the SDI). The report would also examine the feasibility of creating a DoD Office of Economic Conversion; note 41, pp. 340-41.

The "revolving door" refers to the interchange of personnel between military industry and the Defence Department. See further Adams, G., *The Policy of Defense Contracting: The Iron Triangle* (Transactions Press, New Brunswick, 1982).

- 43. Defense Budget Project, The FY 1985 Defense Budget: the Buildup Continues (Center on Budget and Policy Priorities, Washington, D.C., 1984), p. 1-1.
- Maroni, A. and Foelber, R., The Defense Spending Debate: Comparing Recent Defense Appropriations with 1981 Projections (Congressional Research Service, Washington, D.C., 29 May 1984), Report No. 84-97F.
- 45. See, for example, US Congress, House Armed Services Committee, 'Staff Briefing on the FY 1984 DoD Operating and Maintenance Request', March 1983.
- 46. Hereafter the debates on all of these measures are referred to as the "defence budget debate".
- 47. See Department of Defense, Report of the President's Commission on Strategic Forces, Washington, D.C., 6 April 1983; SIPRI (note 30), pp. 37-38. In addition, Congress released \$1.7 billion in funds to continue research, development and testing on the MX. This agreement is similar to the decision leading to the cancellation of B-1 bomber production. See Adams, G., The B-1 bomber: An Analysis of its Strategic Utility, Cost, Constituency and Economic Impact (Council on Economic Priorities, New York, May 1976); and Adams, G., 'The B-1: bomber for all seasons' (Council on Economic Priorities, New York, February 1982), newsletter.
- 49. 'US launches anti-satellite warhead', Washington Post, 14 November 1984, p. A-1.
- 50. Conference Report (note 41), pp. 95–96 and 165–66. With respect to NATO forces, the Senate also rejected a measure proposed by Senator Sam Nunn which would have reduced US troop strength in Europe. The Nunn amendment was the latest in a series of congressional efforts to seek ways of pressuring NATO allies to fulfil their 1977 commitment to maintain a 3 per cent rate of growth in their spending.
- 51. Senate, Department of Defense Appropriations Bill, 1985 report 98-636, p. 79.
- 52. Conference Report (note 41), *passim*. The Research and Development request was reduced by \$2.1 billion. Operating and Maintenance funds reduced by \$2.73 billion and military personnel funds by \$816 million.
- 53. Note 41, pp. 102-16.
- 54. Note 41, pp. 116-18.
- 55. Note 2, p. 20. In another significant procurement change, Congress mandated that managers of major weapon system acquisition programmes should serve for no less than four years or until the programme had reached a major decision milestone (the DSARC process). Average tour of duty has been roughly two years. This has sparked criticism that managers were never really in charge of their programmes. Conference Report (note 41), p. 123.
- See Mohr, C., 'Grenada invasion: roots of purported American shortcomings are traced', New York Times, 26 October 1984.
- 57. Hiatt, F., 'Military readiness, command system criticized', Washington Post, 5 March 1984, p. 1.
- 58. Note 57.
- 59. Note 43, p. II-1.
- 60. A Report to the Committee on Appropriations, US House of Representatives on the Readiness of the US Military", in *Hearings on Department of Defense Appropriations for 1985*, Part 1, pp. 663-1039; Hiatt, F., 'Weinberger hits critical reports as "dangerous", *Washington Post*, 24 July 1984, p.1.
- 61. See Secretary Weinberger's testimony to the House Defense Appropriations Subcommittee, DoD Appropriations for 1984, Part 1, p. 440.
- 62. See Gold, D., Misguided Expenditure: An Analysis of the Proposed MX Missile System (Council on Economic Priorities, New York, 1981); and deGrasse, Jr, R.W., Military Expansion/Economic Decline (Council on Economic Priorities, New York, 1983).
- 63. See Congressional Budget Office, *Defense Spending and the Economy* (US Government Printing Office, Washington, D.C., February 1983); and Rep. Aspin, L., *Defense Spending and the Economy* (House of Representatives, Washington, D.C., April 1984).
- 64. deGrasse, Jr, R.W., 'The military decline', in S. Gordon and D. McFadden (eds.), Economic Conversion. Revitalizing America's Economy (Ballinger, Cambridge, Mass., 1984), p. 9.
- 65. Department of Defense, 'FY 1985 Department of Defense Budget', News Release, Washington, D.C., 1 February 1984.
- 66. Note 45.
- 67. General Accounting Office, Underestimation of Funding Requirement in Five-Year Procurement Plans, Briefing Paper, NSIAD-84-88, 12 March 1984.
- 68. Adams, note 42.

- 69. Pravda, 16 November 1984, English quotation from Novosti Press Agency, Daily Review, 16 November 1984.
- Pravda, 28 November 1984, English quotation from Novosti Press Agency, Daily Review, 28 November 1984.
- 71. The Soviet figure was given credence by at least some Western scholars until the mid- to late 1960s. Speculations about the reasons for changed Soviet publication policy can be found in Hutchings, R., *The Soviet Budget* (Macmillan, London, 1983), pp. 122-40.
- 72. About 50 years ago, in the spring of 1935, the then head of the finance commissariat Grinko had to explain why official military expenditures for 1934 had almost trebled compared with the planned outlay. He gave increases in forces and price rises as reasons, but it seems more probable that the budget figure was brought in line with actual expenditures.
- 73. Sovietskaya Rossiya, 1 December 1984, quoted in Washington Post, 13 December 1984.
- 74. The US Defense Intelligence Agency has, on the basis of available material, predicted a 5–10 per cent rise in procurement for 1984. See Defense and Foreign Affairs Daily, 18 June 1984.
- 75. Defense Daily, 28 February 1984.
- 76. Comments on these estimates are made in SIPRI, World Armaments and Disarmament, SIPRI Yearbook 1979 (Taylor & Francis, London, 1979), pp. 28-32 and 1984 (note 30), pp. 88-94.
- 77. This is the CIA's assumption as can, for instance, be deduced from the CIA statement before the Subcommittee on International Trade, Finance and Security Economics of the Joint Economic Committee of the US Congress, on 20 September 1983, as expressed in the CIA's prepared written presentation (USSR: Economic Trends and Policy Developments, 14 September 1983, pp. 8-10).
- 78. Military Technology, No. 5, 1984.,
- 79. Jane's Defence Weekly, Vol, 2, No. 5, 11 August 1984.
- 80. International Defense Review, No. 12, 1984, p. 1800.
- Breyer, S., 'Neue Entwicklungen der sowjetischen Kriegsmarine 1983/84, Marine-Rundschau, Vol. 81, No. 11, 1984.
- See, for example, Nincic, M., 'Fluctuations in Soviet defence spending', Journal of Conflict Resolution, Vol. 27, No. 4, 1984; Pfeiler, W., 'Konturen sowjetischer Rüstungspolitik', Aus Politik und Zeitgeschichte, No. B 22/84, 2 June 1984.
- 83. Note 70.
- 84. See, for example, 'Deng takes on the Army', Asiaweek, 23 March 1984; The Times, 5 July 1984; Financial Times, 12 November 1984; Milavnews NL-278, December 1984; and SIPRI, World Armaments & Disarmament, SIPRI Yearbook 1983 (Taylor & Francis, London), pp. 157-58 and 1984 (note 30), pp. 94-95.
- 85. 87 per cent of officers at divisional level and 71 per cent at regimental level. *Patriot* (New Delhi), 27 July 1984. See, for example, reports such as 'Air Force promotes younger and better-educated officers', Xinhua News Agency, 15 January 1985.
- 86. 'Investment increased for military school', Xinhua News Agency, 26 October 1984.
- 87. 'Top PLA officer Yu Quili', quoted in Patriot (New Delhi), 27 July 1984.
- 88. SIPRI (note 30), p. 94.
- 89. Of the 11 items specified in the 1984 budget, the largest items are "appropriations for capital construction total 44.16 bn yuan". Total planned investment in capital construction amounts, however, to 65 billion yuan, of which only half, or 32.3 billion yuan, comes from the State Budget and the remainder from other sources. This suggests that: (a) not all the appropriation for capital construction in the State Budget is used for capital construction; and (b) figures given in the State Budget form only a part of government spending. Report on the Final State Accounts for 1983 and the Draft Budget for 1984 delivered at the Second Session of the Sixth National People's Congress on 16 May 1984 Xinhua News Agency, 7 June 1984, para. 1, p. 8 and para. 3, p. 20.
- 90. They are, however, taking on a number of civilian tasks. *Financial Times*, 12 November 1984; 'Chinese navy expands civilian services', Xinhua News Agency, 12 January 1985.
- 91. Report on Final State Accounts (note 89), p. 23.
- 92. China Daily, 3 August 1984.
- 93. Asian Defence Journal, No. 11, November 1984, p. 61.
- 94. International Defense Review, No. 11, November 1984, p 1604.
- 95. Note 94, p. 1795.
- 96. International Defense Review, No. 12, December 1984, p. 1789.
- 97. 'China's Defence Industry', in International Institute for Strategic Studies, *Strategic Survey* 1979 (Neil More Associates, London, 1980), pp. 67-72.
- 98. Asian Defense Journal, No. 11, November 1984, p. 63.

- 99. Neue Zürcher Zeitung, 15 January 1985.
- 100. Colombia, Mexico, Panama and Venezuela.
- 101. Goldblat, J. and Millán, V., 'The Honduras-Nicaragua conflict and prospects for arms control in Central America', in SIPRI (note 30), p. 538.
- 102. Calculated from Summary of Foreign Assistance Decisions on Central America: Fiscal Years 1983-85, given in Department of State (March) Administration requests, the Congressional Research Service (2 March 1984) and the House and Senate Appropriations Committees.
- Economic and Social Progress 1984 (Inter-American Development Bank, Washington, D.C., 1984), table 3.
- 104. Latin America Weekly Review, WR-84-27, 13 July 1984; Latin America Regional Report, RS-84-10, 12 December 1984.
- 105. Defence Services Estimates 1984-85 (Government of India Press, New Delhi, 1984); Far Eastern Economic Review, 15 March 1984.
- 106. Far Eastern Economic Review, 15 March 1984 and 31 May 1984.
- 107. Financial Times, 22 March 1984; Defense and Armament, No. 28, March 1984.
- 108. Times of India, 12-18 August 1984.
- 109. Far Eastern Economic Review, 26 April 1984; International Defense Review, Vol. 17, July 1984.
- 110. Far Eastern Economic Review, 20 December 1984.
- 111. The Japan Times Weekly, 12 January 1985. For inflation forecasts, see OECD 1984 (note 3).
- 112. Asahi Evening News (Tokyo), 17 May 1984.
- 113. Atlantic News, No. 1681, 29 December 1984.
- 114. Japan Times Weekly, 12 January 1985.
- 115. Mainichi Daily News (Tokyo), 7 August 1984.
- 116. Middle East Economic Survey, 12 March 1984; Petroleum Intelligence Weekly, 16 July 1984; Neue Zürcher Zeitung, 21 September 1983.
- 117. Daily Telegraph, 4 June 1984; Le Monde, 1 March 1984; Neue Zürcher Zeitung, 21 September 1983; Hindustan Times (New Delhi), 23 July 1984.
- 118. Economist, 26 January-1 February 1985, p. 40.
- 119. African Defence, 29 June 1984; International Defense Review, Vol. 17, July 1984; Congressional Quarterly, 20 October 1984, p. 2740.
- 120. Defense & Foreign Affairs Daily, Vol. 13, No. 223, 20 November 1984; News Review on West Asia, September 1984 (IDSA, New Delhi, 1984), p. 360.
- 121. Congressional Quarterly (note 119).
- 122. Defense & Foreign Affairs Daily (note 120); International Defense Intelligence, 24 December 1984; Congressional Quarterly (note 119).
- 123. Defense & Foreign Affairs Daily (note 120).
- 124. Wall Street Journal, 24 January 1985.

Appendix 7A. Tables of world military expenditure, 1975–84

Notes, definitions and sources for the military expenditure data can be found on page 285. For the conventions used in the tables, see page 284.

Table 7A.1.	World	military	expenditure	summary,	in	constant	price	figures
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Figures are in US \$ mn, at 1980 prices and exchange-rates. Totals may not add up due to rounding.

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	Share of 1984 total (%)
USA Other NATO"	139 277 99 643	131 712 101 601	137 126 103 290	137 938 107 047	138796 109368	143 981 112 297	153 884 113 132	167 711 116 058	179 61 5 119 140	200 329 121 815	30.9 18.8
Total NATO	238 920	233 313	240 416	244 985	248 164	256 278	267 016	283 769	298755	322 144	49.6
USSR Other WTO	[122 400] 11 066	[124 200] 11 557	[126 100] 11 871	[128 000] 12 216	[129 900] 12 375	[131 800] 12 479	[133 800] (12 643)	[135 800] (13 054)	[137900] (13847)	[142 000] (14 222)	21.9 2.2
Total WTO	[133 466]	[135757]	[137 971]	[140216]	[142 275]	[144 279]	[146443]	[148 854]	[151 747]	[156 222]	24.1
Other Europe Middle East South Asia Far East (excl. China) China ^b Oceania Africa (excl. Egypt) Central America South America World total	13 423 35 111 5 040 [18 970] [36 800] 3846 11 634 1 510 8 762 507 480	14 054 38 625 5714 [20720] [37 600] 3 832 12 979 1 720 9 720 514 030	14 031 [37 212] 5 518 [22 250] [36 200] 3 849 13 391 2 185 10 374 523 400	14 233 37 052 5 769 [24 530] [40 500] 3 917 13 930 2 326 10 274 537 730	15 005 38 822 6 264 [25 490] [52 700] 4 036 (14 799) 2 496 10 277 560 330	15 482 41 190 6 549 [26 800] [42 700] 4 273 (13 960) 2 495 10 428 564 440	15 386 [45 923] 7 003 [28 380] [36 000] 4 579 [12 676] 2 709 10 744 576 860	15 819 [49 996] 7 737 [30 230] [37 700] 4 761 [12 299] [2 847] [15 898] 609 900	16 171 [46 335] 8 105 [311 90] [36 500] 4 802 [12 007] [3 029] [14 160] 622 800	(16 200) [46 150] 8 256 [31 660] [36 200] 4 986 [10 977] [3 170] [13 100] 649 070	2.5 7.1 1.3 4.9 5.6 0.8 1.7 0.5 2.0 100.0
Industrial market economies ^c Non-market economies ^c Major oil-exporting countries ^c Rest of the world ^c With 1982 per capita GNP: < US \$440 US \$440-1 679 > US \$1 680	257 534 [171 972] 33 352 43 452 6651 8 979 27 822	252 529 [175 263] 37 450 47 509 7 241 9 323 30 945	260 073 [176 551] [36 185] 49 215 6 997 10 193 32 025	265 584 [183 312] 38 107 49 205 7 715 8 547 32 943	270 652 [197 798] 38 941 51 357 8 306 8 541 34 510	280 052 [189 842] 41 712 51 168 8 284 8 101 34 783	290 278 [185 448] [45 143] 54 238 8 944 8 493 36 801	307 827 [189 757] [48 598] [61 862] 9 712 9 385 42 765	324 230 [191 671] [44 874] [60 018] 10 045 9 415 40 558	348 697 [196 133] [44 988] [57 419] 9 985 8 635 38 799	53.7 30.2 6.9 8.8 1.5 1.3 6.0

	1976	1977	1978	1979	1980	1981	1982	1983	1984
Total NATO	-2.3	3.0	1.9	1.3	3.3	4.2	6.3	5.3	7.8
Total WTO	[1.7]	[1.6]	[1.6]	[1.5]	[1.4]	[1.5]	[1.6]	[1.9]	[2.9]
Other Europe	4.7	-0.2	1.4	5.4	3.2	-0.6	2.8	2.2	(0.2)
Middle East	10.0	[-3.7]	-0.4	4.8	6.1	[11.5]	[8.9]	[-7.3]	[-0.4]
South Asia	13.4	- 3.4	4.5	8.6	4.5	6.9	10.5	4.8	1.9
Far East (excl. China)	[9.2]	[7.4]	[10.2]	[3.9]	[5.1]	[5.9]	[6.5]	[3.2]	[1.5]
China	2.21	[-3.7]	11.9	[30.1]	(- <u>19.0</u>]	[-15.7]	[4.7]	[-3.2]	[-0.8]
Oceania	-0.4	0.4	1.8	3.0	5.9	7.2	4.0	0.9	3.8
Africa (excl. Egypt)	11.6	3.2	4.0	(6.2)	(-5.7)	[-9.2]	[-3.0]	[-2.4]	[-8.6]
Central America	13.9	27.0	6.5	7.3	0.0	8.6	[5.1]	[6.4]	[4.7]
South America	10.9	6.7	-1.0	0.0	1.5	3.0	[48.0]	[-10.9]	[-7.5]
World total	1.3	1.8	2.7	4.2	0.7	2.2	5.7	2.1	4.2
Industrial market economies	-1.9	3.0	2.1	1.9	3.5	3.7	6.0	5.3	7.5
Non-market economies	[1.9]	[0.7]	[3.8]	[7.9]	[-4.0]	[-2.3]	[2.3]	[1.0]	[2.3]
Major oil-exporting countries	12.3	[-3.4]	5.3	2.2	7.1	[8.2]	[7.7]	[-7.7]	[0.3]
Rest of the world	9.3	3.6	-	4.4	-0.4	6.0	[14.1]	[-3.0]	[-4.3]
With 1982 per capita GNP:							,		
< US \$440	8.9	- 3.4	10.3	7.7	(-0.3)	[8.0]	[8.6]	[3,4]	[-0.6]
US \$440-1 679	3.8	9.3	- 16.1	-0.1	- 5.2	4.8	[10.5]	[0.3]	[-8.3]
> US \$1 680	11.2	3.5	2.9	4.8	0.8	5.8	[16.2]	[-5.2]	[-4.3]

Table 7A.2. World military expenditure, annual rates of change

Figures are percentages.

Table 7A.3. World military expenditure, in constant price figures

Figures are in US \$ mn, at 1980 prices and exchange-rates. Totals may not add up due to rounding.

	1975	1976	1977	1978	1979	1980	1 98 1	1982	1983	1984
NATO ^a										
North America										
Canada	4 070	4 3 4 1	4 622	4 792	4 5 5 0	4 703	4785	5 2 5 4	5 247	5 772
USA	139 277	131 712	137126	137 938	138 796	143 981	153 884	167 711	179615	200 329
Europe										
Belgium	3 299	3 47 3	3 562	3 798	3 882	3 958	3 995	3 862	3 714	3 764
Denmark	1 547	1 527	1 534	1 594	1 604	1618	1 6 3 6	1 683	1 697	
France	21781	22 703	23 981	25 384	25 962	26 425	27 066	27 623	28 094	27 896
FR Germany	25 219	25 044	24952	26 007	26355	26 692	27 012	26 664	26 887	26 992
Greece	2 288	2 508	2658	2715	2 630	2 276	2 693	2746	2 500	2710
Italy	7728	7 687	8257	8 608	9154	9 578	9781	10463	10689	11435
Luxembourg	38.4	41.1	40.3	43.8	45.1	52.5	54.3	54.8	56.0	57.4
Netherlands	4 806	4 746	5 287	5 106	5 413	5 269	5 325	5 306	5 259	5 347
Norway	1 444	1 479	1 507	1612	1 651	1 669	1 686	1752	1 828	1833
Portugal	1 063	846	77 9	788	800	868	864	865	832	763
Turkey	2870	3 2 9 5	3 1 7 3	2 906	2 578	2 4 4 2	3 015	3 296	3 172	3 0 5 1
UK	23 490	23910	22 936	23 694	24 744	26749	25 221	26489	29 167	30 497
Total NATO (excl. USA)	99 643	101 601	103 290	107 047	109 368	112 297	113132	116058	119140	121815
Total NATO	238 920	233 313	240 416	244 985	248 164	256278	267 016	283 769	298 755	322 144
WTO ^d										
Bulgaria	(829)	(918)	(910)	[954]	[980]	[1000]				
Czechoslovakia	2316	2345	2 292	2 380	(2338)	(2431)	(2415)	(2 460)	[2506]	••
German DR	3 1 8 6	3 390	3 507	3 686	(3 859)	(4167)	(4 508)	(4 765)	(5 030)	(5375)
Hungary	684	644	668	760	754	755	778	765	1 140	(1 100)
Poland	2793	2 897	3 089	2964	(2 984)	(2863)	(2673)	(2 938)		••
Romania	1 258	1 363	1 405	1 472	1 460	1 263	1254	1 095	(1127)	(1 094)
USSR	[122 400]	[124200]	[126 100]	[128 000]	[129900]	[131 800]	[133 800]	[135 800]	[137 900]	[142 000]
Total WTO (excl. USSR)	11 066	11 557	11871	12 216	12 375	12 479	(12643)	(13 054)	(13 847)	(14222)
Total WTO	[133 466]	[135757]	[137 971]	[140216]	[142 275]	[144 279]	[146443]	[148 854]	[151 747]	[156 222]

Other Europe										
Albania	93.3	112	115	117	126	131	134	134	[130]	••
Austria	795	813	840	918	984	961	950	983	1 100	1 0 3 2
Finland	649	662	613	642	717	771	787	910	(931)	(847)
Ireland	267	283	291	320	344	363	347	352	327	334
Spain	3 297	3 5 2 9	3 538	3 526	3 699	4 007	4 101	4650	5 071	5 280
Sweden	3 801	3 788	3 829	3 943	4 078	4 008	4012	3 960	3 921	3 971
Switzerland	1882	2133	2 0 2 2	2 0 2 6	2 1 2 0	2108	2 105	2 193	2139	2 2 4 1
Yugoslavia	2 641	2734	2784	2742	2937	3 1 3 4	2950	(2638)	(2 551)	[2365]
Total Other Europe	13 423	14054	14 03 1	14 233	15 005	15 482	15 386	15819	16171	(16 200)
Middle East										
Bahrain	27.3	35.7	46.6	114	148	157	192	232	(262)	[262]
Cyprus	31.2	30.4	39.3	31.4	40.5	30.9	44.8	[48.1]	[68.6]	••
Egypt	[4267]	[3711]	[3882]	[2179]	[2068]	(1 464)	(1488)	(1679)	(1 883)	[1944]
Iran	13 528	14659	11 898	11039	6 578	5125	[5565]	[6161]	[5275]	
Iraq ^f	2 247	2 204	2 303	2 179	(2 668)	[3352]	••	••	••	
Israel	(4 441)	(4 4 3 3)	(4 431)	(3 943)	(4155)	(4 256)	(4 565)	[4382]		
Jordan	329	535	438	434	494	455	497	518	(510)	[549]
Kuwait	1017	1 250	1 344	1 168	1 159	1 265	(1 481)	(1 672)		
Lebanon ^e	91.7	95.2	74.2	143	215	332	308	363	426	
Oman ^e	698	785	686	767	779	1 178	1 247	1351	1 595	[1576]
Saudi Arabia	(6812)	(9 159)	[99 01]	(12 279)	(16 336)	(19261)	(22164)	(25 396)	[21 927]	[20316]
Syria	1 390	1 409	1 387	1 506	2511	(2144)	(2018)	[1841]	[1995]	[2140]
United Arab Emirates ^e	33.4	84.2	520	814	1 1 8 5	1 707	(2043)	(1 660)	••	
Yemen Arab Republic	136	168	188	344	3 71	339	423	(488)	••	
Yemen, People's Democratic Rep. of	62.7	67.1	74.6	112	115	123	151	138		••
Total Middle East	35 11 1	38 625	[37212]	37 052	38 822	41 190	[45923]	[49 996]	[46 335]	[46150]
South Asia										
Afghanistan	59.5	75.9	78.4	80.8	120					
Bangladesh	95.3	163	179	168	176	187	(209)	234	233	(253)
India	3 681	4256	4 0 4 2	4 2 3 3	4 585	4755	5`015	5 445	5 705	5 693
Nepal	13.1	17.3	17.5	17.8	19.5	19.6	20.3	23.1	25.1	27.5
Pakistan	1 1 5 2	1161	1156	1 2 3 1	1 302	1 404	1 572	1817	1915	2 0 4 6
Sri Lanka	39.8	41.4	45.3	38.9	61.3	58.7	53.9	[69.4]	72.6	78.7
Total South Asia	5 040	5714	5518	5 769	6264	6 549	7 003	7737	8105	8 2 5 6

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Far East										
Brunei	54.4	95.2	96.1	106	189	[191]	180	[200]	(217)	(279)
Burma	162	156	181	213	227	(246)	[257]	(263)	(261)	(259)
Hong Kong	35.3	63.4	97.4	142	156	280	278	(290)		
Indonesia	1976	1 977	I 914	2065	1963	2174	2 4 4 9	[2 564]	[2461]	[2662]
Japan	8 205	8 2 3 4	8 469	8 988	9 575	9768	10042	10 429	10914	11 378
Korea, North ^e	1 039	1 147	1 168	1 307	1 429	1 533	1 677	1 807	1 968	2135
Korea, South	1 695	2435	2 892	3 604	3 385	3 708	3844	4 1 4 3	4 186	4134
Malaysia	883	923	1 059	1 108	1 249	1 557	1 856	1 970	2 0 9 0	(1 829)
Mongolia ^e	(128)	(140)	(139)	(145)	(165)	(146)	(216)	(246)	(249)	(262)
Philippines	857	978	967	888	821	776	784	877	843	524
Singapore	413	500	556	520	532	605	677	748	816	900
Taiwan	1610	1878	2 2 3 5	2 544	2667	2679	(2794)	3 1 2 9	3 141	3 093
Thailand	(741)	(913)	(1 101)	(1 382)	1 557	1 476	1 574	1 699	1 822	1951
Total Far East	17 7 99	19439	20 874	23 008	23 912	25 1 39	26 628	28 363	29 266	29710
Iotal Far East (Incl.										
Viet Nam)	(18070)	[20720]	[22 250]	[24 520]	[25 400]	126 8001	1002001	(20.220)	[21.100]	[2] ((0)
vict Italii)	[109/0]	[20720]	[22250]	[24 550]	[25 490]	[20 800]	[20 300]	[30230]	[31 190]	[31 000]
Oceania										
Australia	3 481	3 481	3 494	3 5 4 1	3 6 5 1	3 858	4113	4 301	4 3 5 4	4 508
Fiji	2.3	3.4	3.7	4.1	4.3	5.9	4.4	4.7	4.5	4.1
New Zealand	363	348	352	373	382	410	462	456	444	474
Total Oceania	3 846	3 832	3 849	3 917	4 0 3 6	4 273	4 579	4761	4 802	4 986
Africa										
Algeria	597	837	729	792	783	890	792	829	909	894
Benin ^e	8.6	8.3	10.1	16.0	17.7	23.1	30.8	37.0	•••	
Burundi	16.2	19.4	26.5	26.1	22.1	22.8		••		
Cameroon	78.4	82.4	79.2	75.6	76.9	82.6	90.1	95.7	102	[114]
Central African Republic	14.7	14.4	12.7	(13.9)	(17.0)	[13.3]	[17.0]	••	••	1
Chad ^e	19.2	28.3	24.9	24.5	27.9		••		••	

Congo	53.2	56.8	54.4	54.9	48.0	47.6				[65.2]
Ethiopia	260	207	187	304	364	359	[359]	[351]		•••
Gabon	30.9	34.8	45.2	[69.8]	(64.0)	(74.8)	[47.9]	•••	[85.0]	[82.9]
Ghana	446	398	229	170	(116)	[102]				
Ivory Coast	100	114	90.4	124	119	118	[109]	115	[111]	[112]
Kenya	98.6	141	237	307	334	272	265	272	253	••
Liberia	6.9	7.8	12.2	12.0	14.6	26.4	40.3	[34.2]		
Libya	[1310]	[2142]	[2461]	[3113]	[4045]	[3276]	[2475]	[2182]		
Madagascar	47.6	55.4	73.4	75.1	97.4	(91.4)	(85.2)	••		
Malawi	14.1	14.8	21.5	28.8	30.6	(29.6)	(23.6)			
Mali	40.4	48.3	47.1	39.0	44.3	38.6	(35.1)	(38.6)		••
Mauritania	42.7	109	123	94.8	104	80.6				
Mauritius	1.9	2.2	2.2	2.3	2.9	5.5	5.4			
Morocco	676	948	1 088	966	971	1118	1 140	[1511]	[1 329]	[803]
Mozambique ^e	12.0	(35.2)	38.0	72.9	74.6	95.0	112	124		
Niger	12.8	12.7	13.2	16.0	17.9			••		
Nigeria	4018	3 4 3 2	3 274	2765	2326	2 280	1 995	1 563	[1407]	[1213]
Rwanda	15.8	17.6	17.0	18.9	19.7	21.9	••	••		
Senegal	54.0	64.4	64.6	70.9	69.3	64.2	67.4	(64.8)	(69.5)	••
Sierra Leone	10.6	9.7	11.9	17.1	14.8	[12.1]	[10.9]			
Somalia	63.1	62.9	69.0	161	139	95.5	92.7	81.0	(87.2)	••
South Africa ⁸	2 097	2 594	(2819)	(2733)	(2948)	(3 106)	(2915)	[2731]	[2777]	[3013]
Sudan	188	239	271	233	212	217	[208]	[201]	[191]	[189]
Tanzania	175	184	228	(420)	(449)	(242)	[164]	••		
Togo	15.4	19.7	24.5	26.4	24.8	24.4	23.9	(21.3)		
Tunisia	95.7	118	161	181	178	194	233	296	(307)	(315)
Uganda [#]	313	278	192	152						
Upper Volta (Burkina Faso)	30.5	40.1	37.2	44.6	36.2	35.4	40.5	(42.4)	[37.5]	••
Zaire	338	212	151	[191]	[168]	[164]	[164]	[191]	••	[68.7]
Zambia	[118]	[117]	[9 7.7]	[96.3]	[181]	[134]		••		••
Zimbabwe	214	276	369	424	492	(459)	359	395	368	[246]
Total Africa	11634	12979	13 391	13 930	(14 799)	(13 960)	(12 676)	[12299]	[12007]	[10977]
Central America										
Costa Rica	17.4	23.3	32.8	30.2	32.3	30.9	27.0	22.6	24.6	(25.8)
Cuba ⁱ	(446)		95 7	1 028	1 103	1 0 5 3	976	1017	1178	1 184
Dominican Republic	91.8	100	100	111	127	99.4	108	(95.0)		••

Table 7A.3. (Continued)

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
El Salvador	50.9	64.6	76.5	79.4	(86.9)	94.8	105	115	114	131
Guatemala	71.3	74.7	103	112	116	128	136	[147]	(152)	151
Haiti	15.0	15.4	15.8	19.6	22.1	21.6	24.2	22.2	21.3	••
Honduras	33.6	35.5	43.9	56.0	57.3	113	111	[116]	[113]	 [118]
Jamaica	30.4	36.8	35.1	31.4	[27.9]	[23.0]	[22.9]	[23.8]	[28,1]	[110]
Mexico	670	752	702	714	797	756	1 000	1077	[1042]	[1 092]
Nicaragua	45.6	61.0	75.7	91.5	60.6	119	[137]	[145]	[172]	[[]]]
Panama	20.5	20.5	[19.2]	[20.9]	[21.6]	[24.0]	[26.1]	[27.7]	[-/-]	75.7
Trinidad and Tobago	(19.1)	27.7	24.8	31.4	45.0	32.5	37.5		(55.5)	(44.6)
Total Central America	1 510	1 720	2185	2 326	2 496	2 495	2709	[2847]	[3 029]	[3170]
South America										
Argentina	3 172	3 921	3 954	4018	4 0 5 6	3 936	4178	[8784]	(6 536)	[5 226]
Bolivia	144	186	169	191	216	138	155	[166]	[153]	[154]
Brazil	1 981	2 209	2 0 2 0	1868	1 665	1 304	1 3 5 4	1 535	[1902]	(1891)
Chile	926	973	1 285	1 443	1651	2 0 3 8	1760	[2098]	[2256]	[2 294]
Colombia	(438)	(451)	(412)	(513)	(565)	534	477	486	473	570
Ecuador	177	183	285	204	210	222	(235)	(179)	(196)	[210]
Guyana	56.6	78.6	47.0	(34.3)	(42.5)	[51.0]	48.1	·	[36.9]	
Paraguay	52.2	54.0	57.9	60.9	56.3	60.7	73.7	75.4	67.1	
Peru	681	771	1119	849	667	(980)	(1211)	(1217)	(1 291)	(1287)
Uruguay	226	188	201	243	(301)	260	338	[382]		
Venezuela	909	705	825	851	847	907	914	926	839	(925)
Total South America	8 762	9 720	10 374	10 274	10 27 7	10428	10 744	[15 898]	[14 160]	[13100]

Table 7A.4. World military expenditure, in current price figures

Figures are in local currency, current prices.

		1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
NATO ^a											
North America:											
Canada	mn dollars	3 127	3 589	4 1 2 4	4 662	4 825	5 499	6 289	7 655	8 0 8 6	9 273
USA	mn dollars	90 948	91 013	100 925	10 9247	122 279	143981	169888	196 390	217 154	250 01 1
Europe:											
Belgium	mn francs	70 899	81 444	89 480	99 726	106472	115754	125 689	132 127	136 853	147 496
Denmark	mn kroner	5 310	5714	6 382	7 294	8 045	9117	10 301	11669	12 574	
France	mn francs	55 872	63 899	73 779	85 175	96 439	111 672	129 708	148 02 1	165 029	175 770
FR Germany	mn marks	37 589	38 922	40 184	43 019	45 41 5	48 518	52 1 9 3	54 234	56 496	58 14 1
Greece	mn drachmas	45 936	56 963	67 738	77 861	89 791	96 97 5	142 865	176 270	193 340	248 418
Italy	bn lire	3 104	3 608	4 533	5 301	6 468	8 203	9 868	12 294	14 400	17 100
Luxembourg	mn francs	836	983	1 0 2 9	1154	1 242	1 534	1 715	1 893	2104	2 296
Netherlands	mn guilders	7119	7 662	9 092	9 1 4 6	10106	10476	11296	11 921	12 149	12757
Norway	mn kroner	4771	5 333	5934	6854	7 362	8 242	9 468	10956	12 395	13 209
Portugal	mn escudos	19898	18 845	22 082	27 3 54	34 343	43 440	51 917	63 817	76 765	92 21 1
Turkey	mn lira	30 200	40 691	49 790	66 239	93 268	185 656	313 067	44 7 7 9 0	556738	803 044
UK	mn pounds	5 165	6132	6810	7616	9 0 2 9	11510	12 144	13 849	15 952	17 506
wto											
Bulgaria	mn leva	(554)	(613)	(614)	[650]	[700]	[820]	[970]	10011	[022]	
Czechoslovakia	mn korunas	18458	18 821	18 646	19 666	(20.050)	(21.470)	(21500)	(22,020)	[73650]	
German DR	mn marks	7 512	7 994	8 261	8 674	(9110)	(0.875)	(10705)	(11315)	(11970)	(12 830)
Hungary	mn forints	11811	11 67 1	12 607	14 983	16 200	17 700	19060	20.050	32 044	(12 030)
Poland	mn zlotys	52 274	56.605	63 31 5	65 653	(70,780)	(74 285)	(84.450)	(101 100)	(210,000)	(33 / 76)
Romania	mn lei	9713	10 57 5	10963	11713	11 835	10 394	10 503	10773	(11 662)	(11700)
Other Europe								10205	10775	(11002)	(11/00)
Albania	man talas										
Austria	mn ieks	653	783	805	818	885	915	940	935	[910]	
Finland	mn schillings	7949	8734	9 5 2 5	10778	11965	12 439	13132	14 325	16546	16484
Iraland	тп тагккаа	1 452	1 695	1767	1 996	2 396	2 876	3 287	4154	(4 616)	(4 659)
Spein	mn punt	67.1	84.0	98.0	116	142	176	203	241	248	276
Swadan	mn pesetas	103 064	127 028	158 568	189 104	229 401	287 276	336974	437 102	535 226	620865
Switzerland	mn kronor	9758	10719	12 082	13 674	15 163	16951	19023	20386	21 993	23 816
Switzerianu	mn jrancs	2813	3 242	3110	3 1 5 1	3 414	3 5 3 3	3 7 5 6	4134	4155	4 4 7 6
i ugoslavla	mn ainars	28 815	33 234	38766	43 379	56 330	78 060	102 650	(122 035)	(160 080)	[240 000]

Table 7A.4. (Continued)

		1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Middle East											
Bahrain	mn dinars	5.8	9.3	14.3	40.5	53.9	59.2	80.7	106	(123)	[127]
Cyprus	mn pounds	7.4	7.5	10.4	8.9	12.6	10.9	17.5	[20.0]	[30.0]	••
Egypt	mn pounds	[1631]	[1564]	[1845]	[1150]	[1200]	(1025)	(1150)	(1 490)	(1940)	[2350]
Iran	bn rials	453	547	564	585	385	362	[488]	[640]	[660]	••
lraq	mn dinars	470	520	593	587	(788)	[99 0]	[1350]	[2400]	[3 200]	
Israel	mn pounds	(2073)	(2721)	(3 660)	(4 905)	(9217)	(21 808)	(50715)	[107 270]	[229 500]	
Jordan	mn dinars	56.7	103	96.5	102	133	136	160	179	(185)	[205]
Kuwait	mn dinars	191	247	292	276	293	342	(430)	(523)	••	••
Lebanon	mn pounds	315	327	351	491	738	1 1 4 1	1058	1 246	1465	••
Oman	mn riyals	241	271	237	265	269	407	522	581	671	[675]
Saudi Arabia	mn riyals	(14 865)	(26 325)	[31685]	(38 684)	(52 388)	(64076)	(75 723)	(87 695)	[76445]	[69 950]
Syria	mn pounds	3 3 4 5	3 778	4160	4 740	8 287	(8 415)	(9 378)	[9778]	[10729]	[12602]
United Arab Emirates	mn dirhams	124	312	1 928	3019	4 3 9 4	6330	(7 575)	(6155)		
Yemen Arab Republic	mn rials	286	411	572	1 180	1 606	1 545	2025	(2 404)		••
Yemen, People's Democratic Rep. of	mn dinars	.15.4	17.1	20.0	30.8	36.1	42.6	56.0	55.1		
South Asia											
Afghanistan	mn afahanis	1834	2353	2617	2919	5472					
Bangladesh	mn taka	1 023	1 581	1917	2.038	2,409	2,891	(3.661)	4 4 8 2	4 805	(5765)
India	mn runees	23 823	25400	26159	28 091	32 336	37 390	44 556	52 192	61 146	66 875
Nenal	mn runees	116	148	165	180	204	236	271	345	421	485
Pakistan	mn runees	7 509	8112	8 895	10054	11513	13 903	17407	21316	24 1 29	27 797
Sri Lanka	mn runees	410	432	478	460	804	971	1051	F1 5001	1 800	2 300
on Lanka	mn rupees	410	452	470	100	001	271	1001	[1500]	1000	2,500
Far East											
Brunei	mn dollars	97.9	167	175	203	372	[410]	416	[480]	(530)	(700)
Burma	mn kyats	886	1041	1 197	1 320	1 4 9 1	(1622)	[1703]	(1833)	(1923)	(2023)
Hong Kong	mn dollars	118	219	354	5 45	666	1 388	1 574	(1815)	••	••
Indonesia	bn new rupiahs	602	723	777	906	1 0 3 8	1 363	1724	[1975]	[2120]	[2540]
Japan	bn yen	1 3 5 6	1 488	1 653	1 822	2010	2 21 5	2 388	2 5 4 7	2712	2 890
Korea, North	mn won	1864	2 0 5 8	2 0 9 6	2 3 4 4	2 563	2750	3 009	3 242	3 5 3 0	3 8 3 1
Korea, South	bn won	465	771	1 008	1 438	1 597	2 2 5 2	2831	3 273	3 4 2 0	3 450
Malaysia	mn ringgits	1 542	1654	1987	2183	2 547	3 389	4 4 3 2	4 978	5 479	(5010)
Mongolia	mn tughriks	(373)	(407)	(405)	(421)	(480)	(426)	(630)	(716)	(726)	(764)
Philippines	mn pesos	3812	4614	4 924	4 863	5 240	5 829	6746	8 3 0 0	8 800	7 670
Singapore	mn dollars	739	878	1 007	987	1051	1 296	1 569	1 800	1 988	2 263
Taiwan	bn dollars	38.3	45.7	58.3	70.2	80.7	96.5	(117)	136	139	138
Thailand	mn baht	(9 5 50)	(12 250)	(15 875)	(21 500)	26 650	30 225	36 325	41 250	45 900	49 700

Oceania											
Australia	mn dollars	1849	2 100	2 365	2 590	2911	3 388	3 962	4 603	5131	5 570
Fiji	mn dollars	1.2	2.0	2.3	2.7	3.1	4.8	4.0	4.6	47	40
New Zealand	mn dollars	187	209	243	288	334	421	547	628	656	736
Africa											
Algeria	mn dinars	1 312	2 001	1956	2 4 9 0	2742	3417	3 481	3 893	4 477	4631
Benin	mn francs	1819	1750	2133	3 384	3 7 3 6	4 888	6 502	7 821		
Burundi	mn francs	672	860	1256	1 533	1 767	2 0 4 8	[2460]	[2730]	[4 480]	
Cameroon	mn francs	10 023	11 582	12769	13700	14876	17 460	21 068	25 347	31 353	[40 376]
Central African Republic	mn francs	1774	1915	1 880	(2 289)	(3061)	[2816]	(4 029)		••	
Chad	mn francs	4052	5 977	5 2 5 5	5186	5 890					
Congo	mn francs	7 178	8 205	9 000	10 000	9450	10 050				[21 596]
Ethiopia	mn birr	259	265	280	519	722	744	[790]	[810]	••	
Gabon	mn francs	3612	4807	7 107	[12 160]	(12036)	(15 806)	[11 000]		[25 150]	[26 500]
Ghana	mn cedis	90.6	126	157	202	(213)	[280]				•
Ivory Coast	mn francs	9834	12 536	12 640	19 579	21 854	25 031	[25000]	28 400	[29 057]	[30726]
Kenya	mn pounds	19.9	31.8	61.2	92.6	109	101	110	136	141	
Liberia	mn dollars	4.5	5.4	8.9	9.4	12.8	26.4	43.4	[39.0]		
Libya	mn dinars	[235]	[405]	[495]	[810]	[995]	[970]	[875]	[920]		
Madagascar	mn francs	6470	7 895	10 800	11775	17 420	(19315)	(23 500)			
Malawi	mn kwachas	7.4	8.1	12.2	17.8	21.0	(24.0)	(21.0)			
Mali	mn francs	8 100	10456	12751	14080	15331	16295	(16628)	(18 702)		
Mauritania	mn ouguiyas	1 200	3 497	4 3 5 0	3 605	4 3 0 1	3 700	••	••		
Mauritius	mn rupees	6.6	8.8	9.4	10.8	15.7	42.6	47.7	••	••	
Morocco	mn dirhams	1 673	2 548	3 294	3 209	3 495	4 400	5 047	[7 400]	[6910]	[4635]
Mozambique	mn meticais	600	(17 6 0)	1 900	3 650	3733	4754	5 595	6 188		
Niger	mn francs	1 361	1 667	2143	2 862	3 4 3 0	••				
Nigeria	mn nairas	1 008	1 069	1 219	1 222	1 1 4 2	1 246	1 3 1 9	1111	[1200]	[1240]
Rwanda	mn francs	860	1 0 2 0	1 131	1414	1 704	2 035		••		
Senegal	mn francs	8 2 3 4	9913	11 073	12 5 5 3	13 470	13 558	15070	(17 005)	(20 375)	••
Sierra Leone	mn leones	5.9	6.3	8.7	13.3	14.0	[12.8]	[14.2]	••		••
Somalia	mn shillings	145	165	200	513	552	601	843	9 02	(1 325)	
South Africa ⁸	mn rands	93 1	1 281	(1 548)	(1654)	(2018)	(2419)	(2615)	[2810]	[3210]	[3855]
Sudan	mn pounds	40.2	52.0	68.9	70.9	84.7	108	[130]	[155]	[195]	[250]
Tanzania	mn shillings	728	818	1 1 30	(2 324)	(2828)	(1 985)	[1690]	••	••	••
Togo	mn francs	1960	2 799	4 268	4615	4 66 1	5 1 5 5	6 040	(5 998)	••	
Tunisia	mn dinars	30.3	36.0	52.2	61.8	65.4	78.6	103	148	(168)	(191)
Uganda	mn shillings	642	835	1 08 9	1 1 7 4	1 457	3 324	6071		••	
Upper Volta (Burkina Faso)	mn francs	3 871	4 667	5 627	7 305	6814	7 470	9216	(10 800)	[10337]	
Zaire	mn zaires	70.4	79.7	96.0	[180]	[330]	[460]	[620]	[990]	••	[1250]
Zambia	mn kwachas	[46.0]	[54.0]	[54.0]	[62.0]	[128]	[106]				
Zimbabwe	mn dollars	85.6	122	180	227	300	(295)	261	318	364	[360]

Table 7A.4. (Continued)

		1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Central America											
Costa Rica	mn colones	101	140	205	201	235	265	317	505	730	870
Cuba	mn pesos	(326)		700	784	841	811	842	924	1 1 16	1 167
Dominican Republic	mn pesos	57.2	67.4	75.8	87.1	109	99.4	116	(110)		
El Salvador	mn colones	69.7	94.8	125	147	(185)	237	300	369	413	536
Guatemala	mn quetzales	42.9	49.8	77.1	91.0	105	128	152	[165]	(183)	
Haiti	mn gourdes	50.9	55.8	60.9	73.5	93.8	108	134	132	140	
Honduras	mn lempiras	42.8	47.4	63.6	86.2	99.1	226	245	[280]	[300]	[335]
Jamaica	mn dollars	20.0	26.6	28.2	34.0	[39.0]	[41.0]	[46.0]	[51.0]	[65.0]	
Mexico	mn pesos	5870	7 630	9 1 9 0	10980	14 460	17 340	29 340	50 200	[98140]	[164 400]
Nicaragua	mn cordobas	191	262	363	459	450	1 200	[1700]	[2250]	[3 500]	••
Panama	mn balboas	14.7	15.3	[15.0]	[17.0]	[19.0]	[24.0]	[28.0]	[31.0]		88.0
Trinidad and Tobago	mn dollars	(25.0)	40.0	40.0	56.0	92.0	78.0	103		(198)	(180)
South America											
Argentina	mn pesos argentinos	2.9	18.0	50.9	142	364	724	1 572	[8750]	(28 900)	[181 000]
Bolivia	mn pesos	1 606	2171	2131	2 6 5 1	3 603	3 376	5 021	[12000]	[41 500]	[793 000]
Brazil	mn cruzeiros	13 259	20960	27 465	35 247	48 01 5	68712	146750	329 200	[987 600]	(2873700)
Chile	mn pesos	2383	7815	19850	31 223	47 640	79 488	82184	[107 700]	[147 300]	[178 000]
Colombia	mn pesos	(6 960)	(8 607)	(10494)	(15369)	(21 122)	25 264	28 786	36470	42 528	59 481
Ecuador	mn sucres	2 542	2914	5116	4 097	4 638	5 539	(6639)	(5867)	(9 540)	[13 900]
Guyana	mn dollars	78.9	120	77.5	(65.0)	(95.0)	[130]	153		[160]	180
Paraguay	mn guaranies	3316	3 588	4 204	4 892	5 793	7 644	10 581	11566	11676	
Peru	mn soles	25 464	38 527	77 246	92 514	121 000	(283 000)	(613 470)	(1 013 760)	(2274000)	(4 770 000)
Uruguay	mn new pesos	218	274	464	811	(1 676)	2 362	4126	[5 540]		
Venezuela	mn bolivares	2 297	1918	2 422	2673	2 993	3 893	4 550	5 060	4 860	(5 900)

	1975	1976	1977	1 978	1979	1980	1 981	1982	1 983	1 984
NATO ^a					·					
North America										
Canada	1.9	1.8	1.9	2.0	1.8	1.8	1.8	2.1	2.0	2.1
USA	5.9	5.4	5.3	5.1	5.1	5.6	5.8	6.5	6.7	6.9
Europe										
Belgium	3.1	3.1	3.2	3.3	3.3	3.3	3.4	3.4	3.3	3.4
Denmark	2.5	2.3	2.3	2.3	2.3	2.4	2.5	2.5	2.4	
France	3.8	3.8	3.9	4.0	3.9	4.0	4.2	4.1	4.2	4.1
FR Germany	3.7	3.5	3.4	3.3	3.3	3.3	3.4	3.4	3.4	3.3
Greece	6.8	6.9	7.0	6.7	6.3	5.7	7.0	7.0	6.4	6.8
Italy	2.5	2.3	2.4	2.4	2.4	2.4	2.5	2.6	2.7	2.8
Luxembourg	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.8	0.9	1.3
Netherlands	3.4	3.2	3.3	3.1	3.2	3.1	3.2	3.2	3.2	3.2
Norway	3.2	3.1	3.1	3.2	3.1	2.9	2.9	3.0	3.1	3.0
Portugal	5.3	4.0	3.5	3.5	3.5	3.5	3.5	3.4	3.4	3.3
Turkey	5.8	6.2	5.8	5.2	4.3	4.3	4.9	5.2	5.0	5.0
UK	4.9	4.9	4.7	4.6	4.6	5.1	4.8	5.0	5.3	5.4
WTO										
Bulgaria ^j	(3.0)	(3.1)	(3.0)	[3 1]	[3 1]	[3 1]	[3 1]			
Czechoslovakia ^j	3.2	3.1	3.1	3 1	(3.0)	(3.1)	(3.2)	(3.2)		••
German DR^{j}	4.0	41	4.0	4 1	(4.1)	(4.2)	(3.2) (4.4)	(4.5)		(4.7)
Hungary	2.4	2.2	2.2	2.4	2.4	2.5	2.4	2.4	3.6	()
Poland	2.8	2.6	2.7	2.6	2.7	2.8	2.9			••
Romania	2.2	2.2	2.1	2.1	2.0	1.7	1.6	1.4	(1.5)	
Other Europe										
Austria	1.2	1.2	1.2	1.3	1.3	1.2	1.2	1.3	1.4	13
Finland	1.4	1.5	1.4	1.4	1.4	1.5	1.6	1.8	(1.7)	
Ireland	1.8	1.8	1.7	1.7	1.8	1.9	1.9	1.9	1.7	
Spain	1.7	1.8	1.7	1.7	1.7	1.9	1.9	2.2	2.3	2.5
Sweden	3.2	3.2	3.3	3.3	3.3	3.2	3.3	3.3	3.2	
Switzerland	2.0	2.3	2.1	2.1	2.2	2.1	2.0	2.1	2.0	
Yugoslavia ^k	5.7	5.6	5.3	4.8	4.8	5.0	4.6	4.1	(3.9)	

Table 7A.5. World military expenditure as a percentage of gross domestic product

Table 7A.5. (Continued)

	1975	1 976	1977	1978	1979	1980	1981	1982	1983	1984
Middle East										
Bahrain	1.6	1.7	2.2							
Cyprus	2.9	2.3	2.5	1.7	2.0	1.5	2.0	[2.0]	[2.7]	
Egypt	[33.4]	[24.9]	[22.5]	[11.8]	[9.6]	(6.6)	(6.8)	(7.3)	(8.7)	
Iran	13.3	12.4	10.5	11.2	6.6	5.8	[6 .9]	[7.7]		
Iraq	11.7	10.7	10.4	••	••	••				
Israel	(26.0)	(26.4)	(24.4)	(20.4)	(20.1)	(20.3)	(20.3)	[19.2]	[16.9]	
Jordan	17.6	23.9	18.4	15.9	17.3	13.6	13.5	13.3	(12.4)	
Kuwait	5.5	6.4	7.2	6.5	4.4	4.6	(6.4)	(9.1)		
Lebanon	4.2	••	3.1	5.6	6.6					
Oman	33.3	32.8	26.9	29.6	22.9	20.8	22.0	23.4	25.7	
Saudi Arabia	(12.4)	(17.3)	[17.1]	(18.0)	(22.1)	(20.2)	(16.7)	(16.8)	[16.3]	
Svria	16.2	15.2	15.3	14.5	21.1	(16.2)	(14.1)	[13.5]	[14.4]	
United Arab Emirates	0.3	0.6	3.0	5.0	5.5	5. 8	(6.4)	(5.7)		
Yemen Arab Republic	8.6	9.4	10.0	16.1	17.5	13.0	15.4	16.4		
Yemen, People's Democratic Rep. of	15.4	13.4	12.5	17.5	17.5	18.3	15.4	17.3		
South Asia										
Afghanistan		1.8	1.8	1.9	3.5					
Bangladesh	0.9	1.5	1.5	1.3	1.3	1.3	(1.5)	1.6		
India	3.3	3.2	3.0	2.9	3.1	3.1	3.1	3.3		
Nepal	0.7	0.9	0.9	0.9	0.9	0.9	0.9	1.1	1.2	
Pakistan	6.2	5.7	5.4	5.4	5.3	5.3	5.8	6.2	6.5	
Sri Lanka	1.5	1.4	1.3	1.1	1.5	1.5	1.2	[1.5]	1.5	
Far East										
Brunei	35	48	4 1	4.6	61	[3 0]	45	[5 4]	(5.6)	
Burma	3.9	30	4.1	4.0	43	(4 3)	[4,1]	(4 0)	(5.0)	
Hong Kong	0.3	04	0.5	0.7	4.5 0.6	1.0	10	(1.0)		
Indonesia	5.1	49	43	4 2	3 5	3.2	3 3	[3.4]	[3 0]	
Тарар	0.0	0.9	0.9	0.0	0.9	0.0	0.9	1.0	[5.0]	
Korea North	9.8	10.1	9.6	9.7	9.7	94	9.8	1.0	••	
Korea South	4 5	55	5.6	6.0	5 1	6.0	6.0		 5 7	
Malaysia	69	59	61	5.8	5.6	6.5	79	8 1	81	
Philippines	3 3	34	3.2	27	24	2.2	2.2	24	23	
Singapore	5.5	6.0	63	5.6	5 1	53	55	2. 4 5.6	2.J 5 7	
Taiwan	77	79	87	8.6	8 2	8 1	(8.1)	9.0 9.1	75	
Theiland	(2.2)	00	(4.0)	(1 4)	4.0	0.1	(0.1)	0.1	1.5	

Oceania									
Australia	2.8	2.7	2.7	2.7	2.7	2.7	2.8	2.8	2.9
Fiji	0.2	0.3	0.3	0.4	0.4	0.5	0.4	0.4 ·	0.4
New Zealand	1.7	1.6	1.6	1.7	1.7	1.8	1.9	2.0	2.0
Africa									
Algeria	2.3	2.9	2.4	2.4	2.2	2.1	1.9	1.9	
Benin	1.6	1.3	1.4	2.0	1.9	2.0	2.2	2.2	
Burundi	2.1	2.2	2.5	2.8	2.5	2.4	••	••	
Cameroon	1.6	1.6	1.5	1.3	1.2	1.1	1.1	1.1	1.1
Central African Republic		••	1.5	(1.7)	(2.0)	[1.7]		••	
Chad	2.7	3.8	3.2	••	••		••	••	
Congo	4.4	4.6		5.0	••	2.8			••
Ethiopia	4.5	4.1	4.0	6.8	8.8	8.5	[8.7]	[8.5]	
Gabon	0.8	0.7	1.0	[2.3]	(1.9)	(1.7)	[1.1]		[2.1]
Ghana	1.7	1.9	1.4	1.0	(0.8)	[0.7]			••
Ivory Coast	1.2	1.1	0.8	1.1	1.1	1.1	[1.1]	1.1	[1.1]
Kenya	1.7	2.2	3.3	4.5	4.8	3.8	3.6	4.0	3.7
Liberia	0.7	0.9	1.3	1.2	1.5	2.9	5.0	[4.7]	
Libya	[6.2]	[8.3]	[8.6]	[14.2]	[12.7]	[9.3]	[9.5]	••	
Madagascar	1.6	1.9	2.4	2.5	3.0	(2.9)	(3.1)	••	
Malawi	1.4	1.3	1.7	2.2	2.4	(2.4)	(1.8)		
Mauritania	6.3	15.3	17.9	14.4	15.5	Ì1.7	••		
Mauritius	0.2	0.2	0.2	0.2	0.2	0.5	0.5	••	
Morocco	4.6	6.2	6.6	5.8	5.6	6.3	6.6	[8.2]	[7.3]
Nigeria	5.2	4.4	4.5	3.8	3.0	2.9	3.0	2.5	
Rwanda	1.6	1.7	1.6	1.7	1.8	1.9		••	
Senegal	2.2	2.3	2.3	2.6	2.5	[2.2]	[2.3]		
Sierra Leone	1:0	0.9	1.1	1.4	1.3	[1.0]	[1.0]		
South Africa	3.4	4.1	(4.5)	(4.2)	(4.3)	(3.9)	(3.8)	[3.6]	[3.6]
Sudan	2.4	2.5	2.6	2.3	••	••	••		
Tanzania	3.8	3.5	3.8	(7.0)	(7.7)	(4.9)	[3.7]		
Тодо	1.5	2.1	2.5	2.4	2.2	2.2	2.4	(2.2)	
Tunisia	1.8	1.9	2.4	2.5	2.2	2.2	2.5	3.1	(3.1)
Uganda	2.9	3.2	2.2	1.8					
Upper Volta (Burkina Faso)	2.7	2.9	2.9	3.4	2.7	2.7	2.9	(3.0)	[2.5]
Zaire	3.7	2.8	2.4	[3.3]	[3.0]	[2.7]	[2.6]	3.2	
Zambia	[2.9]	[2.9]	[2.8]	[2.8]	[4.8]	[3.5]			
Zimbabwe	4.3	5.6	8.2	10.0	11.0	(8.6)	6.0	6.4	••

Table 7A.5. (Continued)

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	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Central America							<u> </u>			
Costa Rica	0.6	0.7	0.8	0.7	0.7	0.6	0.6	0.5	0.6	
Cuba ^k	(4.0)		8.3	8.3	8.8	8.4	7.2	7.7		
Dominican Republic	1.6	1.7	1.7	1.8	2.0	1.5	1.6	(1.4)	••	
El Salvador	1.6	1.7	1.7	1.9	(2.1)	2.7	3.5	4.1	4.3	
Guatemala	1.2	1.1	1.4	1.5	1.5	1.6	1.8	[1.9]	(2.1)	
Haiti	1.7	1.5	1.3	1.5	1.8	1.8	1.8	1.8	1.8	
Honduras	1.9	1.8	1.9	2.3	2.3	4.5	4.6	[5.0]	[5.1]	
Jamaica	0.8	1.0	1.0	0.9	[0.9]	[0.9]	[0.9]	[0.9]	[1.0]	
Mexico	0.5	0.6	0.5	0.5	0.5	0.4	0.5	0.5	[0.6]	
Nicaragua	1.7	2.1	2.5	3.2	3.1	5.5	[6.6]	[7.6]	[9.8]	
Panama	0.8	0.8	[0.7]	[0.7]	[0.7]	[0.7]	[0.7]	[0.7]	••	
Trinidad and Tobago	(0.5)	0.6	0.5	0.7	0.9	0.5	0.6		(1.0)	
South America										
Argentina	2.0	2.4	2.4	2.7	2.6	2.6	2.9	[6.7]	(4.9)	
Bolivia	3.3	3.8	3.3	3.5	3.9	2.6	3.1	[3.0]	[3.0]	
Brazil	1.3	1.3	1.1	0.9	0.8	0.5	0.6	0.6		
Chile	6.7	6.1	6.9	6.4	6.2	7.4	6.4	[8.8]	[9.8]	
Colombia	(1.7)	(1.6)	(1.5)	(1.7)	(1.8)	1.6	1.5	1.5	1.4	
Ecuador	2.4	2.2	3.1	2.1	2.0	1.9	(1.9)	(1.4)	(1.7)	
Guyana	6.6	10.5	6.9	(5.1)	(7.2)	[8.6]	9.6		[11.0]	
Paraguay	1.7	1.7	1.6	1.5	1.3	1.4	1.5	1.6	1.4	
Peru	4.6	5.0	7.3	5.5	3.9	(5.7)	(7.2)	(7.2)	(8.6)	
Uruguay	2.7	2.2	2.3	2.6	(2.9)	2.6	3.4	[4.3]		
Venezuela	1.9	1.4	1.6	1.6	1.4	1.5	1.6	1.7	1.7	

Conventions

.. Information not available or not applicable

() Uncertain data

[] Estimates with a high degree of uncertainty

- Negligible or nil.

Notes, definitions and sources for the tables of world military expenditure

^a Spain is not included in NATO but in Other Europe, since military expenditure data according to the NATO definition are not yet available for Spain.

^b The exchange-rate used is \$1/0.5 yuan. See further SIPRI Yearbook 1984, p. 136.

^c The economic groupings used here as as follows:

Industrial market economies: Australia, Austria, Belgium, Canada, Denmark, Finland, France, FR Germany, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, UK and USA.

Non-market economies: Albania, Bulgaria, China, Cuba, Czechoslovakia, German DR, Hungary, North Korea, Mongolia, Poland, Romania and USSR.

Major oil-exporting countries: Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Oman, Saudi Arabia, United Arab Emirates and Venezuela.

Rest of the world: Excluding Kampuchea, Laos and Viet Nam. Countries are grouped in accordance with the classification used by the World Bank in *World Development Report 1984* (Oxford University Press, New York, 1984), pp. ix, 276 and table 1, p. 218.

^d The SIPRI practice of using official consumer price indices, which tend to understate actual price changes in WTO countries, especially for recent years, results in overstated volume expenditure increases for the WTO countries, excluding the USSR.

^e At current prices and 1980 exchange-rates. In the case of Oman, figures for 1980-84 are in constant prices.

^fAt 1979 prices and 1979 exchange-rates.

⁸ The SIPRI estimate in square brackets is based on planned military expenditure in real terms. ^h At 1978 prices and 1978 exchange-rates.

ⁱ The current price series is deflated from 1977 using Cuban figures for inflation. Beween 1975 and 1977 it is assumed that there was little or no inflation.

^j Per cent of gross national product.

^k Per cent of gross material product.

Table 7A.1: Military expenditure figures are given in 1980 prices and 1980 US dollar exchangerates by (a) alliances and regions and (b) economic groups. World totals are rounded to the nearest 10 million.

Table 7A.3: This series is based on the data given in the local currency series, deflated to 1980 price levels and converted into dollars at 1980 period-average exchange-rates. Local consumerprice indices (CPI) are taken as far as possible from *International Financial Statistics* (IFS) (International Monetary Fund, Washington, D.C.). For the most recent year, the CPI is an estimate based on the first 6–10 months of the year. Period-average exchange-rates are taken as far as possible from the IFS. Regional totals include estimates of military expenditure in countries for which data were not available.

Table 7A.4: Figures for recent years are budget estimates.

Table 7A.5: The share of GDP is calculated in local currency. GDP data are taken as far as possible from IFS. For WTO countries, military expenditure is given as a percentage of GNP up to and including 1978, and after 1978 as a percentage of NMP.

Definitions and sources

For more detailed information, readers are referred to previous editions of the SIPRI Yearbook.

The NATO definition of military expenditure is used as a guideline throughout. Where possible, the following items are *included*: all current and capital expenditure on the armed forces and in the running of defence departments and other government agencies engaged in defence projects; the cost of paramilitary forces and police when judged to be trained and equipped for military operations; military R&D, tests and evaluation costs; costs of retirement pensions of service personnel, including pensions of civilian employees. Military aid is included in the budget of the donor country. *Excluded*: civil defence, interest on war debts and some types of veterans' payments.

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Problems encountered when applying this definition include: the absence of disaggregated expenditure series; the non-disclosure of certain expenditure categories, especially procurement and R&D; uncertainty as to the amount of military aid included in recipients' budgets; and the degree to which police forces, border and coastguards and the like play a military role

The data cover 127 countries for the calendar years 1975–84. Calendar year figures are calculated fron fiscal year data where necessary, on the assumption that expenditure takes place evenly throughout the year. All series are *revised* annually. Changes in final figures may be due to revision of any component of the data base, i.e. military expenditure, inflation, rates of exchange and GDP/GNP/NMP data.

Main sources of military expenditure data

NATO

Official NATO data published in Financial and Economic Data Relating to NATO Defence, annual press release (NATO, Brussels).

USSR

SIPRI estimate. For further details see SIPRI Yearbooks 1974, p. 172; and 1979, p. 28.

Other WTO

1975-79: Alton, T.P., Lazaricik, G., Bass, E.M. and Znayenko, W., 'East European defense expenditures, 1965-1978', in *East European Assessment*, Part 2, a compendium of papers submitted to the Joint Economic Committee, US Congress (US Government Printing Office, Washington, D.C., 1981); Alton, T.P., Lazaricik, G., Bass, E.M. and Znayenko, W., *Military Expenditures in Eastern Europe, Post World War II to 1979* (L.W. International Financial Research, Inc., New York, 1980).

After 1979: domestic sources.

Others

Domestic budgets, defence appropriations and final accounts. Official publications such as Government Finance Statistics (International Monetary Fund, Washington, D.C.); Statistical Yearbook (United Nations, New York); Statistical Yearbook for Asia and the Pacific (United Nations, Bangkok); Statistik des Auslandes (Federal Statistical Office, Wiesbaden); Europa Yearbook (Europa Publications, London). Journal, and newspapers are consulted for the most recent figures.

8. Military research and development expenditure

MARY ACLAND-HOOD

Superscript numbers refer to the list of notes and references at the end of the chapter.

The substantial rise in the volume of world military research and development (R&D) expenditure since 1980 accelerated in 1984. The estimated rate of growth per year, which was something under 1 per cent from 1974 to 1980, was around 5-8 per cent from 1980 to 1983, and seems to have been more than 10 per cent from 1983 to 1984. This is more than double the rise in military expenditure as a whole.

The lack of hard information about two of the big spenders—the USSR and China—makes it impossible to be precise about total world military R&D expenditure. The USSR is one of the two overwhelmingly biggest spenders, and China is one of the six largest. However, it seems likely that the total in 1984 was roughly \$70-80 billion in current money terms, having been well over \$60 billion in 1983. (The current price estimates are subject to considerable variation depending upon the exchange-rates and price indices used in constructing them.)

The amounts spent on military R&D can indicate how much of a burden this use of resources is on economies but do not lead directly to measures of its results, although they are an important determinant of them. Moreover, the results of different sorts of military R&D are very different, covering a wide spectrum from highly threatening and destabilizing to protective. However, these large and increasing expenditures can be expected to increase the speed with which new and modernized weapons can replace slightly older ones and so create pressures to increase military expenditure far into the future, independently of the state of political relations then.

The data in the tables which follow are intended to give an indication of the level and pattern of and trends in resources used for military R&D for the countries for which reasonably reliable figures for a number of years are available. They account for something over a half to around three-fifths of total military R&D. For the same countries, the figures show the share of military R&D in each country's total R&D, government R&D, military expenditure and gross domestic product (GDP) in the 1980s. They show that the bigger spenders on military R&D use bigger shares of their R&D, military expenditure and GDP on it. They also show that these big spenders use very big shares indeed of their government and total R&D resources on military R&D.



Figure 8.1. Military R&D as a percentage of government R&D, 1981-84 averages

Figure 8.2. Military R&D as a percentage of gross domestic expenditure on R&D, 1981-84 averages





Figure 8.3. Military R&D as a percentage of military expenditure, 1981-84 averages

Figure 8.4. Shares of military R&D in 10000 units of gross domestic product, 1981-83 averages



Table 8.1. Military R&D in 21 countries, current prices, fiscal years 1975-84, a national currencies

Country	Currency	Fiscal year ^a begins	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Australia	mn dollars	1 Jul		80	••	89 🗶	94	108	114	141	147	
Austria	mn schillings	l Jan			••		8	19	••	22		
Belgium	mn francs	1 Jan	114	117	68	50	77	58	64	129	101	(55*)
Canada	mn dollars	1 Apr	63	71	7 9	83	86	101	116	132	159	
Denmark	mn kroner	b -	5 X	7۴	8	8	4	5	5	6	6	(6*)
Finland	mn markkaa	1 Jan	12	14	15	17	18	20	24	29	32	36
France	mn francs	1 Jan	5 0 5 0	5 600	6100	7 500	9 3 5 0	11 350	15700	16700	18100	(20100^*)
FR Germany	mn marks	1 Jan	1 045	1 491	1 596	1732	1 848	1730	1 572	1 647	1 835	1937
Greece	mn drachmas	1 Ja n			53	82	97	1 9 4	221			
India ^d	mn rupees	1 Apr	(797)	(873)	(864)	(1082)	(1 386)	(1 346)	(1 600)		••	
Italy	bn lire	1 Jan	15.2	26.3	31.9	36.7	32.8	<u>41.7</u> ¥	<u>168.1</u>	142.6	216.0	(388*)
Japan	bn yen	1 Apr	17.1	18.9	22.0	24.2	26.7	29.1	32.2	(36.5)	(40)	(42*)
Netherlands	mn guilders	1 Jan	68	74	74	84	91	91	107	104	110	Ì16 (
New Zealand ^f	mn dollars	1 Apr	1	1	2	2	4	3	4	4	(4)	••
Norway	mn kroner	1 Jan		••	92	96	96	102	161	220	295	
Spain	mn pesetas	1 Jan		773	285	409	432	261	1114			
Sweden	mn [°] kronor	1 Jul	780		1 1 4 3	1 097	992	942	1055	1 482	2010	••
Switzerland	mn francs	1 Jan	66	91	83	93	126	84	69			
Turkey	mn lire	1 Mar				••		54	134	134 ⁸		
UK ^h	mn pounds	1 Apr	(691)	(782)	(902)	(1063)	(1 350)	(1683)	1 739	1758	1 965	2169*
USA ⁱ	mn dollars	k -	9 679	10430	11 864	12 583	13 594	15 075	17 841	22 102	24 500 ^{<i>j</i>}	29 494 ^{j*}

^a Fiscal years are entered under the calendar years in which they begin, with the ^e Figures for earlier years have major omissions. exception of the USA, for which they are entered under the calendar year in ^fExpenditures of the Ministry of Defence, which are included in R&D objectives which they end. This ensures that the fiscal years are entered under the calendar other than defence. year in which the greater part of them falls.

^b 1975-77, 1 Apr: 1978 onwards, 1 Jan. 1978 data grossed up to a full year basis ^h 1975-80 adjusted upwards to make them consistent with later years, which by the national authorities.

^c Revised upwards; earlier years exclude some or all capital expenditure.

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^d The SIPRI estimates are military R&D (which does not include space), plus 75 Jul-30 Oct) omitted. per cent of space R&D, since "the Department of Space ... [is] engaged in objectives" (R&D Planning in the Framework of National Plans, Centre for the Study of Science, Technology and Development, Council of Scientific and Industrial Research, New Delhi, 1978, p. 2). If space is not included, the figures are about one-third smaller.

^g 1 Mar 1982-31 Dec 1982. From 1983, fiscal years begin on 1 Jan.

have fuller coverage because of improved reporting methods.

¹ 1975-77, outlays; 1978 onwards, obligations. 1976 transitional quarter (1

^j Revised downwards from 1983. Previously all space spending was classified as research primarily orientated towards the achievement of strategic/defence R&D or R&D support. From 1983 some has been reclassified as non-R&D. The provisional figure for 1985 military R&D is 35846.

^k Pre-1976, 1 Jul; from 1976, 1 Oct.

Sources: See page 292.

Country	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Australia		125	.64		114.8	114.7	115.1	119.3	122.6	
Austria					0.7	1.5		1.5		
Belgium	5.3	5.0	2.7	1.9	2.8	2.0	2.0	3.8	2.8	(1.4)*
Canada	82.0	83.5	86.3	84.3	80.4	83.2	85.4	87.9	98.8	
Denmark	••	1.8	1.8	1.8	0.8	0.8	0.8	0.8	0.9	(0.8
Finland	5.3	5.4	5.2	5.4	5.4	5.4	5.7	6.3	6.5	6.7*
France	1 962.2	1983.7	1982.8	2235.2	2517.1	2685.8	3 276.1	3116.5	3 081.3	(3 190*)
FR Germany	942.6	959.1	990.0	1045.8	1071.1	951.8	813.7	809.6	873.0	(895.4*)
Greece		••	2.1	2.8	2.8	4.5	4.2			•••
India	(117.1)	(143.0)	(133.8)	(154.8)	(185.7)	(172.5)	(172.9*)			
Italy	37.8	56.1	58.1	59.5	46.4	48.7 ▼	166.6	121.4	160.3	(260*)
Japan	(103.8)	102.0	108.8	116.6	124.2	125.6	132.3	(145.1)	(157)	(165)
Netherlands	45.9	45.9	43.0	46.9	48.7	45.8	50.4	46.2	47.7	(48.8)
New Zealand	2.2	2.1	2.5	3.0	4.4	3.3	2.9	2.7	(2.9)	
Norway		••	23.4	22.6	21.5	20.6	28.7	35.2	43.6	
Spain		21.5	6.4	7.6	7.0	3.6	13.6			
Sweden	28	8.7 ^b		323.0	281.0	228.6	210.6	246.4	311.3	
Switzerland	44.3	59.9	53.8	60.1	78.0	50.4	38.8		••	
Turkey						(0.7)	1.2	(1.2)		
UK	(2944.4)	(2959.8)	(2936.7)	(3181.7)	(3 503.9)	(3718.6)	(3 583.3)	3 3 5 4.0	3 498.8	3 700.7*
USA	15 397.4	15785.4	16 363.6	16206.8	15850.5	15766.5	17 125.2	19386.4	21 297.4*	24 668*

Table 8.2. Military R&D in 21 countries, constant prices, calendar years 1975-84, US \$ million, 1980 prices and exchange-rates

^a Fiscal year 1976/77. ^b Fiscal year 1975/76.

Sources: See page 292.

Conventions for tables 8.1. and 8.2:

Information not available. ..

Provisional figure.

() SIPRI estimate.

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Break in series.

Sources and methods

The military R&D figures are, as far as possible, government funding for the objective defence and defined, as are the other R&D figures, according to the Organization for Economic Co-operation and Development (OECD) *Frascati Manual.*¹ The OECD Directorate for Science, Technology and Industry is a very important source for R&D figures.

Table 8.1 and figures 8.1 and 8.2 are on the basis of the fiscal years for which the data were originally reported. The fiscal years are defined in table 8.1. Table 8.2 and figures 8.3 and 8.4 are on a calendar year basis. The tables are intended to be as comparable as possible to the equivalent military expenditure tables in appendix 7A. The military R&D and GDP figures were adjusted where necessary to calendar years, assuming an even spread of expenditure through each year. For table 8.2, consumer price indices were used as deflators, as they are available over the whole period covered for all the countries included, and their use results in reasonable indications of trends in resources absorbed. The data in the figures are calculated from current national currency figures.

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SIPRI Worksheets.

9. Militarization in Africa

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Superscript numbers refer to the list of notes and references at the end of the chapter.

I. The process of militarization

During the 1970s it became clear that a process of militarization was consolidating itself in Africa. The military spending of the continent as a whole and of most individual countries within it greatly increased over the decade. Up to 1980, African arms imports rose faster than in any other region of the world. The gap between the most and least armed African states increased alarmingly. During the late 1960s and early 1970s there was a spate of military coups. Since then about half of the states in the region have been ruled by governments of military origin. The continent has been riven by major wars in Southern Africa, the Horn, the Western Sahara and Chad, not to mention several minor armed conflicts. Outside powers have intervened militarily in the affairs of the continent with increasing impunity. France, the Soviet Union and Cuba still maintain substantial military contingents on African soil, and in the early 1980s the United States negotiated extensive facilities for its rapid deployment forces in Morocco, Egypt, Liberia, Somalia and Kenya. South Africa has greatly expanded its apartheid war machine and has been increasingly prepared to use it in what its Defence White Papers call "offensive pro-active action"¹ against its Black African neighbours.

The rises in military spending and arms transfers flattened out towards the end of the 1970s and indeed began to decline in the early 1980s. Nevertheless, the legacy of expansion has remained. The region is still a major zone of conflict. It is no longer insulated from the cold war and the strategic calculations of the major powers in the way it was (at least relatively speaking) in the 1960s. The productive base of many areas of the continent has been devastated by war, especially in the Horn and Southern Africa. The overall allocation of resources for military purposes—although temporarily falling—has remained much larger than it was in the 1960s. There has, however, been much national and sub-regional variation, making any overall assessment extremely difficult.

Such an assessment must be made in the context of a major crisis in development, the impact of which has been especially severe south of

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the Sahara.² In this region per capita GDP grew by an average of only 0.4 per cent a year from 1970 to 1981. It has fallen every year since then, and in 1983 was an estimated 4 per cent below its 1970 level. Domestic food production has declined steadily relative to population, and the region has become a major importer of food. Some of this decline can be attributed to the inefficient allocation of scarce resources, African economies having performed significantly worse than those of other developing countries facing similar external economic difficulties. But it is also true that the region has been badly hit by global recession. Most African countries were able to cope with the first phase of the global economic crisis in the mid-1970s by a combination of external borrowing and internal adjustment in their economies, without (for the region as a whole) a major decline in GDP growth. However, the impact of the second phase of the recession beginning in the late 1970s was far more severe, bringing in its wake a major decline in the terms of trade for primary commodity exporters and dramatically increasing the external debt burden of several African countries. Even oil-exporting countries such as Nigeria have not been exempt from such difficulties. Moreover the hesitant recovery of the international economy over the past two years has to a large extent passed Africa by.

II. Trends in military expenditure

During the early part of the 1970s the military expenditures of African countries continued to rise in spite of recession, reaching a peak in 1976–77, when they were approximately double their level in 1970 (in constant prices). The rise was sharpest in North Africa (table 9.1), owing in part to its proximity to the Middle East. Yet there were also smaller rises in sub-Saharan Africa, whose military spending increased by more than one-half in the first five years of the decade. The spiralling oil revenues of the continent's major oil producers—in particular Algeria, Libya and Nigeria—had some influence on these increases although less than might have been expected.

The picture had begun to change significantly towards the end of the 1970s when the recession began to bite on African economies. By 1977–78 the increases in military spending had levelled off. So far as can be ascertained from incomplete data the military spending of the continent as a whole, as well as of the majority of individual African countries, seems to have actually declined (in real terms) from 1979 into the early 1980s, the decline being especially marked among the oil exporters.
	Military expenditure (US \$ mn)"		Indices (1970 =	Indices of military expenditure (1970 = 100)											
Region	1970	1982	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
All Africa	8 505	13 978	100	105	112	140	161	187	196	203	189	(198)	(181)	[167]	[164]
North Africa ^b	2 654	6 497	100	123	129	205	255	262	292	314	272	303	262	231	245
Sub-Saharan Africa ^c	5 851	7 481	100	97	104	110	118	153	153	153	152	(151)	(145)	[137]	[128]
Oil-exporting countries ^d	3 257	4 757	100	88	99	110	144	187	202	204	211	225	204	167	146
Oil-importing countries	5 248	9 221	100	116	120	158	171	187	193	203	176	(181)	(167)	[166]	[176]

Table 9.1. Trends in African military expenditure, 1970-82

^a At 1980 prices and exchange-rates. ^bNorth Africa includes Algeria, Egypt, Libya, Morocco and Tunisia.

^c Sub-Saharan Africa includes all other African countries, including South Africa.

^dOil-exporting countries include Algeria, Cameroon, Congo, Gabon, Libya and Nigeria. No military expenditure series is available for Angola, also an oil exporter.

Source: Appendix 7A, table 7A.2.

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The effects of military spending on economic performance—and in particular whether increased spending in the 1960s and 1970s bears any responsibility for the economic crisis which has beset the region—are extremely difficult to determine. Superficial reading of the evidence presented in table 9.2 would seem to suggest that military expenditures have, if anything, risen faster in the middle-income and higher-growth economies and that they have risen more slowly or have declined in poorer, low-growth economies. However, this may merely be because in many of the former the factors which account for non-military growth—including rapid rises in earnings from the international economy by oil and other mineral producers—have also generated higher military spending whereas in the lowest-growth economies military spending has fallen because of rapid inflation and shrinking government revenue.³

Dynamic relationships over time cannot be brought to light, however, by static comparisons. They require in-depth analysis of a

	Income per capita ^b and GDP trend ^c									
Military	Middle-incom	ne countries ^d	Low-income countries ^d							
expenditure trend ^a	High growth	Low growth	High growth	Low growth	Zero or negative growth					
Rapid increase	<i>Morocco</i> Mauritius Tunisia Algeria [*]	Libya [*] Mauritania [*] Zimbabwe S. Africa Gabon	Kenya Tanzania Malawi	Ethiopia [*] Benin [*]						
Increase	<i>Egypt</i> Ivory Coast Cameroon Congo [*]	Zambia Liberia* Senegal	Rwanda [*] Mali [*]	Burkina Faso (Upper Volta)* Togo* Burundi* Somalia* Niger* Sierra Leone	<i>Chad</i> Madagascar [*]					
Decline		Nigeria [*]		Central African Republic [*]	Uganda Zaire [*] Ghana [*]					

Table 9.2.	Trends i	i <mark>n military</mark>	expenditure	and ec	conomic	growth	of	African	countries
in the 197	Os								

^a Military expenditure trend in the period 1970-80. Rapid increases are recorded for those countries in which expenditure more than tripled in real terms. Countries with relatively high military burdens in 1980 (military expenditure more than 3 per cent of GDP) are italicized.

^bMiddle- and low-income countries, as defined in *World Development Report 1984* (Oxford University Press, New York, 1984).

^c GDP trend in the period 1970-82. Annual growth rates of 4 per cent or more are classified as high; 0.5-3.9 as low; and less than 0.5 per cent as zero or negative.

⁴ Military-dominated governments as of 1980 are marked with an *. Nigeria and Ghana are included in spite of interim civilian governments (1979–81 and 1979–83 respectively).

kind for which adequate data do not exist for all countries. Maior discrepancies are to be seen between different statistical sources.⁴ Military budget figures for African countries are flawed by the inaccuracies which typically characterize such accounts-including the concealment of military expenditures under other budget headings and the manipulation of prices and exchange-rates. Many governments appear to include neither payments for imports of military equipment nor the amortization of military credits in their military accounts. This omission is particularly serious in countries such as Libva and Ethiopia, where the value of military imports has in some years even exceeded official military budgets. In Ethiopia, arms have been transferred against long-term credits from the USSR which may never be paid in full-and thus, do not add greatly to the military burden in the short run. In Libva, however, hard currency payments to foreign suppliers have almost certainly been substantial. Appropriate (but extremely rough) adjustments have thus been made in SIPRI's military expenditure estimates.

	Security/central government expenditure	Military/ security expenditure ^j	Capital costs/ security expenditure ^j	
Country	1978-80 average	1978-80 average	1968-70 average	1978-80 average
Benin	13.9ª	52.3ª	0.9	2.3"
Botswana	5.5 ^b	40.5 ^b	14.6	12.5 ^e
Central African Republic	23.9°	86.1°	n.a.	n.a.
Gabon	8.1 ^d	55.5 ^d	15.3 ⁱ	51.9 ^d
Ghana	7.0 ^e	95.6 ^e	11.4	25.0 ^e
Liberia	5.3 ¹	77.0 ^f	3.1	6.3 ^{<i>f</i>}
Madagascar	12.2 ^f	51.1 ⁵	2.7	8.5 ^f
Mauritius	1.78	38.2 ^g	8.0 <i>ª</i>	10.3 ^g
Morocco	17.5	74.9	2.4	32.1
Nigeria	11.9	97.5	32.0	48.8
Sierra Leone	10.0 ^d	51.0 ^d	7.0	8.1 ^d
Sudan	16.5	n.a.	10.2	n.a.
Tanzania	12.3 ^f	74.4 ⁵	3.8	1.8 ^f
Uganda	19.7 ^{<i>h</i>}	86.2 ^{<i>h</i>}	26.7	21.7 ^h

Table 9.3. Security expenditures of certain African countr	nditures of certain African cou	an countries
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^a 1970–72. ^f 1977–79.

Figures are percentages.

^b 1977-78. ⁸ 1975-77.

^c 1972–73. ^h1976–77.

^d 1974–76. ⁱ 1969–71.

^e 1976–78. ^j Total security expenditures include police, para-military and security services.

Source: Figures are calculated from Ball, N., Third World Security Expenditure: A Statistical Compendium, FOA Report C 10250-M5 (Swedish National Defence Research Institute, May 1984).

Moreover, military statistics seldom provide breakdowns between categories of military expenditure that would make possible a more precise analysis of the effects upon the economy. Ball's recent monograph. *Third* World Security Expenditure: A Statistical Compendium, is virtually the only comparative statistical source to provide such breakdowns, and some of these relating to African countries are summarized in table 9.3. Its coverage is fragmentary with regard to the number of countries listed, the quality of the budget data and the time periods for which they are available. Nevertheless, three significant conclusions seem to emerge. First, in some African countries total security expenditures—including police, paramilitary and security services—are significantly higher than total military spending and may be the more significant aggregate in terms of resource allocation within the economy. Second, African governments vary considerably in the share of government expenditures they allocate for military and security purposes. Third, there has been a tendency, especially among the economically better endowed countries like Gabon, Morocco and Nigeria, to spend an increased proportion of the military budget on the formation of military capital (arms procurement and military construction).

III. The dynamics of arms transfers

Like military spending, arms transfers to the African continent rose sharply during the 1970s, tailing off and eventually declining (though less than they had risen) in the early 1980s. They were, as might be expected, even more sensitive than military expenditures to changes in international economic and political conditions. The recycling of oil revenues had a major impact on African purchases of major weapons during and after the two 'oil shocks' of the 1970s (figure 9.1). Not only did the arms imports of the African oil exporters rise sharply, but they also absorbed a major share of the continent's arms bill in the two periods concerned (48 per cent in 1975–76; 51 per cent in 1978–80).

Another major influence was the shifting focus of armed conflict. Thus, there occurred substantial rises in the transfer of major arms to the Horn and to Southern Africa in the period from 1976 to 1978. In the Horn this resulted from the outbreak of hostilities in the Ogaden and Eritrea in 1977–78 and the Soviet–Cuban airlift of arms to Ethiopia. In Southern Africa it followed from the widening of the scope of the liberation struggle in Namibia and Zimbabwe; from the increased involvement of South Africa after its invasion of Angola in 1975–76; and from the decision by Cuba and the USSR to come to the



Figure 9.1. African imports of major weapons, 1970-83: by economic and geographical groups

^bEgypt, Morocco and Tunisia.

^c The Horn includes Ethiopia, Kenya, Somalia and Sudan. Southern Africa includes South Africa, Angola, Botswana, Mozambique, Tanzania, Zambia and Zimbabwe. ^d Algeria, Congo, Gabon, Libya and Nigeria.

Source: SIPRI.

aid of the MPLA (Movimento Popular de Libertaçao de Angola) government of Angola. The share of the two regions in the continent's arms transfers rose accordingly, to 44 per cent of the total in 1977 and 1978, falling sharply soon after.

The volatile situation in the Middle East has had an even more enduring impact. From the 1960s until the 1973 war with Israel, Egypt's⁵ imports of major weapons alone were slightly more than those of all the rest of Africa put together (being exactly 50 per cent of the African total in the 1960s and 58 per cent from 1970 to 1974). Following the war and during the two oil shocks the arms imports of the North African oil exporters (Algeria and Libya) eclipsed those of Egypt for the remainder of the decade. Nevertheless, since 1981 the forging of a new strategic relationship between Egypt, Morocco and the United States has brought with it a renewed inflow of weapons. In 1982 and 1983 Egypt, Morocco and Tunisia (shown as oil importers in figure 9.1)

^a SIPRI trend indicator values, at constant (1975) prices. See chapter 11.

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imported among them no less than 58 per cent of all major arms reaching Africa, almost offsetting the sharp decline in transfers to other parts of the continent. Moreover, a substantial proportion of these flows is provided in the form of grants or forgiven credits. Egypt is, after Israel, the single largest recipient of US military assistance.

Along with these changes it seems as if the Soviet Union is beginning to lose the dominant position it has held in the African market for major weapons since the 1960s, its share dropping from around 60 per cent to only 30 per cent in 1980-83 (table 9.4). This was partly due to the final disintegration of its special relationship with Egypt. However, it was also the result of a drop in its arms transfers to Black Africa (which had risen sharply in the late 1970s during the crises in the Horn and Southern Africa).

rigules ale per	rcentage	5.					
	USA	France	Other NATO	USSR	Other socialist	Others	Annual average volume of arms imports (US \$ mn) ^a
North Africa		• •					
1960-69	11.7	9.0	21.0	54.1	2.7	1.4	64
1970-74	11.5	62.8	8.1	17.0	0.4	0.2	157
1975-79	6.5	21.7	3.5	66.6	0.7	0.9	1 212
1980-83	11.5	9.6	21.1	56.5	0.6	0.7	1 041
Egypt							
1960-69		_	0.03	97.5	2.5	_	195
1970-74	_	0.5	0.4	97.9	1.2	_	439
1975-79	9.8	25.4	16.0	47.4	_	1.4	201
1980-83	79.0	8.4	8.2		4.4	0.03	900
Black Africa							
1960-69	18.3	13.4	36.0	21.0	6.4	4.8	61
1 9 7074	7.1	23.4	20.9	24.1	13.6	11.0	106
1975-79	9.0	11.6	16.5	54.8	2.2	5.8	633
1980-83	21.0	15.1	22.4	33.1	1.9	6.5	533
South Africa							
1960-69	11.4	44.2	44.3	-	_	0.1	70
1970-74	-	51.2	16.8	_	_	32.0	57
1975-79	0.2	34.9	47.1	0.1	_	17.7	148
198083	-	29.5	25.8	-	-	44.7	33
All Africa							
1960-69	6.8	11.5	17.0	61.0	2.7	1.0	390
1970-74	3.4	20.4	6.1	63.5	2.7	4.0	760
1975-79	7.1	20.0	11.4	56.9	1.0	3.5	2 195
1980-83	37.6	10.6	16.8	30.5	2.3	2.3	2 506

Table 9.4. African imports of major weapons, 1960-83: by supplier

^a SIPRI trend indicator values, at constant (1975) prices. See chapter 11. Source: SIPRI.

The strategic division of labour among the Western powers also seems to have been in a process of change. Previously the United States had not been a major supplier of weapons to Africa, leaving security relationships with the latter to the former colonial powers. Among these France has been the largest exporter, both to North Africa and to sub-Saharan Africa. Until the formal implementation of the arms embargo in 1977, France was also, together with Italy, the major source of weapons for South Africa. Nevertheless by the early 1980s the United States had become the largest individual exporter of major weapons to the continent, mainly because of its enhanced interest in North Africa and Egypt, but also because it was selling larger quantities to those Black African countries in which it has acquired a strategic stake, especially in the vicinity of the Indian Ocean.

It is far easier to identify the political and economic influences shaping arms transfers than it is to analyse the effects of these transfers. Direct comparisons between SIPRI arms trade figures and non-military trade figures are not possible. Other estimates suggest that the value of arms imports may have fluctuated between 6 and 10 per cent of the continent's import bill since the mid-1970s.⁶ It is widely accepted, however, that the available statistical sources tend to underestimate the value of the arms trade:⁷ not only undercounting the transfers by particular exporters, but also leaving out or underrecording the trade in small arms and in spares and parts. Taking such omissions into account, the inflow of arms could well compare in value with debt service repayments (which were on average around 12 per cent of the foreign trade of sub-Saharan African countries in the early 1980s), and it may represent up to one-third of all imports of machinery and transport equipment.

Too little is known about the prices, financing and credit terms of arms transactions to make firm generalizations about their true foreign exchange costs or about their impact on the debt burdens of African states. However, there seems a good *prima facie* case for arguing that a substantial proportion of scarce foreign exchange is diverted from alternative uses, competing in particular with allocations for the import of non-military investment goods.

IV. Emerging disparities in military capability

One of the major consequences of recent trends is that the sophistication and destructiveness of weapons in the hands of African states has increased, as can be seen in table 9.5. Only two countries, Egypt and South Africa, had acquired either high-performance combat aircraft or

Table 9.5. Acquisition of major weapon systems by African states

Weapon system	Pre-1960	1960–64	1965–69	1970-74	1975–79	1980-84	Total ^a
Armoured	9	14	5	3	9	>4ª	>44ª
High-performance jet combat	-	2	4	6	3	6	21
Missile systems	1	1	2	3	14	11	32

Figures are number of countries that acquired the systems.

^a Does not include one or two of the smaller African countries which may have acquired armoured vehicles.

Sources: SIPRI, World Armaments and Disarmament, SIPRI Yearbooks (annual); IISS, The Military Balance (annual); and Luckham, R., 'Armaments, underdevelopment and demilitarization in Africa', Alternatives, No. 6, 1980.

any kind of missile system by the mid-1960s, although by then around half of the independent states had acquired tanks or armoured cars to demonstrate their sovereignty. By the early 1980s, in contrast, virtually every country had at least a token armoured force; more than one-third (21 countries) had new or near-new jet combat aircraft; and around two-thirds (32 countries) were equipped with some kind of missile system, usually a basic surface-to-air-missile, anti-tank guided weapon or small sea-launched missile on a patrol boat.

However, this accumulation of arms has by no means been evenly spread. Only seven states—South Africa, Egypt, Libya, Ethiopia, Algeria, Morocco and Nigeria (listed in order of military capability)can be said to possess an all-round conventional military capability comparable to states outside the region. Only two of these, Ethiopia and Nigeria, are in Black Africa. These seven states possess the only major armoured formations on the continent (with the possible exception of Somalia); the only air forces with combat aircraft comparable to those in service with the air forces of industrialized countries; the only blue-water navies (although a handful of other African countries deploy individual blue-water vessels); and include the only countries to have acquired a full spread of the available missile systems. Between them these seven countries amassed 84 per cent of the continent's imports of major weapons during 1980–1983, were responsible for 79 per cent of its military spending in 1980 and employ around 72 per cent of the 1.8 million men in uniform on the African continent.

A further 7–9 countries (Somalia, Angola, Kenya, Tunisia, Sudan, Tanzania, Mozambique and at least potentially Zimbabwe and Zaire) have what can be described as a sub-regional military capability—being in principle well enough equipped to fight a conventional military campaign outside their own boundaries, but lacking the all-round firepower of the first group. In addition to these, a further 10-12 countries are equipped with varying degrees of adequacy for defence against conventional attack. The remaining countries maintain military establishments which can do no more than provide the regimes in power some protection from riots and threats to their internal security.

Such wide differences in military capability have not by themselves resulted in the more powerful states using force against their weaker neighbours. But in combination with the crises that have developed in Africa during the past two decades they have almost certainly contributed to instability. Over half the 14 countries possessing a regional or sub-regional military capability (South Africa, Libya, Ethiopia, Morocco, Angola, Sudan, Mozambique and Somalia) are currently engaged in major armed conflicts—although among them only South Africa and Libya (and Morocco, depending on which view of the present dispute in the Western Sahara is accepted) have troops deployed outside their own formally recognized frontiers.

Moreover, a number of the more powerful countries have been taking a more direct military role in the affairs of fellow African states. Libya is the most frequently cited, but is by no means the only state on the continent to play a regional military role. African states have sent troops and arms to the aid of other African ruling elites-for example, the Moroccan expeditionary force which helped crush the 1977 Shaba revolt in Zaire. They have aided rival factions in struggles for power, like the Libyan and Zairean troops sent to aid the GUNT (Gouvernement d'Union Nationale de Transition) and government factions in Chad in 1983-84. They have financed and armed guerrilla and revolutionary movements, such as POLISARIO (Frente Popular para la Liberación de Sakiet el Hamra y Rio de Oro) in the Western Sahara, and the Eritrean movements. They have also, in some cases, invaded their neighbours outright, whether to seize territory (as in the 1977–78 Ogaden war between Somalia and Ethiopia), to overturn unpopular governments (as in the Uganda-Tanzania war of 1977-78) or to destabilize opponents (as in South Africa's numerous armed interventions against Frontline States, i.e., its immediate neighbours). Some of them have lent their assistance (not always successfully) to peacekeeping efforts, like the OAU (Organization of African Unity) forces dispatched to Chad in 1979 and 1981.

V. Military government

In late 1984, almost half of Africa's 52 countries were ruled by governments of military origin (22 countries) or of mixed military and civilian origin (3 countries). Eighteen have been under military rule for more than a decade (see appendix 9A). At least 13 have had their regimes overturned by two or more military coups. And many of the remainder have been threatened by attempted coups. In addition Namibia is under direct South African military occupation; and in South Africa itself the military and security apparatuses, though formally excluded from politics, are increasingly central political actors.

Moreover, the distinctions between military and civilian governments appear increasingly superficial.⁸ In the final analysis power in most African states (both under military and civilian government) is distributed and held on to by control of the state security apparatus and organized military force.

A process of return to civilian rule appeared to have been initiated in the late 1970s, with the transfer of power back to elected civilians in Ghana (1979), Nigeria (1979), Uganda (1979–80) and the Central African Republic (CAR) (1979); Sierre Leone had also had such a transfer of power in 1968. But Ghana, Nigeria and the CAR were soon returned to military government (in 1981, 1983 and 1981 respectively), and Sierra Leone and Uganda have reverted to closed political systems, the government of the latter now being locked in civil war against what remains of the political opposition. Only a handful of other African countries (Botswana, Senegal, Morocco, Seychelles and Mauritius) have held freely contested elections in the past decade; but only in Mauritius, in 1982 and again in 1983, have actual transfers of power between regimes resulted.

In this inauspicious political context there are few clear-cut relationships between army rule, military spending and development. On the face of it the economic performance of military-dominated governments has been dismal. Only 4 out of the 19 military governments listed in table 9.2 (21 per cent) had high rates of growth in the period 1970-82 as compared with 9 of the 17 civilian governments (53 per cent). Six of these military governments (32 per cent) were classified by the World Bank as middle-income countries, compared with 11 (65 per cent) of the civilian governments. Nevertheless this does not seem to be because military regimes are any more likely to devote resources to their armies than civilians. Indeed the reverse, for nine civilian-ruled countries (again 53 per cent) had rapid increases in military spending in the 1970–80 period, compared with the six with lower rates of military growth and one (Uganda, which had, however, been under military rule for most of the 1970s) which reduced its military expenditure. In contrast only five military-ruled countries (26 per cent) made major increases in their military expenditures, ten made smaller increases and four (Nigeria, the CAR, Zaire and Ghana) actually cut them back.

Table 9.2 shows a heavy concentration of military-dominated governments among that group of countries which has suffered low incomes, low GDP growth and low military growth since 1970. It would seem on this limited evidence that army rule, sluggish growth and stagnant military expenditure may all be symptoms of a broader crisis in the economies and state systems of African countries, rather than any one of them being the principal determinant of the other.

Another symptom of this crisis may be the fact that a number of the coups and attempted coups which have shaken the stability of African states have been uprisings from lower levels of the army hierarchy, by junior officers or rank-and-file soldiers. Associated with these radicalizing influences, a surprising number of the military governments in Africa operate populist or left-wing systems of government: as for example in Libya, Ethiopia, Ghana, Burkina Faso (formerly Upper Volta), Benin, the Congo Republic and Madagascar.

VI. Permanent armed conflict

The pattern of conflict in Africa stems directly from colonial rule, the incompleteness of decolonization and the artificial nature of many post-colonial states. Decolonization was marked by at least 10 major anti-colonial wars—in Algeria, Kenya, Cameroon, Guinea-Bissau, Angola, Mozambique, Zimbabwe, the Western Sahara, Namibia and Azania⁹/South Africa—of which the two latter still have to be won. These have been followed by at least 20 major armed conflicts (listed in appendix 9A), most of them concerning the unfinished agenda of independence. The majority have been civil wars, fought in order to modify or dismember the existing post-colonial state framework—the most important being the series of civil wars which broke out after Zaire's independence, between 1960 and 1967, the Nigerian civil war and the continuing conflicts in the Western Sahara, Chad, Eritrea and the southern Sudan.

However, the nature and scope of conflict in Africa have changed since independence in at least four significant respects. First, as noted above, as the military capabilities of African states have grown, armed conflicts between them have become more frequent.

Second, the situation has been aggravated by the failure of many African governments to develop their economies and provide significant improvements in the welfare of their citizens. There has been a rise in conflict—like the Shaba rebellions in Zaire, the Ethiopian revolution and the war in Eritrea—animated by economic issues as well as ethnic and regional antagonisms. The nationalist movements in Eritrea and Western Sahara, for example, give as much importance to economic and social change in the 'liberated zones' as they do to the purely nationalist dimensions of their struggle. In Ethiopia this has not only enabled the movements to survive the large-scale central government campaigns against them, but also to broaden their revolt by linking up with other radical political movements.

Third, conflict has become increasingly intertwined with intervention by foreign powers. This does not mean that the domestic and regional sources of conflict are no longer important—merely that they increasingly interact with the international situation, incorporating Africa into the strategic territory of the cold war, as is shown in the region-byregion survey below.

Finally, warfare has directly and substantially aggravated economic conditions over broad regions of Africa. The famines which have put millions of lives at risk in the Horn, on the fringes of the Sahara and in Southern Africa over the past two years are as much the consequence of the breakdown of distribution systems as they are of climatic conditions and the destruction of the ecological balance. For this breakdown the wars in Eritrea, the Ogaden, southern Sudan, Chad and western Sudan, Angola and Mozambique bear part of the blame. Moreover, Africa now has more refugees both in absolute numbers (more than two and a half million in 1983 according to the UNHCR¹⁰) and relative to population than any other world region. To these one must add the direct casualties both among the military participants and in the civilian population which (though no reliable estimates exist) must number hundreds of thousands.

VII. The pattern of foreign intervention

External intervention in African conflicts has been pervasive (as is verified by appendix 9A) and dates back to the colonial era. There was, however, a honeymoon period of roughly a decade and a half after independence during which it occurred relatively infrequently, and when it did, the intervention was undertaken mainly by or on behalf of former colonial powers.

A major watershed occurred between 1974 and 1979 when a series of major upheavals—the final collapse of the Portuguese colonial empire, the broadening of the liberation struggle in Zimbabwe into a major anti-colonial war, the Ethiopian revolution, the Ogaden and Eritrea wars and the Shaba uprising in Zaire—brought a major increase in external intervention, not only by the major powers but equally significantly by South Africa.

France has intervened more often in African conflicts than any other outside power.¹¹ Its dispatch in August 1983 of 2 800 troops to Chad

(withdrawn again in autumn 1984) was only the most recent of a string of French interventions in sub-Saharan Africa.¹² France bases small but more or less permanent military detachments in Senegal, the Ivory Coast, the Central African Republic, Gabon and Djibouti; and has recently begun a reorganization of its 47 000-man *Forces d'Action Rapide*, based in metropolitan France, to enable it to react more quickly and effectively to emergencies overseas.

Large-scale military aid was provided by Cuba, the USSR and east European countries to Angola in 1975–76 and to Ethiopia in 1977–78. These two episodes were the first time socialist countries had sent major expeditionary forces to the aid of governments outside the socialist bloc-clearly demonstrating their command of the logistics involved. They were, moreover, among the series of events which led Western policy makers to ask for 'linkage' between progress on negotiations concerning the central strategic balance and restraints on Soviet intervention in the Third World. The numbers of Cuban and Soviet troops and military advisers dispatched to Africa were substantial. In 1981 there were (according to Western intelligence estimates, ¹³ which must be treated with more than a little caution) around 24 000 Cubans and 2 200 Soviet and east European military advisers in Angola and Mozambique (the great majority in the former) and 12 000 Cubans and 2000 from the USSR and eastern Europe in Ethiopia. These troops were backed by a major inflow of Soviet weapons, peaking in the later 1970s.

There is no doubt, moreover, that the intercession of the socialist countries made a major difference to the course of events in Africa during this crucial period-halting the South African invasion of Angola in 1976 and defeating Somalia's advance into the Ogaden. Nevertheless the direct strategic advantages gained by the Soviet Union were limited, especially in the Horn where it was forced (by supporting Ethiopia) to abandon the military facilities it had previously constructed in Somalia. Moreover, there were major military and political costs attached to being involved in the protracted conflicts which ensued in both Angola and Eritrea. These costs explain the socialist countries' apparent reluctance to increase their involvement, indeed their increasingly open pursuit of a formula under which they can withdraw. Towards the end of 1984 the Cuban contingent quietly and gradually departed from Ethiopia. Soviet reluctance to provide Mozambique with increased economic aid and military assistance against the MNR (Movimento Nacional da Resistencia de Mocambique) rebels was among the factors which drove President Machel into the Nkomati agreement negotiated with South Africa in early 1984. The (still stalemated) negotiations between Angola and South Africa have also received a degree of behind-the-scenes encouragement from the USSR and Cuba.

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The Soviet and Cuban interventions have been evaluated somewhat more positively in Africa than in the West. A majority of the member states of the OAU came down on the side of the MPLA government in Angola in 1976 (albeit after some initial hesitation before South Africa's invasion). The condemnation of Somalia's invasion of the Ogaden in 1977 was almost unanimous.

There is little doubt but that most African states regard South Africa, not the Soviet Union, as the major external threat to the region's security. Since the mid-1970s South Africa has regularly maintained a large military force (of 70 000-100 000 men at any one time) outside its own border in Namibia and southern Angola.

The major development of the 1980s has been the increase in US strategic interests in Africa, mainly as an adjunct of US policy in the Middle East and the Indian Ocean. Egypt and the Horn are specifically included in the command responsibilities of the rapid deployment force, reorganized in early 1984 as the US Central Command (USCENTCOM). The USA has negotiated facilities for this force in Morocco, Egypt, Somalia and Kenya (supplementing its even more extensive facilities in Oman and Diego Garcia). In the course of the past five years it has become (for the first time) a major supplier of arms to Africa, principally to Egypt but also to Morocco, the Sudan, Kenya and Somalia. In Southern Africa it has constructed a political alliance with South Africa through the policy of 'constructive engagement', relaxing some of the restriction on the transfer of military-related technology, and encouraging South Africa to link Cuban withdrawal from Angola to the negotiations concerning a settlement in Namibia.

Through these processes Africa is not merely becoming an arena for the cold war, but it is being incorporated in the strategic planning and to some extent the force structures of the major powers. This contains many dangers for African states. It is conceivable that their foreign partners may occasionally act as a restraining influence. Yet the incentives for the latter to provide weapons and military assistance to African allies in the major conflicts of the region have tended in practice to override such restraints. This assistance has most probably increased the scale, duration and destructiveness of African conflicts. Moreover, it has increased the danger that such conflicts might worsen relations between the powers or even precipitate a military confrontation at a global level.

VIII. Divergent regional patterns

No part of the continent has escaped the impact of militarization.

However, there have been significant regional differences in its impact and in the relative importance of the different dimensions described above.

North Africa and Egypt

North Africa is where rises in military spending and in arms transfers have been the sharpest. Its military situation is almost inextricably interlinked with that in the Middle East.

Four major factors have shaped developments over the past 10 years. The first is the turn-around in Egypt's external alliances crystallized in the Camp David Accords of 1978. In the first instance this enabled Egypt to cut its military spending (figure 9.2(a)), taking considerable pressure off its economy. Over the longer run, however, it laid the foundation for the consolidation of an informal strategic relationship with the United States and for a large rise in Egypt's procurement of weapons from the USA and western Europe.

Second, revenues from oil (and in the case of Morocco, phosphates) provided the government revenues and foreign exchange for an almost continuous expansion in military spending and arms purchases by Libya, Algeria and Morocco.

Third, in Libya this enabled Colonel Gaddafy's populist military government to build up a substantial military establishment equipped with sophisticated weapons, and to use these weapons to pursue its policies in Africa and the Middle East. Not only has Libya provided arms and assistance to a wide spectrum of radical movements and governments, but it also dispatched troops to protect General Amin in Uganda, and twice in the 1980s sent armed forces in to Chad, in addition to occupying the Aozou strip on its border with Chad since 1973.¹⁴

Fourth, there is the conflict in the Western Sahara, in reality a continuation of the war of independence begun by the POLISARIO guerrilla movement against Spain, when the latter ceded the territory to Morocco and Mauritania in 1975. Mauritania renounced its claims in 1979, its economy having been put under severe pressure by the conflict. Morocco continues the war, mainly for the sake of the phosphate resources in the Western Sahara. The USA has replaced France as its main source of arms and military support. POLISARIO still appears to receive arms and financial aid from Algeria and Libya, in spite of a series of diplomatic rapprochements between these two countries and Morocco (including a Treaty of Union negotiated between Colonel Gaddafy and King Hassan in 1984). The OAU's efforts to bring about negotiated settlement of the war have all so far come to nothing.

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Figure 9.2(a). Military expenditure trends in North Africa, 1970-82

Figure 9.2(b). Imports of major weapons to the Horn of Africa, 1970-83



^aAt 1980 prices and exchange-rates. The graph is on a semi-logarithmic scale: slopes represent rates of change.

^bSIPRI provisional estimates, subject to a considerable margin of error.

"The Maghreb includes Algeria, Morocco and Tunisia.

^dSIPRI trend indicator values, at constant (1975) prices. See chapter 11.

^eThe Horn, Eastern Africa and the Indian Ocean include all countries in Eastern Africa, from Sudan in the north to Tanzania in the south, and OAU member states on the Indian Ocean (see appendix 9A).



Figure 9.2(c). Military expenditure trends in West, Central and Eastern Africa, 1970–82

Figure 9.2(d). Military expenditure trends in Southern Africa, 1970-82



^fWest and Central Africa include all countries from Mauritania in the north-west to Zaire in the south-west.

⁸Figures for Angola are official expenditure figures for defence and security, converted into US dollars at the 1980 exchange-rate. Since it has not been possible to deflate these to 1980 prices, the time-span covered is limited to three years.

^hIncluding Tanzania, although it is also included in Eastern Africa in figure 9.2(c).

Sources: Figures 9.2(a), (c) and (d): Appendix 7A, table 7A.2. Figure 9.2(b): SIPRI.

The Horn, East Africa and the Indian Ocean

In the Horn a classical arms race has developed, interacting with the global arms race between the superpowers.¹⁵ The situation in the Horn was radically transformed by the broadening of the revolt in Eritrea into a full-fledged liberation struggle with mass support and by the Ethiopian revolution of 1974. Somalia profited from the divisions which had opened up in Ethiopia by invading the Somali-speaking Ogaden in 1977 in the name of the Western Somalia Liberation Front. The choice made by the Soviet Union to support Ethiopia was decisive in the Ogaden campaign where Somalia was defeated; but against the guerrillas in Eritrea it has ended up in a destructive stalemate.

Between 1970 and 1976 (including the first two years after the revolution) Ethiopia acquired all its weapons from the West, 80 per cent of them from the USA. On the other hand Somalia was the Black African country to receive the most substantial Soviet military assistance before the mid-1970s, given in exchange for air and naval facilities. Somalia was supplied exclusively, and the Sudan to three-quarters, by the USSR and other members of the WTO. From 1977 all this changed: Ethiopia receiving 98 per cent of its arms from the WTO between 1977 and 1983; and Somalia and the Sudan none at all (Kenya has never imported any weapons from the socialist countries). Initially the USA was careful not to inflame the regional situation by supplying major quantities of arms to Somalia directly (which were provided instead by conservative Arab countries and Italy). By 1982 and 1983, however, the USA provided almost two-thirds of Somalia's. Sudan's and Kenva's increased arms purchases. In exchange it got facilities for its rapid deployment force and participation by the three countries (and Egypt) in the Operation Bright Star joint exercises held in 1982 and 1983.

The pattern of military expenditures does not, however, follow that of the arms transfer statistics. The recorded military spending of the Horn and of the other states bordering on the Indian Ocean (figure 9.2(c)) has risen by around 50 per cent since 1970, less than might have been expected in the circumstances. The spending peaked in 1978–79, influenced by the Ogaden war, as well as the war between Tanzania and Uganda in 1978–79. However, these expenditures almost certainly include only a small proportion of the arms which have flowed into the region, the majority of which have been financed by grants and credits from foreign suppliers.

The end result of the regional arms race was to lock all the countries of the region more tightly into the respective security frameworks of the two superpowers—at the same time committing the latter to defend narrowly based and increasingly threatened regimes. The scene is set not only for further conflict but also for the further politicization of the famine by the attempts of governments on the one hand and the national movements on the other to control the flow of relief aid and secure maximum political and military advantage from it.

West and Central Africa

In West and Central Africa neither was there a major arms race nor were the main influences (at least in a direct and obvious sense) external. Constant price military spending has fallen in aggregate since 1970 (figure 9.2(c)). However, this trend for the region is heavily influenced by the reductions in spending by the three countries with the largest military budgets at the start of the 1970s—Nigeria, Ghana and Zaire.¹⁶ The majority of the other countries have increased their expenditures, although none of them can be considered a major military spender. Instead the most obvious symptom of militarization is the high proportion of military regimes. Almost the only countries to have escaped army rule are those which retain strong military and economic ties with France (Senegal, the Ivory Coast, Gabon and Cameroon).

The most central development in West Africa was the emergence, after the 1967–70 Nigerian civil war, of Nigeria as a regional military power, with an army and military spending several times larger than its rather limited pre-war level; and exceeding those of all the other countries of West and Central Africa put together. Following the internal coup which removed General Gowon in 1975, military spending was, however, steadily cut back.¹⁷ This was achieved through a reorganization of the army and the demobilization of around half of the quarter of a million men who had been recruited during the war. The reorganization also paved the way for the country's brief (1979–83) return to civilian rule.

Although this still left Nigeria with a far more powerful military force than any of its neighbours, it has been used with considerable restraint. Nigerian troops were sent to Chad in 1979 and 1981–82, but only in a limited role and (in 1981) as part of the OAU Peacekeeping Force. The Nigerian government, moreover, played a central role in the negotiation of the protocol establishing a mutual defence and nonaggression agreement within the framework of the Economic Community of West African States (ECOWAS), signed in 1981. So far this state of affairs has not been drastically changed by the advent to power on 31 December 1983 of a new military regime, its main preoccupation being the rapidly deteriorating economic situation of the country.

The major armed conflicts involving the region have been (apart from the Nigerian civil war) at its fringes: in the Western Sahara (involving Mauritania up to 1979, and indirectly Senegal) and in Chad, where the situation is extraordinarily complex. The conflict began as a regionally based uprising by a radical guerrilla movement, FROLINAT (National Liberation Front), based on nomadic Moslem groups, against a conservative French-supported government. It ended up, after the latter was finally overthrown in 1979, in a series of civil wars between different ex-guerrilla factions, each trying to control the state. This in turn attracted extensive foreign intervention, both by other countries in the region and by outside powers.

The first of these factions to emerge in full control of the government of national unity (GUNT), that of Goukouny Oueddei, signed a treaty with Libva in 1980 under which the latter sent in a force of three Libvan regiments and an 'Islamic Legion' of up to 5 000 men co-ordinated by East German and Soviet military specialists, which was used to drive out the armies of the GUNT's rivals. However, in 1981, Goukouny was prevailed upon by President Mitterrand of France and by other African heads of state to ask Libya to withdraw, the Libyan troops being replaced by French arms and an Inter-African Force representing the OAU and made up of troops from Nigeria, Zaire and Senegal. His main rival, Hissein Habré, took the opportunity to launch an attack with his Forces Armées du Nord, backed by arms and finance from the United States, Egypt and the Sudan, and within a few months had seized power, after the Inter-African Force had failed to intervene to save Goukouny. The latter went into exile in Libya, whence the GUNT launched a new invasion from the north in 1983. The USA dispatched AWACS aircraft to the Sudan to monitor the situation, and France sent 2 800 troops to the aid of Habré in August 1983. A military stalemate ensued until late in 1984 after France and Libya reached agreement to withdraw their respective intervention forces (an agreement not yet fully implemented by Libya).

South and Southern Africa

In Southern Africa the dominant trends have been the gathering southward thrust of the liberation struggle and the efforts of the heavily armed South African state to crush it and preserve the system of apartheid under its so-called 'total strategy'.

The crucial political watersheds occurred in 1974–77: the collapse of the Portuguese empire after the revolution by the Portuguese armed forces in 1974 and the transfer of power to the liberation movements; South Africa's invasion of Angola in 1975–76 co-ordinated with an attack by CIA-funded mercenaries from Zaire; the airlift of Soviet arms and Cuban troops which saved the MPLA government of Angola and drove back the South African force in ignominy; and finally the demonstrations in Soweto and other South African townships in 1976 which, though brutally crushed, exposed the shaky foundations of the apartheid system.

This series of events shifted the balance of forces in the liberation struggle and brought it to South Africa's own borders. However, it also brought the region directly within the ambit of the cold war. The Western powers busied themselves attempting to orchestrate negotiated settlements in Zimbabwe and Namibia, in order to forestall socialist entrenchment in these countries. The Lancaster House Agreement under which Zimbabwe acceded to majority rule in 1980 owed. however, more to successes in the field by the guerrilla armies and to mediation by the Frontline States (Angola, Botswana, Mozambique, Tanzania, Zambia and Zimbabwe), than to Western diplomacy. The five-nation contact group of Western countries established in 1977 prevailed on South Africa to negotiate an internationally recognized transition to independence in Namibia, but South Africa has deliberately stalled these negotiations ever since. Meanwhile the Reagan Administration has encouraged South Africa to link settlement in Namibia to Cuban withdrawal from Angola; and there has emerged an undeclared alliance between the USA and South Africa under the policy of 'constructive engagement'.

The same events promoted the South African authorities to begin a process of political and economic restructuring in the apartheid system. The 'total strategy' which was first put before the public in the Defence White Paper of 1977 is less a coherent plan than an ideological statement,¹⁸ under which government policies with regard to the economy, political change and security affairs are co-ordinated around defence of a modified apartheid system. At a political level the process culminated in the constitutional reforms put into effect in 1984. These extended political rights to members of the Coloured and Indian communities, but not to Africans. However, they also introduced an executive presidency, with wide-ranging powers in regard to national security. In this way they consolidated the influence the military establishment had already acquired informally through membership of the state security council.

At the same time the government has followed a multi-track external policy aimed at maintaining its control over decolonization in Namibia, bringing neighbouring African states into its sphere of influence, preventing them from supporting the liberation movements, and forcing Cuba and the USSR out of the region. One strand in this policy is the large-scale use of military force across its own borders. The most recent episode in a series of interventions was its offensive in Angola in December 1983, aimed at forcing the latter to the negotiating table

under terms favourable to South Africa. Direct military destabilization is supplemented by aid to insurgent movements inside the Frontline States, especially the MNR in Mozambique and UNITA (União Nacional para a Independência Total de Angola) in Angola, both of which receive arms, training and logistical support from South Africa. In March 1984 Mozambique and South Africa signed an agreement at Nkomati under which South Africa agreed to withdraw its assistance to the MNR insurgents in Mozambique, while the latter undertook to prevent its territory being used by ANC (African National Congress) guerrillas to initiate military action against South Africa. A few weeks before this Angola and South Africa had established (through the mediation of the USA and Zambia) a joint commission to monitor the disengagement of South African troops from Angola, as a preliminary to broader negotiations over South African withdrawal, the removal from Angola of Cuban troops and the transition to independence of Namibia.

However, in no sense are negotiations perceived by South Africa as a clear-cut alternative to the use of force; both have been pursued in tandem. The ground for the recent round of negotiations was brutally cleared by South Africa's destabilizations of its neighbours. Since the Nkomati accord the MNR has increased the scale of its activities inside Mozambique, casting some doubt on South Africa's readiness to implement it. The withdrawal from Angola begun by South Africa in early 1984 is still incomplete, and negotiations over Namibia remain stalled.

South Africa's policies have been supported by major increases in military spending, initiated well before the crucial political turning point of the mid-1970s. These rises seemingly tailed off in the early 1980s (figure 9.2(d)), partly because South Africa no longer had direct access to arms markets abroad, but mainly because it faced economic difficulties, aggravated by the burden of war in Namibia and Angola. Nevertheless such evidence of a slowdown in South Africa's military growth should be treated with caution. A proportion of the country's military expenditure is hidden away under other budget heads and this could have expanded. There have also been large rises in the police budget, reflecting increased concern with internal security.¹⁹ The SADF (South African Defence Force) has been extensively reorganized and re-equipped for mobile armed attack against neighbouring states and (in co-operation with civilian commando units) for area defence inside South Africa. A new military command structure based on three military regions has been introduced, and the first division-level exercises inside South Africa since World War II (Operation Thunderchariot) took place in 1984.

The strength of South Africa's standing operational forces may be anywhere between 160 000 and 200 000 men (including perhaps 80 000 members of the part-time citizen and commando forces under arms at any given point in time). This is based on a total mobilizable strength of between 400 000 and 500 000.²⁰ The latter has been achieved by a series of increases in the period of compulsory white male military service and in the time spent on active reserve—reinforcing labour shortages in the civilian economy and arousing considerable discontent. Conscription for members of the Coloured and Indian communities is under discussion, being part of the price they may be forced to pay for the limited political rights conceded to them under the revised constitution.²¹ A South West African territorial force was formed in Namibia in 1980 with a nominally independent command (though in practice it remains fully under South African control).²² It incorporates Black battalions, recruited in part on tribal lines, and compulsory conscription has been introduced for Black Namibians. The future of this force will most likely emerge as an area of major difficulty in the negotiations over the future of Namibia.

The expansion of the apartheid war machine has been backed by the creation of a defence-industrial base, starting seriously in 1964 soon after the voluntary arms embargo.²³ Production is organized by ARMSCOR (Armaments Development and Production Corporation), a government-owned corporation. But it involves substantial subcontracting in the private sector (between two-thirds and three-quarters of total output), fitting into an evolving alliance between the military establishment and the major industrial firms. The share of local production in total procurement rose, according to official figures. from 30 per cent in 1972 to 75 per cent in 1980, replacing imports which fell sharply after the embargo became compulsory in 1977. However, South Africa's claims to military self-sufficiency are extremely difficult to evaluate, due to the extensive below-the-counter trade in parts, spares, technological know-how and dual-use technologies.²⁴ South Africa has also acquired nuclear technology from Western firms and research establishments, theoretically for civilian purposes, although the balance of evidence suggests that South Africa has used this to develop and test its own nuclear weapon.²⁵

Despite its apparent success, however, South Africa's total strategy rests on shaky foundations, being threatened by its high costs, by recession in the economy, by recruitment difficulties and, above all, by the resistance of Black South Africans. This resistance was rekindled in 1984 by the government's own constitutional changes, precipitating major demonstrations organized by the United Democratic Front (UDF), which emerged to co-ordinate the protests of African, Coloured and Indian communities. The government responded harshly, among other things by calling in the military in November 1984 to take part in massive searches for dissidents in the Black townships.

The Frontline States, especially Angola and Mozambique, have been almost irreparably damaged by prolonged South African destabilization. Their military expenditures have soared (figure 9.2(d)). Nevertheless the total military spending of all six Frontline States remains considerably less than that of South Africa, illustrating the enormous disparity with the resources the latter has at its disposal. Economic activity has effectively ceased over broad regions as a result both of direct South African military action and of the activities of the South African-supported insurgent groups. A considerable proportion of the population in the affected areas have become internal refugees. Things have been made even worse by the drought and famine that developed in Southern Africa between 1982 and 1984. Thus, although the other Frontline States did not endorse President Samora Machel's claim that the Nkomati agreement was in reality a victory for Mozambique and for the liberation struggle, they had sufficient sympathy for Mozambique's plight not to come out in open condemnation.

IX. Conclusion: the OAU and prospects for regional security

The plight of the Frontline States illustrates all too clearly the vulnerability of African countries in a deteriorating international environment. Yet this does not mean that nothing further can be done to ensure their individual and collective security. Some individual African governments have already taken steps to cut back their military spending and to demilitarize their politics, though with varied success, as seen above.

African governments have also worked through the OAU's diplomatic machinery. The latter is based (under article III of the OAU Charter) on the principles of non-interference in the internal affairs of member states, respect for their territorial integrity (on the basis of internationally recognized boundaries) and the peaceful settlement of disputes. The OAU has its own Commission of Mediation, Conciliation and Arbitration, although in practice this task has devolved on the annual Assembly of Heads of State and Governments and upon *ad hoc* committees appointed to mediate particular disputes.

Mechanisms have also developed to handle conflicts at a sub-regional level. The member states of the Economic Community of West African States (ECOWAS) signed a Mutual Defence and Non-Aggression Protocol in 1981. A similar agreement among the Francophone countries belonging to the *Communauté Economique de l'Afrique de l'Ouest* (CEAO) has been in force since 1977. The Southern African Development Coordination Conference (SADCC), consisting of Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia and Zimbabwe, has discussed how to respond to South African destabilization, although it does not have a formal defence agreement. Individual SADCC members have also co-operated on a bilateral basis: Zimbabwe has sent military units to Mozambique to assist the latter guard railways and pipelines from sabotage by the MNR.

The OAU has at least succeeded in isolating some of the region's conflicts from external intervention (notably the Nigerian civil war of 1967–70) and in preventing the further international escalation of others (like the 1977–78 Ogaden war). However, its diplomatic machinery has moved slowly and has been seriously weakened by the disagreements which emerged between 1980 and 1984 among member states over recognition of the Sahrawi Arab Democratic Republic (SADR) as legitimate government of the Western Sahara, and over the conflict in Chad. These almost led to the disintegration of the OAU itself. The OAU was finally rescued by a spate of diplomatic initiatives which culminated in the November 1984 Heads of State meeting at Addis Ababa (although at some cost, since Morocco announced its withdrawal from the OAU because of the decision to seat a SADR delegation at the meeting). The OAU has, in sum, not been notably successful in settling the major conflicts of the continent.

Since the early 1960s there has been a debate among African states over the creation of an Africa-wide military force. Some African leaders like the late Kwame Nkrumah of Ghana argued for the establishment of an African High Command under the banner of the OAU, capable of standing up to South African aggression and of functioning as a peace-keeping force. Others argued for a more limited and purely peace-keeping force under the umbrella of the OAU's Defence Commission. The first practical steps in this direction were taken with the decisions to dispatch neutral inter-African forces to Chad in 1979-80 and 1981-82. The first of these forces was not mobilized (except for a small contingent dispatched by the Congo). The second, composed of 4 800 troops from Nigeria, Zaire and Senegal, was sent to Chad, following diplomatic initiatives by France and within the OAU. However, there was political disagreement over its role in Chad and it lacked clear operational instructions. In consequence it stood by while Habré's army swept past it into power in 1982.

Some of the shortcomings mentioned have arisen from weaknesses in

the OAU's decision-making machinery. However, there are also problems of a more structural nature. To the extent that African conflicts have tended to develop a deep-rooted social character, like the wars in Eritrea and Western Sahara, they are not easily dealt with through the OAU's diplomatic machinery—which is better suited to the resolution of disputes among states.

South Africa's military build-up, moreover, is a fundamental challenge to the entire OAU system. In the past the liberation movements held the initiative, supported by the Frontline States and by the OAU's Liberation Committee. It has proved far more difficult to organize an effective response to South Africa's sustained destabilization of the Frontline States, undertaken since the late 1970s. A negotiated settlement on South African terms-such as those offered Mozambique in 1984 under the Nkomati accord-would be neither a satisfactory nor a durable alternative. Thus it is crucial that broad international support be mobilized for more effective implementation of the international arms embargo on South Africa, based on more stringent criteria concerning items with a possible military end-use (at present left to the governments of the exporting countries to define unilaterally). So far as possible this should be co-ordinated with economic measures like the oil embargo imposed by members of OPEC. At the very least international economic mechanisms (such as IMF stand-by credits) should not be used as at present to rescue the South African economy from difficulty.

Although in the past the OAU has had some success in isolating African conflicts from the cold war, external pressures are on the increase and systematically undermine the continent's collective security. African countries have been demanding that Africa be recognized as a nuclear weapon-free zone since before the signature of the OAU Charter in 1963—a demand initially prompted by France's nuclear testing in the Sahara. Several African countries would directly benefit, too, from the proposals to create a zone of peace in the Indian Ocean. Both proposals received strong African support at the 1978 and 1982 United Nations Special Sessions on Disarmament.

These initiatives are threatened, however, from two main directions: first, by the fact that South Africa is believed to have developed its own nuclear weapon or at the very least the capacity to produce such a weapon, though it shields itself from international censure behind official denials. Along with evidence of military and nuclear collaboration between South Africa and Israel²⁶—also believed to possess an undeclared nuclear weapon capability—this has become a matter of major concern to the OAU.

The acquisition by the major world powers of bases and military

facilities in Africa and their increasingly open intervention in African conflicts, described above, are even more destabilizing. It is quite conceivable—given current developments in strategic doctrines and in weaponry—that nuclear weapons be deployed and even used in Africa and around its coastlines in the course of a future conflict between the powers. Foreign military facilities are against the spirit of the OAU Charter. Foreign bases are explicitly ruled out by the ECOWAS protocol of Defence and Mutual Security (although some Francophone members of ECOWAS maintain that this does not cover French military 'facilities' in their countries). Yet too many African governments are dependent for their survival on military support given to them by outside powers. And this makes it difficult in practice to mobilize their support for disengagement from the cold war and the arms race.

Notes and references

- 1. The phrase comes from Republic of South Africa, White Paper on Defence and Armaments Supply 1982 (Cape Town, 1982), p. 3.
- 2. Described in: World Bank, *Toward Sustained Development in Sub-Saharan Africa* (The World Bank, Washington, D.C., September 1984), from which most of the figures quoted below concerning African development are taken.
- 3. It is remarkable that the five countries in which military spending has declined during the 1970s—Central African Republic, Ghana, Nigeria, Uganda and Zaire—had all previously enjoyed periods of rapid military growth, stimulated by windfall export earnings and presided over by military governments. In each case this military expansion ultimately contributed (along with the subsequent decline of exports) to the collapse of the economy and military retrenchment.
- 4. These discrepancies are discussed in Ball, N., Third World Security Expenditure: A Statistical Compendium, FOA report C 10250-M5 (Swedish National Defence Research Institute, May 1984), pp. 3-49. See also Brzoska, M., 'The reporting of military expenditures', Journal of Peace Research, Vol. 18, No. 3, 1981.
- 5. Although Egypt is commonly analysed as part of the Middle East, it is included in this survey because it is also a founding member of the Organization of African Unity, being the country in which the two regions geographically and socially intersect.
- 6. This is the range of variation in the figures in World Military Expenditure and Arms Transfers 1972-82 (US Arms Control and Disarmament Agency, Washington, D.C., April 1984).
- 7. Brzoska, M., 'Arms transfer data sources', Journal of Peace Research, Vol. 26, No. 1, 1982. The tendency of the available international arms transfer data series to underestimate French arms sales by comparison with French official sources is documented in Kolodziej, E.A., 'Measuring French arms transfers', Journal of Conflict Resolution, Vol. 23, No. 2, 1979.
- 8. The civilian governments of at least eight African states originate in some manner from coups on behalf of the current ruling group (Guinea-Bassau, Uganda, Comoros, Seychelles and Lesotho), civil wars (Chad) or transfers of power by a military regime (Egypt through the gradual 'civilization' of a military government; Sierra Leone following a counter-coup in 1968 by rank-and-file soldiers against the previous military regime). The great majority of African civilian governments operate closed political systems, based on presidential or one-party rule. At the same time military governments have 'civilianized' themselves by co-opting politicians and civil servants or creating their own political support structures. More than half of the military regimes in Africa have established their own political prize; and others such as Libya, Ghana and Burkina Faso (formerly Upper Volta) have (at least in theory) established systems of popular consultation organized around peoples' committees.
- 9. Azania is the name for South Africa used by the liberation movement.

- 10. United Nations High Commissioner for Refugees, Refugees Magazine, No. 5, December 1983, p. 53.
- 11. France's role is described more fully in Luckham, R., 'French militarism in Africa', Review of African Political Economy, No. 24, May-August 1982. See also Kolodziej, E.A., 'French arms trade: the economic determinants', in SIPRI, World Armaments and Disarmament, SIPRI Yearbook 1983 (Taylor & Francis, London, 1983), pp. 371-90.
- 12. It was remarkable only in that it was undertaken by the socialist government of M. Mitterrand who had been one of the more vocal critics of France's alleged role as "gendarme of NATO in Africa" when in opposition.
- 13. US Department of State, Soviet and East European Aid to the Third World, 1981 (Department of State Publication 9345, Washington, D.C., February 1983).
- 14. Nevertheless Colonel Gaddafy's efforts to transmute weapons into influence have not met with uniform success—backfiring badly in the course of the OAU Heads of State Conference in Tripoli in 1982 when the conference broke up without a quorum over the issues of the Western Sahara and Chad, Gaddafy losing his opportunity to become the Organization's Chairman.
- 15. A fuller description of the arms race in the Horn is given in Luckham, R. and Bekele, D., 'Foreign powers and militarisation in the Horn', *Review of African Political Economy*, Nos 30 and 31, September and December 1984.
- 16. The latter two may have had an undue influence on the aggregate regional figures because of their high inflation rates, which tend to exaggerate the estimates of their constant price spending in the early period.
- 17. The military budget was reduced from a peak of 41 per cent of central government expenditure and 7 per cent of GDP in the last year of the civil war (1969) to 9 per cent and 3 per cent respectively in 1980. At the same time, however, the army was re-trained and reequipped, the capital component of defence spending rising from a low of 11 per cent of the total shortly after the war to 48 per cent in 1980 (as compared with 32 per cent at the peak of the civil war).
- A useful summary of the total strategy in the context of South Africa's national security bureaucracies is Davies, R., O'Meara, D. and Dlamini, S., *The Struggle for South Africa:* a Reference Guide to Movements, Organisations and Institutions, Vol. 1 (Zed Press, London, 1984), pp. 178-97.
- 19. See Resister, No. 32, June-July 1984; Resister, No. 35, December 1984-January 1985, describes the increases in the police budget.
- 20. The estimates in International Institute for Strategic Studies, *The Military Balance 1984-85* (IISS, London, 1984) are 83 000 for the regular South African forces (i.e., members of the permanent force plus national service-men) and 404 000 men for South Africa's total mobilizable strength. They do not include any figures for the total numbers actually under arms from the Citizen Force and commandos. Estimates of the latter are made in *The Apartheid War Machine* (International Defence and Aid Fund, London, 1980), whose figures for the permanent force and national service-men are also higher. The latter are updated in *Apartheid's Army in Namibia* (International Defence and Aid Fund, London, 1982). Both publications, though slightly dated, are indispensable sources on South Africa's military establishment.
- 21. Recruitment of African, Coloured and Indian soldiers into the SADF has already substantially increased. See Grundy, K. W., Soldiers Without Politics: Blacks in the South African Armed Forces (University of California Press, Berkeley, 1983).
- 22. See Apartheid's Army in Namibia (note 20).
- 23. Further details of South Africa's military industries will be provided in SIPRI's forthcoming study of arms production in the Third World (from which some of the figures provided below are taken: Ohlson, T. and Brzoska, M., Arms Production in the Third World (Taylor & Francis, London, 1985)); and in SIPRI, Southern Africa, the Escalation of a Conflict (Almqvist & Wiksell, Stockholm, 1976).
- 24. NARMIC/American Friends Service Committee, Automating Apartheid, US Computer Exports to South Africa and the Arms Embargo (Philadelphia, 1982).
- 25. The most cogent summary of this evidence is in Smith, D., South Africa's Nuclear Capability (World Campaign Against Military and Nuclear Collaboration with South Africa, and United Nations Centre Against Apartheid, London and New York, 1980).
- For details of South Africa's military and nuclear collaboration with Israel, see Resister, No. 34, October 1984; and Adams, J., The Unnatural Alliance: Israel and South Africa (Quartet Books, London, 1984).

Appendix 9A. Inventory of military government, armed conflict and external military intervention in post-colonial Africa

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	Major armed conflic	ts in region ^a					Number of	Years of military
Region	Internal	External	Direct external military interventions ^b	Country ^c	Date of independence	Origin of regime ^d	successful coups	government since independence
Northern	Algeria, 1954-62, in	dependence	Algeria, 1954-62	Libya	1951	M	1	16
Africa	war		(France)	Algeria	1962	М	1	(20) ^e
	Algeria, 1962–63,	Arab–Israeli wars,	Tunisia, 1961, Bizerta	Egypt		$C + M^f$	1	(?) ^e
	postrevolutionary	1967 and 1973	incident (France)	Morocco	1956	С	-	-
	uprisings		Western Sahara, 1973–76 (Spain)	Tunisia	1956	С	-	-
West C Africa V	Western Sahara, PO independence: agains Mauritania, 1976–79 1976–present	LISARIO war of st Spain, up to 1976; y; and Morocco,	Western Sahara, 1977–78 (France)					
West	Guinea-Bissau, 1963-	-74, independence	Senegal, 1962, counter-	Benin	1960	М	6	19
Northern Algeria Africa war Algeria postrew uprisin Wester indepen Maurit 1976–J West Guinea Africa war Nigeria civil w	war		coup (France)	Burkina Faso	1960	М	4	19
	Nigeria, 1967–70, civil war		Guinea-Bissau, 1963-74 (Portugal)	(formerly Upper Volta)				
			Guinea, 1970, invasion	Togo	1960	Μ	1	18
			by exiles (Portugal)	Mali	1960	М	1	17
			Nigeria, 1967-70	Ghana	1957	М	5	15
			(mercenaries)	Nigeria	1960	М	4	15
			(mercenaries)	Niger	1960	М	1	11
			Sierra Leone 1971	Mauritania	1960	М	2	7
			countercoup (Guinea)	Liberia	1847	М	1	5
			Gambia, 1980–81,	Guinea	1958	М	1	1
			countercoup (Senegal, UK)	Guinea- Bissau	1974	$C + M^f$	1	(?) ^e
				Sierra Leone	1961	С	2	1

Appendix 9A. (Continued)

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	Major armed co	onflicts in region ^a					Number of	Years of military
Region	Internal	External	Direct external military interventions ^b	Country ^c	Date of independence	Origin of regime ^d	successful coups	government since independence
				Cape Verde	1975	С	_	_
				Gambia	1965	С	-	_
				Ivory Coast	1960	С	-	_
				Senegal	1960	С	-	_
Central	Cameroon, 1955–62, war over independence arrangements Zaire, 1960–67, series of secessionist wars and populist rebellions Rwanda, 1963–66, ethnic violence Burundi, 1965–66 and 1972, ethnic	5–62, war over	Cameroon, 1955-62	Zaire	1960	М	2	20
Africa	independence ar	rangements	(France)	Burundi	1962	М	2	19
	Zaire, 1960-67,	• .	Zaire, 1960–63 (mercenaries; UN), 1964 (Belgium, USA),	CAR	1960	М	3	18
Region Internal Central Cameroon, Africa independence Zaire, 1960- series of sec wars and po rebellions Rwanda, 19 ethnic violen Burundi, 19 and 1972, et violence Chad, 1966- war, 1980-p Zaire 1977 a populist reb Shaba	wars and populi	onist ist		Congo	1960	М	> 1 g	17
	rebellions		1966–67 (mercenaries)	Rwanda	1962	М	1	12
	recemons Rwanda, 196366, ethnic violence Burundi, 196566	Gabon, 1964, counter- coup (France)	Equatorial Guinea	1968	М	1	6	
	Burundi, 1965–66		CAR, 1967, against riots	Chad	1 96 0	$C + M^{f}$	3	? ^e
	and 1972, ethnic	2	(France)	Cameroon	1960	С	-	_
	violence		Chad, 1968–75 (France),	Gabon	1 96 0	С		_
	Chad, 1966-79, war, 1980-prese	FROLINAL revolutionary	19//-80 (France), 1979-80 (Nigeria, OAU).	São Tomé and	1975	С	-	_
	war, 1980–present, civil war Zaire 1977 and 1978, populist rebellions in Shaba		1980-81 (Libya), 1981-82 (OAU), 1983-84 (Libya; France), Libya in per- manent occupation of Aozou strip from 1973	Príncipe				
			Zaire (Shaba) 1977 and 1978 (France, Belgium, USA, Morocco, Senegal, Ivory Coast, Togo and Gabon)					
			CAR, 1979 coup (organized by France)					

Horn, Eastern Africa	Kenya, 1952-60, indep	Kenya, 1952–60, independence war (Mau Mau rebellion)	Kenya, 1952-60 (UK)	Sudan	1956	М	>2 ^g	23
Eastern	Mau rebellion)		Kenya, Tanzania and	Somalia	1960	М	1	16
and	Sudan, 1955–72,	Somalia, 1962–68,	Uganda 1964, against	Madagascar	1960	М	1	13
Indian	civil war in South	with neighbours	Ethiopia 1077 procent	Ethiopia		М	>18	11
Ocean	Ethiopia, 1961– pre-	Somalia–Ethiopia	Ogaden and Eritrea wars	Uganda	1962	С	>2 ^g	9
	Eritrea (widened to	1977–78, Ogaden	(USSR, Cuba, German	Comoros	1975	С	2	-
	other regions since	war	DR and S. Yemen)	Seychelles	1976	С	1	-
	1975)	Uganda-Tanzania	Uganda, 1978–79 war (Libya; Tanzania and Mozambique)	Djibouti	1977	С	-	-
	Zanzibar, 1964	tion war against		Mauritius	1968	С	-	-
	Uganda 1962-63	Gen. Amin	Comoros, 1978 coup	Kenya	1963	С	-	-
	and 1966,	Somalia-Ethiopia	(mercenaries)	Tanzania	1 96 1	С	-	-
	Ruwenzuru and Buganda uprisings	1982 (Ethiopia/ SSDF incursion)	Seychelles, 1981–82 (mercenaries, Tanzania)					
	Sudan, 1983– present, resumption of civil war in South							
Southern	Angola, 1961-74, inde	pendence war	Angola, 1961–74	Angola	1975	с	_	
Africa ·	Mozambique, 1962-74	, independence war	(Portugal) Mozambique, 1961–74 (Portugal)	Botswana	1966	С	_	_
	Zimbabwe, 1966-80, i	ndependence war		Lesotho	1966	С	1	-
	Namibia, 1966-present	, independence war		Malawi	1964	С	_	-
	Angola, 1975-76, inva	ision by South	Swaziland, 1963, against strike (UK)	Mozambique	1975	С	_	-
	Africa		Zimbabwe, 1967–80	Swaziland	1968	С	-	-
	Angola, 1975-present,	anti-revolutionary	(South Africa)	Zambia	1964	С	-	-
	Africa	, FNLA and South	Namibia, 1966-present	Zimbabwe	1980	С	_	-
	Malawi, 1964-67,	Botswana, 1977,	(South Africa)	Namibia	Still colony	(MO) ^{<i>h</i>}	-	-
	internal rebellions	border clashes	Angola, 1975–76 (South Africa, CIA	South	1910	С	-	-
	Mozambique, 1976– present, MNR insurger	with Rhodesia ncy Mozambique,	Zaire and mercenaries; Cuba and USSR)	Africa	(Republic 1961)			
	South Africa, armed struggle initiated 1961, gathering momentum since 1976	1981, and Lesotho, 1982, South African commando raids	Angola 1975-present (South Africa; Cuba, USSR and German DR)					

	Major armed conflic	ts in region ^a					Number of	Years of military
Region	Internal	External	Direct external military interventions ^b	Country ^c	Date of independence	Origin of regime ^d	successful coups	government since independence
	Zimbabwe, 1982– present, insurgency in Matabeleland		Zambia and Mozambique, 1977–80 (air strikes by Rhodesia)					
			Lesotho, 1980 and 1982, attempted destabiliz- ation and commando raid (South Africa)					
			Mozambique, 1976– present, during MNR insurgency (Rhodesia to 1980, South Africa since then; Zimbabwe assistance to Mozambique)					
			Zimbabwe, Matabeleland insurg- ency, 1982–present (South Africa)					
^a Does no with both columns. ^b Direct p nal count supply of the oppo this is int ^c Countri of militar ^d M = mi ^e It is imp	bt include civilian riots, in an external and an in participation by the arm try. Country or group f arms, finance or train sed parties in a conflict dicated by a semicolon es within each sub-regi ry government since ind litary, $C =$ civilian. possible to provide pre government because of	, coups or minor bo ternal dimension are ned forces or securit intervening is in bra ing not provided on are aided by differe between them. on are listed accordi- dependence. cise figures for the n definitional ambigui	rder skirmishes. Conflicts e spread across both ty personnel of an exter- ckets. Does not include the spot. In cases where ent external countries, ting to number of years number of years under ities.	It is impossible egime for these Figure for the ion of conflictir Namibia under Sources: Luckha ion, Alternative Middle East and Research Bulletin	to make a clear of countries. number of coups ng factions within de facto military m, R., 'Armamer s VI, 1980; Europ <i>I The Middle East</i> n (monthly).	distinction b would be la governmen occupation ats, underde aa, Africa S and North	between milita urger if police ts had been ir by South Af evelopment an outh of the S Africa (annu	ary and civilian coups or elimina- ncluded. rica. Id demilitarisa- <i>ahara and the</i> als); and <i>Africa</i>

10. Arms production in the Third World¹

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Superscript numbers refer to the list of notes and references at the end of the chapter.

I. Incentives and expectations

When a Third World government decides to invest in local arms production, this decision reflects ambitions on a larger scale than those reflected in a policy to import weapons. The overriding rationale for efforts to implement indigenous arms production is to reduce dependence on outside suppliers, but other political factors may also play a role: for example, a struggle for regional power status or national or regime prestige. Economic factors are also decisive. Several governments in developing countries believe that they can reduce costs incurred for arms acquisitions by substituting domestic arms production for arms imports. It is also argued that arms production programmes can indirectly contribute to the civilian economy by improving manpower skills and by increasing labour productivity. Finally, the acquired sophisticated arms production technology is expected to help the economy keep abreast of modern technology in general: arms production technology is claimed to have spin-off effects on other industrial branches, thus stimulating overall industrial development and benefitting the economy as a whole.

These incentives, on the demand side, are only part of the picture. There is also a general willingness on the part of governments and companies in industrialized countries to meet the demand for technology imports. A major political motive for supplying arms and arms production technology is to exert political influence. As the recipient states have attempted to diversify their sources of supply in order to maximize independence, suppliers (governments as well as firms) have agreed to export production technology in order to maintain political influence and expand their markets. Rather than lose a customer to a competitor, companies in industrialized countries are now more favourable to arrangements for co-production and licensed production.

Another motivation for the willingness of arms producers to transfer production know-how and technology to developing countries is the reduction in costs for components which can be produced with cheap labour in these countries. Such components are occasionally produced on a sub-contracting basis and then exported to the licenser.

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The extent to which the production of arms in Third World countries is possible depends on (a) the diversification of the country's industry, its skilled manpower base and the level of its R&D facilities; (b) the production costs (given the small production runs), the size of the local market and the possibilities for exporting the arms produced; and (c)the access to production technology, know-how, licences, patents, and so on. This chapter gives an overview of arms production in the Third World and discusses some of the important economic, political and technological implications.

II. Development patterns for arms production

The domestic production of arms in Third World countries often follows a fairly uniform step-by-step pattern. Know-how gained serves as a basis for subsequent phases. With respect to technological advances, the following five phases are common. The first step is usually the import of equipment for *repair*, *maintenance and overhaul* of imported weapon systems. Foreign suppliers export technological skills by training personnel in the recipient countries.

The next step often involves the assembly of imported arms. Components, subsystems and unassembled kits of particular weapon systems are purchased abroad and assembled domestically.

During the third phase, simple components are produced locally under licence, while sophisticated and more expensive parts continue to be delivered from abroad. Licence-produced and imported components are then assembled domestically. At this stage, producers in the developing countries normally lack experience in introducing new production techniques and must therefore rely on foreign technical support. Close co-operation is required between the licenser and the licensee, to guarantee the transfer of production technology and its accurate application.²

In the fourth stage, a major portion of *the weapon system is licenceproduced*. While the number of imported parts is reduced so that it can be said that the weapon is 'produced domestically', many sophisticated components still have to be imported.

The fifth and final stage is the *indigenous design and production of* weapon systems. This stage can only be initiated—at least for technologically advanced weapon systems—on the basis of many years of production experience and when very sophisticated and diversified R&D facilities are set up. Design and production often are still dependent on some know-how and technology input from producers in the industrialized countries.³

III. Status of the development of arms production capacities

Table 10.1 lists 22 developing countries engaged in the production of major weapons. In addition, there are several countries not listed, in which only ammunition or small arms are produced, or where in the past a small number of simple ship hulls have been produced locally.⁴ These are such isolated efforts that they are not considered relevant to this examination of Third World arms production. The register of arms-producing countries includes eleven countries in Asia, six countries in Latin America, three in the Middle East and two in Africa. The level of domestic arms production attained in the respective countries differs widely; and within a country, various projects have reached different stages.

Modern fighter aircraft are built in 12 countries, while light aircraft, light trainers and transport aircraft are manufactured in 13 countries. Ten aircraft manufacturers throughout the developing world have produced or assembled helicopters, and another eight have produced guided missiles. Major fighting ships, such as destroyers, frigates, corvettes or fast attack craft, are constructed in 12 countries. Nearly all the developing countries in table 10.1 produce small fighting ships, but they often produce only the hulls locally; the engines, weapons and electronic equipment are usually imported. Submarine progammes are limited to four countries, and the manufacture of battle tanks has been introduced in three. Artillery and cannons are manufactured in 10 of the 22 countries, and armoured personnel carriers and other military vehicles are built in 11 countries. The countries can be ranked by aggregating table 10.1 by country: for example, Argentina, Brazil, India and Israel belong to the group of most advanced producers (group A).

Table 10.2 provides a time perspective. Arms production in Third World countries, with few exceptions, is a fairly recent phenomenon. A dynamic expansion has taken place since the late 1960s.

The foremost arms producers in Latin America are Argentina and Brazil. Argentina has had a long history of unsuccessful attempts to establish an autonomous arms industry, starting from the era of President Peron. Most of these projects were later abandoned. Production is currently directed mainly towards licence agreements with the expressed aim of reaching stage 5, the indigenous development of weapons. Brazil's arms producers stress indigenous production and have been successful in exporting armoured fighting vehicles and light aircraft. African arms production is negligible, except for that of South Africa: despite the UN arms embargo, South Africa

	t.											
Region/ country	Fighters, light fighters, jet trainers	Light planes, transport planes	Helicopters	Guided missiles	Major fighting ships, fast attack craft	Small fighting ships	Submarines	Main battle tanks	Artillery	Light tanks, APCs	Small arms	Group
Latin America	-											
Argentina	5	5	4	5	4	5	3	4	5	4	5	Α
Brazil	5	5	3	5	5	5	3	5	4	5	5	Α
Chile	3	3	_	-	_	5	_	_	_	5	5	С
Colombia	_	3	_	_	-	5	-	-	-	_	2	D
Mexico	_	_	-	_	-	5	_	_	_	3	4	D
Peru	3	-	-	-	4	5	-	-	-	-	5	С
The Middle East												
Egypt	3	5	3	5	5	5	_	_	3	5	5	В
Iran	_	×	_	x	_	-	-	-	_	×	4	D
Israel	5	5	1	5	5	5	_	5	5	5	5	Α
Africa												
Nigeria	_	_	2	_	_	_	_	-	_	0	3	D
South Africa	4	4	1	5	4	5	3	1	5	5	5	В

Table 10.1. Stages of production reached by 22 Third World arms producers, 1984^a
Asia												
Burma	_	-	_		_	3	-	-	_	_	3	D
India	5	5	4	5	5	5	3	5	5	5	5	Α
Indonesia	-	5	4	_	-	5	_	-		_	4	С
Korea, North	(3)	-	-	-	5	5	3	(4)	4	4	4	В
Korea, South	4	-	4	×	5	5	0	5	4	4	5	В
Malaysia	-	-	-		3	5	_	_	_	_	4	D
Pakistan	1	4	2	3	0	1	_	1	_	_	4	С
Philippines	3	5	4	_	_	5	_		_	_	4	С
Singapore	1	1	1	_	4	5	-	1	3	1	5	С
Taiwan	4	5	3/4	5	4	5	_	1	5	5	5	В
Thailand	_	5	_	_	-	5	_	_	-	_	4	D

Key to production stages:

0 = planned

1 = major overhaul and refurbishment capacity

2 = assembly

3 = licensed production of components

4 = licensed production of weapon systems (import of sophisticated parts)

5 = indigenous design and production

 $\times =$ status unknown

() = estimate

- = nil

^a Only the most advanced projects in each category and for each country are registered here.

Sources: SIPRI; Archive of the Institute for Peace Research and Security Policy, University of Hamburg.

Key to groups:

A = diversified and sizeable arms production

B = production in most categories

C = production in several categories

D = limited production

Country	Year" 1965	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84
Fighters ^b															_					
India	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
South Africa				×	×	×	×	×	×	×	×	×	×	×	×	×				
Brazil							×	×	×	×	×	×	×	×	x	×	×	×	×	x
Israel								×	×	×	×	×	×	×	×	×	×	×	×	×
Taiwan										×	×	x	×	×	x	×	×	×	×	×
Korea, North										~	(\mathbf{x})	(X)		~	~	~		~	~	~
Argentina											x	x	×	×	×	×	×	×	×	×
Korea, South											~			~	~	x	×	×	×	×
Egypt																		×	×	×
Chile																		~	~	Ŷ
Peru																				(×)
Helicopters																				
India	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Taiwan					×	×	×	×	×	×	×	×	×							
Philippines										×	×	×	×	×	×	×	×	×	×	×
Argentina										×	×	×	×	×	×	×				
Indonesia												×	×	×	×	×	×	×	×	×
Korea, South														x	×	×	×	×	×	(X)
Brazil															×	×	×	×	×	`x´
Egypt																×	×	×	×	×

Table 10.2.	Years of	production of	of certain	weapon	systems in	Third	World	countries,	1965-84
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Missiles																				
India			×	×	×	×	×	×	×	×	X	×	×	×	×	×	×	×	×	×
Israel			(×)	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
South Africa												×	×	×	×	×	×	×	×	х
Brazil												×	×	×	×	×	×	×	×	×
Pakistan													(×)	(×)	(×)					
Egypt														×	×	×	×	×	×	×
Taiwan														×	×	×	×	×	×	×
Argentina														(×)	×	×	×	×	×	×
Battle tanks																				
India	×	×	×	х	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	х
Korea, North					(X)	(×)	(X)	(X)	(X)	(X)	(X)	(X)	(×)							
Israel					. ,		• •	• •	• •	. ,			ÌxÍ	x	Ìx ́	x	ÌxÍ	ÌX	x	×
Argentina															×	×	×	×	×	×
Brazil																×	×	×	×	×
Korea, South																			×	×
Maior fighting ships ^c																				
Korea, North	×	×					×	×	×	×	×	×	×	×	×	×	×	×	×	×
India				×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
Argentina							×	×	×	×	x	×	×	×	×	×	×	×	×	×
Brazil								×	×	×	×	×	×	×	×	×	×	×	×	×
Peru															×	×	×	×	×	×
Korea, South																×	×	×	×	×

^a Years are for actual production (excluding assembly).
 ^b Fighter aircraft include COIN roles, exclude trainers.
 ^c Destroyers, frigates, corvettes and submarines.
 () = Uncertain status.

Source: SIPRI.

Arms production in the Third World

has been able to import technology and machinery to produce arms locally.

Israel has established the most sophisticated arms production capacity of all the developing countries. Egypt has established a major arms production complex in co-operation with west European and US arms producers. It also had a number of major-weapon programmes in the 1950s and 1960s. The status of Iran's previously far-reaching arms production plans is uncertain. Of the 11 Asian countries which produce arms, India has launched the technically most ambitious programme, trying to reach self-sufficiency not only in production but also in design and development. The government of India has initiated programmes in each of the 11 arms categories covered in table 10.1, often relying on indigenous development. Taiwan and South Korea are second and third on the list for technically advanced countries in Asia: both countries have considerably expanded their production capacities for a wide variety of weapon systems, especially during the early 1980s. North Korea has a diversified arms industry, with emphasis on shipbuilding, mostly based on Soviet designs and technology. Five ASEAN (Association of South-East Asian Nations) countries-Indonesia, the Philippines, Malaysia, Singapore and Thailand-are relative newcomers, trying to translate successes in civilian manufacturing into arms production.

IV. Self-sufficiency versus imports

Modern arms production usually requires a capacity for high technology in several branches of industry. The production process is highly complex and requires inputs from a diversified industrial base. Since a broad industrial base is atypical for developing countries—as are adequate research and development facilities—weapons and components of weapon systems are often produced under licence or derived from foreign models through copying or reverse-engineering. Projects developed indigenously often require technical assistance from foreign personnel and, as a rule, the more sophisticated components are imported.

Of the different types of aircraft produced in developing countries, more than half are produced under licence (see table 10.1). This is also true of the production of major warships. The production of helicopters and submarines is particularly difficult: neither type has been both developed and produced in a Third World country. Indigenous design is concentrated in the fields of small arms and minor ships such as patrol craft. More than two-thirds of all licences originate in western Europe. The United States and the Soviet Union are much more restrictive (see the register of licensed production, appendix 11C).

The dissemination of arms production technology is usually not limited to a simple licenser-licensee relationship. Licensers frequently incorporate technology imported from other countries into the weapon system before granting a production licence to another country. The industrial and political relationships involved are therefore very complex and interwoven. Figure 10.1 illustrates the dissemination of technology for the Aviocar transport aircraft, produced under licence in Indonesia. The design—by the Spanish firm CASA, partly owned by Northrop Corporation, USA—began with R&D assistance from MBB of FR Germany in 1968.

The level of indigenous production in many categories is one measure of self-sufficiency; the content of indigenous production in a particular weapon system is another. Reducing the import content below 30 per



Figure 10.1. Diffusion of technology: the case of the transport aircraft Aviocar

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cent, even in production programmes marked as 'indigenous development', is the exception rather than the rule. A case in point is main battle tank programmes: even the most experienced Third World arms producers have to import most of the essential components (see table 10.3).

In general, beyond basic assembly and simple production, the technical diseconomies of further import substitution become substantial. Dependence on imported know-how and materials tends to increase with the degree of sophistication. Moreover, an attempt to increase the domestic content per unit of output by substituting for imports normally leads to a steep rise in costs. A higher indigenous content

	ТАМ	Merkava	Vijayanta
First year of production	1981	1979	1965
Producing country	Argentina	Israel	India
Country of origin	FR Germany, Argentina	Israel	UK/India
Engine model	MTU, FR Germany	Teledyne-Continental, USA	Leyland, UK
Transmission/ steering	Renk, FR Germany	GM Allison, USA	Merritt-Wilson, UK
Main armament	Rheinmetall, FR Germany (licence)	M64, UK (licence)	L7 A1, UK (licence)
Machine-gun	FN, Belgium (licence)	FN, Belgium (licence)	••
Commander's vision system	Steinheil, FR Germany	Israel	
Secondary sight	Zeiss, FR Germany		
Night vision		Mitsubishi, Japan	Bofors AB, Sweden
R&D	Thyssen-Henschel, FR Germany	Israel, with US financial assistance and hard- and soft- ware supplies	Vickers, UK
Tank fire control system		Israel	Marconi, UK (licence)
Tracks	Diehl, FR Germany	Israel	
Smoke discharger	Wegmann, FR Germany	••	•••
Laser range finder		Israel	

Table 10.3. Foreign collaboration in the production of certain tanks in Third World countries

Sources: von Senger und Etterlin, F.M., Taschenbuch der Panzer 1983, Tanks of the World (Bernard & Graefe, Munich, 1983); Jane's Armour and Artillery (Macdonald, London, several editions).

increases the need for intensified co-operation with foreign firms, as far as high technology is concerned. Even when a Third World firm has reached an advanced stage of production, this does not necessarily imply that the next generation of weapons, usually considerably more technologically complex, can be built without foreign collaboration. A case in point is India: self-sufficiency has been the overriding principle of arms production in India for more than three decades. However, advances in weapon technology create continuing difficulties for reaching self-sufficiency.⁵

V. Effects of industrial bottlenecks

Sophisticated major-weapon systems are usually manufactured from different kinds of industrial metals and materials; standardized components and parts demand a rigid uniformity in material specifications and manufacturing tolerance. Literally thousands of different components have to be produced. Consequently, arms production is dependent on supplies from a wide variety of industries. The production of some types of major-weapon systems creates greater difficulties than others. For example, large-size foundry pieces used for tanks are particularly difficult to produce. This is probably why there are so few tank production programmes in Third World countries.

A weak industrial infrastructure, typical for developing countries, imposes technological limitations if arms production is to proceed beyond assembly and production of parts. The smaller the industrial base and the manpower potential, the less likely is the domestic production of arms.

The dynamic increase in domestic arms production in developing countries in the 1970s can probably be partly explained by the growing manufacturing sector in many countries. The desire to produce arms might also have enhanced the propensity to give priority to industrialization in general and to certain industries in particular. To get an idea of the size of the capacity for arms production in the developing countries, an attempt has been made to identify what may be called 'the potential arms production base'. Statistical data for industrial production and manpower are used to rank the countries.⁶

There is a strong positive correlation between actual arms production and the potential arms production base. Below a certain level of production potential, it is nearly impossible to manufacture weapons (table 10.4). Only those countries up to around rank order 20 are in a position to produce arms on a larger scale.

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Country	Arms production group ^a	Rank order of potential arms production ^b
Israel India Brazil Argentina	A A A A	8 2 1 5
South Africa Taiwan Korea, South Korea, North Egypt	B B B B	4 6 7 n.a. 10
Chile Indonesia Peru Pakistan Singapore Philippines	с с с с с	12 9 21 19 9 15
Colombia Mexico Iran Nigeria Burma Malaysia Thailand	D D D D D D	17 3 20 23 n.a. 22 16
Venezuela Hong Kong Algeria Zimbabwe Uruguay	Marginal production Marginal production Marginal production Marginal production Marginal production	11 13 18 24 25

Table 10.4.	Arms	production	capacity	and	potential	for	27	Third	World	countries,
1984										

n.a. = not available

Sources:

^a See table 10.1, last column.

^b See text and notes.

Most countries with a growing industrial base—particularly the so-called newly industrialized countries (NICs) such as Singapore, South Korea, Taiwan, and others on the threshold to industrialization such as Argentina, Brazil, Egypt, India, Indonesia, Israel, the Philippines and South Africa—are engaged in major-arms production. However, there are a number of deviant cases of particular interest. A few countries with a substantial industrial and/or manpower base are not among the major producers: Mexico and Venezuela, for instance, are in a position to produce more weapons than they actually do. The opposite also occurs. A case in point is Israel; others are Pakistan, Peru, the Philippines and Singapore. It is likely that economic and technical difficulties will result in these countries. The arms industry is likely to absorb more human and material resources than the economies can reasonably be expected to provide, resulting in bottlenecks and inflationary tendencies.

Structural difficulties and bottlenecks in the economies of the developing countries hamstring a policy of self-sufficiency. As long as domestic arms production is based on a weak industrial base, very large investments are required to initiate the design and production of the numerous components of modern weapon systems. Sub-optimal utilization of production capacity characterizes both the late-comer civil industries and arms production. Technological specialization leads to investments in highly diverse and only partly integrated production capacities; the limited demand of the armed forces results in oversized factories and eventually substantial cost overruns. While foreign exchange requirements might be eased by producing a particular weapon system rather than importing it, it seems likely that the import of production technology for setting up the industrial plants involves a drain on the balance of payments, which might be higher than the original saving. Owing to the lack of industrial structure and despite the relatively low labour costs, it is nearly impossible to produce at costs below world market prices. The exact cost calculations for arms production are not publicly available, although it can be observed that the major-arms production programmes in developing countries have been plagued by cost overruns (which is not unusual for arms production in industrialized countries either). Prices quoted for the export of arms do not necessarily reflect actual production costs. Prices are often 'political' prices, taking world market prices as a guideline.⁷

VI. Conclusion

Arms production in Third World countries has increased substantially during the past 15 years. However, it is doubtful whether dependence on imports has decreased correspondingly. Any such decreases have so far been achieved only for some less sophisticated weapon systems in certain countries.

The major difficulty for developing countries wishing to produce arms domestically results from the design and techniques of production of advanced weapon systems, which are related to the economic conditions and the political situations of the industrialized countries. Heavy outlays on research and development constantly produce technological obsolescence in military equipment, thus constantly accelerating the demand for replacement schemes. The high proportion of 'labour costs' in military budgets further reinforces the technological 'escalation' because a deliberate strategy is being developed to replace 'labour' by 'capital' whenever possible.

It can be concluded that for the time being there is no prospect for reaching a high degree of self-sufficiency in production of sophisticated weapons in most Third World countries. On the surface, a more nearly equal partnership between the industrialized countries and those developing countries that have invested in arms produciton has emerged; in reality, basic asymmetries remain. As long as developing countries continue to formulate military scenarios similar to those prescribed for the East–West conflict, they are also bound to rely on the arms technology of the industrialized countries, imported as either complete weapons or production technology. For developing countries, the implications of the technological lead of the major industrial countries in arms production are that, for modern sophisticated weaponry, dependence upon one or more of the major arms-producing countries cannot be avoided.

In a desire to finance arms industries, many countries find it natural to seek markets abroad and to subordinate arms sales policies almost exclusively to economic considerations.

The implications for armaments developments and disarmament efforts are manifold. More nations and producers are offering arms on the world market. The structure of the supplier market has therefore been directly affected. Effective control of arms transfers is becoming increasingly difficult. Concerted supplier action to limit the transfer of arms seems ever more unlikely as the number of producers, and therefore potential exporters, increases. In particular, the rugged, simple, cheap types of weapon, like light aircraft, armoured vehicles, small arms and communications equipment—in great demand especially for internal control in many countries—are now offered for export by developing nation suppliers themselves. Several arms producers in the Third World have demonstrated their ability to produce these kinds of weapon on the basis of a combination of domestic and imported technology.

Notes and references

- 1. SIPRI is currently preparing a detailed factual study of arms production in the Third World, for publication in 1985.
- 2. In this stage, re-export of components produced in developing countries to the licenser can be introduced. Cost considerations and the competition among producers in industrialized countries force them to accept such compensation agreements.
- 3. Modern weapons incorporate complex parts and materials whose fabrication exceeds the technical capacity of even the more advanced Third World states.
- 4. The Third World small-arms producers are: Algeria, Bolivia, Cameroon, Congo, Cuba, Dominican Republic, Ecuador, Ethiopia, Ghana, Guatemala, Guinea, Iraq, Jordan, Morocco,

Nepal, Saudi Arabia, Sudan, Syria, Tunisia, Upper Volta, Venezuela, Viet Nam and Zimbabwe. The shipbuilding countries are: Algeria, Bangladesh, Dominican Republic, Gabon, Honduras, Hong Kong, Ivory Coast, Madagascar, Panama, Senegal, Sri Lanka, Trinidad and Tobago, Uruguay and Venezuela. Light aircraft are also produced in Morocco.

- 5. The Jaguar fighter has been purchased from Britain (it is also partly produced in India), and Sea King helicopters and Sea Eagle anti-ship missiles are again supplied by Britain. Mirage 2000 fighters are imported from France, and FR Germany has agreed to both supply and help in the manufacture of submarines.
- 6. Since the United Nations system of International Standard Industrial Classification (ISIC) does not include the category 'arms industry', an attempt has been made here to identify those sub-categories which are most relevant for arms production: ISIC no. 371, iron and steel; 372, non-ferrous metal; 381, metal products; 382, machinery (not electrical); 383, electrical machinery; and 384, transportation equipment. This selection implies the exclusion of major divisions number 2, 4 and 5: mining, energy production and construction, respectively.

These six key industries, which will be called the 'relevant industries' for arms production, are some of the most advanced industries in terms of their ability to incorporate new technologies and to apply research and development. Their output has been taken as the first indicator of arms production capacity. The second indicator, 'manpower base', consists of two sets of data: the employees or persons engaged in the 'relevant industries', and the total number of scientists, engineers and technicians involved in R&D during the latest year for which data are available.

The output of the six industrial branches is given in the United Nations Yearbook of Industrial Statistics (Vol. I), an annual publication. However, the precision of reporting varies to some extent from country to country. To arrive at comparable data, the share of the six industries as a percentage of manufacturing output was computed. Using the share of manufacturing as a percentage of gross domestic product, it was possible to arrive at a comparable output figure for more than 50 developing countries.

Since no comprehensive data are available for all the countries of interest, some estimates have had to be made in order to arrive at this rank order. It should be pointed out that, for the purpose of this discussion, exact information on the value of output or the number of qualified personnel is not too important.

7. A comparison of prices for light planes illustrates that the aeroplanes produced in Israel and Brazil were not the cheapest available. See Interavia (German edition), July 1974, p. 662. Prices of Israeli-produced fast patrol boats are, however, quoted at about 35-40 per cent below world market prices. See The Economist, 28 August 1976. The successful export attempts of the Singapore-built M-16 rifle are claimed to be a function of the price. By using pressed rather than forged parts without sacrificing durability, it sells for \$340-350, or about one-third cheaper than the original MS M-16, according to The Times of India, 15 December 1983.

11. The trade in major conventional weapons

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Superscript numbers refer to the list of notes and references at the end of the chapter.

I. The flow of arms: general trends

The current trend in the volume of transfers of major weapons, for the period 1980–84, is one of decline. Broken down by year, statistics show that the decline was slow in 1980–82 but was sharper in 1983 and particularly in 1984. Although allowance must be made for a possible upward revision of the figure for 1984 as more arms transfers in that year are identified, the downward trend for the beginning of this decade is clearly visible. (The figures in this chapter are based on the SIPRI values of major weapons *actually delivered* in the given year or years; for a description of the valuation method used, see appendix 11D.)

This downward trend has been largely determined by economic factors. Many countries are facing budget constraints, and many countries, particularly in the Third World, are burdened by debts and can no longer allocate so much funding to armaments. The decline can also in part be explained by market saturation-cycles of weapon acquisition were terminated in the early 1980s in many countries, and they are now pausing to catch their breath. Countries are also increasingly substituting domestic arms production for arms imports. Finally, the structural changes in the arms market to some extent invalidate the usual methods of measuring the value of arms transfers. Arms sales are today seldom straightforward cash or credit deals. They involve the transfer of technology and know-how, industrial offsets and other financial arrangements. There is also an increasing flow to recipient countries of weapon-related items, such as spare parts, components, upgrading and modification kits, and so on. These items are imported instead of ready weapon systems and are omitted from SIPRI's and most other estimates of the size of the global arms trade.

This structural change has been in evidence for some time, but it was overshadowed by the huge increases in arms imports during the 1970s. Its impact on the arms market did not become clearly visible until the 1980s. The change has largely resulted from the increasing leverage recipient countries can exert—which in turn follows from the simultaneous occurrence of competition among a growing number of suppliers and a global reduction in the demand for weapons. It remains

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to be seen whether a revitalized international economy and continued global tensions will reverse current trends. Today the arms market is a buyer's market.

There are a number of additional points to be made from examining the export figures for the period 1980-84:

1. The aggregate figures for the five-year period show that the United States is the leading arms supplier, accounting for almost 40 per cent of total arms exports. The share of the Soviet Union has declined to about 32 per cent (see table 11.1). Seventy-nine countries were recorded as recipients of major weapons from the United States during the period; the corresponding figure for the Soviet Union is 40.

2. The annual values and shares for the past five years (see table 11.1) underline that the US lead over the USSR in total exports is largely

Country	1980	1981	1982	1983	1984	1980-84	Per cent of total exports to Third World, 1980-84
USA	5 577 36.7	5 559 38.5	6 186 <i>42.9</i>	5655 40.1	4 685 <i>40.4</i>	27 662 39.7	48.2
USSR	6 538 <i>43.1</i>	4741 <i>32.9</i>	4 184 <i>29.0</i>	4 174 <i>29</i> .6	2532 <i>21.9</i>	22 170 <i>31.8</i>	76.8
France	1 144 <i>7.5</i>	1 347 <i>9.3</i>	1 241 8.6	1 360 <i>9.7</i>	1 242 <i>10.7</i>	6335 <i>9.1</i>	80.6
UK	431 2.8	532 <i>3.7</i>	667 <i>4</i> .6	519 <i>3.7</i>	822 <i>7.1</i>	2972 <i>4.3</i>	73.5
FR Germany	316 2.1	435 3.0	250 1.7	613 <i>4.4</i>	746 <i>6.4</i>	2 359 <i>3.4</i>	61.0
Italy	366 <i>2.4</i>	531 <i>3.7</i>	576 <i>4.0</i>	374 2.7	372 <i>3.2</i>	2 219 <i>3.2</i>	91.9
Third World	192 <i>1.3</i>	306 2.1	438 <i>3.0</i>	467 <i>3.3</i>	311 2.7	1714 2.5	96.1
China	82 <i>0.5</i>	148 1.0	221 1.5	222 1.6	430 <i>3.7</i>	1 103 <i>1.6</i>	99.4
Others	533 <i>3.5</i>	831 <i>5.8</i>	668 <i>4.6</i>	707 5.0	444 <i>3</i> .8	3 182 <i>4.6</i>	62.9
Total	15 179	14 430	14 431	14091	11 584	69 715	65.8

Table 11.1. The leading major-weapon exporting countries: the values and respective shares for 1980-84

Figures are SIPRI trend indicator values, as expressed in US \$ million, at constant (1975) prices; shares in percentages. Figures may not add up to totals due to rounding.

explained by a downward trend for Soviet arms exports, especially to the Third World. One possible reason for this is the Soviet reluctance to part with advanced production technology, which is now often required by the recipients. Another explanation is the poor performance of Soviet weapons in the 1982 Lebanon War. Some of the Soviet Union's main clients also seem to have acquired more weapons than they have been able to absorb (e.g., Libya and South Yemen).



Figure 11.1. Percentage shares of imports of major weapons by the Third World: by region, 1965-84

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3. The two superpowers taken together account for a decreasing share of the global arms trade. In 1980 they accounted for 80 per cent of total exports, but for only 62 per cent in 1984. This trend becomes even more prominent in the statistics for deliveries to the Third World: the US-Soviet share is down from 79 per cent (1980) to 53 per cent (1984) (see table 11A.2). This is, in part, a consequence of the increased leverage recipients have exerted.

Figure 11.2. Percentage shares of exports of major weapons to the Third World regions listed in figure 11.1, by supplier, 1965-84



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4. France maintains its position as the third largest arms supplier, with a slowly rising trend. There is a steep upward trend in arms exports from Britain, China, FR Germany and Spain.

5. There is a declining trend for some of the smaller west European exporters (e.g., Austria, the Netherlands and Sweden). The overall share of arms exports from Western industrialized countries (except the United States) is rising (see figure 11.3).

6. Third World exporters account for about 3 per cent of total deliveries and for about 4 per cent of all sales to Third World countries. Brazil, Egypt and Israel are the main exporters: they account for over 60 per cent of arms sales from developing countries during 1980-84.

Figure 11.3. Exports of major weapons to the Third World regions listed in figure 11.1, by supplier, 1975–84



^a Other western Europe (excl. France), Canada and Australia.

^bEastern Europe and China.

Source: Table 11A.2.

Statistics for arms imports reveal, among other things, the following facts:

1. About two-thirds of the total trade during 1980-84 consists of arms imports by the Third World.

2. The rate of growth of Third World arms imports has fluctuated considerably. From 1965-69 to 1970-74, the volume rose by 60 per

Figure 11.4. Imports of major weapons, by region, 1975-84



Source: Appendix 11, table 11A.1.

Importing country	Percentage of total Third World import
1. Egypt (4)	10.6
2. Syria (1)	10.5
3. Iraq (3)	10.3
4. India (6)	7.5
5. Libya (2)	6.9
6. Saudi Arabia (5)	6.7
7. Israel (7)	4.8
8. Cuba (8)	3.7
9. Argentina (9)	3.1
10. Jordan (18)	2.1
11. Taiwan (16)	1.8
12. Pakistan (19)	1.6
13. Yemen, South (10)	1.5
14. Morocco (12)	1.5
15. Indonesia (17)	1.5
16. Nigeria (-)	1.3
17. Peru (15)	1.3
18. Algeria (11)	1.2
19. South Korea (14)	1.2
20. Venezuela (-)	1.2
Others	19.7
	Total 100.0
	Total value 45 888

Table 11.2. Rank order of the 20 largest Third World major-weapon importing countries, 1980-84

Percentages are based on SIPRI trend indicator values, as expressed in US \$ million, at constant (1975) prices. Rank order for the period 1979-83 is given in brackets.

cent; it rose by 230 per cent during the boom in 1975-79. But from then to the current period, 1980-84, the rate of growth is only about 4-5 per cent (table 11A.1).

3. During the past few years, the absolute decline in arms imports is most pronounced in Africa and the Far East. In other regions arms imports are fairly constant or slowly rising, depending on the time period chosen (see figure 11.4).

4. The six highest ranking Third World arms-importing countries— Egypt, Syria, Iraq, India, Libya and Saudi Arabia—account for more than 50 per cent of all Third World arms imports (table 11.2).

5. The NATO countries imported about twice as many weapons, in terms of volume, during 1980–84 than did the WTO countries.¹

II. The suppliers

The Soviet Union

Arms exports remain a very important element in Soviet foreign trade and foreign policy, although the volume of exports continued to decrease in 1984. The decline in Soviet arms exports can be seen from many other indicators, as well as the SIPRI statistics. According to US intelligence data, the share of exports in Soviet arms production was lower for most weapon categories in the early 1980s than in the 1970s (see table 11.3).

According to estimates based on Soviet and other east European countries' trade statistics, arms exports in 1983 accounted for about 50 per cent of Soviet exports to non-socialist countries in the Third World and about 8 per cent of exports to socialist countries (see figure 11.5). Arms exports are an important source of hard currency for the Soviet Union.²

The worsened economic situation in many Third World countries and the saturation of imports in client countries such as Libya have recently reduced Soviet hard currency earnings. According to US estimates, credit had to be given for three-quarters of the weapons sold on hard currency terms.³ In these cases there are no immediate financial transfers to the Soviet Union, since the normal grace period is 3-5years. There are signs that the Soviet Union has recently changed its credit policy of charging 2–2.5 per cent interest. In May 1984 Indian officials were offered the full spectrum of Soviet conventional weapons

Table 11.3. US Defense Intelligence Agency estimates of the share of exports in Soviet arms production, by item, 1972–83

	Average 1972–76	Average 1977–81	1982	1983
Armoured vehicles				
Heavy and medium tanks	27	17	16	11
Infantry combat vehicles"	3	6	18	12
Armoured personnel carriers ^a	43	18	20	-
Armoured reconnaissance vehicles	16	25	16	13
SP field artillery ^b	5	10	5	5
Towed field artillery ^b	33	20	4	7
Warships				
Major surface combatants	14	17	25	10
Minor surface combatants	17	37	36	22
Aircraft				
Fighters/fighter-bombers	33	36	36	26
Trainers	43	41	50	29
Helicopters ^c	9	27	25	22
Transports ^c	10	16	17	17

Figures are percentages.

^a The figure for production includes imports.

^bArtillery over 100-mm calibre.

^c Both civilian and military.

Source: Calculated from Congressional Record, US Senate, 10 August 1984, pp. S 10387-89.



Figure 11.5. Share of arms exports in total Soviet exports to non-socialist Third World countries, estimate, 1974-83

Sources: 1974-79: Wharton Econometric Forecasting Associates, Soviet Arms Trade with the Non-Communist Third World in the 1970s and 1980s (Wharton, Washington, D.C., 1983), p. 26; and Wharton Econometric Forecasting Associates, 'Centrally planned economies', Current Analysis, Vol. 4, No. 62, p.4.

in production or on the drawing board but were reportedly also notified that in the future interest rates would be 5 per cent.

In 1984 the Soviet Union succeeded in concluding some politically significant arms deals. After the USA denied requests for Stinger surface-to-air missiles by Saudi Arabia, Jordan and Kuwait, the latter two turned to the Soviet Union. A large deal was concluded with Kuwait, possibly worth \$327 milion, for surface-to-air missiles (SAMs), surface-to-surface missiles (SSMs), armoured vehicles and other military equipment. The Kuwaiti armed forces already operate USmade Hawk SAM systems (some 200 missiles), for which an upgrading programme was agreed in 1984. Soviet and US advisers will in the future work side by side in modernizing Kuwaiti air defence systems. In December 1984 Jordan signed a contract with the Soviet Union for the delivery of air defence radars and surface-to-air missiles.

The Nigerian Air Force ordered Soviet MiG-21MF and MiG-21UTI aircraft in 1984. The Nigerian military, which took power on New Year's Eve 1983/84, had voiced strong discontent with its established west European suppliers. They held negotiations with suppliers throughout the world and finally chose the Soviet aircraft. Both Kuwait

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Figure 11.6. Importers of Soviet major weapons, 1978-82 and 1980-84

Shares are per cent of total imports of Soviet weapons.



and Nigeria have received Soviet weapons in the past, but military relations with the Soviet Union were discontinued. Kuwait received the last of its SA-7 SAMs in 1980; Nigeria obtained its last T-55 tanks in 1981. Jordan has been a more regular Soviet customer, but relies mostly on Western suppliers.

Economically more important were new Soviet sales to traditional customers, such as MiG-25 Foxhound and MiG-29 aircraft to India, MiG-23 and -25 aircraft and T-62/72 tanks to Iraq and air-to-air missiles (AAMs) to Syria. These three countries also accounted for the majority of Soviet deliveries in 1980–84 (see figure 11.6).

Other socialist countries

Arms exports from WTO countries other than the Soviet Union, and from other socialist countries, rose notably in the early 1980s.

Like other east European countries, *Bulgaria* is reluctant to reveal any information about its arms exports; no official data are published. However, a US research firm estimates that arms were the leading export earner in 1982, accounting for 9.1 per cent of total Bulgarian export revenue. It is also claimed that the majority of Bulgarian arms exports are destined for the Soviet Union, other east European countries and three countries in the Third World (Algeria, Iraq and Libya). A rapid build-up is noted in two areas: exports to the Third World and production of electronic equipment providing a competitive edge vis- \dot{a} -vis other WTO arms suppliers in the future.⁴

Bulgaria is not a major producer of weapons. Production and exports are largely confined to small arms and ammunition. There is also some re-export of Soviet weapons—the level of arms exports is very much a function of Soviet policy: Bulgarian sales to Iraq, for example, increased rapidly during 1980–82 when the Soviet Union maintained a low profile as an arms exporter to Iraq. Recent Bulgarian sales of major weapons include a batch of SA-7 Grail SAMs to Argentina⁵ and a corvette design of which two units are being built locally in Algeria.⁶ Given the fact that Bulgarian warship production capability is virtually nil, the latter is presumably derived from a Soviet design.

During 1984 there were reports about Bulgarian involvement in covert transfers of small arms and ammunition (produced both in Bulgaria and elsewhere) to such countries as Chile, El Salvador, Lebanon, North Yemen, South Africa and Tanzania.⁷ These reports were denied by Bulgarian authorities.

Czechoslovakia is generally described as the second largest arms exporter among the WTO countries after the Soviet Union. The most frequently exported weapon system since the late 1970s is the L-39 Albatross—now the standard jet trainer in the air forces of Bulgaria, the German Democratic Republic, Hungary and the Soviet Union. The aircraft has also been supplied to the Third World (Afghanistan, Ethiopia, Iraq, Libya and Syria). During 1984 there were reports about Libyan deliveries of this aircraft to Nicaragua.⁸ Czechoslovakia is reportedly the second largest supplier of arms to Syria after the Soviet Union.⁹ A large part of this export consists of armoured vehicle chassis, military trucks, small arms and ammunition.

Romania produces a number of Western aircraft under licence, including SA-316B Alouette and SA-330 Puma helicopters, and BN-2A Islander light-planes. Recent customers for these aircraft are Angola, Algeria, Pakistan and Sudan. Romania also produces Soviet equipment under licence. The Yak-52 primary trainer is being exported to other WTO countries, and in 1983 Egypt ordered 200 Romanian-built T-55 tanks, partly for local assembly in Egypt. However, the deliveries were stopped after some 60 vehicles because the tanks were being re-exported to Iraq.¹⁰ In apparent contradiction to this, it is reported that the majority of Iraq's battle-damaged armoured vehicles are being sent to Romania for repair and overhaul work.¹¹

Yugoslavia is another country with growing exports to the Third World. Official Yugoslav reports stated that already in 1980 a quarter of Yugoslav exports to the Third World was accounted for by arms sales. This would amount to well over \$200 million.¹² Exports of major weapons mainly consist of naval vessels (for example, training frigates to Indonesia and Iraq), Galeb and Super Galeb jet trainers and artillery.

The People's Republic of China is currently making a major effort to increase its arms exports, particularly to the Third World. The foundation for this export drive was laid already in 1980, when the Chinese arms industry was re-organized along Western lines in order to promote productivity as well as marketing (see chapter 7).

Until recently, Chinese arms were mostly transferred free of charge. The new, market-oriented policy manifested itself in several ways during 1984. First, China participated in two international military exhibitions. In May, Chinese firms displayed a wide array of ground forces material in Canberra, Australia. In October, company and military delegations participated in the Defendory Expo in Athens, Greece, exhibiting photographs of Chinese military equipment available for export. Second, China ran an advertising campaign in the Western military press. The advertisements—mainly by Norinco, an umbrella company co-ordinating the production and export of ordnance and ground forces material—underlined the cost efficiency and reliability of Chinese weapons.¹³ Third, the National Day Parade in Peking on 1 October 1984 was used to show several new or improved weapon systems to foreign correspondents.

The main purpose of the new arms export policy, and of the general opening to the West, is to gain access to Western technology.¹⁴ Arms sales will, it is hoped, also generate commercial counter-trade with the Third World, particularly with Asian and Latin American countries.

The weapons offered for export include heavy equipment for ground forces, small arms and patrol craft. The vast majority of these weapons are based on outdated, though sometimes improved, Soviet designs and technology. The main advantage of Chinese weapons is therefore the low cost. It is too early to predict the outcome of the Chinese efforts, but Third World countries are now weighing cost and supplier diversification considerations for their import decisions.

Recent recipients of Chinese weapons include Bangladesh (F-6 fighters and submarines), Egypt (F-7 fighters, fast attack craft and submarines), Iraq (F-6/7s, assembled in Egypt, and T-69 tanks), Iran (F-6s, T-59 tanks, artillery and small arms), the PLO (artillery and small arms), Pakistan (Q-5/A-5 fighters, tanks and fast attack craft), Somalia (fighters) and Zimbabwe (fighters, light tanks and small arms).¹⁵ It is also reported that Singapore Aerospace Industries has begun marketing improved versions of Chinese-built F-7 and A-5 fighter aircraft.¹⁶

North Korea has reportedly become a major arms exporter. Annual export figures of over \$500 million have been mentioned for the early 1980s.¹⁷ This would imply a tremendous growth in North Korean arms exports between the late 1970s and the early 1980s. Up to the late 1970s, North Korea was seen as an avid, though not very resourceful, supplier of military expertise to both governments and resistance movements throughout the world. Only small arms and ammunition were reported to have been exported.¹⁸

The export of major weapons was first acknowledged in the late 1970s when North Korea supplied some MiG-17 and MiG-21 fighters to Madagascar. In 1981 armoured vehicles were exported to Zimbabwe. In 1981–82 deliveries of armoured vehicles, ordnance, missiles and ammunition (of Chinese, North Korean and Soviet origin) to Iran began. It is sales to Iran that are estimated to make up the bulk of the large export figures cited. It remains unknown to what extent they represent an exceptional case, or are the beginning of an enduring export effort for North Korean arms, but it is claimed that there has recently been a sharp decline in North Korean arms sales. Iran has reportedly stopped all arms purchases from North Korea due to the poor quality of the weapons. Some equipment has reportedly even been returned.¹⁹

The United States

In 1984 the United States firmly re-established its position as the world's foremost arms supplier. The main recipients of US weapons during 1980–84 were Japan, Egypt, Saudi Arabia and Israel (see figure 11.7).

Arms sales are a key foreign-policy instrument for the USA. How to sell weapons in order to best utilize this instrument—and minimize the negative impact of structural changes in the international arms market—was a controversial issue in 1984. This was illustrated by the problems encountered in selling fighter aircraft designed for export, by arms sales to China, and by the more general problem of technology transfers and industrial offsets in connection with arms sales. The intensity of the debate on arms transfers, however, was not as high as during the two previous presidential election years: 1976 (when arms sales were a major issue in the Carter campaign) and 1980.

The FX export fighter programme was initiated in 1979 by the Carter Administration. The programme was intended to keep and expand the list of Third World customers for US aircraft while at the same time minimizing the risks for regional arms races and the unwanted spread

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Figure 11.7. Importers of US major weapons, 1978-82 and 1980-84

Shares are per cent of total imports of US weapons.



of advanced US military technology to many countries. The FX programme has so far been a failure. The two export fighters—Northrop's F-20 Tigershark and General Dynamics' F-16/79—had, by early 1985, not secured a single contract (save a Singaporean order for 8 F-16/79s, which will be changed to an order for F-16As if Thailand's request for the latter aircraft is granted).

The United States has sold 1 100 other jet fighters to 29 different countries since 1980. These sales include F-16s to Egypt, Greece, Pakistan, South Korea, Turkey and Venezuela, and F-15s to Saudi Arabia. All these countries were listed among the 43 potential customers for FX aircraft. Administration officials now state that there may be a need to reassess the FX policy.²⁰ General Dynamics has put forward a request to have the F-16A designated an export fighter.

Why has the FX programme failed? One reason is that the Department of Defense and the Air Force have not come forward in open marketing support for the FX fighters. Sales of the F-20, for example, will not reduce the unit costs of F-14, F-15, F-16 and F/A-18 fighters procured by the US Air Force and Navy. But the crucial explanations are to be found on the side of the recipients. The 'intermediate' label on the FX aircraft is interpreted by potential buyers as meaning 'inferior'. Customers in the Third World want first-quality aircraft, that is, aircraft in use with the air force of the selling country. Furthermore, the price difference between the F-20 and the F-16A is minimal, and competition among suppliers provides customers with alternatives. Peru and the United Arab Emirates, two other countries on the FX list, instead ordered the French Mirage-2000 when their requests for the F-16A were turned down.

Another issue in 1984 was that of arms sales to China and Taiwan. During 1984 the USA sold 24 S-70C helicopters—a civil version of the US Army UH-60B Blackhawk—to China for delivery in 1984–85. Another contract was signed for 40 Beechcraft T-34C turbo-prop trainers. An agreement in principle was reached covering the sale of improved Hawk surface-to-air missiles, AN/TPS-43 and -63 radars and avionics (radar and fire-control equipment) to improve Chinese-built F-8 fighters. The agreement also reportedly covers the transfer of technology for production of TOW anti-tank missiles, artillery shells and armour-piercing ammunition.²¹

Since the liberalization of US sales of dual-use technology items in 1981, there has been a drastic increase in such exports to China. The total value of US high-technology sales (both civilian and military) to China in 1984 reportedly exceeded \$2 billion, up from some \$1 billion in 1983 and \$350 million in 1982.²² Furthermore, during 1984 China became the second socialist country (Yugoslavia was the first) to be allowed to receive equipment under the US Foreign Military Sales (FMS) programme.

The vast Chinese market is thus potentially open for the US arms industry, especially when it comes to weapons with primarily defensive capabilities. It is, however, too early to call China a major buyer of US weapons. Internal politics in both countries and international political considerations lend support to the view that civil and dual-use technology, rather than military end-items and military technology, will continue to be the mainstay of US exports to China. One reason for the Chinese caution is continued US arms sales to Taiwan: they amounted to \$760 million in 1984, including an agreement for 12 Hercules transport aircraft.

The general trend towards industrial offsets and technology transfers in connection with arms sales is also felt in the United States. Military exports are an important means to improve the huge deficit in the US balance of payments. Over 6 per cent of total US exports is accounted for by arms exports, but more and more arms agreements also include various forms of industrial compensation agreements. The 1984 purchase of the Patriot SAM system by the Netherlands involves offset work for Dutch industry corresponding to 120 per cent of the order value. The Spanish purchase of F/A-18 fighters involves local component production both for the Spanish aircraft and units being bought by the US Navy. South Korea negotiated a similar agreement in connection with its order for F-16s. The US Navy ordered 272 Penguin airlaunched anti-ship missiles as part of the offset agreements concluded when Norway ordered six batteries of Improved Hawk SAMs in 1983. The industrial offsets for the Greek purchase of 40 F-16s are expected to reach 100 per cent.

According to a report from the US General Accounting Office (GAO) the US economy may 'loose' approximately \$30 billion in the next five years in industrial offsets. It is noted that licensed production, subcontracting and counter-trade may improve US national security by achieving commonality of weapon systems. On the other hand, the report notes that offset deals might harm the US industrial base, erode its competitive edge, distort international trade patterns and, most importantly, contribute to the unlimited spread of US military technology. The concerns are aggravated when the client state also receives US FMS credits.²³ A case in point is Israel, which during 1983–84 was granted licensed production rights and technology transfer amounting to some 15 per cent of the value of its arms procurement from the USA, while simultaneously using FMS credits for the purchase of goods and technology from its own arms industry.²⁴

There is thus a potential conflict between national security concerns and pure commercial interests. This is all the more clear with respect to another type of technology transfer: the upgrading of Soviet weapons by US and west European companies on behalf of Soviet arms recipients in the Third World, particularly in the Middle East. Such activities are mostly connected with French and British arms industries, but the USA also has a share. There is, for example, a US-made improvement kit for the Soviet SA-7 Grail portable SAM, and the US company Teledyne will upgrade Soviet-built T-54 tanks in the Egyptian Army with new engines, guns and fire control equipment. The contradiction between corporate interests and national security may generate a firmer political grip on technology transfers in the form of legislation.

West European countries

Official published figures indicate that 1984 was a record year for *French* arms sales. In the first half of 1984 alone, orders added up to FRF 40.4 billion. This represents a large increase over the annual total for 1983 (FRF 28.1 billion) and is also higher than the previous record in 1981 (FRF 37.5 billion).²⁵

But the official figure is misleading. Of the 1984 total, FRF 35 billion was for a single deal, called 'Al Thakeb', for the development and

delivery of Shahine air defence missile systems to Saudi Arabia. This deal secures long-term research and development work for the French missile industry. The missile industry, with Matra and Aérospatiale as the most important companies, was also successful in securing other orders, such as Magic-530 and R-550 Magic air-to-air missiles and AM-39 Exocet air-to-ship missiles for the Indian Air Force, Roland-2 surface-to-air missile systems (on AMX-30 tanks) for Spain, and the new ARMAT anti-radar missile to Egypt and possibly Iraq.

For other sections of the French arms industry, 1984 was a bad year. The French aerospace industry organization expressed concern about the decrease in orders for its largely export-dependent member companies. By 1983 orders were down by 45 per cent compared to 1982.²⁶ In 1984 the only big new order was for 40 Mirage-2000s for the Greek Air Force. The Egyptian Air Force also took up an option for an additional 16 Mirage-2000 aircraft. Egypt now also holds marketing rights for the sale of this aircraft in the Middle East. Other sales were limited to small batches of helicopters, training aircraft and replacements for fighter aircraft. The socialist government in 1984 reversed its stand on arms deliveries to Chile. Dassault was allowed to sell one attrition Mirage-IIID. With this decision, none of the restrictions imposed when the socialist government came to power in 1982 seems to remain.

Although the *British* government cleared exports to Chile in general some years ago, there has been a public outcry about every arms deal since then. Despite negotiations on many weapon systems, for example, Centaur APCs, Lynx helicopters, Jaguar fighters and Rapier SAMs, actual deliveries were limited to a second County Class destroyer with its armaments. The British government does not want to license exports for weapons that can be used for internal repression. The sale of AMAC-1 armoured cars (optimized for riot control) in which the Chilean armed forces had shown interest was therefore quietly shelved.²⁷

In 1984, one Kharg and two Hengam Class supply and landing ships built in the 1970s were handed over to Iran. This reversal of policy did not cause as much embarrassment to the British government as did US accusations that spare parts for tanks and aircraft engines were supplied to Iran. The British government denied that "lethal spare parts" had been licensed for export to Iran. The USA refused to accept the distinction between lethal and non-lethal spare parts.²⁸ British arms industry and government are competing hard for a number of large orders. Saudi Arabia was offered the whole range of weapons produced in Britain, but despite advanced and prolonged negotiations for Tornado and Hawk aircraft, no deal was signed in 1984. There is strong French competition from the Mirage-4000, and Saudi Arabia may actually not be interested in buying a European aircraft in addition to its large fleet of US aircraft.

The Italian arms industry secured a number of new contracts, but the downturn in export deliveries and export orders, as well as the crisis of the industry in general, continues. New orders are mostly for helicopters of various types, including the new A-129 Mangusta (for the United Arab Emirates) and missiles. There were no new orders for ships. The spectacular rise of Italian arms exports in the 1970s and early 1980s was mainly based on exports of ships. In July 1984 a conference was held with government and industry participation on the future of the heavily export-dependent Italian arms industry. The companies asked for more government aid in order to streamline the industry and reduce overcapacity.²⁹ The government cannot avoid involvement since more than half of all Italian arms production is by state-owned companies. The task of reorganization becomes even more urgent if the government pursues its intentions to 'moralize' arms exports. At the July conference, Minister of Defence Spadolini criticized Italian deliveries of weapons to many 'hot spots'.³⁰ The best known cases are deliveries to Iraq (ships, helicopters, missiles and ammunition) and Iran (spare parts and ammunition).³¹

In the *Federal Republic of Germany*, restrictions on arms exports were further reduced. Submarines were offered to South Korea and Taiwan, countries that were not cleared to receive weapons under the former socialist/liberal coalition. In 1984 it became known that already in May 1983 the conservative government had yielded its right to veto sales of the Tornado, co-produced with the UK and Italy. Reportedly, the Saudi armed forces were offered 300 Gepard tanks in order to compensate for the denial of Leopard tanks in 1983.³² But as in the case of the Tornado, no Saudi order resulted from this West German offer.

Both *Switzerland* and *Sweden* are generally considered to have restrictive arms export policies. However, public criticism has led to government inquiries into their arms export policies. In Sweden the reason was the discovery of retransfers of Swedish weapons to countries in the Middle East via third countries. In Switzerland, focus is on the PC-7 trainer which has been delivered to both Iran and Iraq, among other countries. The PC-7 is officially treated as a civilian aircraft, although it is acknowledged by the Swiss government that it can be armed. Despite its official stand that the transfers to Iran and Iraq are legal, in September 1984 the Swiss government stopped Air Force reserve pilots from ferrying further PC-7s to Iran.³³

The *Dutch* arms industry, already hard hit by the bankruptcy of the Rhine-Shelde-Verolme shipyard in 1983, lost an order that would have

been crucial for the future of warship-building in the country. The Portuguese Navy cancelled the order for one Kortenaer Class frigate (plus two to be built under licence) after it failed to secure the necessary financial support. This was to have come from sales of old ships, from the USA and FR Germany. Reportedly, FR Germany withdrew its commitment to pay one-third of the cost of the frigates when the Dutch design was chosen.³⁴

III. Interactions

In the *SIPRI Yearbook 1984* the view was put forward that the international market for arms is becoming a buyer's market.³⁵ This is primarily the result of the simultaneous occurrence of two factors: fierce competition among a growing number of suppliers, and budgetary constraints among the recipients. In 1984 more evidence of a market shift emerged.

First, there is the great number of offset deals involving technology transfers. While arms transfers were previously usually concluded on cash or credit terms, it is now difficult for a seller to avoid offset arrangements with the arms recipient. This is so in the case of sales not only to industrialized countries, but also to countries in the Third World. The offsets often equal, and sometimes even exceed, the value of the arms transfers, as was the case with the Belgian order for 2 500 military vehicles from Canada. The value of the offsets reportedly amounts to three times the value of the contract itself.³⁶

Industrial offsets may include: (a) joint production of a weapon; (b) production under licence of the weapon; (c) subcontracting in the purchasing country for components and spare parts for the weapon; (d) transfer of research and development capabilities; (e) the right to market the weapon on behalf of the supplier; (f) maintenance contracts for regional users of the weapon; and (g) imports of other industrial goods from the weapon recipient by the supplier country.

Second, there is the related issue of financing. The financial conditions in many cases determine success in the race for contracts. An obvious case is the above-mentioned cancellation of Dutch Kortenaer Class frigates for the Portuguese Navy. Another case is that of the 'Al Thakeb' air defence deal between France and Saudi Arabia. In 1982 the French government had borrowed about \$4 billion from the Saudi government. The Al Thakeb deal settles this French debt: Saudi Arabia will not have to make any payment. The funds for the development and production of the missiles and launch systems will come from the French government.³⁷

Both industrial offsets and financing agreements generate resource

flows in addition to the arms flows; they are both expressions of the trend of suppliers to increasingly subsidize their own arms exports. It is noteworthy that the arms industries themselves, particularly those in western Europe, seldom have to bear the burden of the subsidies.

Third, there were frequent reports about the intensity of competition for contracts. The new Nigerian military government, which claimed irregularities in arms purchases to be one of the reasons for taking power, found that bribes had been handed out on a regular basis in connection with arms imports. In India, suspicions were raised concerning the conduct of business in connection with the purchase of towed 155-mm howitzers. Offers from eight countries were received, and six howitzers tested. The choice of the Austrian GHN-45 seemed imminent, when charges of fraud were raised.³⁸ The procurement decision has been postponed.

Fourth, there is the case of 'export' weapons. In western Europe many weapons are tailor-made to the specifications of Third World recipients—this has largely been considered a commercial success. In the Soviet Union and the United States the term 'export' weapons has a different meaning: it refers to weapons with down-graded capabilities. The US FX fighter has been mentioned; the USSR also tries to export less capable versions of their front-line aircraft (table 11.4). Customers in the Third World are sceptical: they demand, and often receive, top-of-the-line aircraft, such as the US F-16. Soviet clients also prefer more advanced systems if they can afford them: the Soviet Union recently sold an aircraft (the MiG-29) to India that it had not even supplied to its own forces. In this case, India could capitalize on Soviet fears that India would continue to diversify its arms imports and move away from the Soviet Union.

Fifth, there is a tendency—even among major producers and traditional exporters—to import some equipment in order to gain export

	Soviet MiG-23	Export MiG-23		Soviet Su-17	Export Su-22T
Radar	High Lark	Spin Scan	Radar	High Fix	Spin Scan
AAM	AA-7, -8	AA-2	Armament	ASM	Bomb
Engine	R-29B	R-27	Engine	AL-21F	AL-7F
Navigation	ARL-S		Body pylons	4	2
Radio compass	ARK-15	ARK-9	Friend-foe identification	Odd Rod	_
Radar warning receiver	Sirena-3	Sirena-2	Radar warning receiver	Sirena-3	_

Table 11.4. Comparison of the MiG-23 and the Su-17 (Su-22) for Soviet forces and for export

Source: Defence Electronics, September 1984, p. 138.

orders. For example, in early 1985 the United Kingdom short-listed two foreign-designed aircraft—the Swiss Pilatus PC-9 and the Brazilian EMB-312 Tucano—as the remaining candidates for a new RAF trainer. The British government is confident that the choice of either one of these foreign aircraft will lead to increased arms exports to the country concerned.

Finally, the increasing leverage of recipients was illustrated by the Soviet agreements with Jordan, Kuwait and Nigeria. Sellers' grip on recipients is no longer the trademark of the arms trade. If one superpower declines to supply certain equipment, some customers simply turn to the other superpower.

In spite of these developments, it is wrong to conclude that the recipients of arms totally dictate the market. There are still vestiges of supplier control, particularly by the USA and the USSR. The United States, for example, showed restraint on several occasions during 1984. Jordan and Kuwait were denied Stinger surface-to-air missiles, and Thailand did not receive final approval of its request for F-16 aircraft nor was it granted the AIM-7 Seasparrow surface-to-air missile. Shipments of heavy equipment to Lebanon were halted, although this to a large extent was due to the lack of an identifiable recipient. Argentina was re-certified as a potential purchaser of US major weapons in December 1983, but by early 1985 this had not resulted in any contracts. When US intelligence reported the imminent delivery of Soviet MiG-21 fighters to Nicaragua, the possibilities of a blockade or an invasion were discussed in the USA. It was found that the USSR had respected US dominance in the region and not delivered any MiGs. During 1984 Honduras requested 12 F-5E fighters from the United States, but the request was denied on the grounds that a deal would upset the military equilibrium in the region.

However, implicit arms transfer control is becoming more and more undermined, not least as a result of superpower behaviour. The US sale of F-16 aircraft to South Korea in 1981 has led to a firm order from North Korea for the MiG-23, which the Soviet Union will probably agree to deliver. Similar predictions can be made regarding Soviet deliveries of advanced fighter aircraft such as the MiG-23 and the Su-24 to Viet Nam, at least in part as a result of pending F-16 orders from Singapore and Thailand.

IV. A recipient perspective: Greece and Turkey

Although Greece and Turkey are both members of NATO, their predominant security concerns are not with the threat from the Soviet

Union and the WTO, but with the threat from each other. The hostile relationship between these two countries on NATO's southern flank is a cause of major concern to the United States and to NATO planners.

The Greek-Turkish rivalry includes the Cyprus issue, the status of certain islands, and disputes over territorial water rights and airspace over the Aegean Sea. Furthermore, Greece opposes the deployment of coastal defence missiles along the Turkish Aegean coast, and Turkey objects to the Greek NATO-assigned forces on the island of Limnos.

The relationship between Greece and the rest of NATO is strained. First, the Greek government has alleged that the United States is supporting Turkish expansionism. Second, in May 1984 Greece withdrew from all joint NATO exercises on the grounds that it does not consider the Soviet Union to be a major threat. Third, in January 1985 Greece announced that it will adopt a new defence doctrine which stresses defence against Turkey rather than against the WTO. A "reorganisation of the country's defences and redeployment compatible with the new concept" will reportedly take place.³⁹ Fourth, in 1984 Greece purchased military auxiliary equipment—600 bulldozers, dumpers and excavators—worth \$43 million from the Soviet Union.

Partly in response to the Greek government's anti-Western rhetoric, the Reagan Administration threatened in July 1984 to block delivery of 16 ex-Norwegian F-5 fighters to Greece and instead deliver them to Turkey. This was a political gesture only, since these aircraft are of no major military or economic significance. Greece remains an important ally of the United States. Greece is strategically located and there are vital US military installations on Greek territory. The USA has bilateral defence co-operation agreements with both Greece and Turkey, and it is assisting both countries in modernizing their military inventories and their arms production capabilities.

The most recent example of US assistance is the sale of F-16 fighter aircraft to Greece and Turkey. The agreement with Turkey was concluded in May 1983: it covers the local assembly in Turkey of 160 F-16Cs and is valued at about \$4 billion. The aircraft will be assembled during 1988–94 by a joint venture company formed by the Turkish government-owned aviation company TUSAS (49 per cent), General Dynamics (42 per cent), other US companies (7 per cent) and the Turkish military (2 per cent). Initially, Turkey intends to produce 20 per cent of the components, with an increasing proportion thereafter. The Turkish government is conscious of the leverage it has in winning US support for Turkish industry through offsets and other forms of industrial co-operation. The Turkish offer to Greece to join the Turkish assembly programme can, in part, be interpreted as a political move in order to increase Turkish leverage in its offset negotiations with US companies.⁴⁰

At the end of 1984 Greece decided to acquire 40 F-16s to complement the 40 Mirage-2000s previously ordered from France: Greece also has an option on another 20 fighters of either type to be taken up during 1985-87. The Greek government opted for US fighters in continuation of previous policy. A total shift away from US aircraft would hamper operationability, even if it would also decrease political dependence on the USA. Furthermore, US companies, such as Lockheed, were instrumental in the creation of the Greek aerospace industry in the mid-1970s. There are no plans for assembly of the F-16s in Greece, but it is expected that Greece will manufacture some components. General Dynamics and subcontracting companies will also make investments and purchases in Greece. The entire purchase of 100 new fighters-in Greece referred to as 'the deal of the century'-is valued at some \$3 billion. The Greek government and the largely state-run arms industry hope that the infusion of technology and offsets resulting from this purchase will bolster the Greek arms industry, which currently runs at a loss. The offsets are expected to reach 100 per cent of the total sales price spread over 25 years.⁴¹

Both Greece and Turkey depend to a large extent on US military aid and Foreign Military Sales (FMS) credits to finance their arms procurement. While wanting more US aid, they also want to minimize the dependence it entails. Therefore, both countries try to diversify the sources of arms supplies, and to establish indigenous arms production capabilities.

As of January 1985 Turkey was negotiating with Italy and Spain for the purchase of some 50 transport aircraft to be built under licence in Turkey. Helicopters have been acquired from Italy, frigates from FR Germany (including some licensed production) and Rapier SAMs and Sea Skua AShMs from the UK. Greece is buying Mirages from France, and has acquired maintenance contracts and rights to manufacture spare parts for Mirage-F1 fighters. In early 1985, Greece was negotiating with Italy, the Netherlands and the UK about procurement including licensed production or assembly rights—of some 30 transport aircraft.

It remains to be seen whether the continuing build-up of military capabilities in Greece and Turkey will primarily strengthen NATO against possible aggression from the WTO; it may also contribute to the risk of conflict between the two NATO members.

Notes and references

^{1.} Statistics for arms imports by the WTO countries are incomplete; deliveries are often estimated owing to the secrecy regarding them. There are also substantial deliveries to Soviet forces stationed in other WTO countries, which confuse reporting on country-to-country transfers.

- 2. Wharton Econometric Forecasting Associates, 'Centrally planned economies', Current Analysis, Vol. 4, No. 62, 15 August 1984, p. 4.
- 3. Wharton Econometric Forecasting Associates, 'Centrally planned economies', Current Analysis, Vol. 4, No. 22-23, 9 April 1984, pp. 8-9.
- 4. Estimates are based on the assumption that Bulgarian statistics authorities, when reporting on exports of machinery and transport equipment (SITC 7) to the United Nations, allocate arms exports to SITC categories 78 and 79 (road vehicles and other transport equipment). Bulgaria produces no passenger cars and only a small number of trucks, and has insignificant aircraft and shipbuilding capabilities. See Wharton Econometric Forecasting Associates, 'Centrally planned economies', *Current Analysis*, Vol. 4, No. 58, 2 August 1984.
- 5. Military Technology, No. 3, 1984, p. 88.
- 6. Jane's Fighting Ships 1984-85 (Jane's, London, 1984), p. 4.
- 7. For example, it has been reported that during 1978-80 Soviet and Bulgarian weapons were delivered to Durban, South Africa, on board Danish freighters. One shipload—containing *inter alia* 4000 AK-47 rifles, 300 machine-guns, 327 mortars, 85000 handgrenades and 10000 landmines, all officially intended for Nigeria—was intercepted by Turkish customs authorities. See *The Observer*, 29 April 1984; and *Frankfutter Rundschau*, 16 May 1984. In April 1984 Greek customs agents found 16 150 pistols, 3000 automatic rifles and 2 million rounds of ammunition hidden in three oil-tanker trucks on board a Greek freighter *en route* from Burgas, Bulgaria to North Yemen. See *Wall Street Journal*, 14 August 1984.
- 8. Washington Post, 25 November 1984.
- 9. Interavia Airletter, 5 July 1984.
- 10. International Defense Review, No. 3, 1984, p. 237; and Strategy & Defence, No. 88, 1984, p. 91.
- 11. Defense & Foreign Affairs Daily, 27 March 1984.
- 12. Reuters News Agency, Belgrade, 15 December 1980.
- 13. See, for example, Asiaweek, 26 October 1984, p. 9.
- 14. International Defense Review, No. 12, 1984, p. 1795.
- 15. See also the arms trade registers, appendices 11B and 11C.
- 16. Aviation Week & Space Technology, 17 December 1984, p. 21.
- 17. See Defence and Armament, No. 27, 1984, p. 10; and Defense & Foreign Affairs Daily, 30 March 1984.
- An overview is given in An, N. and An, R., 'North Korean military assistance', in J. F. Cooper and D. S. Papp, *Communist Nations Military Assistance* (Westview, Boulder, Col., 1983), pp. 169-77.
- 19. International Defence-DMS Intelligence Newsletter, Vol. 6, No. 40, 1 October 1984.
- 20. This suggestion was put forward in testimony before the House of Representatives Committee on Foreign Affairs by William Schneider (Under Secretary of State for Security Assistance) and Richard Armitage (Assistant Secretary of Defense for International Security Affairs). See also Washington Times, 29 March 1984; and Defense & Foreign Affairs Daily, 3 April 1984.
- 'TOWing the Peking line', Far Eastern Economic Review, 28' June 1984, pp. 12-13; Milavnews, No. 8, 1984, p. 5; and Aviation Week & Space Technology, 18 June 1984, p. 31.
- 22. Far Eastern Economic Review, 8 March 1984, p. 13.
- 23. Trade Offsets in Foreign Military Sales, Report by the Comptroller General of the United States, US General Accounting Office, GAO/NSIAD-84-102, 13 April 1984.
- 24. El-Abd, H. and O'Sullivan, M. K., 'Encountering countertrade', Journal of Defense & Diplomacy, July 1984; US Assistance to the State of Israel, Report by the Comptroller General of the United States, US General Accounting Office, GAO/ID-83-51, 24 June 1983.
- 25. Le Monde, 14/15 October 1984.
- 26. Interavia Airletter, September 1984, p. 857.
- 27. Latin America Weekly Report, 22 June 1984.
- 28. The Guardian, 22 February 1984; and The Guardian, 23 February 1984. It should be noted that there were also US transfers of spare parts to Iran.
- 29. Rossi, S. A., 'The Italian defence industry with respect to international competition', *Defence Today*, No. 77/78, 1984, pp. 406–408.
- 30. Neue Zürcher Zeitung, 29 September 1984.
- 31. Some of the suppliers to the two belligerent countries in the list published in the SIPRI Yearbook 1984 (table 7.5, p. 198) have been questioned. In the case of South Korea, it was found that although the sales took place, the government was not responsible for them. The sale of South African howitzers to Iran was not confirmed in 1984. On the other hand, during 1984 other suppliers were added to the list: Iraq has received cluster-bombs from a Chilean com-
pany; and Iran has reportedly received supplies from Austria, Brazil, Chile, Mexico, Spain, Turkey and the UK.

- 32. Der Spiegel, No. 49, 3 December 1984.
- 33. L'Express, 19 October 1984.
- 34. Europäische Wehrkunde/Wehrwissenschaftliche Rundschau, October 1984, p. 585.
- 35. SIPRI, World Armaments and Disarmament, SIPRI Yearbook 1984 (Taylor & Francis, London, 1984), pp. 175-209.
- 36. Financial Times, 13 July 1984; Defense & Foreign Affairs Digest, September 1984, p. 2; and Milavnews, No. 8, 1984, p. 3.
- 37. Armed Forces Journal, No. 11, 1984, p. 72.
- 38. The Statesman (New Delhi), 20-21 September 1984; and 'India's Austrian gun scandal', Defence Journal, No. 10-11, 1984, pp. 13-25.
- 39. Jane's Defence Weekly, 5 January 1985.
- 40. Howarth, H. M. F., 'Greece's growing defense industry: fighter project seen as springboard to maturity', *International Defense Review*, No. 9, 1984, p. 1287.
- 41. Frankfurter Rundschau, 7 November 1984.

Appendix 11A. Aggregate tables of the value of the trade in major weapons with the Third World, 1965–84

Table 11A.1. Values of imports of major weapons by the Third World: by region, $1965-84^a$

Region									
code	Region ^c		1965	1966	1967	1968	1969	1970	1 97 1
8	Middle East	A B	441 545	440 718	1 063 883	1 258 1 087	1 212 1 351	1 462 1 353	1 758 1 544
12	North Africa	A B	81 82	122 92	135 102	83 110	87 110	121 116	123 129
9	South Asia	A B	213 235	391 250	271 297	297 314	312 336	300 363	499 362
10	Far East (excl. Viet Nam) ^d	A B	340 348	497 339	199 378	266 364	586 348	271 341	419 348
15	South America	A B	110 100	138 127	128 148	208 156	158 173	148 209	222 238
13	Sub-Saharan Africa (excl. S. Africa)	A B	95 77	93 78	81 79	55 84	71 92	121 94	134 113
14	Central America	A B	18 37	21 19	16 15	8 12	10 17	6 21	47 31
	South Africa	A B	186 112	92 90	78 89	45 68	46 63	77 52	69 51
11	Oceania	A B	-		-	_	_	_	_
	Total (excl. Viet Nam) ^e	A B	1 485 1 536	1 794 1 715	1 971 1 990	2 220 2 195	2 482 2 490	2 506 2 551	3 272 2 816
	Viet Nam	A B	74 190	237 274	494 315	473 387	298 427	433 568	435 490
	Total ^e	A B	1 559 1 726	2 031 1 989	2 465 2 305	2 693 2 582	2 780 2 917	2 939 3 118	3 707 3 305

Figures are SIPRI trend indicator values, as expressed in US \$ million, at constant (1975) prices. A = yearly figures, B^b = five-year moving averages.

^a The values include licensed production of major weapons in Third World countries (see appendix 11C). For the values for the period 1950–56, see *SIPRI Yearbook 1976*, pp, 250–51; and for 1957–64, *SIPRI Yearbook 1978*, pp. 254–55.

^b Five-year moving averages are calculated from the year arms imports began, as a more stable measure of the trend in arms imports than the often erratic year-to-year figures.

^c The regions are listed in rank order according to their five-year average values in the column for 1982. The region code numbers in the first column correspond to those used in the arms trade registers (appendices 11B and 11C).

^d Viet Nam is included in the figures for the Far East after 1975, the year the Viet Nam War ended. ^e Items may not add up to totals due to rounding.

— Nil.

.. Not applicable.

Source: SIPRI computer-stored data base.

1972	1 9 73	1974	1975	1976	1 9 77	1978	1979	1980	1981	1982	1983	1 9 84
1 076 1 869	2 211 2 282	2 836 2 653	3 527 3 475	3 613 3 837	5 190 3 972	4 018 4 238	3 512 4 294	4 859 4 220	3 893 4 517	4 8 1 9 4 6 6 4	5 503	4 246
167	145	228	761	929	948	1 337	2 281	1 524	1 018	1 118	637	376
157	285	444	602	841	1 251	1 404	1 422	1 456	1 316	935		
409	289	373	177	414	663	1 077	541	765	973	1 113	966	807
374	349	332	383	541	574	692	804	894	872	925		
162	302	249	640	1 035	653	2 367	1 964	1 180	925	567	757	645
281	354	478	579	989	1 332	1 440	1 418	1 401	1 079	815		
310	352	446	630	710	826	713	798	649	796	720	988	802
296	392	490	593	665	735	739	756	735	790	791		
89 176	152 199	386 258	232 470	432 693	1 148 676	1 269 787	299 847	788 708	733 535	453 574	401	493
35 46	56 72	87 75	137 80	58 90	60 89	110 183	80 319	605 397	740 432	452 445	281	147
25	37	274	179	118	211	253	120	80	11	26	16	1
96	117	127	164	207	176	156	135	98	51	27		
_		_	_	3	2	3 2	3 2	1 3	2 4	4 4	9	2
2 273	3 545	4 878	6 284	7 312	9 699	11 147	9 599	10 450	9 091	9 271	9 557	7 519
3 295	4 050	4 858	6 344	7 864	8 807	9 641	9 997	9 912	9 594	9 178		
1 200 467	82 384	185	20									
3 473	3 627	5 064	6 304	7 312	9 699	11 147	9 599	10 450	9 091	9 271	9 557	7519
3 762	4 435	5 156	6 401	7 905	8 810	9 641	9 997	9 912	9 594	9 178		

Table 11A.2. Values of exports of major weapons listed in table 11A.1: by supplier, 1965-84ª

Figures are SIPRI	trend indicator v	values, as	expressed i	n US \$	million,	at constant	(1975) prices.
A = yearly figures	, $B = five-year m$	loving ave	erages.				

Country ^b		1965	1966	1967	1968	1969	1970	1971
USSR	A	544	970	1 545	1 1 1 6	834	1 136	1 5 1 5
	B	773	910	1 002	1 1 2 0	1 229	1 615	1 2 4 9
USA ^c	A	540	514	481	754	1 244	1 258	1 179
	B	484	533	707	850	983	1 120	1 182
France ^c	A	96	140	68	288	172	203	276
	B	127	146	153	174	201	258	308
UK	A	265	193	203	294	348	185	393
	B	203	227	261	245	285	318	322
Italy	A	7	1	20	67	53	43	41
	B	14	23	30	37	49	51	49
FR Germany	A	13	83	4	11	17	1	25
	B	28	27	26	23	12	18	17
China ^c	A	9	47	17	5	10	22	106
	B	25	26	18	20	32	60	65
Netherlands	A B	22 7	1 8	<u> </u>	5 8	25 15	10 20	34 27
Canada ^c	A	18	12	11	48	19	37	55
	B	13	20	22	25	34	40	31
Switzerland	A B	1 1	1 1	1 1	1 1		2 1	2 2
Sweden	A B	_	_2	_	_	* 1	1	2
Czechoslovakia	A	4	8	11	39	22	31	14
	B	10	14	17	22	23	24	16
Japan ^c	A B	6 10	11 19	30 20	49 18	2 16	* 10	*
Third World	A	4	25	15	9	20	8	15
	B	10	11	15	15	13	14	16
Other industrialized, West	A	30	23	58	7	11	3	46
	B	22	24	26	20	25	16	18
Other industrialized, East	A B	*		2 1	<u> </u>	2 2	-1	5 1
Total ^d	A	1 559	2 031	2 465	2 693	2 780	2 939	3 707
	B	1 727	1 989	2 305	2 581	2 917	3 118	3 305

" The values include licences sold to Third World countries for production of major weapons (see appendix 11C). For the values for the period 1950-56, see SIPRI Yearbook 1976, pp. 252-53; and for 1957-64, SIPRI Yearbook 1978, pp. 256-57. ^b The countries are listed in rank order according to their five-year average values in the column

for 1982.

^c Including exports to Viet Nam.

^d Items may not add up to totals due to rounding.

1972	1973	1974	1975	1976	1977	1978	1 979	1980	1981	1982	1983	1984
1 225 1 469	1 537 1 673	1 930 1 681	2 160 1 867	1 554 2 265	2 156 2 792	3 526 3 413	4 565 3 805	5 265 3 971	3 514 3 947	2 986 3 406	3 404	1 863
1 166 1 214	1 061 1 431	1 404 1 973	2 343 2 705	3 892 3 438	4 826 3 565	4 727 3 702	2 036 3 441	3 029 3 070	2 585 2 661	2 971 2 667	2 682	2 069
351 363	538 441	449 497	593 683	553 789	1 282 932	1 070 988	1 161 1 090	874 1 039	1 065 1 050	1 025 1 021	1 123	1 018
369 368	316 461	579 500	647 533	587 580	536 541	553 472	383 434	302 427	395 387	503 437	352	634
52 66	56 72	139 96	72 155	159 212	348 269	341 317	423 379	314 424	469 430	571 408	373	311
37 36	3 64	116 85	138 90	131 97	60 120	41 119	229 151	136 158	291 224	93 288	371	549
158 83	27 92	104 82	63 63	57 89	66 73	154 77	26 95	80 125	147 138	218 219	221	430
27 29	39 35	33 34	42 43	29 48	72 75	64 79	169 84	62 79	55 69	44 39	15 	20
39 28	6 21	1 17	6 15	34 37	29 43	116 45	28 46	17 59	42 40	90 36	21	11
2 2	2 1	* 3	1 3	8 4	5 8	6 11	22 15	15 19	29 24	25 29	31	45
5 7	1 6	6 11	21 11	21 14	5 26	16 37	69 36	76 39	15 38	21 27	10 	11
14 15	1 10	15 8	6 6	6 9	15	18 24	45 28	53 29	22 30	7 24	23	15
		3 1		3 4	8	14 8	21 7	7	4	_	_	—
18 67	20 103	276 140	185 163	202 236	134 248	382 249	338 269	187 325	300 339	420 330	448 	296
11 18	19 20	11 20	13 50	46 69	162 77	113 77	51 84	1 3 111	82 182	296 214	470 	211
-1		6	2 10	30 11	18 18	6 22	32 32	26 28	78 30	31	13	36
3 473 3 762	3 627 4 435	5 064 5 156	6 304 6 401	7 312 7 905	9 699 8 810	11 147 9 641	9 599 9 997	10 450 9 912	9 091 9 594	9 271 9 178	9 557 	7 519

* < \$ 0.5 million.

— Nil.

.. Not applicable.

Source: SIPRI computer-stored data base.

Appendix 11B. Register of the trade in major conventional weapons with industrialized and Third World countries, 1984

This appendix lists major weapons on order or under delivery during 1984. (Note: Statistics in chapter 11 are for actual deliveries only.) The sources and methods for the data collection, and the conventions, abbreviations and acronyms used, are explained in appendix 11D. The entries are made alphabetically, by recipient, supplier and weapon designation.

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
I. Industrialize	ed countries							
11 Australia	France	18	AS-350 Ecureuil	Hel	1982	(1983) (1984)	(6) (12)	For delivery 1983-84; 12 for AF, 6 for Navy
		6	AS-350 Ecurcuil Milan	Hel ATM	(1983) (1983)	1984	6	In addition to 18 ordered 1982 Unspecified number of missiles and 10 launchers ordered; follow-on orders expected; total cost: \$6 mn
		(550)	R-550 Magic	AAM	1981	(1983) (1984)	(275) (275)	Replacing obsolete Sidewinders on Mirage fighters
	UK	6	SH-3D Sca King	Hel	(1985)			In addition to 2 ordered 1980
			Rapicr	Landmob SAM	1975	1978 1979 1980 1981 1982 1983 1984	(50) (50) (50) (50) (50) (50) (50)	Final assembly in Australia from 1983
	USA	2	F/A-18 Hornet	Fighter/strike	1981	1984	2	Delivered Oct 1984; training in USA until carly 1985
		2	KC-135	Tanker/transport	1982	(1985)	(2)	For in-flight refuelling of RAAF F-111s and F/A-18 Hornets
		10	P-3C Orion	ASW/mar patrol	1982	1984	(4)	Update-2 version; in addition to 20 P-3B/Cs in service; will probably replace 10 P-3Bs; for delivery 1984-86
		8	SH-60B Scahawk	Hel	1984			Total requirement: 32; first batch of 8 for delivery from 1987; for use on FFG-7 frigates; also designated S-70B

		36	M-198 155mm	ТН	1980	1983 1984	(18) (18)	
		(30)	AGM-84A Harpoon AIM-7F Sparrow	AShM AAM	1982 1984	(1984)	(12)	Arming 10 P-3C Orions on order Arming F/A-18 Hornets; for delivery from 1986
			AIM-9L	AAM	1984			Arming F/A-18 Hornets; for delivery from 1986
		(64)	RGM-84A Harpoon	ShShM	1976	1980 1981 1983 1984	(16) (16) (16) (16)	Arming 4 FFG-7 Class frigates
		(96)	RIM-66A/SM-1	ShAM/ShShM	1976	1980 1981 1983 1984	(40) (40) (40) (40)	Arming 4 FFG-7 Class frigates
		1	FFG-7 Class	Frigate	1980	1984	Ĭ	In addition to 3 in service; ordered Apr 1980; licensed production of 2 to follow
7 Austria	France	24	Mirage-50	Fighter/MRCA	(1985)			Austria opting for interim solution; considering purchase of F-5s, Drakens, or Mirages to replace SAAB SK-105s
	Netherlands	300	Centurion	MBT	1984			Unit cost: \$5 300; ammunition to be produced by Voest-Alpine
	Switzerland	6 4	PC-7 PC-7	Trainer Trainer	1983 1984	1984 1984	6 4	Replacing SAAB Safir; option on more In addition to 6 ordered 1983; Austrian designation: PL-7
	USA	24	M-109-A2 155mm	SPH	1982	(1983) (1984)	(12) (12)	US LoO Mar 1982
4 Belgium	Brazil France	5 (1020)	EMB-121 Xingu Milan	Transport ATM	(1982) 1979	1980 1981 1982 1983 1984	(200) (200) (200) (200) (220)	Unconfirmed
	USA	124	M-109-A2 155mm	SPH	1983	1984	(62)	
		(840)	AIM-9L	ААМ	(1977)	1979 1980 1981 1982 1983 1984	(62) (40) (160) (160) (160) (160)	

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
5 Bulgaria	USSR		T-72	MBT	(1978)	(1980) (1981) (1982) (1983) (1984)	(50) (50) (50) (50) (50)	
4 Canada	Brazil		EMB-312 Tucano	Trainer	(1983)			Unspecified number reportedly ordered in connection with Brazilian order for DHC-5Ds
	USA	2 138	C-130H Hercules F/A-18 Hornet	Transport Fighter/strike	1984 1980	(1985) 1982 1983 1984	(2) 2 (19) (17)	Order incl 113 single-seat fighters and 25 two-seat operational trainers; de- livery schedule: 1982-89; Canadian designation: CF-18; delivery interrupted 1984 to negotiate modifications
		26 86	M-109-A2 155mm AIM-7F Sparrow	AAM	1983 1980	(1982) (1983) (1984)	(12) (38) (36)	Arming F/A-18s; more to follow
		408	AIM-7M Sparrow	AAM/SAM	1984	(1)01)	(50)	Arming F/A-18 Hornets; total cost incl spares and training: \$113 mn; for delivery from 1985
		182	AIM-9L	ААМ	1980	(1982) (1983) (1984)	(24) (76) (82)	Arming F/A-18s; more to follow
		416	AIM-9M	ААМ	1984			Arming F/A-18 Hornets; total cost incl 40 training missiles: \$41 mn; for delivery from 1985
		36	RGM-84A Harpoon	ShShM	1984			Total cost incl 2 practice missiles: \$47 mn
			Scasparrow	ShAM/ShShM	1984			To arm new Canadian patrol frigate; RIM-7M version; total value inel radar, launch system and missile modifications: \$92 mn
3 China	France	6 50	AS-332 AS-365N	Hel Hel	(1984) 1980	1982 1983 1084	(1) (10) (10)	Ordered Jul 1980; second batch to be assembled locally; for offshore oil operations; may carry HOT ATMs

	USA	24 (40) 	S-70C T-34C BGM-71A TOW MIM-23B Hawk	Hel Traincr ATM Landmob SAM	1984 (1984) (1984) (1984)	1984	(3)	Ordered Jul 1984; total cost: \$140 mn; commercial version of UH-60A US Army helicopter sold to civilian company; contract does not prohibit military use Unconfirmed Agreed in principle Jun 1984 Agreed in principle Jun 1984
7 Cyprus	Brazil France Syria	20 84 	EE-9 Cascavel VAB SA-7 Grail	AC APC Port SAM	1982 1984 (1984)	1984	20	Unspecified number reportedly ordered Jul 1984
5 Czechoslovakia	USSR		MiG-23	Fighter	(1977)	1979 1980 1981 1982 (1983) (1984)	(30) (30) (30) (30) (5) (5)	Incl interceptor, ground attack and trainer versions
			M-1973 152mm	SPG	(1980)	(1981) (1982) (1983) (1984)	(25) (25) (25) (25)	
			M-1974 122mm	SPH	1979	(1980) (1981) (1982) (1983) (1984)	(40) (40) (40) (40) (40)	
			AT-4 Spigot	АТМ	1979	(1980) (1981) (1982) (1983) (1984)	(240) (240) (240) (240) (240) (240)	
			SA-9 Gaskin	Landmob SAM	1979	(1980) (1981) (1982) (1983) (1984)	(200) (200) (200) (200) (200) (200)	
4 Denmark	USA	12	F-16A	Fighter/strike	1984			For delivery 1987-89; in addition to 58 in service; total cost incl spares and technical support: \$210 mn

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
	_	200	AIM-9L	ААМ	1983	(1983) (1984) (1985)	(50) (50)	Arming F-16s
		33	RGM-84A Harpoon	ShShM	(1983)	(1965)	(100)	US LoO Jul 1983; arming Nicls Juel Class
7 Finland	Sweden	(20)	J-35 Draken	Fighter/strike	1984	1984	(2)	In addition to 20 in service; first 2 aircraft delivered Jun 1984
		8	RBS-15	ShAM/ShShM	1983			Ordered Mar 1983; first export
	UK	50	Hawk	Adv trainer/strike	1977	1980 1981 1982 1983 1984 (1985)	2 4 12 12 11 (9)	4 delivered complete from the UK, the rest locally assembled 1981-85; Mk 51
	USA	2	PA-31 Chieftain	Lightplane	1983	1984	2	Upperformed, improved version
		• •	BOM-/IA TOW	AIM	(1985)			reportedly ordered
	USSR	(65)	T-72	MBT	1984			Unspecified number ordered; to replace T-55 MBTs
4 France	USA	2	E-3A Sentry	AEW	(1984)			US LoO Feb 1984; option on 3 more
5 German DR	USSR		MiG-23	Fighter	(1978)	1979 1980 1981 1982 1983 (1984)	(12) (12) (12) (12) (12) (12) (3)	
			Su-20 Fitter-C	Fighter/ground attack	(1978)	1979 1980 1981 1982 1983 (1984)	$(10) \\ (10) \\ (10) \\ (10) \\ (10) \\ (2) $	
			BTR-70	APC	(1982)	(1983) (1984)	(50) (100)	Replacing BTR-60; also designated SPW-70

			M-1973 152mm	SPG	(1978)	(1979) (1980) (1981) (1982) (1983) (1984)	(12) (12) (12) (12) (12) (12)	
			M-1974 122mm	SPH	(1979)	(1984) (1980) (1981) (1982) (1983) (1984)	(12) (20) (20) (20) (20) (20)	
			T-72	МВТ	(1978)	1979 1980 1981 1982 1983 1984	(50) (100) (100) (100) (100) (100)	
			T-74	MBT	(1981)	1982 1983 (1984)	(15) (15) (15)	
			AT-4 Spigot	ATM	1978	(1979) (1980) (1981) (1982) (1983) (1984)	(240) (240) (240) (240) (240) (240) (240)	
4 Germany, FR	Canada France	7 40	CL-601 MM-38 Exocet	Transport ShShM	1984 (1981)	(1985) (1982) (1983) (1984)	(3) (4) (20) (16)	For delivery 1985-86 Arming 10 S-143A Class FACs under construction in FR Germany
	UK	12	Lynx	Hel	1979	1982 1983 1984	(4) (4) (4)	For 6 Bremen Class frigates
		2	Lynx	Hel	1984		. ,	For delivery 1986; in addition to 12 in service
		(264)	Sca Skua	AShM	(1984)			To arm 22 Sea King helicopters; 4 missiles/hel
	USA	500	AGM-65B	ASM	1981			Arming F-4Fs; will probably also be ordered for Tornado MRCA

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		(1792)	MIM-104 Patriot	Landmob SAM	1984			28 fire units with 64 missiles each; FRG will pay for 14 units and get the rest in exchange for Roland-2 air defence for German and US air bases in FRG; total cost: \$1 000 mn
		(150)	RAM	ShAM/PDM	(1985)	1000	(10)	Prior to licensed production
		(144)	RGM-84A Harpoon	ShShM	(1978)	1982 1983 1984	(48) (48) (48)	Arming 6 Bremen Class trigates
		110	RIM-66A/SM-1	ShAM/ShShM	1985			Total cost incl 70 containers and spares: \$44 mn
		(144)	Scasparrow	ShAM/ShShM	(1978)	1982 1983 1984	(48) (48) (48)	Arming Bremen Class frigates
4 Greece	France	(40)	Mirage-2000	Fighter/strike	1984			Part of \$2 bn purchase of Mirages/F-16s; extensive offsets; option on 20 more
	Germany, FR	(2) 4	Do-28D-2 Leopard ARV	Transport ARV	(1984) 1981	(1984) 1983 1984	(2) 2 2	Military aid
		106	Leopard-1-A4	MBT	1981	1983 1984	(53) (53)	
	Italy	(30)	G-222	Transport	(1985)			Negotiating; competing with F-27 and HS-748
	Jordan	13	F-5A	Fighter	1983	(1984)	(13)	
	USA	2 40	F-5B F-16C	Fighter/trainer Fighter/strike	1983 1984	(1984)	(2)	Some version D trainers; part of Mirage/
		8	Model 209 AH-1S	Hel	(1980)			F-16 purchase; option on 20 more Ordered Sep 1980; armed with TOW ATM: US LOO 1983; total cost; \$66 mn
		48	M-109-A2 155mm	SPH	1981	(1984)	(12)	
		51	M-113-A2	APC	1983	1984	(51)	
		58	M-198 155mm	1H MPT	1982	(1984)	(20)	
		(110)	M-00-A3		(1984)			US LOU Aug 1983; total cost: \$186 mn
		280	AIM-7M Snarrow	A A M/S A M	(1984) 1987			Incl in sale of Skyguard SAM system
		300	AIM-9L	AAM	1984			To arm A-7H Corsairs
		(64)	BGM-71A TOW	ATM	(1983)			Arming 8 Model 209 AH-1S helicopters

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		1097	BGM-71A TOW	AIM	1984			Improved 10W; total cost incl 54 launchers: \$19 mn
5 Hungary	USSR		T-72	MBT	1980	1982 1983 (1984)	(30) (30) (30)	Ordered Apr 1980
7 Ireland	France	5	AS-365F	Hel	1983	1984 (1985)	2 (1)	
4 Italy	France	2 (3510)	Falcon-50 Milan	Transport ATM	1984 1981	1982 (1983)	(1000) (1000)	Italy plans to procure 37 750 missiles; the remainder will be produced under licence by OTO-Melara over a 10-year period; order inel 1 850 launchers of which 286 are purchased directly
	USA	2311	BGM-71A TOW	АТМ	1981	(1982) (1983) (1984)	(200) (1000) (1111)	First sale of improved version; order inel 632 practice missiles
		6629	BGM-71A TOW	ATM	1984	(1701)	()	Total cost incl 1 239 practice
		450	FIM-92A Stinger	Port SAM	1984			Total cost incl 150 launchers: \$51 mn
10 Japan	UK	(100)	FH-70 155mm	ТН	1984			Ordered Jul 1984; some to be produced under licence
	USA	4 2	C-130H Herculcs C-130H Herculcs	Transport Transport	1982 1984	1984	4	Total requirement: 18 In addition to 4 in service; total cost: \$54 mn; for delivery 1987
		3	CH-47D Chinook	Hel	1984			For delivery 1986; planned procurement of 55; licensed production planned from fourth helicopter
		4	E-2C Hawkeye	AEW	1981	1984 (1985)	(2) (2)	In addition to 4 delivered 1982-83
		12	F-15C Eagle	Fighter	1978	1981 1982 1983 1984	3 3 2 2 (2)	In addition to 123 being produced under licence; incl some F-15D trainers
		16	King Air C-90	Trainer	(1979)	(1985) 1980 1981 1982 1983 1984	(2) 2 4 3 2 1	
		(1)	Learjet-35A	Mar patrol/transport	(1983)	1984	(1)	Improved version designated 36A

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		2	SH-60B Scahawk	Hel	1983			Replacing SH-3Bs; for ASW
		1	UH-60A	Hel	1984			To serve as test bed for Japanese ASW helicopter designated SH-X
		12	M-110-A2 203mm	SPH	1984	(1985)	(12)	Order may be increased 1985; possibly built under licence
			AGM-84A Harpoon	AShM	(1980)	(1982) (1983) (1984)	(10) (20) (20)	Arming P-3C Orions
		164	AIM-9L	AAM	1981	(1983) (1984)	(82) (82)	Arming F-4 and F-15 fighters; licensed production to follow
			BGM-71A TOW	ATM	1983			9 systems reportedly ordered; licensed production planned from 1985
		••	FIM-92A Stinger	Port SAM	1982	(1984) (1985)	(50) (100)	•
			MIM-104 Patriot	Landmob SAM	1984			For delivery 1985-91; 130 launchers in 24 Patriot launch units; the missiles to be produced under licence after delivery of initial batch from USA
		(24)	RGM-84A Harpoon	ShShM	(1979)	(1981) (1983) (1984)	(8) (8) (8)	Arming Yubari- and Ishikari Class frigates
		(96)	RGM-84A Harpoon	ShShM	(1981)	1982 1983 1984	(8) (16) (24)	Arming Hatsuyuki- and last of Tachikaze Class destroyers
4 Netherlands	Germany, FR	445	Leopard-2	MBT	1979	1981	4	Contract signed Jun 1979; chosen
						1982	(50)	instead of US M-1 Abrams; offsets to
						1983	(60)	Dutch industry at 59% of purchase value,
						1984	(60)	may reach 100%; to replace 369 Centurions and 130 AMX-13s
	USA	13	P-3C Orion	ASW/mar patrol	1978	1981	1	
				-		1982	3	
						1983	5	
						1984	4	
		(38)	AGM-84A Harpoon	AShM	(1978)	(1981) (1982) (1983)	(1) (3) (17)	
						(1984)	(17)	

		(840)	AIM-9L	ААМ	1977	(1979) (1980) (1981) (1982) (1983) (1984)	9) (40) 0) (160) 1) (160) 2) (160) 3) (160) 4) (160) 3) (100) 4) (200)	Arming 102 F-16 fighters
		900 646	AIM-9L FIM-92A Stinger	AAM Port SAM	1983 1982	(1083)		Total cost: \$78 mn
		040	The schedule		1962	(1983)		
		160	MIM-104 Patriot	Landmob SAM	1984			Contract signed Dec 1983; total cost: \$300 mn incl 20 launchers and 4 AN/
		(48)	RIM-24 Tartar	ShAM	(1983)	(1984)	(24)	Arming 2 additional Kortenaer Class frigates
11 New Zealand	Australia	10	A-4G Skyhawk	Fighter/bomber	1984	1984	10	In addition to 12 in service; to be converted to A-4K standard
	USA	1	P-3B Orion	ASW/mar patrol	(1983)	1984	1	In addition to 5 in service
4 Norway	Germany. FR	6	Туре 210	Submarine	1983			Contract signed Sep 1983; for delivery from 1989; offsets incl delivery of 12 fire control systems for West German submarines
	Iceland	1	Thor Class	PC	(1984)	1984	1	From Iceland Coast Guard; built in Denmark 1951
	Sweden		RBS-70	Port SAM	1982	(1983) (1984)	(100) (100)	Third order
		•••	RBS-70 RBS-70	Port SAM Port SAM	1983 1984	(1984)	(100)	Fourth order Total value: SEK80 mn; fifth order; for delivery from 1986
	USA	60	F-16A	Fighter/strike	1977	1980 1981 1982 1983 1984	(6) (16) (16) (13) (9)	Delivered from Fokker, the Netherlands
		(24)	F-16A	Fighter/strike	1983		()	Ordered as attrition aircraft; for delivery carly 1990s; F-16 A/Bs
		12	F-16B	Fighter/trainer	1977	1980 1981 1982 1983 1984	(2) (3) (3) (2) (2)	Delivered from Fokker, the Netherlands
		5	M-88-A1	ARV	1981	(1984)	(5)	

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		432	AIM-9L	AAM	1977	(1982) (1983) (1984)	(60) (100) (100)	NATO co-production programme; production started Dec 1980 at Raufoss; also pro- duction of rocket engine for NATO Side- winder; formal contract signed Mar 1981
		(324)	MIM-23B Hawk	Landmob SAM	1983			Leasing agreement; ordered number un- confirmed; 6 btys with 6 launch units/bty
5 Poland	Nigeria	2	F-27 MK-400M	Transport	(1983)	1984	2	
	USSR	(24)	SA-N-5	ShAM	(1982)	1984	(24)	Arming 2 Tarantul Class corvettes
		(24)	SSN-2 Styx	ShShM	(1982)	1984	(24)	Arming 2 Tarantul Class corvettes
		2	Tarantul Class	Corvette	(1982)	1984	2	-
4 Portugal	Brazil	5	EMB-111	Mar patrol	(1983)			Negotiating
	Italy	12	A-109 Hirundo	Hel	(1985)			Delayed due to funding problems
	USA	30	A-7P Corsair-2	Fighter	1983	1984 (1985)	(10) (20)	Refurbished
		3	C-130H Hercules	Transport	1984			Ordered Jan 1984 after long negotiations
5 Romania	France	4	AS-365N	Hel	(1980)	-		Unconfirmed
4 Spain	Canada	2	CL-215	Amphibian	(1984)	1984	2	In addition to 18 delivered earlier
	Chile	40	T-35 Pillan	Trainer	1984			For assembly in Spain; Chile will buy Aviolet trainers from CASA, Spain
	France	12	AS-332	Hel	1981	1982	4	For SAR duties
						1983	6	
						1984	2	
			HOT	ATM	1984			Ordered Dec 1984; incl 250 launchers
		• •	Milan	ATM	1984			Ordered Dec 1984; incl 250 launchers
		414	Roland-2	Landmob SAM	1984			Total cost incl 18 AMX-30 Roland launch units: \$124 mn; offsets valued at 65% of total cost (incl production of parts for Roland programme)
	Italy	24	AB-412 Griffon	Hel	1984			For Army mountain brigades
	UK	17	FV-101 Scorpion	LT	(1984)			Unconfirmed; for Navy; for delivery from 1985
	USA	12	AV-8B Harrier	Fighter	1983			For delivery 1987-88; total value: \$378 mn; offset value: \$130 mn

		6	CH-47D Chinook	Hel	1985			For Army; in addition to 12 in service; for delivery 1986 (4) and 1987 (2);
		72	F/A-18 Hornet	Fighter/strike	1983			total cost: \$80 mn For delivery 1986-89; option on 12 more; total cost: \$2 600 mn
		10	SH-60B Scahawk	Hel	1984			Total value: \$275 m; assembly and some component production in Spain; for delivery from 1988
		11	LVTP-7A1 AIM-7F Sparrow	Amph ASSV	(1984) (1983)			US LOO Aug 1984 Arming F/A-18A Hornet fighters
		1760	MIM-72C	Landmob SAM	1981			, mining 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1 / 1
		(80)	RGM-84A Harpoon	ShShM	(1977)			Arming 5 FFG-7 Class frigates
		(24)	RGM-84A Harpoon	ShShM	1983	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	(12) (12)	Arming Lazaga Class FACs
		(120)	R1M-67C/SM-2	ShAM/ShShM	1982			Arming 5 FFG-7 Class destroyers now under construction
7 Sweden	Germany, FR	20	Bo-105CB	Hel	1984			For Army; to carry 4 TOW ATMs; for delivery 1986-87
	UK		Sky Flash	AAM	1981	(1983) (1984)	(50) (100)	Additional quantity for JA-37 Viggen; total cost: approx \$26.5 mn
	USA	1000	AGM-114A	ASM	1984		(100)	First export sale of Hellfire; to be adapted for shore defence; Sweden will develop new warhead, container and one-rail launcher; projected requirement is 1.000 missiles; for delivery 1987-88
		(960)	AIM-9L	AAM	1984			US DoD agreed to sell May 1982; delay due to funding problems; to arm JA-37 Viggen; Sweden already has AIM-9J; total cost: approx \$75 mn
		2000	BGM-71A TOW	АТМ	1980	1981 1982 1983 1984	(500) (500) (500) (500)	Total cost incl 100 practice missiles and associated equipment: \$16 mn
		1000	BGM-71A TOW	ATM	1984			TOW-2 version
7 Switzerland	Germany, FR	35	Leopard-2	MBT	1983			345 more to be built under licence; for delivery from 1988; reduced from original order for 420
	UK	(240)	Rapier	Landmob SAM	1980	1984	(16)	60 towed Rapier systems with Blindfire radar ordered Dec 1980
	USA	3	UH-60A	Hel	1984			
		500	AGM-65A	ASM	1981			Arming F-5Es

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
4 Turkey	Canada Denmark	20 12	CF-104 F-104G	Fighter/strike Fighter	(1984) (1984)			For delivery from 1985
	Egypt	35	F-4E Phantom	Fighter	(1984)			USA approved of resale Mar 1983; Saudi financing expected
	Germany, FR	(2500)	Milan	АТМ	1981	(1981) (1982) (1983) (1984)	(480) (480) (500) (500)	
		3	Kocin Class	Frigate	(1982)	1983 (1984)	2 (1)	NATO aid
		2	Meko-200 Type	Frigate	1983	(1985)	(1)	Followed by licensed production of 2; armed with 1x4 Harpoon ShShMs and Aspide SAMs
	Italy	40	AB-205A-1	Hel	1983	(1984) (1985)	(20) (20)	For Army
		2	G-222	Transport	1984			To be supplied as pattern aircraft prior to licensed production of 50 in Turkey; may be cancelled in favour of Spanish CN-235s
			Aspide	AAM/SAM/ShAM	(1985)			Negotiating: to arm Meko-200 frigates; eredit arrangement not finalized
	Netherlands	20	F-104 G	Fighter	1983	(1983) (1984)	(10) (10)	In addition to 25 received earlier
	Norway Spain	(16) 52	F-5A CN-235	Fighter Transport	(1984) (1985)			In addition to 11 received earlier Negotiating; part of production co- operation package; 3 from Spain, 49 to be built under licence
	UK	(432)	Improved Rapier	Landmob SAM	1983	1983 1984 (1985)	(12) (180) (240)	Total value incl 36 launch units and 18 Blindfire radars: \$225 mn
	USA		Sea Skua Citation-2	AShM Transport	(1984)	(1984)	(36)	Arming 12 AB-212 ASW helicopters
	USA	160	F-16C	Fighter/strike	1983	1984	8	8 two-scat trainers delivered directly; 32 fighters to be assembled in Turkey 1985-86; licensed production of 24 trainers and 96 fighters to start 1988
		(15)	F-4E Phantom	Fighter	1984			Total cost: \$70 mn; from US surplus stocks; to be refurbished before delivery

		25	Model 205 UH-1H	Hel	1982	1984	(12)	
		15	Model 205 UH-1H	Hel	1983	(1965)	(15)	For assembly in Turkey; total cost: \$27 mn
		6 750	Model 209 AH-1S AIM-9P	Hcl AAM	(1983) 1982	(1983) (1984) (1985)	(250) (250) (250)	Total cost incl TOW ATMs: \$50 mn AIM-9P-3 version
		(48)	BGM-71A TOW FIM-92A Stinger	ATM Port SAM	(1983) (1983)	(1909)	(250)	Arming 6 Model 209 helicopters To be followed by NATO Stinger; unconfirmed
		(48) 595	RGM-84A Harpoon Roland-2	ShShM Landmob SAM	1983 (1985)			Arming 4 Meko-200 frigates For defence of US and Turkish airbases; unconfirmed
4 UK	France	(48)	MM-38 Exocet	ShShM	(1981)	1983 1984	(12)	Arming 4 Broadsword Class destroyers
	USA	62	AV-8B Harrier	Fighter	1981		()	Selected after competition with Harrier Mk 5; final agreement between BAe and McDonnell-Douglas covers 328 Harriers for US Marines and 60 for RAF
		8	CH-47D Chinook	Hel	1982	1984 (1985)	(3) (5)	First 3 to replace losses in Falkland/ Malvinas conflict
		15	F-4 Phantom	Fighter	1982	(1984)	(15)	Version J; total cost \$178 mn; ex-US Navy
		3	L-1011 Tristar	Tanker	1984	(1984)	(3)	For conversion to tanker for RAF; in addition to 6 bought from BA
		(300)	RGM-84A Harpoon	ShShM	1984			Arming 4 Type 22 destroyers and 8 Type 23 frigates; offsets worth 130% of order value
		(200)	UGM-84A Harpoon	SuShM	1975	1981 1982 1983 1984	(8) (16) (16) (16)	Arming Churchill, Swiftsure, Trafalgar and Type 2400 submarines
1 USA	Canada	969	Piranha	APC	1982	1983 1984	(50) (100)	USA selected GM of Canada to produce Swiss-designed Piranha (680 for Army, 289 for Marines)
	Israel	12	Kfir-C1	Fighter/MRCA	1984	(1985)	(12)	On loan; \$70 mn maintenance contract for IA1; to simulate MiG-21s in air combat training
	Italy	11	CH-47C Chinook	Hel	1984	(1984)	(11)	Originally ordered by Iran; final batch vetoed by USA and not sold to other customers

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
	Norway	272	Penguin-3	AShM	1984			Arming 55 SH-60B LAMPS Mk 3 helicopters evaluated since 1980; in part to offset Norwegian purchase of Hawk SAMs
	UK	18	Sherpa	Transport	1984	1984 (1985)	(2) (16)	For transport of US troops in Europe; total cost: \$54.5 mn; deal incl 10-year operation by Shorts at cost of \$96 mn; option on additional 48
		(200)	Rapier	Landmob SAM	1981	(1983) (1984)	(32) (32)	Offset for Trident SLBM; for defence of US air bases in the UK; delivery to start in 1983; 32 launch units with 4 missiles/launcher; second order for approx. 70 missiles in 1982
2 USSR	Czechoslovakia		L-39 Albatross	Traincr	1972	1978 1979 1980 1981 1982 1983 1984	(20) (20) (20) (20) (20) (20) (20) (20)	Replacing L-29 Delfin
	India		SA-316B Chetak	Hel	(1984)		(20)	Reportedly ordered; in addition to 8 delivered 1983
6 Yugoslavia	Norway		Penguin-2	ShShM	(1984)			Negotiating
	USA	(40)	AGM-65B	ASM	1982	1983 1984	(12)	Arming Orao fighters
	USSR		T-74	MBT	(1982)	(1983)	(12)	
			AT-3 Sagger	АТМ	(1978)	(1984) 1980 1981 1982 1983	(12) (60) (60) (60) (60)	Arming Gazelle helicopters
			SA-7 Grail	Port SAM	(1978)	1984 1980 1981 1982 1983 1984	(60) (60) (60) (60) (60) (60)	Arming Gazelle helicopters

II. Third World countries

9 Afghanistan	USSR		SA-3 Goa	Landmob SAM	(1983)	(1983) (1984)	(30) (30)	Designation unconfirmed; a number of btys reportedly delivered
12 Algeria	Brazil		EE-9 Cascavel	AC	(1985)			Negotiating sale valued at \$400 mn
-	France	55	M-3	APC	1982	1983 1984	(25) (30)	
		(4000)	VP-2000	APC	1983	(1984)	(500)	
	Romania	(6)	SA-316B	Hel	(1983)	(1984)	(6)	
	UK	(25)	Hawk	Adv trainer/strike	(1985)			Negotiating
		2		Support ship	1981	1984	2	Similar to ships ordered by Oman; order incl 2 PCs; total value: \$124 mn
	USA	3	C-130H-30	Transport	(1983)	1984	3	Recipient unconfirmed
	Yugoslavia	••	G-4 Super Galeb	Trainer/ground attac	(1985)			Negotiating
13 Angola	Romania	(36)	SA-316B	Hel	(1982)	1983	6	Fitting out probably done in France;
						1984	(6)	originally reported as order of 6
	Spain	(12)	C-212-200	Transport	(1984)			Unconfirmed
	Switzerland	12	PC-7	Trainer	1982	1983	(6)	
						1984	(6)	
	USSR	2	An-26 Curl	Transport	(1982)	1983	I	
						1984	1	
		(10)	An-26 Curl	Transport	(1984)			Unconfirmed; in addition to 2 delivered in 1984
		(14)	MiG-23	Fighter	(1983)	(1983)	(4)	According to South African reports
				U	. ,	(1984)	(10)	e ,
		5	Su-22 Fitter-J	Fighter/ground attack	(1984)	(1984)	(5)	
			T-62	мвт	(1980)	(1981)	(35)	
					` '	(1982)	(35)	
						(1983)	(35)	
						(1984)	(35)	
			SA-8 Gecko	Landmob SAM	(1983)	(1983)	(24)	Unconfirmed: reportedly manned by
					(1700)	(1984)	(24)	Soviet personnel; to protect 2 bases
15 Argentina	Austria	(200)	Cuirassicr	LT/TD	(1984)			Negotiations reportedly resumed after Falkland/Malvinas conflict; status of deal uncertain
	France	(24)	AS-332	Hel	1983	(1984)	(5)	

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		60	ERC-90S Sagaie	AC	1981	(1983)	(20)	
		(1000)	НОТ	ATM	1980	(1984) 1980 (1981) (1982) (1983)	(40) (200) (200) (200) (200)	Current status uncertain
		(72)	MM-40 Exocet	ShShM/SShM	1980	(1984) 1983 (1985)	(200) (12) (30)	Arming 6 Meko-140 frigates
		(96)	MM-40 Exocet	ShShM/SShM	(1980)	1983 1984	48 48	Arming 4 Meko-360 destroyers
	Germany, FR	4	Meko-360 Type	Destroyer	1978	1983 1984	2 2	Armed with Aspide ShAMs and MM-40 Exocet ShShMs
		2	Type TR-1700	Submarine	1977	1984 (1985)	1 (1)	Delivered prior to licensed production of 4
	Israel	(30)	A-4E Skyhawk	Fighter/bomber	(1982)	(1982) (1983) (1984)	(12) (12) (6)	Unconfirmed
		••	Shoet Mk-2	APC	(1984)	(1984)	(10)	Unconfirmed; reportedly licensed production planned
	Italy	2	S-61R	Hel	(1983)	(1984)	(2)	F
	2	(15)	Palmaria 155mm	SPH	(1983)		(-)	Possibly order for turret only; if so for adaption on TAM chassis
		(96)	Aspide	AAM/SAM/ShAM	(1979)	1983 1984	48 48	Arming 4 Mcko-360 destroyers; 16 reserve missiles per 8-cell launcher
	Spain	12	C-212-200	Transport	1984			
8 Bahrain	Egypt		Fahd	APC	(1984)			Unconfirmed order for unspecified number
	France	(24)	MM-38 Exocet	ShShM	1979	1983 1984	(12) (12)	Arming 2 TNC-45 FACs
	Germany, FR	2	TNC-45	FAC	1979	1983 1984	1	Armed with 4 Exocet ShShMs
	UK USA	(12) 2000	Hawk F-4 Phantom BGM-71A TOW	Adv trainer/strike Fighter ATM	(1985) (1983) (1982)	(1983)	(1000)	Negotiating Unconfirmed
		2000	2001/1/11/10		(1702)	(1983)	(1000)	
9 Bangladesh	China	(36) 3	F-6 Hainan Class	Fighter FAC	(1985) (1984)	1984	3	Negotiating

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		(6)	Romeo Class	Submarine	(1983)	1984	1	First submarine delivered 1984; 5 more reportedly on order
	Singapore	2	РВ-46 Туре	PC	(1983)	1984	1	For fishery protection
13 Benin	France	2	AS-350 Ecurcuil	Hel	(1983)	1983 1984	1 1	Gift
	USSR		MiG-23	Fighter	(1984)			Acc to unconfirmed reports, a squadron of MiG-23s will be delivered
15 Bolivia	Brazil	3	HB-315B Gavaio	Hel	1984	1984	3	
	France	12	Mirage-50	Fighter/MRCA	(1984)			Unconfirmed
		18	T-33A	Trainer	1984			Total cost incl spare parts: \$6.2 mn
13 Botswana	UK	2	BN-2A Islander	Transport	1984	1984	2	
15 Brazil	Australia	12	A-4G Skyhawk	Fighter/bomber	(1983)			Version unconfirmed; for aircraft earrier 'Minais Gerais'
	Canada	(12)	DHC-5D Buffalo	Transport	(1983)		•	Unconfirmed
	France	2	Mirage-3D	Trainer	1982	1984	2	Replacing lost aircraft
		(48)	MM-40 Exocci	2020/02/02/02	1984			and 2 frigates of Niteroi Class
	Germany, FR	1	Турс 209/3	Submarine	1982			Order incl 2 submarines to be built under licence; also designated Type 1400; part of barter deal for iron ore
	Italy	(6)	SH-3D Sca King	Hel	(1982)	(1983) (1984)	(2) (4)	Option on 2 more
	USA	1	HS-125	Transport	(1984)	1984	1	In addition to 11 in service
		12	UH-60A	Hel	(1984)			US LoO; licensed production may follow
	. <u></u>	12	LVTP-7A1	Amph ASSV	1983			For Brazilian Marines
10 Brunei	UK		Rapier	Landmob SAM	1979	1983 1984	(24) (24)	1 bty ordered; incl Blindfirc radar; total cost: \$82 mn
13 Cameroon	Canada	2	DHC-5D Buffalo	Transport	(1983)	1984	2	
	France	1	AS-332	Hel	(1984)	1984	1	For VIP usc
		6	Alpha Jet	Adv trainer/strike	1981	(1984)	(6)	NG-version
			Milan	ATM	(1981)	1982	12	6 launchers and 12 missiles delivered
						(1983)	(36)	1982; additional deliveries under new
	LICA	77	V 150 Commundo	ABC	1001	(1984)	(100)	military co-operation programme
	USA	21	+-150 Commando	ALC	1901	1983	(13)	
13 Central African	Argentina	12	IA-58A Pucara	COIN	(1985)			Negotiating
Republic	France	1	AS-350 Ecureuil	Hel	(1984)	1984	1	

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
13 Chad	France	1	C-130H Hercules	Transport	(1983)	(1984)	(1)	
	USA	1	C-130H Hercules	Transport	1983	1984	1	
15 Chile	Brazil	2	EMB-120	Transport	(1982)			Reportedly ordered for delivery 1985
	France	1	Mirage-3D	Trainer	1984	1984	1	Replacing lost aircraft
		3	Mirage-50	Fighter/MRCA	(1984)			Unconfirmed; in addition to 16 in service
	Germany, FR	2	Турс 209/3	Submarine	1980	1984	2	
	UK	(18)	Jaguar	Fighter	(1985)			Negotiating; ex-RAF
		6	Lynx	Hel	(1985)			Negotiating; for 2 County Class destroyers
		(100)	Centaur	APC	(1985)			Export licence under review by UK
		(8)	MM-38 Exocet	ShShM	1981	1982	(4)	Arming 2 County Class destroyers
						1984	(4)	
			Rapier	Landmob SAM	(1985)			Reportedly negotiating
		(16)	Scacat	ShAM/ShShM	1981	1982 1984	(8) (8)	Arming 2 County Class destroyers
		2	County Class	Destroyer	1981	1982 1984	1 1	Second ship,'HMS Antrim', delayed on way to Chile to observe events around Grenada late 1983: delivered mid-1984
	USA	1	King Air C-90	Trainer	(1984)	(1984)	(1)	
15 Colombia	Australia	2	C-130A Hercules	Transport	1984			
	Brazil	14	EMB-326 Xavante	Trainer/COIN	(1982)			Unconfirmed
	France	(32)	MM-40 Exocet	ShShM/SShM	(1980)	1983 1984	(16)	Arming 4 FS-1500 Class frigates
	Germany, FR	4	Bo-105C	Hel	(1983)	1984	2	On 4 FS-1500 Class frigates
		4	FS-1500 Class	Frigate	1980	(1983) 1983 1984	2 2	Similar to ships ordered by Malaysia
	Netherlands	2	F-27 Mk-600	Transport	(1984)			Unconfirmed
	Spain	5	C-212-200	Transport	1984			
	Switzerland	(10)	PC-6A Porter	Transport	(1984)			Number ordered also reported to be 6
	USA	(15)	A-37B Dragonfly	Fighter/COIN	1982	(1983) (1984)	(12)	Ordered Dec 1982; originally reported as order of 12
		2	C-130H Hercules	Transport	(1983)	(1)(1)	(5)	
		ŝ	Model 300C	Hel	(1983)	1984	8	
		240	AIM-7F Sparrow	AAM	1982	1983 1984	(120) (120)	For Skyguard air defence system

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			(64) 4	Scasparrow Asheville Class	ShAM/ShShM Frigate	(1980) (1982)	1983 1984 1982 1984	(32) (32) 2 2	Arming FS-1500 Class frigates; Aspide/ Albatros launcher Leased by Navy; for coastal patrol
13	Congo	USSR	(3)	ZSU-23-4 Shilka	AAV	(1984)	(1984)	(3)	Unconfirmed
14 (Cuba	USSR		MiG-23	Fighter	(1980)	1980 1981 1982 1983 1984	(19) (19) (19) (7) (3)	Cuba has approx 75 MiG-23s inel B/E interceptor, F ground attack and U trainer versions
				BMP-1	MICV	(1980)	(1981) (1982) (1983) (1984)	(25) (25) (25) (25)	Unconfirmed; acc to US sources
				AA-2 Atoll	ААМ	(1980)	1980 1981 1982 1983 1984	(75) (75) (75) (75) (75)	Arming MiG-23s Part of air defence deal incl SA-3s; demand for reloads to replace SAMs fire unsuccessfully at US Lockheed SR-71
				SA-6 Gainful	Landmob SAM	(1980)	(1980) (1981) (1982) (1983) (1984)	(250) (50) (50) (50) (50)	Part of air defence deal incl SA-3s; demand for reloads to replace SAMs fired unsuccessfully at US Lockheed SR-71 recce aircraft
			(18) 1 1	SA-N-4 Foxtrot Class Koni Class	ShAM Submarine Frigate	(1982) (1982) (1982)	1984 1984 1984	(18) 1 1	Arming second Koni Class frigate
13	Djibouti	France	100	VLRA	Recce AC	1983	1983 1984	9 91	МАР
14	Dominican Republic	USA	12	A-37B Dragonfly	Fighter/COIN	(1983)	(1984)	(12)	Unconfirmed
15	Ecuador	France	10 (36)	AS-332 MM-40 Exocet	Hel ShShM/SShM	1982 1979	1982 1982 1983 (1984)	(3) (12) (18) (6)	Status of deal uncertain Arming 6 Esmeraldas Class corvettes
		Israel Italy	12 (72)	Kfir-C2 Aspide	Fighter/MRCA AAM/SAM/ShAM	1982 1979	1982 1983 (1984)	(24) (36) (12)	USA approved sale; option for 12 more Arming 6 Esmeraldas Class corvettes

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		6	Esmeraldas Cl	Corvette	1979	1982	2	Similar to Libyan Wadi (Assad) Class
						1983	3	
				_		(1984)	1	
	USA	1	L-100-30	Transport	1982	1984	1	
8 Egypt	Brazil	10	EMB-312 Tucano	Trainer	1983	(1985)	(10)	To be followed by local assembly of 110; approx 80 for transfer to Iraq
	China	(100)	F- 7	Fighter	1982	1983	(10)	Local assembly
						1984	(40)	
		(24)	Hai Ying-2	ShShM/SShM	1983	1984	(24)	Arming 2 Jianghu Class frigates
		(72)	Hai Ying-2	ShShM/SShM	(1984)	1984	(72)	Arming 6 Huangfen Class FACs
		5	Hainan Class	FAC	1983	1984	5	In addition to 2 delivered 1983
		6	Huangfen Class	FAC	(1984)	1984	6	Delivered Sep 1984; copy of Soviet Osa-1 Class; armed with Hai Ying-2 ShShMs
		(2)	Jianghu Class	Frigate	1983	(1984)	(2)	
		2	Romeo Class	Submarine	1982	1983 (1984)	1 1	In addition to 2 delivered 1982
	France	36	Mirage-2000	Fighter/strike	1981			20 ordered Dec 1981, total cost: \$1 000 mn; option on 16 more taken up 1984
		16	Mirage-5SD	Fighter	1980	1983 (1984)	(10) (6)	Ordered Jun 1980
		(60)	ARMAT	ARM	1984			Arming Mirage-2000s
			AS-30L	ASM	1983			Arming Mirage-2000s
		(288)	НОТ	ATM	1981	1984 (1985)	(200) (88)	Arming 24 of 36 Gazelle helicopters ordered 1981
			R-550 Magic	AAM	1983			Arming Mirage-2000s
			Super-530	AAM	1983			Arming Mirage-2000s
	Italy	(48)	Aspide	AAM/SAM/ShAM	(1983)	1984	48	Arming 2 F-30 Class frigates
	Romania	200	T-55	MBT	1983	1983 (1984)	(30) (30)	Ordered Jul 1983; Romanian designation: M-77 or TR-77; some may be assembled under licence; for re-transfer to Iraq; deliveries reportedly stopped because of Faurian re-exports
	Spain	600	BMR-600	ICV	1982	1984	250	Total cost incl 3 000 trucks and 700 coaches: \$400 mn; for delivery 1984-85
		6	Cormoran Class	FAC	(1985)			Negotiating; competing with shipyards in South Korea, Italy, UK and USA

2	F-30 Class	Frigate	1982	1984	2	Option on 2 more; rapid delivery due to diversion to Egypt of last 2 ships for Spanish Navy
4	S-70 Class	Submarine	(1985)			Negotiating
	HS-748-2A	Transport	1983			Negotiating
14	SRN-6	Hovercruft	(1091)			In addition to 2 delivered 1076:
	5111-0	novercran	(1981)			unconfirmed
4	E-2C Hawkeye	AEW	1983	(1985)	(1)	First 2 for delivery 1985-86; total cost for 4 aircraft: \$465 mn
1	E-2C Hawkeye	AEW	1984			In addition to 4 ordered earlier; for delivery May 1987
34	F-16C	Fighter/strike	1982			Agreement in principle for a total of 150 aircraft; total cost incl 6 F-16D trainers: \$975 mn
6	F-16D	Fighter/trainer	1982			
	M-109-A2 155mm	SPH	(1982)	1984 (1985)	(10) (20)	Unspecified number for delivery from 1984
472	M-113-A2	APC	(1984)	、 ,		US LoO Mar 1984; 354 A2s, 43 M-806 ARVs, 52 fitter vehicles and 23 ambulance vehicles; total value incl M-125-A2s, M-577-A2s and M-548s: \$157 mn
19	M-125-A2	APC	1984			US LoO Mar 1984
42	M-198 155mm	TH	(1983)			US LoO Oct 1983
33	M-548	APC	1984			US LoO Mar 1984
13	M-577-A2	CPC	1984			US LoO Mar 1984
439	M-60-A3	MBT	1980	1981	128	
			.,	1987	183	
				(1983)	(120)	
				(1984)	(120)	
220	M-60-43	MRT	1002	1004	(100)	In addition to 430 strandy on order
			1762	1704	(100)	for delivery from 1984; deal incl 23 M-88-A1 ARVs
94	M-60-A3	MBT	(1983)			US LoO Sep 1983
23	M-88-A1	ARV	1982	(1984)	(11)	•
				(1985)	(12)	
56	M-88-A1	ARV	1984	. ,		Total cost: \$63 mn; in addition to 109 ordered earlier
600	AGM-65A	ASM	1980	(1980)	(75)	Arming F-16s
				(1981)	(100)	
				(1982)	(200)	
				(1983)	(200)	
124	A DA 204 C		(100.5	(1984)	(25)	— • • • • • •
424	AIM-/M Sparrow	AAM/SAM	(1984)	(1984) (1985)	(106) (212)	To arm Skyguard air defence system; US LoO Feb 1984
	2 4 14 4 1 34 6 472 19 42 33 13 439 220 94 23 56 600 424	 2 F-30 Class 4 S-70 Class 14 SRN-6 4 E-2C Hawkeye 1 E-2C Hawkeye 34 F-16C 6 F-16D M-109-A2 155mm 472 M-113-A2 19 M-125-A2 42 M-198 155mm 33 M-548 13 M-577-A2 439 M-60-A3 220 M-60-A3 220 M-60-A3 23 M-88-A1 56 M-88-A1 600 AGM-65A 424 AIM-7M Sparrow 	2F-30 ClassFrigate4S-70 ClassSubmarine Transport14SRN-6Transport14SRN-6Hovercraft4E-2C HawkeyeAEW1E-2C HawkeyeAEW34F-16CFighter/strike6F-16D Fighter/strike6F-16D Fighter/strike7M-109-A2 155mmSPH472M-113-A2APC19M-125-A2 M-548APC13M-548 M-50-A3APC20M-60-A3 MBTMBT220M-60-A3 MBTMBT94M-60-A3 ASM-31MBT95M-88-A1 ARVARV600AGM-65AASM424AIM-7M SparrowAAM/SAM	2 F-30 Class Frigate 1982 4 S-70 Class Submarine (1985) HS-748-2A Transport 1983 14 SRN-6 Hovercraft (1981) 4 E-2C Hawkeye AEW 1983 1 E-2C Hawkeye AEW 1983 1 E-2C Hawkeye AEW 1984 34 F-16C Fighter/strike 1982 6 F-16D Fighter/strike 1982 7 M-109-A2 155mm SPH (1982) 472 M-113-A2 APC 1984 19 M-125-A2 APC 1984 13 M-577-A2 APC 1984 13 M-577-A2 CPC 1984 439 M-60-A3 MBT 1980 220 M-60-A3 MBT 1982 56 M-88-A1 ARV 1984 600 AGM-65A ASM 1980 424 AIM-7M Sparrow AAM/SAM (1984)	2 F-30 Class Frigate 1982 1984 4 S-70 Class Submarine (1985) HS-748-2A Transport 1983 14 SRN-6 Hovercraft (1981) 4 E-2C Hawkeye AEW 1983 (1985) 1 E-2C Hawkeye AEW 1984 34 F-16C Fighter/trainer 1982 1984 6 F-16D Fighter/trainer 1982 1984 42 M-109-A2 155mm SPH (1982) 1984 42 M-113-A2 APC 1984 (1985) 19 M-125-A2 APC 1984 (1985) 13 M-577-A2 CPC 1984 1982 13 M-577-A2 CPC 1984 1982 1982 1983 (1983) (1983) (1983) 220 M-60-A3 MBT 1982 (1984) 1984 ARV 1982 (1984) (1985) 23 M-88-A1 ARV 1984 (1984)	$\begin{array}{cccccccccccccccccccccccccccccccccccc$

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		150	AIM-9L	AAM	1983	(1984)	(75)	In addition to 300 delivered Apr 1983
		216	MIM-23B Hawk	Landmob SAM	1979	(1983) 1982 1983 1984	(72) (72) (72)	12 btys with 6 launchers/bty; each launcher has 3 missiles; 4 additional- btys on order; total requirement: 24 btys
		72	MIM-23B Hawk	Landmob SAM	1982			Order incl 24 launch units in 4 btys; in addition to 12 btys ordered 1979
		483	MIM-72F	SAM/ShAM	1984			Total cost incl 26 towed launchers: \$160 mn; total requirement to replace Soviet systems: about 60 launchers
		18	RGM-84A Harpoon	ShShM	(1983)	1984	18	US LoO Sep 1983; arming 2 F-30 Class frigates; total cost: \$40 mn
14 El Salvador	Argentina		1A-58A Pucara	COIN	(1982)			Deal reportedly incl FAL 7.62mm rifles; unconfirmed
	Israel	(18)	Mystere B-2	Bomber	(1981)	1981 (1982) (1983) (1984)	(4) (4) (5)	Unconfirmed; most of the aircraft possibly in storage or cannibalized
	USA	(10) 1 15	A-37B Dragonfly C-130H Hercules Model 205 UH-1H	Fighter/COIN Transport Hel	1984 (1983) 1984	1984 1984 (1984)	(10) 1 (15)	Replacement for lost aircraft Transferred to replace 1 C-123 Provider In addition to 26 delivered earlier
13 Ethiopia	Czechoslovakia India	10 (10) 10	L-39 Albatross SA-316B Chetak	Trainer Hel Hel	(1983) (1984) (1984)	1984 (1985)	10 (10)	Unconfirmed
	Libva	(90)	T-55	MBT	(1964) (1983)	1984	(90)	Delivered Ian 1984
	Romania	(10)	SA-316B	Hel	(1984)	(1984)	(10)	Unconfirmed
	USSR	2	Mi-14 Haze	Hel	(1983)	1984	2	For ASW duties
		(6)	MiG-25	Fighter/interceptor	(1983)	(1984)	(6)	Reportedly delivered
			Yak-40 Codling	Transport	(1984)	(1984)	(1)	
13 Gabon	Brazil	(16)	EE-11 Urutu	APC	(1983)	(1983) 1984	(12) (4)	
		12	EE-3 Jararaca	SC	1983	1984	(12)	
	France	6	Mirage-5	Fighter	1983	(1984)	(6)	In addition to 6 ordered 1982
		1	Mirage-5R	Recce	(1983)	(1984)	(1)	
		(6)	ERC-90S Sagaie	AC	(1983)	(1984)	(6)	Part of new armoured squadron

	Spain	(8) 75 1 2 3	VCR-6 VP-2000 Batral Class Pelicano Class	APC APC Support ship LS LC	(1983) 1982 (1983) 1981 (1984)	(1984) (1984) 1984	(8) (75) 1	Part of new armoured squadron Ordered Aug 1981; displacement: 313t; other landing craft may be on order Full load displacement: 710t
13 Guinea	Egypt	(50)	Walid	APC	1983	(1983) (1984)	(25) (25)	Order incl mortars, machine-guns, rifles and ammunition
	USSR	1 2	An-24 Cokc	Transport	(1984)	1984	2	
13 Guinea-Bissau	China France	20 1	Type 55 SA-318C	APC Hcl	(1983) 1984	1984 1984	20 1	BTR-40 copy; designation unconfirmed Gift; also designated Alouette-2
15 Guyana	Brazil	•••	EE-11 Urutu	APC	1982	(1984)	(30)	Undisclosed number ordered for border defence against Venezuela
	UK	1	Skyvan-3M	Transport	(1984)	1984	1	
14 Haiti	Italy	4	S-211	Trainer	1984			
14 Honduras	Brazil	2 (12)	EMB-111 EMB-312 Tucano	Mar patrol Trainer	(1983) (1984)	1984	8	Unconfirmed Original order for 8 reportedly increased to 12
	Isracl	(12)	Kfir-C2 M-4 Sherman	Fighter/MRCA MT	(1983) (1983)	(1965)	(-)	Unconfirmed; sale probably vetoed by USA Unconfirmed; part of Kfir deal
	Spain USA	(4) (10)	C-101 Aviojet A-37B Dragonfly	Trainer/strike Fighter/COIN	1983 1982	1984 1982 1983 1984	(2) (4) (4) (2)	Option on 4 more
		6	A-37B Dragonfly	Fighter/COIN	(1984)			Delivery of 6 A-37s and 28 transport aircraft of unspecified types allegedly pending; order incl 36 105mm howitzers Pending congressional approval
9 India	France	40	Mirage-2000	Fighter/strike	1982			36 fighters and 4 trainers; flight tests began in France Sep 1984; delivery to begin May 1985; option for licensed production cancelled
			AMX-30-155 GCT	SPG	(1984)			Negotiating sale of small number; to be followed by licensed production
		• •	AM-39 Exocet	AShM	(1984)			Negotiating; to arm 6 Jaguars; competing with British Sca Eagle AShM and Soviet missiles

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
			MM-38 Exocet Milan	ShShM ATM	(1982) (1981)	1982 (1983)	(50) (50) (100)	Unconfirmed; to replace Styx ShShMs Licensed production to start 1985
		(240)	R-550 Magic	AAM	(1984)	1964	(100)	Arming 40 Mirage 2000s and possibly also Jaguars; for delivery from 1986
		(240)	Super-530	AAM	(1984)			Arming 40 Mirage-2000s
	Germany, FR	2	Type 1500	Submarine	(1981)			Licensed production of 4 to follow
	Sweden	-	RBS-70	Port SAM	(1985)			Negotiating order valued at SEK500 mn
	UK	6	Sea Harrier	Fighter/strike	1979	1983 1984	3	For use with aircraft carrier 'Vikrant'
		10	Sea Harrier	Fighter/strike	1984		-	Order incl 1 T-4 trainer; in addition to 8 in service
		2	Sea Harrier T-4	Fighter/trainer	1979	1984	2	
		1	Sea Harrier T-4	Fighter/trainer	1984			
		12	Sea King HAS-5	Hel	1983	1984	2	Contract signed Jun 1983; option on 8 more; to be armed with Sea Eagle AShMs; total value: approx \$125 mn
		(24)	Sea Eagle	AShM	1983			Arming 12 Sea King helicopters; follow- on orders expected; delivery from 1986
	USSR	95	An-32 Cline	Transport	1980	1984 (1985)	(9) (24)	Delivery rate: 2/month speeded up late 1984; some Western avionics integrated
		(25)	II-76 Candid	Transport	(1984)	(1985)	(6)	Possibly II-76 Mainstay AEW version; for delivery from 1985
		(100)	MI-17	Hel	(1984)	1984	(10)	Replacing Mi-8s
			Mi-24 Hind-D	Hel	(1984)			Unconfirmed
			MiG-25 Foxhound	Fighter	(1984)			Negotiating; also designated MiG-31
		(40)	MiG-29	Fighter	` 1984 [´]			Ordered Aug 1984; first deliveries expected early 1985; first locally assembled aircraft expected 1987
		• •	BMP-1	MICV	(1983)	(1984)	(50)	Licensed production to follow initial deliveries from USSR
		80	AA-7 Apex	AAM	(1984)			To arm MiG-29s
		(200)	AA-8 Aphid	AAM	(1980)	(1981) (1982) (1983) (1084)	(50) (50) (50)	Arming MiG-21s
		160	A A & A phid	A A M	(1094)	(1984)	(50)	To orm MiG 20c
		160	AA-8 Aprila	AAM	(1984)			10 arm MIG-298

		• •	AT-3 Sagger	ATM	1980	(1982) (1983) (1984)	(200) (200) (200)	
		••	SA-8 Gecko	Landmob SAM	(1982)	(1983) (1984)	(48) (48)	Operational carly 1984; unspecified number
		(36)	SA-N-4	ShAM	(1978)	1983	(12)	Arming Godavari Class frigates
		(18)	SSN-2 Styx	ShShM	1978	1983	(6)	Arming Godavari Class frigates
		4	Foxtrot Class	Submarine	1982	(1985)	(1)	First delivery due 1985
		3	Kashin Class	Destroyer	1982			In addition to 3 previously delivered
		(2)	Kresta-2 Class	Cruiser	1982			
		(3)	Nanuchka Class	Corvette	1982			In addition to 3 in service
		(4)	Natya Class	MSO	1982			Number ordered also reported as 6
		6	Yevgenia Class	MSC	(1983)	1983 1984	3 (3)	
10 Indonesia	Australia	6	N-22L Nomad	Mar patrol	1980	1981 1982 1983 1984	2 1 1 (2)	Indonesia has 6 N-22Bs and 12 N-22Ls
			Attack Class	PC	(1981)	1982	1	In addition to 2 delivered 1973-74;
						1983 1984	2 1	being phased out by Australia
	France	24	MM-38 Exocet	ShShM	(1978)	1981 (1984)	(12) (12)	Arming 2 training frigates delivered from Yugoslavia
		(48)	MM-40 Exocet	ShShM/SShM	(1982)			Arming PSMM-5 Class FACs
	Germany, FR	2	PB-57 Type	PC/FAC	1982	1984	2	Delivered unarmed
		2	Турс 209/2	Submarine	(1985)			Negotiating; in addition to 2 in in service; total of 6 planned
	Italy	4	Lerici Class	Minchunter	1983			
	Korea, South	4	PSMM-5 Type	FAC	1982			In addition to 4 in service; armed with Exocet ShShMs
	UK	•••	Improved Rapier	Landmob SAM	1984			Ordered Dec 1984; total value: \$150 mn; offsets for Indonesian electronics industry
		3	Tribal Class	Frigate	1984			Ex-Royal Navy; to be refurbished at cost of more than \$40 mn before delivery
	USA	9	T-34C-1	Trainer	1983	1984	9	Total value incl spares and training: \$12.4 mn
		4	Jetfoil	Hydrofoil FAC	1983	1984	(2)	In addition to 1 in service; total cost:
						(1985)	(1)	\$ 150 mn; option on 6 more and licensed production of 36
	Yugoslavia	1		Frigate	(1981)	(1984)	(1)	In addition to 1 in service; armed with 20mm and 57mm Bofors guns and 4 Exocet ShShMs; deck for Bo-105 helicopter

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
8 Iran	China	(100)	F-6	Fighter	(1981)	(1982) (1983) (1984)	(20) (20) (20)	Part of deal incl T-59 tanks and artillery reportedly worth \$1.3 bn
			T-59	MBT	(1981)	(1982) (1983) (1984)	(100) (100) (100)	Part of larger deal; Iran reportedly has given China access to Soviet weapons captured from Iran
		(300)	Type 59/1 130mm	TG	(1981)	(1984) (1982) (1983) (1984)	(100) (100) (100)	
	Switzerland	(80)	PC-7	Trainer	(1983)	1983	(100)	Delivery suspended after 41 aircraft;
	UK	2	Hengam Class	LS	1977	1984 1984	(35) 2	enquiry commission instituted Unarmed support ship; displacement: 2 500t; original order for 4
		1	Kharg Type	Support ship	1974	(1984)	(1)	
8 Iraq	Brazil	(180)	EE-11 Urutu	APC	(1983)	1984	(180)	Total value incl EE-3 Jararaca: \$250 mn
		(50)	EE-3 Jararaca	SC	1982	1984	(50)	
	China		Type 531	APC	(1982)	(1983) (1984)	(50) (20)	Unspecified number delivered
			Туре 69	MBT	(1982)	(1983) (1984)	(25) (25)	Unspecified number delivered
	Egypt	(80)	EMB-312 Tucano	Trainer	1983		. ,	From Brazil and Egyptian licensed production
		• •	F-7	Fighter	(1983)	1983 (1984)	(5) (20)	Chinese version of MiG-21 assembled in Egypt
		(200)	T-55	MBT	1983	1983 (1984)	(30)	Built in Romania; transferred via Egypt until Romanian halt of deliveries
	France	(150)	Alpha Jet	Adv trainer/strike	(1984)	()		Negotiating; partly built in France and partly locally assembled; agreement not signed
		29	Mirage F-1C	Fighter/interceptor	1982	(1983) (1984)	(15) (14)	Ordered Feb 1982
		(8)	Mirage-5D Super Frelon	Fighter Hel	(1984) (1982)	1984	(8)	
		(150)	AMX-30 Roland	AAV	1981	(1982) (1983) (1984)	(15) (15) (15)	Ordered Feb 1981; number unconfirmed; at least 30 delivered by 1983
		85	AMX-30-155 GCT	SPG	1982	(170.)	()	

		AM-39 Exocet	AShM	1983	1983 1984	(20) (70)	Arming Super Etendard fighters; delivery rate: over 5/month
		ARMAT	ARM	(1984)	(1984)	(6)	Unconfirmed
		AS-30L	ASM	(1984)			Unconfirmed; to arm Mirage F-1s
	(600)	Roland-2	Landmob SAM	1981	(1982) (1983) (1984)	(150) (150) (150)	Ordered Feb 1981
Germany, FR	6	Bo-105CB	Hel	(1984)	1984	6	
Italy	(6)	A-109 Hirundo	Hel	1984			On 6 Wadi Class corvettes; total cost incl 4 AB-212ASW helicopters: \$164 mn
	(4)	AB-212ASW	Hel	1984			On 4 Lupo Class frigates
	(224)	Aspide	AAM/SAM/ShAM	(1981)			Arming 4 Lupo Class frigates and 6 Wadi Class corvettes
	(60)	Otomat-2	ShShM	(1981)			Arming 4 Lupo Class frigates and 6 Wadi Class corvettes
	4	Lupo Class	Frigate	1981			Order incl 6 Wadi Class corvettes and 1 Stromboli Class support ship
	1	Stromboli Class	Support ship	1981	1984	1	Commissioned Mar 1984
	6	Wadi Class	Corvette	1981			Iragi designation: Assad Class
Jordan	(20)	F -6	Fighter	(1983)	(1984)	(20)	Unconfirmed; Chincse F-6 assembled in Egypt reportedly transferred via Jordan
Kuwait	(50)	Chieftain-5	MBT	(1984)	(1984)	(50)	Unconfirmed
Spain	24	Bo-105CB	Hcl	(1981)	(1983) 1984	(12) (12)	Delivery from CASA confirmed by MBB 1984
		C-101 Aviojet	Trainer/strike	(1981)			Unconfirmed
	20	C-212-200	Transport	1981			Incl in \$900 mn 5-year programme
		BMR-600	ICV	1981	(1982) (1983)	(100) (100)	
					(1984)	(100)	
USA	6	L-100-30	Transport	(1982)			US ban lifted Apr 1982; unconfirmed
USSR		MiG-23	Fighter	1984	(1984) (1985)	(15) (15)	Part of large deal signed May 1984; estimated total cost: \$2 500 mn; reportedly guaranteed by Saudi Arabia
	•••	MiG-25	Fighter/interceptor	1984	(1984) (1985)	(15)	Part of large deal signed May 1984
		MiG-27	Fighter/strike	(1979)	(1979) (1980) (1982) (1983) (1984)	(10) (7) (8) (10) (10) (10)	
	(200)	T-55	MBT	1984	(1984) (1985)	(100) (100)	Part of large deal signed May 1984
		T-62	MBT	1984	(1984) (1985)	(100) (100)	Part of large deal signed May 1984

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
			T-72	MBT	1984	(1984)	(50)	Part of large deal signed May 1984
						(1985)	(50)	
			AS-4 Kitchen	ASM	(1983)	(1984)	(10)	Unconfirmed
			AS-6 Kingfish	ALCM	(1983)	(1984)	(20)	Unconfirmed
		• •	SA-6 Gainful	Landmob SAM	1979	(1980)	(100)	
						(1981)	(60)	
						(1982)	(60)	
						(1983)	(60)	
						(1984)	(60)	
			SA-8 Gecko	Landmob SAM	(1982)	1982	(72)	
						1983	(72)	
						1984	(72)	
8 Israel	USA	11	F-15A Eagle	Fighter/interceptor	1982			Compensatory offer due to sale of extra equipment for Saudi F-15s; order incl 22 fuel tanks, 6 spare engines and support equipment
		75	F-16C	Fighter/strike	1983			In addition to 75 in service; total cost: \$2 700 mn of which half is grant and half is credit; offset purchases of F-16 components in Israel valued at \$300 mn; for delivery 1985-88
		300	M-60-A3	МВТ	1979	1980 1981 1982 1983	(50) (50) (65) (50)	
		150	AIM 7M Sparrow	A A M/S A M	1007	1984	(85)	Arming E 15cr US LoO Jul 1983: total
		150	AIM-7M Sparrow	AAM/SAM	1985			cost: \$52 mn
		200	AIM-9L	AAM	1983			US LoO Mar 1983
		200	MIM-23B Hawk	Landmob SAM	1982	(1983)	(100)	
						(1984)	(100)	
		(24)	RGM-84A Harpoon	ShShM	(1980)	1982 (1984)	(12) (12)	Arming 2 Flagstaff-2 Class FACs
13 Ivory Coast	France	I	Alpha Jet	Adv traincr/strike	1983	1984	1	Replacing lost aircraft
8 Jordan	Egypt		Fahd	APC	(1984)			Unconfirmed order for unspecified number

	France	13	Mirage F-1C	Fighter/interceptor	(1984)			Negotiating; in addition to 34 F-1s in service
	Italy	•••	SATCP Mistral Aspide	Port SAM AAM/SAM/ShAM	(1984) (1984)			Unconfirmed Negotiating purchase of Aspide/Spada air defence system
	Spain	20 (20)	C-101 Aviojet C-212-10	Traincr/strike Transport	(1985) (1985)			Negotiating Negotiating; possibly Saudi financial assistance
	UK	278	Khalid	MBT	1979	1981 1982 1984	(100) (100) (78)	Also designated FV-4030/2; originally ordered by Iran and designated Shir-1
		(1500)	Blowpipe	Port SAM	(1985)		. ,	May order as result of US withdrawal of offer to sell Stinger SAMs
	USA	(1500) 24 78	Javelin Model 209 AH-1S M-109-A2 155mm	Port SAM Hel SPH	(1985) 1982 1980	(1002)	((0))	Reportedly negotiating For delivery 1985 Status of deal uncertain
		200	M-00-A3	MBI	1980	(1982) (1983) (1984)	(60) (60) (80)	conversion kits for older models also being offered by USA
		30 (60) (192)	M-88-A1 AGM-65C BGM-71A TOW	ARV ASM ATM	1981 (1983) 1981	()	()	Status of deal uncertain Unconfirmed Arming 24 Model 209 Cobras
	USSR	240	SA-6 Gainful SA-7 Grail SA-7 Grail	Landmob SAM Port SAM Port SAM	(1981) (1981) 1984			Unconfirmed Unconfirmed
			SA-8 Gecko	Landmob SAM	1984			Part of air defence package incl SA-7s, SA-9s and radars
<u> </u>	<u></u>	• •	SA-9 Gaskin	Landmob SAM	1984			<u> </u>
13 Kenya	Israel	(16)	Gabriel-2	ShShM	(1981)	(1981) (1982) (1983) (1984)	(4) (4) (4) (4)	Arming 4 Brooke Marine PCs delivered 1974-75
	ltaly UK	(24) 70	Otomat-2	ShShM TG	1984 (1981)	(1983)	(35)	To arm 2 Type 56M FACs on order from UK
		2	Туре 56М	РС	1984	(1904)	(55)	Ordered from Vosper Sep 1984; to be armed with Otomat-2 ShShMs
10 Korea, North	USSR	(20)	MiG-23	Fighter	(1984)			Reportedly 20-30 aircraft ordered
10 Korea, South	Germany, FR	2	Турс 209/3	Submarine	(1985)			Negotiating; to be followed by licensed production of up to 12 ships

13 Kenya

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
	USA	30	F-16C	Fighter/strike	1981			Reagan Administration lifted ban on F-16 sales to South Korea; total cost incl 6 F-16Ds: \$931 mn
		6	F-16D	Fighter/trainer	1981			
		6	F-4D Phantom	Fighter/interceptor	1982	(1984)	(6)	Compensation for attrition losses
		2	Model 206B	Hel	(1984)	1984	2	- f
		3	Model 412	Hel	(1984)	1984	3	
		(50)	OV-10F Bronco	Trainer/COIN	(1985)		•	Negotiating
		42	LVTP-7A1	Amph ASSV	1982			
		21	M-88-A1	ARV	1981	(1984)	(21)	
		(200)	AGM-65A	ASM	1077	1080	8	
		(200)	FIM-92A Stinger	Port SAM	(1981)	1900	0	Linconfirmed
		170	MIM-23B Hawk	Landmob SAM	1082	(1984)	(85)	Total cost incl 723 rocket motors:
		110	Mini 200 Mark	Editation of the	1702	(1985)	(85)	\$68 mn
		(298)	M1M-23B Hawk	Landmob SAM	(1983)	· /		Unconfirmed
		(64)	RGM-84A Harpoon	ShShM	(1984)			Replacing Standard on 8 PSMM-5 FACs
8 Kuwait	France	6	AS-332	Hel	1983			Total cost incl AM-39 Exocct AShMs: \$95 mn
		1	Mirage F-1B	Trainer	(1984)	(1985)	(I)	Attrition aircraft
		13	Mirage F-1C	Fighter/interceptor	1983	1984 (1985)	(3) (10)	Ordered Mar 1983; armed with Super-530 AAMs; total cost: \$400 mn; delivery
								started Dec 1984
		12	AM-39 Exocet	AShM	1983			Arming 6 AS-332 Super Pumas
		(96)	MM-40 Exocet	ShShM/SShM	1980	1983 1984 (1985)	(12) (60) (24)	Arming 6 TNC-45 and 2 Type 57 FACs
		(78)	Super-530	ААМ	1982	1984	(18)	Arming 13 Mirage F-1Cs
	Germany, FR	2	РВ-57 Туре	PC/FAC	198 0	1983 1984	1	
		6	TNC-45	FAC	1980	(1984) (1985)	(4) (2)	Armed with MM-40 Exocet ShShMs
	UK	12	Hawk	Adv trainer/strike	1983	. ,		Mk-64 trainer/ground attack version; for delivery from 1985; total cost: \$105 mn
		(100)	Chieftain-5	MBT	(1985)			Negotiating
		(100)	FV-101 Scorpion	LT	(1983)			Unconfirmed
		3	Loadmaster Type	10	1084			
	USA	(188)	M-113-A2	APC	1982	1984	(50)	
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		56	M-901 TOW	APC	1982	1984	(20)	US LoO Feb 1982
		20	V-150 Commando	APC	1984			Ordered Jul 1984; together with 62 V-300 Commandos; total cost: \$40 mn
		62	V-300 Commando	APC	1984			
		4840	BGM-71A TOW	ATM	1982	(1984)	(1000)	US LoO Feb 1982; order incl M-901 and and M-113 APCs; total cost: \$97 mn
	USSR		SA-7 Grail	Port SAM	1984	1984	(100)	
			SA D C . L .		(1004)	(1985)	(100)	
			SA-8 Geeko	Landmob SAM	(1984)	1984 (1985)	(48) (48)	
10 Laos	USSR		SA-2 Guideline	Landmob SAM	(1983)	(1984)	(27)	Unconfirmed; small number reportedly delivered
			SA-3 Goa	Landmob SAM	(1983)	(1984)	(18)	Unconfirmed
			SA-7 Grail	Port SAM	(1983)	(1984)	(20)	Unconfirmed
8 Lebanon	France	(5)	SA-330L Puma	Hel	1982	1984	(5)	Part of \$75 mn MAP package
		10	SA-342K Gazelle	Hel	1982	1984	(10)	Part of \$75 mn MAP package; possibly armed with HOT ATMs
		100	AMX-13-90	LT	1982	(1984)	(30)	Total cost incl 10 Gazelle and Puma helicopters: \$75 mn
		85	VAB	APC	1983	1983 1984	(50) (35)	In several versions; in addition to 30 in service
		(60)	SS-12	ShShM	1982	(1984)	(60)	Arming approx 5 Gazelle helicopters delivered 1984
	UK	••	Swingfire	ATM	1980			Ordered May 1980; status of deal uncertain
	USA	253	M-113-A2	APC	1983	(1984)	(70)	USA also supplying \$102 mn worth of ammunition
		102	M-113-A2	АРС	1983			Order incl 25 M-577-A2 CPCs and 93 M-125-A2 mortar carriers; possibly similar to order for 253 APCs
		93	M-125-A2	APC	1983			
		68	M-48-A5	MBT	1983			
		35	M-48-A5	MBT	1984			A total of 137 ordered 1982-84
		25	M-577-A2	CPC	1983			
		35	M-60-A3	MBT	(1984)			US LoO 1984
13 Lesotho	Italy	2	AB-412 Griffon	Hel	(1982)	(1984)	(2)	Delivery blocked by South Africa since May 1984; unconfirmed whether final destination yet reached
	Poland	1	Mi-2 Taurus-2	Hci	(1983)	1984	I	Seller unconfirmed

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
13 Liberia	India	• •	HJT-16 Kiran-2	Trainer/COIN	(1983)			Negotiating sale of small number
	Israel	6 3	SA-316B Chetak IAI-201 Arava	Hel Transport	(1983) 1984	(1985)	(3)	In addition to 3 delivered 1984
		3	IA1-202 Arava	Transport	1983	(1984)	(3)	
12 Libya	Brazil	(8)	EMB-111	Mar patrol	(1985)			Negotiating
		25	EMB-121 Xingu	Transport	(1985)			Negotiating
		(100)	EMB-312 Tucano	Trainer	(1985)			Negotiating for 100-150 aircraft
			EE-11 Urutu	АРС	(1985)			Advanced negotiations for package incl Cascavel AVs and Tucano, Xingu and Bandeirante aircraft
			EE-9 Cascavel	AC	(1984)			
			EE-T1 Osorio	MBT	(1985)			Negotiating; reportedly also Libyan financial development assistance
	Czechoslovakia	10	Let L-410	Transport	(1983)	1984	10	
		(30)	Dana 152mm	SPH	(1981)	(1983) (1984)	(15) (15)	
	France		R-530	AAM	(1975)	(1979)	(76)	Arming Mirages; status of deal uncertain
		10	Combattante-2G	FAC	<u>1977</u>	1982 1983 1984	7 2 1	Delivery of last FAC suspended until Jan 1984 due to Libyan intervention in Chad
	Italy	20	CH-47C Chinook	Hel	(1981)			
		20	G-222L	Transport	(1979)	1981	(4)	
						1982	(6)	
						1983	(8)	
						(1984)	(2)	
		210	Palmaria 155mm	SPH	1981	1982	12	
						1983	(50)	
						1984	(80)	
		•••	Otomat-2	ShShM	(1981)			Arming 4 new Wadi Class corvettes
		(12)	Otomat-2	ShShM	(1982)	(1984)	(12)	Arming trigate 'Dat Assawari' after retrofit in Italy
		4	Wadi Class	Corvette	(1985)			In addition to 4 in service; to be armed with Otomat ShShMs; renamed Assad Class
	USSR	(3)	An-26 Curl	Transport	(1983)	(1983) 1984	(2) 1	
			SA-5 Gammon	SAM	(1985)			Negotiating

		(12)	SA-N-4	ShAM	1980	1981 1983 1984 (1985)	(3) (3) (3) (3)	Arming Nanuchka Class corvettes
		(48)	SSN-2 Styx	ShShM	1980	(1983) 1981 1983 1984 (1985)	(12) (12) (12) (12) (12)	Arming Nanuchka Class corvettes
		•••	SSN-2 Styx	ShShM	(1982)	1983 1984	(36) (36)	Land-based version for protection of Gulf of Sirte
		4	Nanuchka Class	Corvette	1980	1981 1983 1984 (1985)	(1) (1)	Armed with SSN-2 Styx ShShMs and SA-N-4 SAMs
		4	Natya Class	MSO	(1982)	1983 1984	3	In addition to 2 delivered 1981
	Yugoslavia		G-2AE Galeb	Trainer/strike	(1983)			Unspecified number ordered; in addition to some in service
		4	Koncar Class	FAC	(1981)			Unconfirmed; based on Swedish Spica design; to be armed with Styx ShShMs
10 Malaysia	Belgium	186	Sibmas	АРС	1982	1982 (1983) 1984 (1985)	(20) (60) (60)	Incl 162 APCs and 24 ARVs
						(1985)	(46)	
	France	8 (48)	MM-38 Exocet MM-40 Exocet	ShShM ShShM/SShM	1981 (1983)	(1985) 1984	(46) 8	Arming 2 FS-1500 Class frigates Arming 4 new Spica Class FACs
	France Germany, FR	8 (48) 2	MM-38 Exocet MM-40 Exocet FS-1500 Class	ShShM ShShM/SShM Frigate	1981 (1983) 1981	(1985) 1984 1984	(46) 8 2	Arming 2 FS-1500 Class frigates Arming 4 new Spica Class FACs Ordered Jun 1981; delivered Aug 1984; similar to frigates delivered to Colom- bia but with different armament; further orders unconfirmed
	France Germany, FR Indonesia	8 (48) 2 4	MM-38 Exocet MM-40 Exocet FS-1500 Class CN-212	ShShM ShShM/SShM Frigate Transport	1981 (1983) 1981 (1980)	(1985) 1984 1984	(46) 8 2	Arming 2 FS-1500 Class frigates Arming 4 new Spica Class FACs Ordered Jun 1981; delivered Aug 1984; similar to frigates delivered to Colom- bia but with different armament; further orders unconfirmed Unconfirmed
	France Germany, FR Indonesia Italy	8 (48) 2 4 4	MM-38 Exocet MM-40 Exocet FS-1500 Class CN-212 Lerici Class	ShShM ShShM/SShM Frigate Transport Minehunter	1981 (1983) 1981 (1980) 1981	(1983) 1984 1984 (1984) (1985)	(46) 8 2 (2) (2)	 Arming 2 FS-1500 Class frigates Arming 4 new Spica Class FACs Ordered Jun 1981; delivered Aug 1984; similar to frigates delivered to Colom- bia but with different armament; further orders unconfirmed Unconfirmed Different engines and armament than version produced for Italian Navy
	France Germany, FR Indonesia Italy Korea, South	8 (48) 2 4 4 2	MM-38 Exocet MM-40 Exocet FS-1500 Class CN-212 Lerici Class Tacoma Type	ShShM ShShM/SShM Frigate Transport Minchunter LS	1981 (1983) 1981 (1980) 1981 1981	(1983) 1984 1984 (1984) (1985) 1983 1984	(46) 8 2 (2) (2) 1 1	 Arming 2 FS-1500 Class frigates Arming 4 new Spica Class FACs Ordered Jun 1981; delivered Aug 1984; similar to frigates delivered to Colombia but with different armament; further orders unconfirmed Unconfirmed Different engines and armament than version produced for Italian Navy Designation unconfirmed; to be used as fleet support ships; similar to Sri Indera
	France Germany, FR Indonesia Italy Korea, South Switzerland	8 (48) 2 4 4 2 44	MM-38 Exocet MM-40 Exocet FS-1500 Class CN-212 Lerici Class Tacoma Type PC-7	ShShM ShShM/SShM Frigate Transport Minehunter LS Trainer	1981 (1983) 1981 (1980) 1981 1981 1981	(1983) 1984 1984 (1984) (1985) 1983 1984 (1983) (1984) (1985)	(46) 8 2 (2) (2) 1 1 6 (27) (11)	 Arming 2 FS-1500 Class frigates Arming 4 new Spica Class FACs Ordered Jun 1981; delivered Aug 1984; similar to frigates delivered to Colom- bia but with different armament; further orders unconfirmed Unconfirmed Different engines and armament than version produced for Italian Navy Designation unconfirmed; to be used as fleet support ships; similar to Sri Indera

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
	USA	40	A-4E Skyhawk	Fighter/bomber	1981	1984 (1985)	(10) (30)	63 A-4Ls and 25 A-4Cs; 40 A-4Ls to be refurbished by Grumman; remaining 23 A-4Ls to be stored in USA; the A-4Cs to be used for sparses
		14	F-5E Tiger-2	Fighter	(1985)			US LoO Jul 1982; order incl 2 F-5Fs; total cost: \$260 m; purchase postponed due to funding problems
		2 (84)	F-5F Tiger-2 AIM-9L	Trainer AAM	(1985) (1983)			Arming F-5Es
13 Mali	USSR	8	D-30 122mm	TH	(1983)	1984	8	Supplied under military co-operation programme; incl 2 BM-21 multiple rocket launchers
14 Mexico	France	(80)	VBL-M11	AC	1984	(1984)	(27)	Also designated Ultrav; some armed with Milan ATMs
			Milan	ATM	1984			Unspecified number ordered; to arm M-11 VBL vehicles
	Spain	10	C-212-200	Transport	(1984)			For navy; also negotiating licensed production
	USA	4	F-33C Bonanza	Trainer	(1984)	1984	4	For training
12 Morocco	France		AML-90	AC	(1978)	(1981) (1982) (1983) (1984)	(20) (30) (30) (30)	
		108	AMX-10RC	Recce AC	1978	(1984) 1982 1983 (1984)	(10) (20) (10)	Delivery started 1982 but stopped in 1984 due to funding problems
		423	VAB	APC	1975	1979 1980 1981 1982 1983 1984	(16) (75) (75) (75) (75) (75)	Several versions; last 32 (VAB Mephisto) held up for financial reasons
	USA	1	Super King Air	Transport	(1983)	1984	ĺ	In addition to 6 King Air A100 and 3 Super King Air in service
		108 381	M-60-A3 AGM-65B	MBT ASM	(1982) 1982			Status of deal uncertain USA approved sale; arming 20 F-5Es

13	Mozambique	USSR	(24)	MiG-17 MiG-21ME	Fighter/strike	(1981)	1983 1984	(12) (12)	Unconfirmed Soviet offer
			(20)			(1981)			
9	Nepal	UK	1	Skyvan-3M	Transport	1984	1984	1	In addition to 3 in service
14	Nicaragua	Libya	(15)	L-39 Albatross	Trainer	(1983)			Unconfirmed
		• •	MB-326K	Trainer	1984	1984	(3)	Identity of buyer and number delivered unconfirmed	
		USSR	6	An-2	Transport	(1983)	(1984)	(6)	Unconfirmed
			(10)	Mi-24 Hind-C	Hel	(1984)	(1984) (1985)	(3)	
			(16)	Mi-8 Hin	Hal	(1092)	1093	(10)	Order number and designation unconfirmed
			(10)	in o mp	1101	(1962)	1983	(10)	Order number and designation uncommitted
			(100)	BTR-60PB	APC	(1981)	(1982)	(40)	Designation unconfirmed
			(100)			(1)01)	(1983)	(40)	Designation another moto
							(1984)	(20)	
			(20)	PT-76	LT	(1983)	1984	(20)	
			·	ZSU-57-2	AAV	(1982)	1983	(10)	Identity of seller unconfirmed
			(100)	SA-7 Grail	Port SAM	(1984)	(1984)	(100)	Unconfirmed
13	Nigeria	Brazil	(100)	EE-9 Cascavel	AC	1981			Designation unconfirmed; well over 100 ordered; status of deal uncertain
		France	28	AMX-30 Roland	AAV	1982	(1984)	(14)	
				Milan	ATM	(1983)		. ,	Unspecified number of missiles and launchers ordered
			595	Roland-2	Landmob SAM	1982	(1984)	(300)	Total value incl 28 launch vehicles: \$170 mn; contract signed Mar 1982
		Germany, FR	12	Alpha Jet	Adv trainer/strike	1983			In addition to 12 in service; order placed with Dornier
			16	Do-128-2	Mar patrol	1982	1982	3	Original order for 18 reduced in favour
							1983	(5)	of 2 Do-228-200s
							1984	(5)	
							(1985)	(3)	
			2	Do-228-2001	Transport	1983	1984	2	Delivered Sep 1984
			20	UR-416	APC	1984	1984	20	
		Italy	3	G-222	Transport	1982	1984	(3)	Original order for 5 reduced for financial reasons; first 2 delivered Jul 1984
			12	MB-339A	Trainer/strike	1983	1984	1	To replace L-29 Delfin; total cost incl training, spares and support: \$82 mn
			25	Palmaria 155mm	SPH	1982	1983	2	
							1984	(10)	

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		1	Lerici Class	Minchunter	1983			Ordered Jun 1983; for delivery 1986; option on 1 more
	Netherlands Sweden	2 42	F-27 Maritimc FH-77 155mm	Mar patrol TH	(1982) 1982	(1984) 1983 1984 (1985)	(2) (12) (14) (16)	
	Switzerland UK	57 18	Piranha Jaguar	APC Fighter	(1981) 1983	1984 (1985)	(8) (10)	Possibly cancelled Option on 18 more
		3 36	Lynx MBT-3	Hel MBT	1981 1981	1984 1983 1984 (1985)	3 (18) (15) (3)	Order incl 6 ARVs and 5 BLs
		(50) 6	MBT-3 MBT-3 ARV	MBT ARV	1984 1981	(1985) 1983 1984 (1985)	(12) (3) (2) (1)	In addition to 47 ordered 1981
		5	MBT-3 BL	BL	1981	1983) 1983 1984	(1) (2) (3)	
			Blowpipe	Port SAM	1982			Unspecified number ordered; status of deal uncertain
			Swingfire	ATM	1983			Ordered Nov 1983; status of deal uncertain
	USA	3	C-130H-30	Transport	(1982)	1983 (1984)	2 (1)	In analysis for 17 MiC 21s in coming
	055K	18	MIG-21MF	Fignter	1984	(1985)	(18)	but not in operational condition; order incl 6 MiG-21UTIs
		6	MiG-21UTI	Trainer	1984	(1985)	(6)	
8 Oman	France	2	AS-332 VBC-90	Hel	(1980)	(1984) (1984)	(2) (4)	
		(18)	MM-40 Exceet	au ShShM/SShM	1021	(1985)	(4)	Arming 3 Province Class FACs: 2 triple
	Italı	(18)	Dalmania 155mm	SURVISE	(1002)	1982	(12)	launchers on each vessel
	UK	(15)	Chieftain-5	MBT	(1983) 1983	(1984) (1985)	(7) (8)	12-15 ordered in addition to 12 already in service

	• •	Blowpipe	Port SAM	1982			Ordered Dec 1982	
		1		Support ship	1982	1984	1	In addition to 1 delivered 1979; ship named 'Nasr Al Bahr'
		2	Province Class	FAC	1981	1984	2	In addition to 1 delivered 1982; to be armed with MM-40 Exocet ShShMs
	USA	6	Model 214ST	Hel	1983	(1983) (1984)	(4) (2)	
9 Pakistan	China	(60)	Q-5 Fantan-A	Fighter/ground attack	1982	(1982) (1983) (1984)	(18) (18) (24)	
		(100)	Q-5 Fantan-A	Fighter/ground attack	(1984)	(1704)	(21)	In addition to approx. 60 in service
			T-59	MBT	(1975)	(1978) (1979) (1980) (1981) (1982) (1983)	(50) (50) (50) (50) (50) (50)	China has delivered about 50/year
		16	Hai Ving-2	ShShM/SShM	1083	(1984)	(30)	Arming 4 Huangten (Oca-2) Class FACs
		4	Huangfen Class	FAC	(1983)	1984	4	Chinese-built version of Osa-2 Class
	Spain	2	S-70 Class	Submarine	(1983)			Reportedly paid for by Saudi Arabia
	Sweden	(450)	RBS-70	Port SAM	(1983)			Order reportedly incl 144 launchers
	UK	3	Amazon Class	Frigate	(1984)			Part of Pakistani fleet modernization programme; 1 ship to be built in Pakistan; negotiating loan for \$368.4 mn
	USA	2	E-2C Hawkeye	AEW	(1984)			Pakistani request; US decision pending
		36	F-16A	Fighter/strike	`1981 ´	1983	6	In addition to 4 F-16Bs delivered 1982;
						1984 (1985)	(10) (20)	total cost for 40 aircraft: \$1 100 mn
		4	G-134 Mohawk	Recce	1984			US LoO Aug 1984
		12	Model 209 AH-1S	Hel	1981	1984	12	Deal incl TOW missiles, MBTs, ARVs, anti-tank vehicles and howitzers
		12	Model 209 AH-1S	Hel	1982			In addition to 12 received 1984; for delivery 1986
		4	OV-10A Bronco	Trainer/COIN	(1983)			Ordered Jun 1983; unconfirmed
		64	M-109-A2 155mm	SPH	1981	(1983) (1984)	(32) (32)	
		36	M-109-A2 155mm	SPH	1982	(1984) (1985)	(18) (18)	In addition to 64 ordered 1981
		75	M-198 155mm	TH	1981	(1984)	(20)	
		35	M-88-A1	ARV	1981	(1984)	(15)	
		24	M-901 TOW	APC	1981	(1984) (1985)	(12) (12)	

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		1005	BGM-71A TOW	ATM	1981	1983 1984	(100)	Arming Model-209 helicopters and M-901 AVs
		6	RGM-84A Harpoon	ShShM	(1983)	(1984)	(210)	To arm Gearing Class; unconfirmed
		1	Gearing Class	Destroyer	(1983)	(1984)	(1)	In addition to 5 in service
14 Panama	Argentina	(60)	ТАМ	MT	1984			Possibly including vehicles for resale
	USA	• •	A-37B Dragonfly	Fighter/COIN	(1984)	1984	(5)	First combat aircraft in AF
11 Papua New Guinea	Australia	1	N-22L Nomad	Mar patrol	(1983)	1984	(1)	In addition to 2 delivered earlier; Australian military aid
	Israei	3	IAI-201 Arava	Transport	1984	1984 (1985)	(1) (2)	Total cost: \$10 mn
15 Paraguay	Brazil	(10)	EMB-110	Transport	(1985)			Negotiating
		• •	EE-11 Urutu	APC	(1984)		<i>(</i> -)	Unspecified number ordered
	Spain	1 2	C-212-200	PC Transport	1983 1984	(1985)	(1)	Paraguayan name: P-2 Itaipu Original order for 4
15 Peru	Argentina	80	ТАМ		(1985)			Negotiating
	France	26	Mirage-2000	Fighter/strike	1982			Delayed for financial reasons; confirmed May 1984; deliveries to start 1985
		(26)	Mirage-5	Fighter	(1981)	1984 (1985)	(13) (13)	Possibly Mirage-50
		40	AM-39 Exocet	AShM	1982	() /	Xy	Ordered Dec 1982; arming Mirage-2000s
	Italy	4	SH-3D Sea King	Hel	(1984)			In addition to 6 in service
		96	Aspide	AAM/SAM/ShAM	1975	1979 1984	48 (24)	Arming Lupo Class frigates
		96	Otomat-1	ShShM	1974	(1983) 1979 1984 (1985)	(24) 48 (24) (24)	Arming Lupo Class frigates
	USA	6	Model 214ST	Hel	1983	1983	(3)	
	USSR	(12)	Mi-24 Hind-D	Hel	(1984)	1704	(3)	
10 Philippines	Korea, South	3	PSMM-5 Type	FAC	1980			Status of deal uncertain
	USA	16	Model 412	Hel	1982			
		17	S-76 Spirit	Hel	1983	1983 1984	(8) (9)	Total cost incl 2 UH-60As: \$60 mn

		2	UH-60A	Hel	1983	(1985)	(2)	Contract negotiated with Sikorsky; total
		55	LVTP-7A1	Amph ASSV	1982 (1984)			US LOO Feb 1982; for Marine Corps; total cost incl spares and support equipment: \$64 mn
		100	V-150 Commando	APC		1984	56	Apparently part of US basc negotiations
8 Qatar	Egypt		Fahd	APC	(1984)			Unconfirmed order for unspecified number
	France	14	Mirage F-1C	Fighter/interceptor	1980	1982 1983 1984	(4) (4) (6)	
		6	SA-330 Puma	Hel	1980	(1983) (1984)	(3) (3)	
		(12)	SA-342L Gazelle	Hel	(1983)			Unconfirmed
		• •	AM-39 Exocct	AShM	(1983)	(1984)	(20)	Unspecified number reportedly ordered for Commando Mk-2 helicopters
			HOT	ATM	1982			Total cost incl Milan ATMs: \$20 mn
		(50)	MM-40 Exocet	ShShM/SShM	1980	(1983) (1984)	(25) (25)	3 coastal defence systems ordered
			Milan	ATM	1982			
	UK	8	Commando Mk-3	Hel	1981	1983 1984	(4) (4)	For ASW duties
		•••	Rapier	Landmob SAM	(1981)	(1983) (1984)	(24) (24)	1 bty ordered; option on more
13 Rwanda	France	2	Rallye-235GT	Lightplane	1983	1983	1	
						(1984)	(1)	
8 Saudi Arabia	Austria	(400)	Cuirassier	LT/TD	(1985)			Discussing purchase of up to 400; status of deal uncertain
	Brazil		EE-9 Cascavel	AC	1984			Unspecified number ordered; part of \$1 bn arms deal
	France	24	AS-365F	Hel	1980	1984 (1985)	(6) (12)	20 to be armed with AS-15TT; arming 4F-2000 Class frigates
		(2)	ATL-2	Mar patrol	(1983)		. ,	Unconfirmed
		•••	Mirage-4000	Fighter	(1985)			Developed with Saudi financial assistance; may order
		(60)	AMX-10P	MICV	(1982)	(1983) (1984)	(30) (30)	·

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		(80)	AMX-30 Shahine	AAV	1984			Improved version to be developed with Saudi financial assistance; in addition to earlier version AMX-30 Shahine in service; minimum of 80 missile tanks and 20 radar acquisition units; a total of 140 launch systems on order of which rest are shelterized 'S'-version; part of 'Al Thakeb'-deal
		(200)	AS-15TT	AShM	1980	(1984) (1985)	(50) (100)	Arming SA-365F helicopters on 4 F-2000 Class frigates
		(104)	Crotale Naval	ShAM	1980	1984 (1985)	(26)	First export order of naval version; arming F-2000 Class frigates
			OTOMAT-2/TESEO	SShM	1984	()		Otomat Mk-2 coastal defence version; part of 'Al Thakeb' contract for Shahine SAMs and radar systems; unspecified number of btys ordered
		(96)	Otomat-2	ShShM	1980	1984 (1985)	24 (48)	Arming 4 F-2000 Class frigates
		(1000)	Shahine-2	Landmob SAM	1984	. ,	. ,	Contract name: 'Al Thakeb'; total value: \$4 100 mn
		2	Durance Class	Support ship	1980	1984 (1985)	1 (1)	Fuel supply ship; displacement: 10 000t
		4	F-2000 Class	Frigate	1980	(1984) (1985)	(1) (2)	All 4 ships launched by end-1984; part of large turnkey naval 'Sawari' deal
	Germany, FR	(300)	Gepard	AAV	(1985)			Ongoing negotiations; general go-ahead by West German government Oct 1983 reportedly followed by offer Feb 1984
	Indonesia	40	CN-212	Transport	1979	(1983) (1984)	(6) (10)	
	Italy	200	VCC-1	APC	1982	(1983) 1984 (1985)	(50) (75) (75)	Some armed with TOW ATMs
	Spain	4	CN-235	Transport	1984		. ,	Total cost incl BMR-600 AVs, tugs and ammunition: \$150 mn
	UK	140 24 40	BMR-600 Hawk Tornado IDS	ICV Adv trainer/strike Fighter/MRCA	1984 (1985) (1985)			Total cost: \$62 mn Negotiating; part of Tornado deal Negotiating

72	FH-70 155mm	TH	1982	1983 1984	(10) (36)	Unit cost: \$0.75 mn
0	р Ц 7	Hovercraft	1092	(1985) 1083	(26)	
0	BU-1	Hovercraft	1982	1983	(4)	
5	E-3A Sentry	AEW	1981	1984	(4)	4 USAF AWACS to be kept in Saudi Arabia until deliveries begin 1985
2	F-15C Eagle	Fighter	1980			DoD offered to sell; to be retained in USA until needed as replacement
4	F-5E Tiger-2	Fighter	1982	1984	(4)	Cost incl 10 RF-5Es and 1 F-5F: \$350 mn
1	F-5F Tiger-2	Trainer	1982	1984	(1)	
1	KC-10A Extender	Tanker/transport	1984	1984	1	Together with 200 Stinger missiles to guard Gulf area
8	KC-135	Tanker/transport	1981			Order increased from 6 to 8 in 1984; Saudi designation: KE-3; total cost: \$2.4 bn; for delivery 1986-87
10	RF-5E Tigereye	Recce	1982	1984	(5)	
	0.1			(1985)	(5)	
18	M-109-A2 155mm	SPH	1983	(1984)	(8)	
(505)	M-113-A2	APC	1983	(1984)	(100)	Incl 176 A2s, 33 M-578s, 111 M-992, 24 M-106s, 80 M-577s, 19 M-88s and 62 M-125s; total cost incl MGs and ammunition vehicles: \$271 mn
42	M-198 155mm	тн	1983	(1984)	(20)	
100	M-60-A3	MRT	1983	1984	(60)	US LOO Jul 1983: equipped with 105mm
100			1700	(1985)	(40)	gun, laser rangefinder and infra-red
579	V-150 Commando	APC	(1980)	1981	(100)	For modernization of National Guard
			. ,	1982	(100)	
				1983	(100)	
				1984	(100)	
1600	AGM-65D	ASM	(1984)		()	Arming F-15s
(1200)	AIM-7F Sparrow	AAM	1978	1982	(150)	5
. ,	•			(1983)	(150)	
				1984	(150)	
1177	AIM-9L	AAM	1981	1982	(200)	Arming F-15 fighters; not incl in
				1983	(150)	initial contract
				1984	(200)	
(1700)	AIM-9L	AAM	(1984)		. /	Arming F-15 fighters; in addition to previous order of 1 177 Sidewinders
2500	BGM-71A TOW	АТМ	(1982)			Pending congressional approval Feb 1984; not identical with US LoO for 2 538 TOWs in 1983; Saudi Arabia had ordered 10 738

TOW ATMs by Feb 1984

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		2538	BGM-71A TOW	ATM	1983		L. L	US LoO; improved version; total cost: \$26 mn
		400	FIM-92A Stinger	Port SAM	1984	1984	400	Total value incl 200 launchers: in excess of \$30 mn
13 Senegal	France	2	Magister	Trainer	(1983)	1984	2	French military aid; gift including 4 Rallye aircraft
		4	Rallye-235CA	Lightplane	(1982)	1984	4	For fire support and COIN duties; gift
		3	AML-90	AC	1984	1984	3	Military aid
1 Seychelles	USSR		SA-7 Grail	Port SAM	(1983)	1984	(50)	Designation unconfirmed
0 Singapore	Canada	2	Model 205A-1	Hel	(1983)	(1983) (1984)	(1) (1)	Probably attrition aircraft
	France	22	AS-332	Hel	1984	(1985)	(5)	Five delivered early 1985; 17 to be assembled by Samaero
		6	AS-350 Ecureuil	Hel	1982	(1000)	(20)	For Navy
		150	АМХ-13	LI	1978	(1980) (1981)	(30)	
						(1982)	(30)	
						(1983)	(30)	
			AM 20 Emand	4.0114	(1004)	(1984)	(30)	
			AM-39 Exocet	ASIM	(1984)			helicopters
	Italy	30	S-211	Trainer	1983	1984	2	First 6 to be delivered directly; last 24 to be assembled in Singapore; tota cost approx \$60 mn
		6	SF-260 Warrior	Trainer/COIN	1982			In addition to 6 delivered 1980
	UK	(240)	Rapier	Landmob SAM	1981	(1984)	(120)	In addition to 10 btys previously acquired
	USA	40	A-4S Skyhawk-2	Fighter/bomber	1981			Unconfirmed
		4	E-2C Hawkeye	AEW	(1983)			Total cost: \$450 mn; for delivery from 1985
		8	F-16/79	Fighter	(1984)			Congress notified Mar 1984; total cost incl spares and training: \$280 mn
		200	AGM-65A	ASM	1981			Total cost incl launchers: \$26 mn
		(162)	MIM-23B Hawk	Landmob SAM	(1982)			Additional missiles and launchers reportedly on order

13 Somalia	China France Italy	 50 (6)	F-7 VLRA S-211	Fighter Recce AC Trainer	(1984) (1983) (1984)			Reportedly requested
		100	M-47 Patton	MBT	(1983)	(1985)	(100)	All of Italy's 500 M-47s to be returned to USA for refurbishing before transfer to Third World countries
	Saudi Arabia	• •	AML-90	AC	(1984)	1984	(20)	Unspecified number reportedly delivered Feb 1984
	Spain	6	C-212-200	Transport	1984			
		• •	BMR-600	ICV	(1984)			Unspecified number reportedly ordered
		• •	M-41E Cazador	TD	(1984)			Unspecified number reportedly ordered
		2		FAC	1984			Total cost: \$45 mn; 50% financed by Saudi Arabia and 50% by Spain; ordered Feb 1984
16 South Africa	France	(2)	SA-316B	Hel	(1983)	1983 1984	(1)	For Bophutatswana defence force
	Germany, FR	1	BO-105	Hel	(1984)	1984	1	Origin unconfirmed; for Ciskei defence force
	UK	2	BN-2A Islander	Transport	(1983)	(1984)	2	For Ciskei
9 Sri Lanka	Singapore	2	Model 206B	Hel	(1983)	(1984)	(2)	
13 Sudan	Egypt	• •	SA-2 Guideline	Landmob SAM	1984	1984	(24)	Unspecified number delivered Mar 1984; incl SA-7; no launchers
		(50)	SA-7 Grail	Port SAM	1984	1984	(50)	
	France	11	AMX-155 Mk-F3	SPH	1980	(1983)	(5)	
						(1984)	(6)	
	Italy	12	AB-212	Hel	1984			For COIN duties in south Sudan; designation unconfirmed
	Romania	(12)	SA-330 Puma	Hel	1984	1984	(5)	Five reportedly delivered 1984; not known whether more to follow
	Spain	6	C-212-200	Transport	1984			
		• •	BMR-600	ICV	(1984)			Unspecified number of tanks and APCs reportedly ordered
		••	M-41E Cazador	TD	(1984)			Unspecified number of tanks and APCs reportedly ordered; designation uncon- firmed
		2	Cormoran Class	FAC	1984			Ordered Apr 1984; armed with Harpoon ShShMs; order incl 6 river patrol boats and 12 river barques; total value: \$50 mn; 50% financed by Saudi Arabia
	UK	10	BAC-167	Trainer/COIN	(1983)	(1984)	(10)	
	USA	2	F-5E Tiger-2	Fighter	1984	1984	2	

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivere d	Comments
		(54)	V-150 Commando RGM-84A Harpoon	APC ShShM	1984 1984	(1984)	(54)	Total cost: \$10.7 mn Arming 2 Cormoran Class FACs on order from Spain
5 Suriname	Brazil	(10)	EE-11 Urutu	APC	(1983)	(1984)	(10)	As part of \$15 mn aid programme
3 Syria	France Greece Italy	15 18 6	SA-342K Gazelle Steyr-4K 7FA AB-212ASW CH-47C Chinook	Hel APC Hel Hel	1984 (1985) (1984) (1984)			Replacing losses in Lebanon War Negotiating Unconfirmed Unconfirmed
	USSR	12 (8) (35)	SH-3D Sea King MiG-25RE Mi-24 Hind-D	Hel Recce Hel	(1984) 1981 (1983)	(1984) 1983 (1984)	(8) (12) (12)	Unconfirmed Order earlier reported as being larger
		•••	MiG-23	Fighter	1981	1982 1983 (1984)	(15) (70) (30)	
		(800)	BMP-1	MICV	1981 1981	1982 1983 1984	(200) (300) (300)	
		(200)	M-1973 152mm	SPG	1981	1982 1983 1984	(50) (50) (50)	Designation unconfirmed
		(500)	M-1974 122mm	SPH	1981	1982 1983 1984	(100) (100) (100)	Designation unconfirmed
		••	1-62 TE 70	MBI	1982	1982 1983 1984	(200) (200) (200)	
			1-72	мыт	1980	1980 1981 1982 1983 1984	(150) (150) (150) (150) (150)	
			ZSU-23-4 Shilka	AAV	1981	(1982) (1983) (1984)	(25) (25) (25)	

		AA-2 Atoll	ААМ	(1979)	1979 1980 1981 1982 1983	(48) (96) (96) (96) (96)	Arming MiG fighters now being delivered
		AA-6 Acrid	ΔΔΜ	(1984)	(1984)	(50)	Unconfirmed: arming MiG-25s
	••	AA-7 Apex	AAM	(1984)	(1984)	(50)	Unconfirmed: arming MiG-21s and MiG-23s
		AA-8 Aphid	AAM	(1984)	(1984)	(20)	Unconfirmed: arming MiG-21s and MiG-23s
		AT-5 Spandrel	ATM	(1984)	(1984)	(100)	Unconfirmed
	(12)	SA-11	Landmob SAM	(1984)	(1984)	(12)	Unconfirmed
	•••	SA-7 Grail	Port SAM	1978	(1979) (1980)	(25) (25)	
					(1981)	(25)	
					(1982)	(25)	
					(1983)	(50)	
					(1984)	(50)	
	••	SA-8 Gecko	Landmob SAM	1982	(1982)	(48)	Designation unconfirmed; part of up-
					(1983) (1984)	(48) (48)	grading of SAM network around major Syrian cities; deal incl MiG-27 fighter aircraft
		SA-9 Gaskin	Landmob SAM	1978	(1980)	(48)	
					(1981)	(48)	
					(1982)	(48)	
					(1983)	(48)	
					(1984)	(48)	
	• •	\$\$-21	SSM	(1983)	(1983)	(10)	Unconfirmed
	4	Nanuchka Class	Corvette	1981			
Netherlands	2	Zwaardvis Class	Submarine	1981			Request for 2 more turned down by Dutch government 1983; for delivery 1986-87
USA	12	C-130H Hercules	Transport	1984			Total cost incl spares and training: \$325 mn; protest by China
	42	T-34C-1	Trainer	1984			
	357	M-113-A2	APC	1982	(1983) (1984)	(100) (100)	140 APCs, 90 M-106-A2 and 72 M-125-A2 mortar carriers, 31 CPCs and 24 of the ambulance version
	33	M-88-A1	ARV	(1983)			US LoO Jul 1983; offer incl 384 MIM-72F Chaparral SAMs, 120 Sea Chaparral ShAN 170 SM-1 Standard ShAM/ShShMs, 100 A 7F Sparrow AAM/SAMs, 309 M-48-A5 tan conversion kits, and spare parts; total cost: \$530 mn

10 Taiwan

Region code/ Recipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
		100	AIM-7F Sparrow	AAM	(1983)			May be cancelled due to Swiss refusal to sell Skyguard air defence system
		384	MIM-72F	SAM/ShAM	(1983)			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
		170	RIM-66A/SM-1	ShAM/ShShM	(1983)			
		120	Sea Chaparral	ShAM	(1983)			
10 Thailand	Australia	20	N-22B Nomad	Mar patrol	1981	1982 1983 (1984)	2 9 (9)	Order signed Mar 1982; for delivery 1982-84
		4	N-22B Nomad	Mar patrol	1983	1984	(4)	In addition to 20 delivered 1982-84
		1	N-22B Nomad	Mar patrol	1984	(1985)	(1)	For maritime patrol in piracy areas; financed by UN High Commission for Refugees
	France		MM-40 Exocet	ShShM/SShM	(1983)			For coastal defence; unconfirmed
	Germany, FR	6	RFB Fantrainer	Trainer	1982	1984	6	Delivered prior to licensed production of 41
		1	M-41	LT	1984	1984	1	Refurbished with US and British parts; trials
		(2)		MSC	1984			Order number also reported as 4
	Indonesia	(25)	NBo-105	Hel	(1979)	(1983) (1984)	2 (3)	·
	Italy	(48)	Aspide	AAM/SAM/ShAM	1984	. ,		To arm 2 corvettes ordered from USA
	Netherlands	3	F-27 Maritime	Mar patrol	1982	1984	3	For delivery 1984; in addition to 11 in service
	UK	3	Shorts 330-UTT	Transport	1984	1984	3	Two aircraft for Army, one for Police
		•••	MBT-3	MBT	(1985)			For use on Kampuchean border; uncon- firmed; drawn out local testing
			Blowpipe	Port SAM	1982	(1984)	(50)	Additional batch ordered
	USA	16	F-16A	Fighter/strike	(1985)			US LoO Mar 1984; F-16Cs sought; F-16/79 rejected by Thai AF; to be decided 1985
		4	F-16B	Fighter/trainer	(1985)			Decision to be taken 1985
		12	Model 205 UH-1H	Hel	1982	(1983) (1984)	(6) (6)	Total value incl spares and support equipment: \$30 mn; surplus
		2	Model 214ST	Hel	1984	1984	2	•••
		4	Model 337	Trainer	(1984)	1984	4	
		2	RF-5E Tigereye	Recce	(1983)			Reportedly on order
			Super King Air	Transport	(1983)	1984	1	For Army

		4	UH-60A	Hel	(1984)			US offer rejected by Thai government due to costs; direct offer by Sikorsky for lower price being negotiated	
		21 148 40 (164)	M-113-A2 M-48-A5 V-150 Commando	Ampn ASSV APC MBT APC	(1983) 1982 1984 1978	(1984) (1984) (1980) (1981) (1982) (1983) (1984)	(60) 40 (20) (20) (20) (20) (20)	Total cost incl 40 trucks: \$33 mn	
		(16) 2	RGM-84A Harpoon Tacoma Type	ShShM Corvette	1983 1983	(1)(1)	(20)	Arming 2 corvettes on order from USA Ordered May 1983; for delivery 1986-87; similar to Badr Class for Saudi Arabia; a third ship to be built in Thailand	
13 Togo	France	3	TB-30 Epsilon	Trainer	1984	(1985)	(3)	First export order	
12 Tunisia	France	1 (24)	AS-365N MM-40 Exocet	Hel ShShM/SShM	(1983)	1984 1983	1 (8)	Arming 3 Combattante-3 Class FACs	
		3	Combattante-3	FAC	1981	(1984) 1983 (1984)	(16) 1 (2)	Armed with Exocet ShShMs	
	USA	2 6	C-130H Hercules F-5E Tiger-2	Transport Fighter	1984 1982	(1985) (1985) (1984) (1985)	(2) (2) 1 (5)	To replace old transport aircraft	
		6	F-5F Tiger-2	Trainer	1982	1984 (1985)	2 (4)		
		19 54	M-109-A2 155mm M-60-A3	SPH MBT	1981 1982	(1984) 1984	(19) 54		
8 United Arab Emirates	Egypt	•••	Fahd	APC	(1984)			Unconfirmed order for unspecified	
	France	. 8	AS-332	Hel	1982	1983 (1984)	(4) (4)		
		18	Mirage-2000	Fighter/strike	1983			For Abu Dhabi; for delivery from 1985; incl recce version	
		(18)	Mirage-2000	Fighter/strike	1984			For Abu Dhabi; in addition to 18 ordered 1983; reportedly in exchange for 15 mn barrels of oil	
	Italy	30	A-129 Mangusta	Hel	1984			Part of larger agreement; first export sale; first time Italian government actively assists export efforts of Italian arms industry; for Abu Dhabi	

Reg Rec	ion code/ ipient	Supplier	No. ordered	Weapon designation	Weapon description	Year of order	Year of delivery	No. delivered	Comments
			4 (6) (28)	MB-339A SF-260TP OF-40	Trainer/strike Trainer MBT	1984 1982 (1982)	1984 (1984) (1984) (1985)	(2) (6) (14) (14)	For Dubai; 2 delivered Mar 1984 For Dubai Mk 2 version incl some ARVs; for Dubai; in addition to 18 delivered 1982-83
		UK	24 20	Hawk FV-101 Scorpion Papier	Adv trainer/strike LT Landmob SAM	1983 (1983) (1984)	1984	(14)	Ordered Jan 1983; Mk 61 Unconfirmed
		USA	1085	BGM-71A TOW	ATM	(1984) 1981	(1984) (1985)	(540) (545)	Total cost incl 54 launchers and 101 practice missiles: \$28 mn
			343	MIM-23B Hawk	Landmob SAM	1981			DoD intends to sell; total cost incl 7 launch units, support equipment and training: \$800 mn
13	Upper Volta (Burkina Faso)	USSR	• •	MiG-17	Fighter/strike	(1984)	1984	(6)	Delivered via Algeria and Benin by Aug 1984; may be MiG-21
15	Uruguay	Brazil USA	5 1	EE-11 Urutu S-2G Tracker Gearing Class	APC ASW/mar patrol Destroyer	(1984) 1982 1984	1984	1	Unspecified number ordered Status of deal uncertain
15	Venezuela	Argentina Brazil	24 30	IA-58A Pucara EE-11 Urutu	COIN APC	1983 1983	1984	30	Delivery scheduled for 1985-86
		France		AMX-13-90	LT	(1985)			Advanced negotiations for several dozen AMX-13 vehicles
			(60)	Roland-2	Landmob SAM	(1982)	(1000)	(5)	Approximately 10 launch units ordered; unconfirmed
		Germany, FR	10	lpz-l	APC	(1983)	(1983) (1984)	(5) (5)	Unconformed
		Italy	(10)	G-222	Transport	(1984) (1982)	1983 1984	(4) (4)	6 for AF, 2 for Army
			8 4 5	G-222 S-61R Type 42M	Transport Hel PC	(1985) (1984) 1983	1984	(4)	Negotiating; in addition to 8 in service
		Korea, South	(6)	Tacoma Type	LS	1982	1984 (1985)	4 (2)	
		USA	2 18 6	C-130H-30 F-16A F-16B	Transport Fighter/strike Fighter/trainer	1981 1981 1981	1983 1983	(3) (3)	Total cost for 24 F-16s: \$500 mn

		1	Gulfstream-3	Transport	(1983)	(1984)	1	
10 Viet Nam	USSR	(12)	Be-12 Chaika	Mar patrol/amphibian	(1981)	1982 1983	(4) (4)	
			AS-7 Kerry	ASM	1982	1984 1983 1984	(4) (20) (20)	
		2	Petya-2 Class	Frigate	1983	1984	2	In addition to 2 in service
13 Zaire	France	1	AS-332	Hel	(1982)	1984	1	
13 Zambia	USSR		BTR-60PB	APC	(1984)	1984	(30)	Unspecified number of armoured vehicles delivered Mar 1984; designation unconfirmed
	Yugoslavia	(100) • •	PT-76 G-4 Super Galeb	LT Trainer/ground attack	(1983) (1984)	1984	(100)	Unconfirmed
13 Zimbabwe	Brazil	90	EE-9 Cascavel	AC	1983	(1983) (1984)	(10) (80)	Option on 60 more
	China	(15)	F-6	Fighter	(1983)			Unconfirmed offer for 1 squadron; may be cancelled due to absorption problems
		(15)	F -7	Fighter	(1983)			Unconfirmed offer for 1 squadron; may be cancelled due to absorption problems
	Italu	20	T-60		(1983)	1984	(20)	Designation unconfirmed
	Spain	6	C-212-200	Transport	1983)	1982 1983 (1984)		
	UK	4	Hawk	Adv trainer/strike	(1983)	((-)	Negotiating; Mk 60; in addition to 8 delivered 1982; probably cancelled
		5	Hunter FGA-9	Fighter/ground attack	1983	1984	5	Replacing aircraft destroyed in sabotage attack 1982
	USSR	• •	T-55	MBT	1984			Unspecified number on order

Appendix 11C. Register of licensed production of major conventional weapons in industrialized and Third World countries, 1984

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This appendix includes licensed production of major weapons for which either the licence was bought, production was under way, or production was completed during 1984. The entries are made alphabetically, by recipient, licenser and weapon designation.

Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of pro- duction	No. produced	Comments
I. Industrialize	ed countries							
11 Australia	France	1	Durance Class	Support ship	1977			Under construction since 1980; launched 1984; for delivery 1986
	UK	15	Fremantle Class	TG PC	(1982) 1977	(1984) 1980 1981 1982 1983 1984 (1985)	(10) 1 3 4 3 (1)	First ship delivered directly from UK; also designated PCF-420 Class; plan for further 5 ships cancelled 1983
	USA	73 2	F/A-18 Hornet FFG-7 Class	Fighter Frigate	1981 1983	(1985)	(7)	In addition to 2 delivered directly For completion 1991/92
4 Belgium	USA	96	F-16A	Fighter/strike	1977	1979 1980 1981 1982 1983 1984	14 9 16 19 19	
		44 20	F-16A F-16B	Fighter/strike Fighter/trainer	1983 1977	1984 1979 1980 1981 1982 1983	4 3 3 3	In addition to 116 F-16A/Bs on order; offset share: 80%
		514	AIFV	MICV	1979	1984 1982 1983 1984	(100) (100) (100)	Total number ordered: 1 189 incl 525 M-113s; unit cost: \$100 000

		525	M-113-A2	APC	1979	1982 1983 1984	(50) (50) (50)	
5 Czechosłovakia	USSR	(1900)	T-72	МВТ	1978	(1981) (1982) (1983) (1984)	(10) (50) (100) (100)	
4 France	USA		FTB-337	Trainer	1969	1975 1976 1977 1978 1979 1980 1981 1982 1983 (1984)	12 12 12 10 3 (5) (5) (5) (5)	Designation: FTB-337 Milirole; exported to Africa
4 Germany, FR	USA		AIM-9L	ААМ	1977	1981 1982 1983 1984 (1985)	(800) (1600) (2600) (2400) (2400)	For delivery 1981-87; NATO co- production programme
			NATO Stinger RAM	Port SAM ShAM/PDM	1983 (1985)	、 /	、 /	US LoO Apr 1983; NATO co-production; initial batch of 13 000; cost of US parts and support: \$200 mn Planned 'competetive' co-production; total requirement for Danish, west- German and US navies: up to 10 000
4 Greece	Austria	100	Steyr-4K 7FA	АРС	1981	1982 1983 1984	(30) (40) (30)	Production started by Steyr-Hellas in Saloniki 1982; Greek designation: Leonidas; Greece may also produce recce and AAV versions in second batch of 300
4 Italy	France	23000	Milan Roland-2	ATM Landmob SAM	1980 (1983)			OTO-Melara negotiating with Euromissile for licensed production

Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of pro- duction	No. produced	Comments
	USA		AB-205A-1	Hel	1969	1977	(120)	
						1978	(120)	
						1979	(120)	
						1980	(120)	
						1981	(60)	
						1982	(60)	
						1983	(60)	
			4 D 20(D 2			1984	(30)	
		••	AB-206B-3	Hel	1972	1978	(50)	
						1979	(50)	
						1980	(50)	
						1981	(50)	
						1982	(50)	
						1905	(50)	
			A D 212	11-1	1070	1070	(30)	In meduation since 1071
		• •	AD-212	nei	1970	19/9	(10)	In production since 1971
						1960	(10)	
						1087	(10)	
						1083	(10)	
						1984	(10)	
			AB-212ASW	Hel	1975	1978	(10)	
		••			.,	1979	(10)	
						1980	(10)	
						1981	(15)	
						1982	(20)	
						1983	(25)	
						1984	(25)	
			AB-412 Griffon	Hel	1980	1983	(3)	Military version of Bell Model 412:
						1984	(5)	Italy holds marketing rights
		(170)	CH-47C Chinook	Hel	1968	1977	(12)	Licensed production began 1970
		. ,				1978	(12)	
						1979	(12)	
						1980	(12)	
						1981	(12)	
						1982	(12)	
						1983	(12)	
						1984	(12)	

		S-61R SH-3D Sea King	Hel	1972 1965	1976 1977 1978 1979 1980 1981 1982 1983 1984 1977 1978 1978	(2) (2) (3) (3) (3) (3) (3) (3) (12) (12) (12)	In production since 1974 In production since 1969
					1979 1980 1981 1982 1983 1984	(12) (2) (2) (2) (2) (2) (2)	
		M-113-A1	АРС	1963	1977 1978 1979 1980 1981 1982 1983 1983	(150) (150) (150) (150) (150) (150) (150) (150)	
·	(15000)	AGM-65D	ASM	(1983)		(/	Undecided whether joint NATO-European or only Italian production for NATO Europe
USA	(52) 88	CH-47D Chinook F-15J Eagle	Hel Fighter/interceptor	(1984) 1978	1981 1982 1983 1984	(8) (10) (13) (14)	For Army and AF Total order for 100 incl 88 fighters and 12 trainers; 12 delivered directly from USA
	55	F-15J Eagle	Fighter/interceptor	(1985)			MoU signed Dec 1984; in addition to 100 on order; for delivery 1986-90
		KV-107/2A	Hel	(1982)	1984 (1985)	(3) (5)	In addition to 61 produced earlier; improved version

10 Japan

Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of pro- duction	No. produced	Comments
			Model 205 UH-1H	Hel	1972	1973	(5)	
						1974	(9)	
						1975	(9)	
						1976	(9)	
						1977	(9)	
						1978	(9)	
						1979	(9)	
						1980	(9)	
						1 98 1	(5)	
						1982	(6)	
						1983	(6)	
						1984	4	
						(1985)	(5)	
		54	Model 209 AH-1S	Hel	1982	1984	(6)	
						(1985)	(8)	
			Model 214ST	Hel	1980			Joint production programme for military and civilian markets; agreement signed by Bell Textron and Mitsui Oct 1980
			OH-6D	Hel	1977	1978	(12)	Identical to Hughes Model-500D
					1777	1979	(12)	
						1980	(12)	
						1981	(8)	
						1982	(8)	
						1983	(4)	
						1984	9	
						(1985)	(7)	
		42	P-3C Orion	ASW/mar natrol	1978	1987	(5)	
				rio (initial patro)	1770	1983	(7)	
						1984	(8)	
						(1985)	(10)	
		90	S-61B	Hel	1965	1977	(20)	
					1700	1978	(20)	
						1979	(18)	
						1980	(10)	
						1981	(10)	
						1982	(4)	
						1983	(4)	
						1984	m	
						(1985)	(1)	

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		51	5н-эв	nei	1979	1981 1982 1983 1984 (1985)	(6) (8) (5) (7) (10)	
		1350	AIM-7F Sparrow	ААМ	(1979)	1980 1981 1982 1983 1984 (1985)	(10) (50) (100) (200) (250) (250) (150)	Arming F-15s
			AIM-9L	AAM	(1982)	1983 1984 (1985)	(225) (500) (750)	
			MIM-23B Hawk	Landmob SAM	1978	1978 1979 1980 1981 1982 1983 1984 (1985)	(100) (260) (300) (300) (280) (260) (260) (260)	
			Seasparrow	ShAM	1980	(1983) (1980) (1981) (1982) (1983) (1984)	(200) (9) (18) (18) (18) (36)	Arming various Japanese-built frigates and destroyers
4 Netherlands	USA	80	F-16A	Fighter/strike	1975	1979 1980 1981 1982 1983 1984	(3) (15) (18) (21) (16) (7)	
		22	F-16A	Fighter/strike	1981	1984 (1985)	(11) (11)	Order incl 18 F-16As and 4 F-16Bs
		18 57	F-16A F-16A	Fighter/strike Fighter/strike	1982 1983	1050		For delivery 1985-87 For delivery 1987-92
		22	L-10R	righter/trainer	1975	1979 1980 1981 1982 1983 1984	(2) (4) (5) (5) (4) (2)	

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Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of pro- duction	No. produced	Comments
<u> </u>		840	AIFV	MICV	1981	(1983) (1984)	(200) (200)	In addition to 880 in service; 173 will be M-901 TOW version; Dutch designation: YPR-765
		86	M-109-A2 155mm	SPH	(1980)	1981 1982 1983 1984	(12) First 6 delivered Jul 1981; D (24) already has 118 old M-109 (24)	First 6 delivered Jul 1981; Dutch Army already has 118 old M-109s
5 Poland	USSR		An-2	Lightplanc	1960	1977 1978 1979 1980 1981 1982 1983 1984	(200) (200) (200) (200) (200) (100) (100) (100)	
		••	An-28	Transport	1978	1983	(100)	
			Mi-2 Hoplitc	Hcl	(1956)	1979 1980 1981 1982 1983 1984	(200) (200) (200) (200) (200) (200) (200)	In production since 1957; 3 000 built by end-1979
		(1900)	T-72	МВТ	(1978)	(1981) (1982) (1983) (1984)	(10) (50) (100) (100)	In production
5 Romania	France		SA-316B	Hel	1971	1977 1978 1979 1980 1981 1982 1983 1984	25 25 25 25 25 (25) (25) (25)	More than 200 produced by 1981

				SA-330 Puma	nei	1977	1978 1979 1980 1981 1982 1983	(20) (20) (20) (20) (19) (25)	Production rate: 20-30 per year
	UK	20	BAC-111	Transport	1979	1984 1980 1981 1982 1983 1984	(20) (3) (3) (3) (3) (3)	Total cost: \$410 mn plus \$205 mn for licensed production of Rolls-Royce Spcy engine; 20 aircraft for Romanian AF	
	USSR		Yak-52	Trainer	(1979)	1982 1983 1984	(20) (20) (20)	Two-seat piston-engined primary trainer	
			T-72	MBT	(1984)			Reportedly to be built with French engine	
4 Spain	France	18 4	AMX-30R S-70 Class	AAV Submarine	1984 1975	1983 1984 (1985)	1 2 (1)	67% local input; Egypt may order an additional 4	
	USA	3 2	FFG-7 Class FFG-7 Class	Frigate Frigate	1977 1984	(1762)		Construction delayed; first ship to be completed 1985 In addition to 3 now under construction; replacing 2 F-30 Class sold to Egypt; planned completion 1988	
7 Switzerland	Germany, FR	345	Leopard-2	MBT	1983		-	Total cost incl 35 delivered directly:	
	USA	38	F-5E Tiger-2	Fighter	1980	1981 1982 1983 1984 (1985)	(7) (7) (10) (7)	Order incl 32 F-5E fighters and 6 F-5F trainers; local assembly; in addition to 72 in service	
4 Turkey	Germany, FR		Cobra-2000	ATM	1970	(1981) (1982) (1983) (1984)	(100) (100) (100) (100)	Has 85 systems in use; current status of production programme uncertain	
		2	Meko-200 Type	Frigate	1983	、 ,		In addition to 2 built in FR Germany; will probably be armed with 2x4 Harpoon ShShMs and Aspide ShAMs using 1x8 Seasparrow launcher; partly MAP	

Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of pro- duction	No. produced	Comments
	Italy	(9) (50)	Type 209/1 G-222	Submarine Transport	1974 (1984)	1981 1984 (1985)	1 1 (1)	Built under licence in addition to 3 delivered from FR Germany; planned production rate: 1 ship/year To commence as assembly from kits and then progress to complete indigenous production; partly financed by US MAP; may be cancelled in favour of Spanish CN-235s
4 UK	France		Milan BGM-71A TOW	АТМ	1976 1980	1977 1978 1979 1980 1981 1982 1983 1984 (1985) 1982 1983 1984 (1985)	(2000) (4000) (5000) (6000) (6000) (11500) (11500) (11500) (7500) (400) (1500) (4100) (6000)	UK requirement: 50 000; also produced for export as Euromissile production is phased out
1 USA	France	595	Roland-2	Landmob SAM	1974	(1981) (1982) (1983) (1984)	(150) (150) (150) (145)	Delivered to New Mexico National Guard; incl 27 launch units; possibly to be transferred to Turkey
	UK	300	T-45 Hawk	Adv trainer/strike	1981	(,		First deliveries expected 1990; fixed price contract signed 1984; total cost including simulators and training: \$3 200 mn
6 Yugoslavia	France		SA-342 Gazelle	Hel	1971	1973 1974 1975 1976 1977 1978 1979	(5) (10) (10) (10) (15) (15) (15)	SA-341/342 Gazelles produced since 1973

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				1980 1981	(10)	
				1982	(10)	
				1983	(10)	
				1984	(10)	
USSR	T-72	MBT	(1982)	(1984)	(10)	Upgraded T-72 with Yugoslavian-designed laser aiming device

II. Third World countries

12	Algeria	Bulgaria			Corvette	(1983)			Unconfirmed whether licensed production, assembly or sale; no Bulgarian corvette design known until now
		UK	4	Kebir Class	Corvette (1983) 3.1ass PC 1981 APC (1980) MT 1976 ICV 1976 40 Type Frigate 1980 R-1700 Submarine 1977 iB Gavaio Hel (1977) VM Esquilo Hel 1977 09/3 Submarine 1982	(1985)	(3)	In addition to 2 delivered from UK	
15 Argentina	France	•••	VAB	APC	(1980)			2 prototypes of the VBC-90 version delivered 1980; plans for local pro- duction probably cancelled	
		Germany, FR	(300)	ТАМ	МТ	1976	(1981) (1982) (1983) (1984)	(40) (55) (55) (40)	220 plus 80 for Peru; developed by Thyssen (FRG)
			300	VCTP	ICV	1976	1981 1982 1983 1984	(25) (100) (100) (50)	Similar to Marder MICV
			6	Meko-140 Type	Frigate	1980	1983 (1985)	1 (3)	
			4	Type TR-1700	Submarine	1977	()	(-)	In addition to 2 delivered directly
15	Brazil	France	• •	HB-315B Gavaio	Hel	(1977)	(1981) (1982)	(6)	Status unclear after 1982
			• •	HB-350M Esquilo	Hel	1977	1981 1982 1983	(3) (7) (5)	Status unclear after 1983
		Germany, FR	1	Турс 209/3	Submarine	1982			In addition to 1 purchased directly; hull and some components to be built in Brazil; barter agreement for iron ore worth more than \$200 mn
		UK	1	Niteroi Class	Frigate	1981	(1985)	(1)	Ordered Jun 1981; training ship

Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of pro- duction	No. produced	Comments
15 Chile	France	3	Batral Type	LS	1980	1982 1983 1984	1 1 1	
	Spain	21	T-36 Halcon	Trainer/ground attack	1984			Developed from C-101 Aviojet with Chilean engineers; offset by Spanish order for T-35 Pillan; in addition to 12 delivered 1982-83
	Switzerland	• •	Piranha	APC	1980	1981 1982 1983 1984	(10) (20) (20) (20)	4x4 and 6x6 versions, Swiss or Brazilian gun
	USA	(134)	PA-28 Dakota	Traincr	1980	1981 1982 1983 1984	(5) (10) (10) (10)	Built by Indacr; Chile also produces Piper-designed T-35 Pillan trainer and assembles C-101 Aviojet trainers
		100	T-35 Pillan	Traincr	1980	(1983) (1984)	(20) (20)	Developed from Piper PA-28 by US and Chilean engineers
8 Egypt	Brazil	110	EMB-312 Tucano	Traincr	1983			In addition to 10 delivered directly; for delivery from 1985; 30 for Egyptian, 80 for Iraqi AF; option on 60 morc; reportedly \$180 mn loan from Saudi Arabia
	France	37	AS-332 Alpha Jct	Hel Adv trainer/strike	1983 1981	1982 1983 1984 (1985)	(1) (12) (12) (12)	Ordered Dec 1983; mainly assembly Following delivery of 8 directly from France; local component share increased from 10% (1982) to 48% (1984); last 15 NG-version (MS2)
		36	SA-342L Gazelle	Hel	1981	1983 1984 (1985)	(1) (26) (9)	· · /
	UK	(5000)	FV-101 Scorpion Swingfire	LT ATM	(1985) 1977	1979 1980 1981 1982 1983 1984 (1985)	(250) (500) (500) (500) (500) (500) (500)	Negotiations with Alvis-USH 1984

9 India	France	(140)	SA-315B Lama	Hel	1971	1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983	(6) (10) (10) (10) (10) (10) (10) (10) (10	First 40 assentory only, then hereice production of 100 from local raw materials; also for civilian use
			SA-316B Chetak	Hel	(1962)	1984 1978 1979 1980 1981 1982 1983 1984	(15) (15) (15) (30) (20) (20) (20) (20)	257 built by 1983; also for civilian customers
	Germany, FR	(10000) (150)	Milan Do-228	ATM Transport	1981 1982	(1985) (1984)	(100) (3)	First missile completed early 1985 Complementing HS-748 aircraft produced in India
		4	Туре 1500	Submarine	1984			Option from 1981 taken up Feb 1984; in addition to 2 delivered directly
	UK		HS-748	Transport	(1960)	1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 (1984)	 (1) (2) (3) (4) (5) (6) (6) (6) (6) (6) (2) (1) (1) 	

Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of pro- duction	No. produced	Comments
		45	Jaguar	Fighter	1978	1982 1983 1984	(1) (4) (5)	Local production of components; in addition to 40 purchased directly
		31	Jaguar	Fighter	1983			In addition to 45 now being assembled under licence
		6	Godavari Class	Destroyer	1978	1983 1984	1 1	Improved Leander Class design; follow- on to Nilgiri Class
	USSR	(170)	MiG-21bis	Fighter	1976	(1979) (1980) (1981) (1982) (1983) (1984) (1985)	(10) (30) (30) (30) (30) (20) (20)	In addition to 100 previously assembled from kits
		(200)	MiG-27	Fighter/ground attack	1983	1984	(2)	Agreement signed Jul 1983; first flight Nov 1984
		(1000)	BMP-2 T-72	APC/ICV MBT	1983 (1980)	(1984)	(10)	Production began Jul 1984 Discussed since 1980; first prototype rcady Mar 1984; factory rcady for pro- duction; Indian designation: T-72M; possibly similar to Soviet T-74
10 Indonesia	France	(56)	AS-332	Hel	(1982)	1983 1984 (1985)	(1) (3) (4)	Production switched from Puma to Super Puma 1983
	Germany, FR	(100) (50)	BK-117 NBo-105	Hel Hel	1982 1976	(1985) 1976 1977 1978 1979 1980 1981 1982 1983 1984	(1) (1) (2) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4	Licensed production to start 1985 Produced under licence from MBB; total orders by 1984: 123; military orders for approx 50 helicopters
		6	PB-57 Type	PC	1982	(1985) (1985)	(4) (1)	In addition to 2 delivered directly

	Spain USA	80 (64)	CN-212 Model 412	Transport Hel	1976	1976 1977 1978 1979 1980 1981 1982 1983 1984 (1985) (1985)	 (2) (2) (2) (2) (3) (3) (3) (3) (1) 	 100/200-version; total orders by 1984: 185; military orders: approx 80; eustomers for military version: Saudi Arabia, Thailand and Indonesia More than 100 to be assembled from 1984/85; military orders by 1984: 64
8 Israel	USA	9	Flagstaff-2 Class	Hydrofoil FAC	1981	1983	1	In addition to 1 delivered from USA; remaining 8 may be cancelled for financial reasons; arms: 2 Gabriel and 4 Harpoon ShShMs
10 Korca, South	USA		Model 500MD M-101-A1 105mm	Неі ТН	1976 (1971)	1978 1979 1980 1981 1982 1983 1984 (1977) (1978) (1978) (1979) (1980) (1981) (1981) (1983) (1983) (1984)	(10) (10) (15) (15) (15) (15) (10) (10) (10) (10) (10) (10) (10) (10	Possibly without US consent
		•••	M-109-A2 155mm M-114-A1	SPH TH	1983 (1971)	(1978) (1979) (1980) (1981) (1982) (1983) (1984)	(10) (10) (10) (10) (10) (10) (10)	Possibly without US consent
			PSMM-5 Type	FAC	(1974)	1977 1978 1979 1980	3 1 2 2	Produced by US subsidiary Korea Tacoma; first 4 for South Korea; rest built for Indonesia and the Philippines

Region code/ Country	Licenser	No. ordered	Weapon designation	Weapon description	Year of licence	Year of pro- duction	No. produced	Comments
13 Nigeria	Austria	(200)	Steyr-4K 7FA	APC	(1981)			Various versions to be built; possibly also Cuirassier LT/TD
9 Pakistan	Sweden		Supporter	Trainer	1974	1977 1978 1979 1980 1981 1982 (1983) 1984	(15) (20) (20) (20) (20) (5) (5) (5)	Assembly began 1976; production trans- ferred to Kamra AMF 1981; from 1982 using local raw materials only
.5 Peru	Italy	60	MB-339A	Trainer/strike	(1981)			Option on licensed production reportedly cancelled 1984 due to budget constraints
		2	Lupo Class	Frigate	1974	1984 (1985)	1 (1)	In addition to 2 delivered directly
0 Philippines	Germany, FR		Bo-105C	Hel	1974	1975 1976 1977 1978 1979 1980 1981 1982 1983	(1) (2) (2) (1) (2) (2) (2) (1) (1)	44 assembled by 1983; approx 15 of military version in service with armed forces 1984
	UK	(100)	BN-2A Islander	Transport	1974	1984 1974 1975 1976 1982 (1983) (1984)	(1) (3) (7) (10) (10) (10) (10)	A total of 100 to be produced for civil and military customers in 4-phase programme; last 60 locally manufactured since 1982; approx 25 in service with armed forces
10 Singapore	Germany, FR	3	РВ-57 Турс	PC/FAC	1980	(1984)	3	Luerssen design

16	South Africa	Israel	9	Reshef Class	FAC	1974	1978 1979	1	In addition to 3 previously acquired; armed with 6 Scorpioen ShShMs derived
							1980	1	from Israeli Gabriel ShShM
							(1984)	(1)	
10 Taiwan	Israel		Gabriel-2	ShShM/SShM	(1978)	1980	(50)	Taiwanese designation: Hsiung Feng;	
							1981	(75)	arming Lung Chiang Class (PSMM-5), Hai
							1982	(75)	Ou Class (Dvora) and some Gearing/Sumner
							1983	(75)	Class destroyers; also produced in
							1984	(50)	coastal defence version
							(1985)	(50)	
			(34)	Hai Ou Class	FAC	(1979)	1980	(1)	Developed by Sun Yat Sen SRI from
							1981	(8)	Israeli Dvora Class; armed with 2 Hsiung
							1982	(8)	Feng(Gabriel-2) ShShMs
							1983	(8)	
							1984	(8)	
		· .					(1985)	(1)	
		USA	(30)	F-5E Tiger-2	Fighter	1982	1983	(6)	Total cost incl 30 F-5Fs: \$620 mn; for
						1979 1 armed with 6 Scorpioen ShShMs derived 1980 1 from Israeli Gabriel ShShM 1983 3 (1984) 1984 (1) (1984) hM/SShM (1978) 1980 (50) hM/SShM (1978) 1980 (50) Taiwanese designation: Hsiung Feng; 1981 (75) arming Lung Chiang Class (PSMM-5), Hai 1982 (75) Ou Class (Dvora) and some Gearing/Summ 1983 (75) Class destroyers; also produced in 1984 (50) coastal defence version (1985) (50) Class destroyers; also produced in 1984 (50) coastal defence version (1985) (50) Class destroyers; also produced in 1984 (50) (1985) (50) Class destroyers; also produced in 1984 (50) (1979) 1980 (1) Developed by Sun Yat Sen SRI from 1984 1983 (8) 1983 (8) 1984 (6) 1984 (6) delivery 1983-87 (1985) (6)			
			(34) Hai Ou Class FAC (1979) A (30) F-5E Tiger-2 Fighter 1982 30 F-5F Tiger-2 Trainer 1982		(1985)	(6)			
			30	F-5F Tiger-2	Trainer	FAC 1974 1978 1 In addition to 3 previously ac 1979 1 armed with 6 Scorpioen Sh 1980 1 from Israeli Gabriel ShSh 1983 3 (1984) (1) ShShM/SShM (1978) 1980 1983 3 (1984) (1) ShShM/SShM (1978) 1980 1981 (75) arming Lung Chiang Class 1982 (75) Ou Class (Dvora) and som 1983 (75) Class destroyers; also proditions 1984 (50) coastal defence version (1985) (50) Face (1979) 1980 (1) Developed by Sun Yat Sen S 1982 (8) Israeli Dvora Class; armed 1983 (8) Israeli Dvora Class; armed 1983 (8) Israeli Cost incl 30 F-5Fs: \$620 1984 (6) delivery 1983-87 1984 (6) delivery 1983-87 1984 (6) delivery 1983-87 1984 (6) delivery 1983-87 1			
							1984	(6)	
							(1985)	(6)	
10	Thailand	Germany, FR	41	Fantrainer	Trainer	1982	(1984)	(1)	In addition to 6 delivered directly

Appendix 11D. Criteria, values and conventions

I. Selection criteria

The arms trade data cover four categories of 'major weapons': aircraft, armoured vehicles, missiles and warships.

There are two criteria for selection of major weapon items. The first is that of military application. However, some categories have been excluded: such as aerobatic aeroplanes, harbour tugs and icebreakers. The category *armoured vehicles* includes all types of tanks, tank destroyers, armoured cars, armoured personnel carriers, infantry combat vehicles as well as self-propelled and towed guns and howitzers. Military trucks are not included. The category *missiles* includes only guided missiles; unguided rockets are not included.

The second criterion for selection of major weapon items is the identity of the buyer—that is, items either destined for or purchased by the armed forces of the buyer country are included. Weapons for police forces are as a rule not included.

All types of arms transfers are included—that is, direct sales, aid, gifts, loans and grants.

The entry of any arms transfer is made in accordance with the four-category division of major weapons. This means that when, for example, a missile-armed ship or aircraft is purchased, the missiles are entered separately in the arms trade register.

Dates and numbers

Both the order dates and the delivery dates for arms transactions are continuously being revised in the light of new information. The *order date* should be the date on which the sales contract was signed.

In order to enable the reader to follow the development of any given arms transaction, all the *delivery dates* are followed by a column of figures indicating the number of items delivered that year.

The exact number of weapons ordered as well as the number of weapons delivered per year may not always be known and may therefore be estimated.

II. The value of the arms trade

The SIPRI system for evaluating the arms trade was designed as a *trend-measuring device*, to enable the measurement of changes in the total flow of major weapons and its geographic pattern. Expressed in monetary terms, both the quantity and the quality of the weapons transferred are reflected. Aggregated values and percentages are based only on *actual deliveries* during the year or years covered in the tables and figures in which they are presented.

SIPRI independently evaluates the arms trade by maintaining a list of comparable prices based on such actual prices as become known and on such criteria as weight, speed and role of the weapon. For weapons for which all price information is lacking, a comparison is made with a known weapon of the same type as regards performance
criteria, and the weapon is valued accordingly. Each weapon obtains three separate values: new, second-hand and refurbished. Missiles, however, are valued only as new.

The monetary values chosen do not correspond to the actual prices paid, which vary considerably depending on different pricing methods, the length of production runs, and the terms involved in individual transactions—the actual sales price for a given weapon system differs according to the buyer and the coverage of the deal. For instance, a deal may or may not cover spare parts, training, support equipment, compensation and offset arrangements for the local industries in the buying country, and so on.

Furthermore, to use only actual sales prices—assuming that the information were available for all deals, which it is not—military aid and grants would be excluded, and the total flow of arms would therefore not be measured.

Licensed production is included in the aggregated trade statistics and is valued in the same way as the arms trade.

This means that the SIPRI valuation system is not comparable to official economic statistics such as gross domestic product, public expenditure and export/import figures.

III. Conventions

The following conventions are used in the arms trade registers:

	Information not available.
()	Uncertain data or SIPRI estimate.

Abbreviations and acronyms

AA	Anti-aircraft
AAG	Anti-aircraft gun
AAM	Air-to-air missile
AAV	Anti-aircraft vehicle
AC	Armoured car
Acc to	According to
ADV	Air defence version
Adv	Advanced
AEV	Armoured engineering vehicle
AEW	Airborne early-warning system
AF	Air Force
ALCM	Air-launched cruise missile
APC	Armoured personnel carrier
ARM	Anti-radar missile
ARV	Armoured recovery vehicle
AShM	Air-to-ship missile
ASM	Air-to-surface missile
ASSV	Assault vehicle
ASW	Anti-submarine warfare
ATM	Anti-tank missile
AV	Armoured vehicle
BL	Bridge-layer
Bty	Battery
COIN	Counter-insurgency
CPC	Command post carrier

ECM	Electronic countermeasures
FAC	Fast attack craft (missile/torpedo-armed)
FMS	Foreign Military Sales
FRF	French francs
Hel	Helicopter
ICV	Infantry combat vehicle
IDS	Interdictor/strike version
Incl	Including/includes
Landmob	Land-mobile (missile)
LC	Landing craft (<600 t displacement)
LS	Landing ship (>600 t displacement)
LT	Light tank
LoO	Letter of Offer
MAP	Military Assistance Programme
Mar patrol	Maritime patrol aircraft
MBT	Main battle tank
МĠ	Machine-gun
MICV	Mechanized infantry combat vehicle
Mk	Mark
MoU	Memorandum of Understanding
MRCA	Multi-role combat aircraft
MSC	Minesweeper, coastal
MSO	Minesweeper, ocean
MT	Medium tank
PC	Patrol craft (gun-armed/unarmed)
PDM	Point defence missile
Port	Portable
RAF	Royal Air Force (UK)
RAAF	Royal Australian Air Force
Recce	Reconnaissance (aircraft/vehicle)
RL	Rocket launcher
SAM	Surface-to-air missile
SAR	Search and rescue
SC	Scout car
SEK	Swedish crowns
ShAM	Ship-to-air missile
ShShM	Ship-to-ship missile
SLBM	Submarine launched ballistic missile
SPG	Self-propelled gun
SPH	Self-propelled howitzer
SShM	Surface-to-ship missile
SSM	Surface-to-surface missile
SuAM	Submarine-to-air missile
Sub	Submarine
SuShM	Submarine-to-ship missile
TD	Tank destroyer
TG	Towed gun
TH	Towed howitzer
VIP	Very important person

Region codes

1	USA
2	USSR
3	China
4	NATO, excl. USA
5	WTO, excl. USSR
6	Other Europe, eastern
7	Other Europe, western
8	Middle East
9	South Asia
10	Far East
11	Oceania
12	North Africa
13	Sub-Saharan Africa, excluding South Africa
14	Central America
15	South America
16	South Africa

12. Military-related debt in non-oil developing countries, 1972-82

RITA TULLBERG

Superscript numbers refer to the list of notes and references at the end of the chapter.

I. Introduction

During the opening debate at the 39th session of the General Assembly of the United Nations, delegates from a number of Third World countries warned that the debt problems of the developing world are as serious a threat to international stability as the arms race. As the President of Argentina, Raúl Alfonsín, put it: "a world in which politics is replaced by arsenals and economy by finance is simply a world in danger".¹ A world in even greater danger is one in which arsenals are an element of international finance. This study seeks to elucidate some of the connections between the two.

The rise in oil prices in the 1970s led to a flood of petro-dollars which Western banking syndicates proceeded to loan to Third World countries. These loans were readily accepted by countries anxious to achieve economic 'take-off'—particularly since in the early part of the period, as a result of rapid inflation, real interest rates remained negative. Some of the money was used to finance development projects, which it was hoped would generate sufficient income to repay the loans. Some was used for essential current consumption, some for conspicuous consumption, capital flight and the purchase of arms. These latter uses were generally not income-generating and as such led, towards the end of the 1970s, to new net borrowing to pay interest on old debts. A number of studies point to the conclusion that much of the borrowing was invested productively.² It is also the case that loans were taken for non-income-generating purposes and as such have contributed to current liquidity problems.

If a country lives beyond its foreign income, it becomes a net (external) borrower, and any item of foreign expenditure can be considered as contributing to that borrowing. It is therefore of interest to consider how much lower external debt might have been had certain purchases not been made. This exercise can be performed for any item of trade assuming it does not directly or indirectly generate foreign income. The purpose of this study is not to determine how specific loans were used, but to give a picture of total resource use by estimating how much smaller external debts might have been had specific purchases, in this case foreign arms, not been made.

The chapter begins by briefly setting out the facts on the foreign borrowing of non-oil developing countries. An estimate is then made of the proportion of that debt directly or indirectly attributable to their purchase of foreign arms. Other items of military expenditure also influence the size of foreign debt. Countries may run an internal budget deficit, and may bridge the gap between government income and expenditure by foreign borrowing; in so far as their military expenditure in general contributes to their internal deficit, it therefore also contributes in this way to borrowing from abroad. There is another important budget deficit effect. The United States, because of its budget deficit, has maintained high real interest rates in recent years, and this has substantially increased the debt burden of Third World countries. The increase in US military expenditure is therefore also part of the international debt problem. After these general issues are discussed, there are short pieces which illustrate the relevance of arms purchases for the credit positions of certain countries.

II. The external debt of non-oil developing countries

The external debt of the non-oil developing countries can be summarized as follows:

1. The government and government-guaranteed debts of the non-oil developing nations have grown from \$130 billion in 1973 to \$729 billion in 1984. This represents a tripling in real terms³ (see table 12.1 and

Table 12.1. External debt of non-oil developing countries, $1972-85^{a}$

Duration	1972	1973	1 9 77	1979	1981	1982	1983	1984 <i>*</i>	1985°
Long-term	97	112	240	339	461	520	575	634	666
Short-term		18	48	65	111	129	111	95	99
Total	••	130	288	404	572	649	686	729	765

Figures are in current \$ billions.

"Not including debt owed to the IMF.

Sources: World Economic Outlook, 1981, table 27; 1983, table 32 and September 1984, Revised Projections, table 35 (International Monetary Fund, Washington, D.C., 1981, 1983, and 1984).

^bEstimate.

^e Projection.

appendix 12A). The debt rose from an equivalent of 114 per cent of export income in 1973 to 158 per cent in 1983; the percentage of export earnings which has been devoted to debt servicing rose from 15.9 per cent in 1973 to an estimated 21.7 per cent in 1984 (see table 12.2).

2. A flow of capital from developed to developing countries can be regarded as normal. However, there is clearly something abnormal when debtors are unable to keep up service payments and creditors are unwilling to extend new loans. This seems to be the case now, as witnessed by the increase in the number of re-schedulings (from an annual average of 4 during the period 1974–78, to 32 in 1983) and the decline in new lending.⁴

3. The precipitous rise in oil prices in 1975-77 and 1979-80 is central to the problem of increased indebtedness. The oil bill of non-oil developing countries rose from \$5 billion in 1975 to \$67 billion in 1982.⁵

4. The pattern of lending has shifted from government-to-government loans or investment by entrepreneurs in specific projects to lending by banks. The share of total debt outstanding to private lenders has risen from 46 per cent in 1971 to 63 per cent in 1980.⁶ Interest on bank loans is payable whether or not the loan has generated any income.

5. Real interest rates rose sharply in the early 1980s. Between 1971

Table 12.2.	Non-oil developing	countries: o	debt service :	ratio ^a on	short- and	long-term
external deb	ot, 1973–85					

Region	1973	1977	1979	1981	1982	1983	1984 ^b	1985°
All non-oil developing countries	15.9	16.1	19.7	21.4	25.0	22.3	21.7	22.7
Africa ^d		11.9	15.5	18.7	22.2	22.6	24.9	27.0
Asia ^e	••	7.6	8.3	9.5	11.2	10.0	9.9	10.1
Western hemisphere ^f		32.0	42.2	44.6	55.1	47.9	44.6	46.7

Figures are in percentages.

^a Payments (interest, amortization, or both) as percentages of exports of goods and services.

^bEstimate.

Projection.

^d Excluding South Africa but including Algeria and Nigeria.

Including Indonesia.

^fIncluding Venezuela.

Source: World Economic Outlook, 1983, table 35; September 1984, table 38 (International Monetary Fund, Washington, D.C., 1983 and 1984).

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and 1980, the average real interest rate was -0.8 per cent. By 1981, it was 7.5 per cent, and by 1982, 11 per cent.⁷ This increased the debt burden of non-oil developing countries for two reasons. First, a rising proportion of their borrowing over the period was at variable interest rates—from 7 per cent in 1972 to 37 per cent in 1982.⁸ Second, many countries were forced to take short-term loans to enable them to pay interest on old debts.

6. After 1980, the industrial market economies again moved into recession (their aggregate growth rate was negative: -0.5 per cent in 1982),⁹ world commodity prices fell, and Third World countries were also faced with protectionist measures which reduced the growth of their manufactured exports.

7. In a number of developing countries, particularly in Latin America, the problem was aggravated by a substantial exodus of private capital and the non-repatriation of interest.¹⁰

III. Arms purchases and debt

The value of arms transferred to the non-oil developing countries more than doubled in real terms between 1972 and 1982 and their share of total world arms transfers increased from 31 per cent to 41 per cent in the same period.¹¹ Arms purchases grew in importance during the 1970s as the two major arms suppliers switched their policy from one of gifts to one of sales. As the arms industries of the industrial countries have grown, fuelled by and fuelling the tension between East and West, the expansion of arms sales to developing countries has filled both economic and political goals. Recipient countries have used valuable resources to buy weaponry in large quantities and of a high degree of sophistication, with little if any reference to the wishes of the population. In so doing they have added to the debt burden and mortgaged the future of the whole population.

Had they made no foreign arms purchases during the period, borrowing by non-oil developing countries could have been an estimated 20 per cent less each year, and their accumulated debts by the end of the period could have been roughly 15 per cent smaller (see tables 12.3 and 12.4). Before the oil-price shock of 1973–74, arms purchases formed a higher proportion of foreign expenditures by nonoil developing countries, which in the mid-1970s were forced to devote more resources to buying oil. The relative importance of arms purchases therefore declined and, as a consequence, so did arms-related borrowing. Nevertheless, at least one-fifth of new borrowing in the past decade was directly or indirectly for weaponry.

Table 1	2.3.	Non-oil	developing	countries:	alternative	estimates	of	arms	transfer	credits	as a	percentage	of	net	flows	(disbursements –
amortiza	ation	= net flo	ows), 1972–	-82												

Figures are in current \$ millions.

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982
1. Arms transfers (excl. China)	6 005	7 390	5 165	5 145	6120	7 025	8 565	11085	12 690	12 540	13 895
2. US gifts	2 400	3 420	1 520	1 400	190	70	130	170	340	280	290
3. Soviet gifts	490	900	520	360	760	710	1 040	2 540	1 580	1 560	1 720
4. Arms to be paid for	3115	3 070	3 1 2 5	3 385	5 170	6245	7 395	8 375	10770	10 700	11886
5. Possibly paid for	165	590	615	80	15	255	870	465	500	1 165	525
6. Estimated arms transfer credits (A)	2950	2 480	2 510	3 305	5 1 5 5	5 990	6 525	7 910	10 270	9535	11 361
7. Net flows to non-oil developing countries (B)	8019	10 262	16031	20177	24 236	28 641	34 199	39 525	41 474	46 15 1	43 108
8. Net flows, alternative estimate (C)	8 821	11 288	17634	22 195	26 660	31 505	37 6 19	43 478	45 621	50 766	47 419
 Estimated arms transfer credits as percentage of net flows 											
A as percentage of B A as percentage of C	37 33	24 22	16 14	16 15	21 19	21 19	19 17	20 18	25 23	21 19	26 24

Source: See appendix 12A.

Table 12.4. Accumulated military-related debt for arms transfer credits taken, 1972–82

Figures are in current \$ millions.

, ,	1972	1973	1974	1975	1976	1 9 77	1978	1979	1980	1981	1982	1972-82
Estimated arms transfer credits	2 950	2 480	2 5 1 0	3 305	5 1 5 5	5 990	6 5 2 5	7 910	10270	9 535	11 361	67 991
Interest rates	5.6	6.6	7.0	6.8	6.8	6.9	7.9	9.4	9.3	11.6		
Interest payments on arms transfer credits and debt-service borrowing	••	165	340	527	764	1 1 3 0	1 571	2 1 2 5	2917	3 958	5 169	18 66 8
Total accumulated military-related debt	, 1972–82											86 659
Total accumulated military-related debt	, 1972–82,	as a perc	entage of	total del	bt, 1982							15

1

Source: See appendix 12A.

Military-related debt in non-oil developing countries

In consequence, the non-oil developing countries have become not *less* dependent on the industrial nations but more: economically, because of their precarious financial situation; and technically, since the expectations of the military can often only be filled by a steady supply of new and more advanced foreign weapons. The changed pattern of lending has also reduced the possibilities for arms-exporting nations to exert control over the flow of arms. When governments make loans, they have some interest in the use made of those funds. International syndicates of commercial banks do not have the same interest, and may well find ways to by-pass restrictions imposed by domestic arms control policies.¹²

IV. Military expenditures and budget deficits

The relationship between military expenditure and debt is not restricted solely to the procurement of foreign weapons. When developing countries have budget deficits—deficits which may be partly explained by military expenditure—this can also lead to an increase in their external debt. Second, there is also an effect on the cost of servicing the world debt when major industrial countries have budget deficits (again, partly because of military expenditure): these deficits tend to raise the rate of interest.

Developing countries in which government spending exceeds income may well find it difficult for institutional reasons to borrow the necessary money internally.¹³ Consequently they may borrow directly from abroad. Alternatively, they may resort to money creation. However, this route may well lead to inflation and since governments are often reluctant to adjust their exchange-rates, this inflation in turn may lead to balance-of-payment deficits, and indirectly to foreign borrowing. There are clear links between budget deficits and foreign debt.

Any item on the expenditure side in government accounts can be singled out as causing, or contributing to, a budget deficit. There are, however, two good reasons for pointing to the effects of military expenditure.

First, it is a large budget item. At the beginning of the 1980s, in non-oil developing countries, the share of central government expenditure going to health was smaller in 68 per cent of cases, and the share going to social security and welfare was smaller in 64 per cent of cases than the share devoted to the military sector.¹⁴ Second, in most non-oil developing countries military expenditure in the past decade has grown faster than other government expenditure (table 12.5). This is true in

Table 12.5. Annual average percentage growth rates, 1972-82

Region	Per capita income	Central government spending <i>minus</i> military spending	Military spending	Arms imports	
South Asia	2.0	6.2	5.1	9.2	
East Asia ^a	3.4	6.9	7.7	$(-7.9)^{b}$	
Latin America	1.6	6.0	12.4	13.2	
Africa	0.3	6.5	7.8	18.5	

Figures are percentages.

"Including Japan.

^b Reflecting US disengagement from Indo-China. The figure for 1976-82 is 5.6 per cent.

Source: Military expenditure figures from SIPRI sources. Remaining figures from World Military Expenditures and Arms Transfers 1972-82 (US Arms Control and Disarmament Agency (ACDA), Washington, D.C., April 1984), table 1, pp. 12-14 and table 2, pp. 53-56.

three of the four regions of the world which comprise mainly non-oil developing countries.

In spite of this, the International Monetary Fund (IMF), when asked to assist countries with serious debt-servicing problems, appears to have been reluctant to criticize military spending. Deflationary measures, such as the elimination of food subsidies and cuts in welfare budgets, are the conditions normally attached to IMF loans: but military spending seems sacrosanct.¹⁵ Ironically, the resulting public unrest can lead to a demand for further increases in the military budgets, which was initially one of the factors in the rise in indebtedness.

V. Budget deficits in creditor countries

The effect of budget deficits in creditor countries on the debt position of Third World countries must also be considered—deficits which may well be attributed to rapid increases in military spending. The USA, for example, has increased its military spending by 8.6 per cent a year, in real terms, in the four years since 1980, and the central government budget deficit in fiscal year 1983/84 was \$175 billion. In order to finance this deficit, the Administration has raised real interest rates substantially. This has damaged debtor countries in two ways. First, there is now a substantial capital inflow into the USA and consequently developing countries are finding it more difficult to compete for the world's loanable funds. Second, since by 1982 some 37 per cent of the accumulated debt of non-oil developing countries had been borrowed at variable interest rates (varying, for example, with the US prime rate), the cost of the debt-servicing burden, with the rise in the interest rate, has become much higher.

VI. Specific cases

Three specific cases illustrate the contribution of military spending to indebtedness.

Argentina

It has been widely reported that among the "administrative nightmares" inherited by the new government in Argentina, some \$5–10 billion of the country's accumulated \$45 billion debt has been identified as directly incurred for military purchases.¹⁶ One incidental effect of this indebtedness is that the Argentine government is pressing for an expansion of arms exports from its extensive arms industry. Debts which were incurred to meet the requirements of the arms race are now to be repaid by adding to the availability of arms for poorer countries.¹⁷

Peru

Peru, with external debts of \$13 billion on which interest has not been paid since June 1984,¹⁸ signed a tough stabilization agreement with the IMF at the beginning of 1984, limiting wages and requiring cuts in government spending and subsidies. In particular, a cut of over 40 per cent was reportedly to be made in the military budget.¹⁹ These austerity conditions were not met and the Fund withdrew its support, followed by the commercial banks. Although one of the poorest countries in South America-with a per capita income in 1983 of \$870²⁰—Peru has one of the region's best-equipped armed forces, having spent a reported \$300-400 million annually in recent years on arms purchases (not including a deal, financed commercially, for the purchase of 26 Mirage 2000 aircraft, with equipment, at a reported cost of \$700 million).²¹ Imports, with the exception of arms, have already been reduced to a minimum and can barely be covered by exports, leaving nothing for debt servicing.²² Export earnings are further limited by barter arrangements which have been made to repay old Soviet arms debts-textiles and fishmeal for Sukhoi aircraft and tanks ordered in the early 1970s-and, reportedly, to obtain UH-60A Black Hawk helicopters from the USA in exchange for metals.²³ Meanwhile, the GDP declined by 12 per cent in 1983 and per capita income is now at a pre-1970 level. Under-employment is reported at over 50 per cent and annual inflation at over 100 per cent. Debt servicing and military expenditure account for over 50 per cent of public spending.

Thailand

Thailand is one of the few countries where the issue of arms debts has been publicly discussed. Although its foreign debts of about \$11 billion are modest by international standards and its credit rating is good, Thailand now finds that the debt-service element of the central budget has risen from 13 per cent to 21 per cent in three years.²⁴ Adding together debt service, military expenditure and internal security shows that these items take up almost half the Thai budget in fiscal year 1984 (see table 12.6).

The Thai military has for some time been negotiating the purchase of a squadron of F-16A fighters from the USA which, at a cost of \$500 million plus considerable further maintenance costs, would make Thailand the first South-East Asian country to possess such a sophisticated aircraft. The Minister of Finance opposed the purchase on the grounds of the country's external debt problems,²⁵ and a Parliamentary Budget Scrutiny Committee reminded the Defence Ministry that it had reached the ceiling on accumulated defence debts under the provisions of the 1976 Defence Act: that is, defence debts of \$870-1000 million had already been accumulated.²⁶ Other purchases of military equipment, including 40 M-48-A5 battle tanks and an earlywarning system, were being reconsidered in the light of the growing debt burden. The issue of the F-16As has not, however, been dropped and a decision on their purchase is expected at the beginning of 1985. Officials are meanwhile seeking to re-schedule part of the \$1 billion arms purchase debt incurred in 1977 under a previous government which is adding to the strain of debt servicing and forcing a cut-back in funds for economic development, especially in rural areas.²⁷

Table 12.6. Thailand: sl	hares in central	government	budget,	1982-84
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Budget item	1982	1983	1984
Debt service, military expenditure and internal security ^a	38	41	47
Public health	4	4	4

Figures are percentages of total budget.

^a Internal security expenditure covers the combating of dissident organizations. Figures do not include 'secret' military funding.

Sources: Asia Research Bulletin, Vol. 13, No. 6, 30 November 1983; Far Eastern Economic Review, Vol. 125, No. 27, 5 July 1984.

Notes and references

- 1. UN document A/39/PV.S, 25 September 1984, p. 11.
- World Economic Outlook, WEO Occasional Paper No. 21 (International Monetary Fund, Washington, D.C., 1983), Appendix A, Supplementary Note 7, p. 140; Cline, W. R., International Debt and the Stability of the World Economy (Institute for International Economics, Washington, D.C., September 1983), p. 29
- 3. World Economic Outlook, WEO Occasional Paper No. 27 (International Monetary Fund, Washington, D.C., April 1984), p. 60; calculated using an export deflator.
- 4. These figures include Cuba and Poland; see WEO April 1984 (note 3), p. 65. OECD figures for non-concessional net flows show a decline of 16 per cent in real terms between 1978 and 1982; see *External Debt of Developing Countries, 1983 Survey* (OECD, Paris, 1984), table D, p. 28.
- 5. Cline (note 2), pp. 20-22.
- 6. World Debt Tables, September 1981 (World Bank, Washington, D.C., 1981), p. xiv.
- 7. Cline (note 2), p. 23, citing IMF data.
- 8. WEO, April 1984 (note 3), p. 63.
- 9. World Development Report 1984 (World Bank, Oxford University Press, New York, 1984), table 2.1, p. 11.
- 10. Fifty-Fourth Annual Report, 1st April 1983-31st March 1984 (Bank for International Settlements (BIS), Basle, 18 June 1984), pp. 170-71. The BIS estimates of capital flight from Latin America are considered too low by some observers. See, for example, Economist, 23 June 1984.
- 11. World Military Expenditure and Arms Transfers (US Arms Control and Disarmament Agency (ACDA), Washington, D.C., April 1984), pp. 6-7.
- 12. Discussing a Thai military loan, John Burgess noted that two West German banks had expressed an interest but then dropped out, citing West German regulations against military loans, and a Japanese bank had funded its share through its off-shore subsidy "because of similar restrictions in Tokyo". See Burgess, J., 'A loan is a loan is a ...', Far Eastern Economic Review, Vol. 109, No. 32, 1 August 1980, p. 90.
- 13. Goode, R., Government Finance in Developing Countries (The Brookings Institution, Washington, D.C., 1984), p. 198 and table 8-1.
- Government Finance Statistics, Vol. VII, 1983 (International Monetary Fund, Washington, D.C., 1983), p. 27. Computed from data for 76 non-oil developing countries, 61 per cent of which claimed to spend more on education than on defence. IMF data on military spending tend to give low estimates. See SIPRI, World Armaments and Disarmament, SIPRI Yearbook 1983 (Taylor & Francis, London, 1983), Appendix 7C, p. 181.
- 15. For one of the few known exceptions to this see the case of Peru, below.
- 16. International Herald Tribune, 10 April 1984; La Nación (Buenos Aires), 9 August 1984; New York Times, 12 May 1984.
- 17. Latin American Weekly Report, WR-84-26, 6 July 1984; Washington Post, 10 June 1984.
- 18. The Times, 29 October 1984.
- 19. International Herald Tribune, 23 July 1984.
- International Financial Statistics, Vol. 37, No. 11 (International Monetary Fund, Washington, D.C., 1984).
- 21. Latin America Regional Report, RA-84-08, 5 October 1984 and RA-84-10, 14 December 1984.
- 22. Central Bank of Peru report cited in Latin America Regional Report, RA-84-10, 14 December 1984.
- 23. Latin America Regional Report, RA-84-08, 5 October 1984.
- 24. Asia Research Bulletin, Vol. 13, No. 6, 30 November 1983; Far Eastern Economic Review, Vol. 125, No. 27, 5 July 1984.
- 25. Far Eastern Economic Review, Vol. 125, No. 29, 19 July 1984.
- 26. Bangkok Post, 10 August 1984.
- 27. Bangkok Post, 27 and 30 July 1984; Far Eastern Economic Review, Vol. 126, No. 47, 15 November 1984.

Appendix 12A. Definitions and methods

I. Definitions

Non-oil developing: as defined by the IMF, and given, for example, in World Economic Outlook (WEO), September 1984, p. 25. It should be noted that countries not members of the IMF are automatically excluded from this group. Arms transfer figures are taken from World Military Expenditure and Arms Transfers 1972–1982 (US Arms Control and Disarmament Agency (ACDA), Washington, D.C., April 1984). In order to make these compatible with IMF data, the following adjustments were made. To the ACDA figures for its group 'developing countries' (ACDA 1984, p. 103) are added Ecuador, Gabon and South Africa. From the same ACDA figures are subtracted those for OPEC, Albania, Angola, Bulgaria, Cuba, Mongolia, Mozambique, North Korea, Oman, Spain, Taiwan and the People's Republic of China.

Public/publicly guaranteed external debt: as defined by the World Bank and given, for example, in World Debt Tables (WDT), 1982-83 (World Bank, Washington, D.C., February 1983), p. xvii. The extent to which military debt is included in the debt figures published by the World Bank is unclear. The sources of World Bank data are detailed (loan-by-loan) reports, submitted by countries which have received World Bank support (International Bank for Reconstruction and Development (IBRD) loans or International Development Assistance (IDA) credits), on the annual status, transactions and terms of the external debt of public agencies and that of private ones guaranteed by a public agency in the debtor country. Additional information is drawn from the files of the World Bank and the IMF (WDT 1982-83, p. xvii). No specific mention is made of military-related debt. The OECD in its 1983 survey of the External Debt of Developing Countries (OECD, Paris, 1984), which is based on the World Bank's Debtor Reporting System supplemented by its own Creditor Reporting System and other sources such as information from central banks, regards military debt as largely excluded from its data. The survey notes on page 78 that the OECD external debt statistics do not cover:

Military debt financed by *official* credits (military debt financed by private credits is indistinguishably included in private market debt). For a few creditors (e.g. Iraq, Israel) unreported official military debt can be as high as total reported non-military debt. However, for non-OPEC LDCs as a whole, official military debt is estimated to represent in 1982 only some 10 per cent of total reported long-term debt and well under 10 per cent of total reported debt service (a large part of military imports of LDCs is paid in cash or provided on a grant basis).

The OECD estimate of unreported military debt is taken into account when estimating the proportion of total debt arising directly or indirectly from arms purchases (see table 12.4 and the note on net flows alternative estimate, below).

II. Methods used in the compilation of table 12.3

1. Arms transfers (excluding China)

Arms transfers to the non-oil developing countries 1972-82 are taken from ACDA, 1984.

2. US gifts

The values of arms given as gifts by the USA, 1972–82, are taken from Foreign Military Sales, Foreign Military Construction Sales and Military Assistance Facts, September 1982; Military Assistance Program Delivery/Expenditure, MAP, p. 47, and Foreign Military Sales and Military Assistance Facts, December 1978, MAP, p.19, both issued by Data Management Division, Comptroller, Department of Defense Security Assistance Agency. US MAP figures were converted from fiscal to current years on the assumption that deliveries were made evenly throughout the 12 months. For South Korea, Laos, the Philippines and Viet Nam, ACDA 1984 figures were used for the years 1972–75, since MAP figures include technical assistance.

3. Soviet gifts

The estimated value of arms given as gifts by the USSR 1972-82: the value of arms transferred to non-oil developing countries was estimated from cumulative Soviet transfers given in table III of ACDA 1979 and ACDA 1984. Of total Soviet transfers to the world, the following percentages were estimated as having been delivered to non-oil developing countries: 1972-73, 34 per cent; 1974-77, 36 per cent; 1978-82, 45 per cent. The gift element of Soviet arms transfers was estimated from the figures given by Kanet, R.E., 'Soviet and East European arms transfers to the Third World: strategic, political and economic factors', *External Relations of CMEA Countries: Their Significance and Impact in a Global Perspective*, NATO Colloquium 1983 (NATO, Brussels, 1983), using US Congressional and State Department sources. This gave the following percentages: 1972, 50 per cent; 1973, 50 per cent; 1974, 35 per cent; 1975, 25 per cent; 1976, 40 per cent; 1977, 30 per cent; 1978, 30 per cent; 1979, 50 per cent; 1980, 35 per cent; 1981, 35 per cent; 1982, 35 per cent. (In the absence of figures for 1982, the percentage for 1981 was repeated.)

4. Arms to be paid for

Row 1 minus rows 2 and 3 is an estimate of arms to be paid for.

5. Possibly paid for

The values of arms purchased by those countries and in those years for which new credits were not taken, directly or indirectly to cover the purchase of foreign arms. Purchases of foreign goods and services, additions to reserves and debt-service payments must be covered by foreign income, changes in reserves plus new credits. If no credits are taken or if new credits are smaller than arms purchases, then it can be concluded that all or some of the arms have been purchased for cash. New credits are measured by disbursements as given in the *World Debt Tables*, 1981, 1982–83 edition

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SIPRI Yearbook 1985

and First Supplement, and 1983-84 edition (World Bank, Washington, D.C., December 1981, February and May 1983, and January 1984). Arms figures are from ACDA 1984.

6. Estimated arms transfer credits (A)

Row 4 *minus* row 5 gives an estimate of credits taken as a direct or an indirect result of arms purchases.

7. Net flows to non-oil developing countries (B)

New debt of non-oil developing countries is measured by net flows (disbursements *minus* amortization) from the *World Debt Tables*, cited for row 5. World Bank figures for developing countries have been made compatible with the IMF definition of non-oil developing countries by subtracting figures for Algeria, Asia Others (including Taiwan), Indonesia, Nigeria, Oman, Spain and Venezuela. Figures for Afghanistan are added.

8. Net flows, alternative estimate (C)

For this estimate net flows to non-oil developing countries are increased by 10 per cent to cover the assumption made by the OECD (see above) that non-disclosed military debt is 10 per cent of total reported long-term debt.

9. Estimated arms transfer credits as percentages of net flows

The credits taken as a direct or an indirect result of arms purchases as a percentage of new debt.

III. Methods used in the compilation of table 12.4

Table 12.4 gives an estimate of military-related debt accumulated by 1982. The assumption here is that debt-service payments are covered by new borrowing. In order to simplify the calculation, amortization is disregarded—most debts have a grace period of several years before they begin to be amortized—and debt prior to 1972 ignored. Only interest payments are considered as adding to the stock of debt. The interest rates used in this calculation are those given as the average nominal rate on public debt, new commitments, from all creditors given in *World Debt Tables*, 1982–83, p. 3 and *World Debt Tables*, 1983–84, p. 3.

It is assumed that both arms transfer credits and loans taken to pay interest on these credits are contracted at fixed interest rates.

In some few cases it would be possible for countries to meet their debt-servicing commitments without borrowing. For this reason, accumulated military-related debt has been rounded to \$86000 million when calculating it as a percentage of total accumulated debt in 1982.

The method used in constructing tables 12.3 and 12.4 is derived from a technique developed by Michael Brzoska in 'Research communication: the military related external debt of Third World countries', *Journal of Peace Research*, Vol. 20, No. 3, 1983.

Part IV. Developments in arms control

Chapter 13. Multilateral arms control efforts

Introduction / Chemical disarmament / Test ban / Environmental modification

Chapter 14. Major multilateral arms control agreements

Summaries of the agreements / Status of the implementation of the agreements, as of 31 December 1984

Chapter 15. The first year of the Stockholm Conference

Background / The Stockholm Conference mandate and East-West relations / The opening of the conference / The formal proposals / Organization: a tug-of-war and its outcome / Substantive issues, power constellations and prospects for the future

Chapter 16. The Sinai peacekeeping experience: a verification paradigm for Europe

Summary / The Sinai peacekeeping experience / Sinai, a paridgm for Europe / The paradigm's problems-can the Sinai model work in Europe?

13. Multilateral arms control efforts

JOZEF GOLDBLAT

Superscript numbers refer to the list of notes and references at the end of the chapter.

I. Introduction

The 1983 interruption of the US-Soviet talks on the reduction of strategic arms (START) and on the limitation of intermediate-range nuclear forces (INF), and the consequent deterioration of the international situation in 1984, had a negative impact on multilateral arms control negotiations. The 40-nation Geneva Conference on Disarmament (CD) was unable to make any headway. It was even unable to establish or re-establish subsidiary bodies to deal with proposals for the prevention of an arms race in outer space, or to continue the examination of a possible comprehensive nuclear test ban, as recommended by the UN General Assembly. Much time was devoted to disputes over the mandate of the working parties, in particular, whether or not they should engage in the drafting of treaties. Even the meaning of the term 'negotiation' proved to be controversial. Nevertheless, consideration of the items on the Conference agenda continued, although it was frequently disrupted by polemics not directly related to the subjects discussed. The following two sections of this chapter give a brief analytical survey and assessment of the main points made in these discussions. The final section contains an evaluation of the Conference which reviewed the 1977 Convention prohibiting hostile use of environmental modification techniques.

II. Chemical disarmament

Negotiations for a chemical weapons convention were the least affected by strains in the relationship between the major powers, because it is generally recognized that the need for a ban on the possession of these weapons is more than a simple bilateral US-Soviet concern; in one form or another chemical weapons are accessible to many states.

The Ad Hoc Committee of the CD in charge of elaborating the chemical weapons convention "except for its final drafting" set up three working groups, to deal respectively with the scope of the prohibitions,

the elimination of chemical weapon stocks and production facilities, and compliance with the assumed obligations.

In the course of the 1984 CD sessions the wording of several convention provisions was tentatively agreed to, but important divergences remained.¹

Main controversies

As regards the scope of the envisaged ban, there was no common view on the form in which 'dual-purpose' chemicals (that is, useable for both peaceful and military purposes) should be covered. In a wider sense, this is a question of activities to be permitted under the convention, such as civilian industrial production, peaceful scientific and medical research, domestic law enforcement, and development and testing of means of protection against chemical weapons, as well as the manufacture of chemicals for military purposes unrelated to chemical warfare. The old controversy concerning the extent to which tear-gas and herbicides should be limited has not been resolved. The USA continues to consider 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 states' own military bases, should be allowed; it therefore does not accept treaty limitations on their production. Agreed definitions of 'precursors', that is, chemicals which may be used in production of warfare agents, as well as 'key precursors', that is, chemicals essential for their production, are also needed in order to avoid interference with the legitimate trade in chemical products.

There is controversy about the contents and the timing of the declarations by states of chemical weapon stocks and production facilities (that is, facilities for the production of chemical warfare agents and for the filling of chemical munitions). The USA has insisted that the declarations to be made 30 days after the entry into force of the convention for a given state should disclose the locations of the stocks and of the facilities, in order to prevent their illicit use during the period between declaration and destruction.² The Soviet Union is opposed to providing information on the locations of either stocks or facilities until immediately before their destruction, arguing that their premature disclosure would render them vulnerable to attack in the event of war.³ France has stated it would prefer grouping the stocks on the destruction sites and declaring the latter at the same time as the plans for destruction.⁴ The Netherlands too has supported the idea of verifying the declaration of stocks at relocation sites rather than in military arsenals.⁵

Another unresolved question is whether chemicals contained in chemical weapons may be diverted to permitted purposes. The USA is, in principle, opposed to such diversion, primarily because of concerns about how to verify that the items involved are not placed in clandestine chemical weapon stockpiles. It has therefore proposed complete elimination of stocks through destruction. It has also insisted that facilities having a direct connection with a party's chemical warfare capability should be destroyed. This position is shared by France, which would nevertheless permit a chemical-weapon production plant to be converted into a destruction plant, on condition that it be eventually destroyed at the end of the cycle.⁶

A knotty problem to be cleared up before the conclusion of the convention is the elaboration of a co-ordinated timetable for destruction. The schedule would have to take account of the security interests of all parties and to be balanced so as to ensure that no state could gain a military advantage over another because of a difference in the pace of destruction operations. In the opinion of some countries, a judicious approach would be to destroy all operational weapons and operational facilities early in the period of implementation of the convention.⁷

The most serious differences, however, are those related to verification of compliance, that is, measures needed to check whether existing stocks of chemical warfare agents, as well as production facilities, have been eliminated; whether chemical weapons are not being developed, manufactured or otherwise acquired under the guise of civilian industries; and whether 'permitted', that is, legitimate activities are kept within agreed limits.

The problem of on-site inspection

For the first time an estimate has been made of the scope of the chemical disarmament inspectorate that may be required. According to a working paper submitted by the Netherlands⁸ about 50 inspectors and 90 supporting staff would be needed permanently. In addition, about 75–115 inspectors and about 100 or fewer supporting staff would be needed during the first 10 years or so. The actual size of the organization would depend greatly on the scale of inspection planned for plants declared not to produce super-toxic lethal chemicals and their precursors but capable of synthesizing organic chemicals in the relevant amounts. After the 10-year period, during which destruction of CW stockpiles and facilities would take place (France has suggested a shorter period for the destruction of facilities⁹), the envisaged chemical disarmament inspectorate would be considerably smaller than that part of the secretariat of the International Atomic Energy Agency (IAEA),

including the inspectors, which is involved in the application of nuclear safeguards.

The requirement of on-site inspection is especially sensitive. Depending on verification purposes, a variety of methods to conduct such inspection has been proposed, such as: "on an immediate basis", involving the presence of inspectors as soon as feasible; "on a continuous basis", involving the presence of inspectors at all times during an operation; "on a periodic basis", involving regular visits to an operation at fixed intervals; "on a quota basis", involving an agreed number of regular visits to be determined on the basis of agreed criteria; "on a random basis", involving an agreed number of visits which follow an irregular pattern with limited advance warning; or on any other agreed basis arranged bilaterally or multilaterally.¹⁰

Some progress in this field has been made owing to the Soviet statement expressing "readiness 'in principle' to consider in 'a positive manner' the proposal for the permanent presence of the representatives of international control at the special facilities for the destruction of stocks".¹¹ The change in the position of the USSR which for years had resisted any form of continuous inspection on its territory was considered by many to be significant, especially because it concerns one of the most important provisions of the future convention. However, inspection methods relating to other aspects of the convention are still to be developed. Particularly contentious is the idea of inspection "by challenge", that is, to be carried out upon request by a party in addition to "routine" international on-site inspection.

In Article X of its draft convention of 18 April 1984¹² the USA proposed that each party must consent at 24 hours' notice to a "special inspection" (permitting "unimpeded access") of one of the sites for which systematic international on-site inspection is authorized (facilities for 'permitted' activities, as well as chemical weapon stockpiles and production plants destined for destruction) or of any location or facility owned or controlled by the government of a party, including military facilities. The purpose of such an inspection would be to clarify and resolve any matter which may cause doubts about compliance or give rise to concerns about a related matter "which may be considered ambiguous". In response to queries, the US delegation explained that "controlled by the government" meant controlled through "contract, other obligations or regulatory requirements", and that the privately owned chemical industries of the USA would be subject to the inspection provisions of Article X, because they are so heavily regulated by the US government that this equates to the term "controlled" as used in the draft convention.¹³ For locations and facilities not subject to the provisions of Article X, "ad-hoc on-site inspections" are provided for in Article XI of the US draft. These might be refused, but the party in question would have to explain its refusal and suggest alternative methods for resolving the compliance concern.

It was the "open invitation" for inspection of all suspect sites, as required by Article X, that became the subject of an animated debate in the CD. The novel concept of "special inspection", which is considered central in the US draft convention, was categorically rejected by the USSR on the grounds that its adoption would result in the disclosure of the "political, economic, scientific, military, commercial and other secrets" of states, unrelated to the production or storage of chemical weapons. The concept was also characterized by the Soviet Union as discriminatory against parties with state-owned or partly nationalized industries in that it put them in an unfavourable position compared to states with predominantly private enterprise, and as susceptible to giving rise to international friction.¹⁴

As a matter of fact, the US proposal for practically unlimited inspection went further than any other arms control verification scheme put forward in recent years, and since it was formally submitted to the CD it must be presumed to represent the position of the entire US Administration. Considering the complicated structure of the political decision-making process in the USA, it is remarkable that US politicians succeeded, in a relatively short time, in obtaining the consent of the US military to permit intrusive inspection of defence activities by foreigners who may include nationals of unfriendly countries. It remains to be seen, however, whether US industry, which jealously defends its constitutional freedoms, including the right to protect its production and commercial secrets, and which usually resists government pressure, will be willing to throw its doors wide open to foreign controllers.

The proposal for "special inspections", meant to determine that there are no concealed stocks or clandestine facilities, ¹⁵ would seem to reflect a search for absolute guarantees. But in the world of today, plagued with mistrust and suspicion, such guarantees are not obtainable. Very few governments, whatever their economic, social or political systems, would be prepared to shed security precautions and make their defence arrangements fully transparent. Furthermore, mandatory, almost instantaneous inspections 'anywhere', as contemplated in the US draft convention, seem hardly desirable. They may turn out to be excessively burdensome even to some US allies, particularly those with highly developed civilian chemical industries.¹⁶ Moreover, all challenges for such inspections would have political undertones, and since they may not be rejected (presumably because of the threat of withdrawal from the convention) they could generate unfounded recriminations, debilitating the convention or even undoing it. Nor does the degree of rigour proposed by the USA for the verification of a chemical weapon ban appear really necessary, considering that only one category of weapon is to be abolished, whereas other categories would be left unaffected by the convention; unlike nuclear weapons, chemical weapons are not the ultimate instruments of war, certainly not if they were to be employed between the great powers, even though they are capable of causing mass destruction. As recent experience has shown, they cannot be decisive in regional conflicts either.

Under a verification system, which has already been broadly accepted as comprising both human supervision and automatic monitoring instruments, large-scale violations involving militarily relevant quantities of chemical weapons in readily useable form could not remain undetected, even without "special inspections" proposed by the USA. On the other hand, smaller amounts of chemicals, which may be surreptitiously retained, would have to be hidden in remote places to escape detection, and could not be of such importance as to seriously upset a balance of forces. An element of uncertainty is unavoidable in any arms control treaty. But the risks incurred should be weighed, first, against the dangers of an uncontrolled arms race and, second, against the possible impact of treaty violations on the national security of states. On both counts, a chemical weapons convention with less than perfect verification seems to be better than no convention at all.

The prohibition of use

It is now commonly held that, in addition to the prohibition on possession of chemical weapons, a chemical weapons convention should contain a prohibition on their use. However, the implications of such a convention clause for the 1925 Geneva Protocol, which already contains a ban on the use of chemical (and bacteriological) weapons, and which is to continue in force (irrespective of an obvious overlap with the proposed convention), have not, as yet, been thoroughly considered. The following notable questions arise.

1. In joining the Geneva Protocol over 40 states, including the great powers, made a reservation that they would not be bound by the prohibitions contained therein towards any state whose armed forces did not respect it. This important proviso, making allowance for retaliation in kind, has turned the Protocol into a no-first-use treaty. It is clear that the envisaged chemical weapons convention banning the actual possession of chemical weapons would be incompatible with a treaty allowing the use of these weapons, be it only the second use. However, the Protocol reservation could remain valid until the chemical weapon stocks and facilities had been completely eliminated in conformity with the provisions of the convention, which may take up to 10 years. Only then would the parties to the Protocol which had also joined the convention be expected to withdraw the reservation in question. But would they actually do so, if those parties to the Protocol which had not joined the convention decided to maintain their reservation?

2. There is a controversy over the applicability of the Geneva Protocol prohibitions to tear-gas and herbicides. What would be the scope of the ban on use under the convention, if this controversy remained unresolved?

3. The Geneva Protocol prohibits the use of chemical weapons "in war". Would the ban under the convention remain so restricted, or would it be applicable to *any* armed conflict, either international or internal?

4. According to the letter of the Geneva Protocol the ban on use is applicable only "as between" the parties. Over the years, however, the Protocol has come to be considered as an instrument embodying the generally recognized rules of international law binding parties and non-parties alike. Would the convention reinforce these rules by making the ban on use explicitly applicable *erga omnes*?

5. Like most other arms control treaties, the convention would be certain to contain an article allowing the parties to withdraw from it in the event of their supreme interests being jeopardized. Would the withdrawal clause apply to all the provisions of the convention, including the ban on use, and, if so, would the obligations of a given state under the Geneva Protocol be nullified by a withdrawal from the convention?

The main reason for the decision to include the ban on use in a convention prohibiting the possession of chemical weapons is the lack of control provisions in the Geneva Protocol, an omission which has often made it impossible to verify allegations of breaches. To fill this gap and to uphold the authority of the Geneva Protocol until the convention with its verification provisions has been concluded and carried into effect, the UN General Assembly has empowered the Secretary-General to investigate, with the assistance of experts, information that may be brought to his attention concerning activities that may constitute a violation of the Geneva Protocol or the relevant rules of customary international law, including on-site collection of evidence, and to report the results to all member states.¹⁷ Procedures for such investigation have been elaborated by a group of consultant experts.

Their report, submitted in 1983 and supplemented in 1984,¹⁸ specifies the criteria to guide the Secretary-General in deciding whether or not to initiate an investigation, actions related to the initiation of an investigation, and guidance for its organization and implementation. A number of countries have submitted names of qualified experts who could be available at short notice to undertake an investigation, as well as names of laboratories which could carry out testing for the presence of prohibited agents.

Nevertheless, in view of the fact that the Soviet Union opposed these procedures, contending that they are legally inappropriate, they had been disregarded when a decision was taken to investigate accusations made by Iran concerning the use of chemical weapons by Iraq. Hence, in requesting a group of specialists to undertake a fact-finding visit to Iran, the Secretary-General preferred to refer to the "humanitarian principles embodied in the Charter" and to the "moral responsibilities vested in his office" rather than make use of the General Assembly mandate.

Whatever the formal basis for the investigation carried out in March 1984 in Iran, the allegations that chemical weapons had been resorted to were substantiated. In their unanimous conclusions the specialists named mustard gas and a nerve agent known as Tabun (probably never before used in warfare) as types of chemical agent used in aerial bombs in the inspected areas.¹⁹

Iran had acceded to the Geneva Protocol in 1929 without a reservation of reciprocity. However, since the Protocol is generally considered to be a no-first-use treaty, the present government could free itself from its obligations towards Iraq and claim the right of reprisal in kind. Even though Iranian officials have stated that they plan no such retaliatory action, there is a latent danger of escalatory warfare should the use of chemical weapons continue. (The representative of Iran to the CD has claimed that in the space of five months after the fact-finding mission chemical weapons were used by Iraq on more than 24 occasions.²⁰)

It is disturbing that in the face of a clearly established violation of the Geneva Protocol, a treaty which occupies a prominent place in the body of international agreements imposing humanitarian constraints on the conduct of war, the reaction of the international community was weak. It is true that the UN Security Council condemned the use of chemical weapons as reported by the mission of specialists, but it did so through a declaration made by its president on behalf of the Council members²¹ instead of adopting a formal resolution. The violator was not even mentioned by name, although it could be no other state than Iraq, unless Iran itself had staged a chemical attack on its own troops. The latter possibility was alluded to only by Iraq, which also accused the UN mission of concentrating on "secondary" aspects of the conflict. Consequently, no action was recommended by the Security Council: only an appeal was made to settle the conflict peacefully. It is equally disturbing that none of the 70-odd resolutions on arms control and disarmament matters, adopted by the 1984 UN General Assembly, explicitly referred to the violation of the Geneva Protocol by Iraq, whereas on numerous occasions the Assembly has called for strict observance by all states of the principles and objectives of the Protocol and in general terms condemned actions contravening the existing constraints on chemical weapons. In the absence of collective action, measures taken by individual states against violators of international law are certainly in order. Thus, Australia, the USA, Canada, Japan and the states of the European Community have resolved to prevent exports of specific chemicals as well as chemical equipment that could be used in the production of chemical weapons. But in several cases they did so with respect to both Gulf War belligerents instead of penalizing only the violator.

The existing ways of dealing with violations—to induce the guilty party to take remedial action—are thus patently inadequate. It might be useful, therefore, to consider the inclusion in a future chemical weapons convention of a list of steps to be taken by states, even if only on a voluntary basis, in response to proven cases of breaches. The recommended measures could be graduated from mild to severe, and be sufficiently varied to take into account states' different degrees of vulnerability to sanctions. Governments may, of course, choose not to follow any of these recommendations, but their very presence in the text of the convention, or in an associated protocol, could fulfil a deterrent function. It would also facilitate their effective application when called for. The parties must have a clear idea about the consequences of an established violation. There is no point in setting up elaborate verification machinery if a violator can get away with impunity.

III. Test ban

Although no negotiations on a comprehensive test ban treaty (CTBT) were conducted in 1984, several proposals regarding the verification of a test ban were submitted to the CD. A new approach to the cessation of tests was also discussed.

Verification

The Federal Republic of Germany drew attention to recent advances in technology which had improved the recording, transmitting, processing

and analysis of seismic data. It proposed taking these developments into account in the working out of a new concept of a global seismic network for monitoring a CTBT.²²

Norway reported that it was constructing a new experimental regional seismic array (NORESS) which will incorporate many of the latest improvements in seismic instrumentation, telecommunication and signal processing techniques. This will be in addition to the Norwegian Seismic Array (NORSAR), one of the world's largest seismological observatories, in operation since 1970. Whereas NORSAR is primarily designed for seismic events in the teleseismic range (distances of 3 000–10 000 km), the purpose of NORESS is to develop methods of detecting and locating seismic events at distances of less than 3 000 km. In the context of a CTBT, stations of this type would be of particular importance in detecting and locating events too weak to be observed at teleseismic distances. All data and processed results from NORESS will be made available to the international seismological community.²³

Australia proposed that the verification system for a CTBT should include: national technical means; an international seismic detection network; an international atmospheric detection network; any other international detection arrangements deemed necessary (that is, using other technologies); on-site inspection (to be compulsory); and a multilateral organ or organs of parties to deal with consultation, co-operation and complaints. All elements of the system would have to be in place and operational at the time the CTBT entered into force.²⁴

Referring to its 1983 proposal for monitoring atmospheric radioactivity,²⁵ and noting that certain delegations, including that of the Soviet Union,²⁶ were interested in pursuing it, Sweden suggested a technical study. This would cover the specification of the equipment necessary for collecting data on atmospheric radioactivity, the procedures for the exchange of the data, as well as those to be used at international centres for the purposes of compilation, processing and redistribution of the data, and a preliminary estimate of the detection capability of a global network of collecting stations.²⁷

The Ad Hoc Group of Scientific Experts, established to consider international co-operative measures to detect and identify seismic events, submitted a consensus report to the CD on measures to facilitate the verification of a comprehensive nuclear test ban treaty.²⁸ (Their first two reports had been submitted in 1978 and in 1979, respectively.^{29,30}) The 1984 report reiterated the proposal for a global system of seismic data exchange, to be composed of the following elements: (a) a network of more than 50 existing or planned seismological stations around the globe, with improved equipment and upgraded procedures for the extraction of data; (b) an international exchange of these data via the Global Telecommunication System (GTS) of the World Meteorological Organization (WMO); and (c) processing the data at special international data centres for use by participant states.

The data to be reported from each station would be in standard form and on two levels: Level I, routine reporting, with minimum delay, of basic parameters of detected seismic signals; and Level II, detailed records provided in response to requests for additional information. Compared to current seismological practice, increased emphasis would be laid on parameters relevant to event identification.

The Ad Hoc Group maintained its recommendation that all network stations be equipped with modern seismograph systems capable of continuously recording data in digital form, and operated in a standardized way. The Group considered it essential that more highquality stations be set up in the southern hemisphere, especially in Africa and South America. It commended efforts to establish the feasibility of ocean-bottom seismograph systems, noting that such instruments would significantly enhance the capacities of the global system. However, the Group was of the view that an accurate evaluation of the capabilities of the global network would only be possible through a comprehensive experimental exercise of the global system, as proposed in a previous report.

In accordance with the procedures agreed to in advance, ³¹ an international technical test was carried out from 15 October to 14 December 1984 concerning the exchange and analysis of Level I data, using the WMO/GTS system. The test involved some 30 countries providing data from about 70 seismological stations, as well as three experimental international data centres (in Moscow, Stockholm and Washington).³²

A new approach

On 12 June 1984 Japan suggested a step-by-step approach to the question of the cessation of tests. According to the new formula an agreement would be reached to ban underground nuclear test explosions of a yield at present considered to be "technically verifiable on a multinational basis". This yield limit could be gradually lowered as the verification capabilities improved.³³ Japan appealed to the CD to work for the establishment of an acceptable threshold, and to start discussing the institutional mechanisms needed to set the suggested process in motion. In addition, the nuclear weapon states were asked to publish data about their explosions, indicating time, location, yield, etc., to make it easier to determine the existing multilateral verification capabilities and ways of improving them, and also as a confidencebuilding measure, indicating a willingness to accelerate the achievement of a test ban.³⁴

The Japanese proposal was criticized on the grounds that it would not preclude the modernization of nuclear weapons; that it might delay a comprehensive test ban; that it could be understood as "legitimizing" nuclear explosions below an agreed threshold; and that in the end it would prove difficult to verify. As a matter of fact, all partial arms control measures suffer from these and similar deficiencies, which is why comprehensive solutions are preferable. But for a variety of reasons, both political and military, there seem to be insurmountable obstacles to reaching, at least for the foreseeable future, a fully comprehensive test ban which would render substantial improvements in nuclear weapons impossible. None of the nuclear weapon powers is prepared to give up *all* nuclear weapon tests for *all time*, whatever the rigour of a verification regime that might be conceived.

Even the treaty negotiated trilaterally by the UK, the USA and the USSR until 1980 was planned to have a duration of no more than three years. It was meant as a kind of moratorium, for there was to be no automatic extension of its validity, and one of the negotiating parties expressly reserved the right to resume tests immediately after, in the event of France and China's failing to join the ban. But these two states have consistently refused to stop testing, claiming that great disparities exist between their nuclear arsenals and those of the superpowers. Since a mere discontinuation of tests would not reduce these disparities, France and China could hardly be expected to join. The resumption of tests which would follow the expiration of such a treaty would probably damage the cause of arms control more than if the treaty had never been entered into in the first place.

In the present situation, to demand a complete, unconditional ban and nothing less might block any progress. An 'all or nothing' position has never been helpful in arms control negotiations. Had this position been adopted 22 years ago, the 1963 Treaty prohibiting nuclear explosions above ground would not have been signed; 'legitimization' of underground tests would thereby have been avoided, but atmospheric tests would have continued, probably until today, contaminating the atmosphere with radioactive fall-out.

Partial approaches are useful if each step results in actual, meaningful restrictions. As regards nuclear testing, such restrictions would have to be gradually imposed not only on the yield of the explosions, as proposed by Japan, but also on the number of tests conducted annually. Moreover, the following conditions would have to be observed: 1. Naturally, only nuclear weapon states could sign a treaty limiting nuclear weapon tests, the majority of other states being already obligated under the Non-Proliferation Treaty not to acquire nuclear explosive devices.

2. The initial yield threshold would have to be considerably lower than the 150-kt limitation set by the 1974 Threshold Test Ban Treaty (TTBT), as it is common knowledge that detection and identification of explosions much smaller than those now permitted are possible with the existing means of verification. Also, the initial yearly quota of explosions would have to be sufficiently low to reduce the annual average of tests carried out in recent years. Experience has shown that very few tests, if any, are needed to ensure the reliability of stockpiled weapons, this being the main reason put forward by the military to justify nuclear testing even upon renunciation of warhead modernization.

3. There would have to be a clear understanding written into the text that agreements concluded by the nuclear weapon powers to restrict their underground tests were only transitional measures leading to a comprehensive multilateral treaty, and a special procedure would have to be provided for to ensure the achievement of this goal.

4. All such partial agreements would have to be adequately verified, involving on-site observation if necessary—for example, when a test was planned to exceed a certain determined limit. There is nothing inherently complicated in the verification of a threshold limitation. If there are problems in checking compliance with the TTBT, these arise because the envisaged extensive exchange of information necessary to establish, by national technical means, a correlation between yields of explosions and the seismic signals produced by these explosions, has not taken place, pending ratification of the treaty. If anything, a threshold agreement, being less constraining, may require less rigorous verification than a comprehensive ban; its violation could not confer a significant military advantage to the violator, because the explosive force of warheads is less important than missile accuracy.

The steps proposed above are, of course, only half-measures, but, if carried into effect, they would place definite limitations on testing and might actually pave the way towards a comprehensive ban. They could also open the way for France and China to become involved in the negotiations, because they would not foreclose the possibility of narrowing the gap between their arsenals and those of the superpowers. A partial treaty concluded by five nuclear weapon states might be politically more significant than a comprehensive treaty of short duration signed only by the UK, the USA and the USSR.

IV. Environmental modification

A Review Conference of the parties to the 1977 Convention on the prohibition of military or any other hostile use of environmental modification techniques (the Enmod Convention) took place in Geneva from 10 to 21 September 1984. The Conference, which was convened in order to ensure that the purposes and provisions of the Convention are being realized, adopted a declaration,³⁵ the essential points of which are as follows: (a) the years that have elapsed since the entry of the Convention into force have demonstrated its effectiveness; (b) the obligations assumed by the parties have been faithfully observed; (c) the implementation of the Convention has not hindered the economic or technological development of states parties; (d) no party has found it necessary to invoke the provisions dealing with international complaints and verification procedures; and (e) the parties are concerned that the Convention has not achieved universal acceptance which, it is believed, would enhance international peace and security.

Implementation

The Convention prohibits the employment (but not the development or possession) of techniques producing modifications of the environment as the means of destruction, damage or injury to another state party. Only those hostile uses are prohibited which have widespread, longlasting or severe effects. Exempted from the prohibition are non-hostile uses of the modification techniques, even if they produce destructive effects exceeding the threshold of "widespread, long-lasting or severe". Equally permissible are hostile uses which produce destructive effects below the threshold. An Understanding clarifying the relevant Convention article includes a list of phenomena that could be caused by the use of environmental modification techniques, and specifies that these phenomena, when produced by military or other hostile use of modification techniques, would result, or could be expected to result, in destruction, damage or injury exceeding the threshold. However, only fanciful events, such as earthquakes, tsunamis, cyclones or changes in ocean currents, have been enumerated-those which are most unlikely to be caused through deliberate action for warlike purposes, that is, in such a way that the effects would be felt exclusively, or primarily, by the enemy. The techniques which can produce more limited effects (such as precipitation modification) and which are more likely to be used to influence the environment with hostile intent, especially in tactical military operations, have escaped proscription. Yet there is no explanation, either in the preamble or in the body of the Convention, of why *any* hostile modification of the environment or *any* amount of damage caused by such modification should be tolerated.

As a consequence of this threshold approach, the Convention in fact prohibits only those techniques which are the subject of scientific speculation, or which, if proved feasible, could hardly be used as rational weapons of war. Therefore, the statements by the Review Conference, that the "effectiveness" of the Convention has been demonstrated, that the obligations under the Convention have been "faithfully" observed, and that the implementation of the Convention "has not hindered" the development of the parties, are meaningless.

Verification

The Convention stipulates that to clarify problems relating to the objectives of the Convention and to its application the parties may resort to consultations. These consultations could be carried out either on a bilateral basis or through "appropriate" international procedures. The latter may include the services of a Consultative Committee of Experts (to which any state party can appoint an expert) to be convened by the depositary of the Convention upon request submitted by a party. The role of the Committee is that of fact-finding and of providing expert views on the problems raised by the party requesting its services. A summary of the Committee's findings incorporating all views and information presented during its proceedings is to be distributed to the parties. The Review Conference expressed the opinion that this summary could also be considered by the parties. However, the judgement that a party has been harmed (or is likely to be harmed) as a result of a violation of the Convention, including the determination of culpability, is to remain the prerogative of the UN Security Council, which may include non-parties to the Convention, and which may be unable to take a decision due to the great-power veto, which is always used when the interests of the permanent members of the Council or of their allies are affected.

Since the complaints and verification procedures of the Convention have not been tested, it is difficult to measure their adequacy. Given the nature and the scope of the basic obligations of the parties under the Convention, however, they are unlikely ever to be resorted to. Therefore, the satisfaction expressed by the Review Conference that the procedures in question have not been invoked is devoid of substance.

Universality

The number of parties to the Enmod Convention, almost seven years after its entry into force, is exceedingly low. It includes no more than about 30 per cent of UN member states. This is certainly a reflection of the low value attributed to the Convention, either as a law of armed conflict or as an arms limitation measure.

To become a real contribution to the cause of halting the arms race—one of the main purposes proclaimed in its preamble—and to attract new parties, the Convention would have to be substantially amended.³⁶ A requirement of capital importance for the improvement of the Convention is to remove the "widespread, long-lasting or severe effects" threshold in order to make the ban all-embracing, that is, applicable to *any* hostile use of environmental modification techniques. It is regrettable in this connection that even a proposal to lower the threshold and, as a first step, to reduce the area "understood" to be covered by the term "widespread" from several hundred square kilometres to several square kilometres³⁷ was not accepted by the Review Conference.

Comprehensiveness, as desired by a number of states, would also require a prohibition on hostile uses of modification techniques against *any* state or people, instead of confining the ban, as the Enmod Convention does, to injuries to parties, for an environmental 'weapon' would probably strike both combatants and non-combatants in an indiscriminate way, in contravention of the basic rule of international law requiring protection of the civilian population. It would also be difficult, if not impossible, to circumscribe the effects of the use of an environmental modification technique within definite geographical boundaries so as to injure a non-party without injuring a party. However, a proposal made at the Review Conference to make the obligations undertaken by the parties applicable *erga omnes*³⁷ was not accepted either.

In examining the effectiveness of the Convention provisions in eliminating the dangers of military or any other hostile use of environmental modification techniques, an Enmod Review Conference (as distinct from the review conferences provided for in other arms control treaties) is entitled, according to the special Understanding, to consider proposals for amendments. Moreover, an amendment can be accepted by a majority of parties without the consent of the great powers required under certain other treaties. However, since even the modest proposals mentioned above could not be retained, the usefulness of the Enmod Review Conference itself may legitimately be questioned. On the other hand, if it is thought that no modifications at all should be introduced in the text of arms control treaties in force (an opinion also expressed at other review conferences), there is no sense in having an amendments clause included in such treaties.

The Review Conference has certainly not increased the chances of the
universal acceptance of the Enmod Convention, the lack of which it deplored. Indeed, there is hardly a point in convening conferences which confine themselves to expressing contentment with the mere existence of a treaty, whatever its value, but which refuse to remove those deficiencies which are responsible for its widespread unattractiveness.

Notes and references

- 1. Conference on Disarmament document CD/540.
- 2. Conference on Disarmament document CD/516.
- 3. Conference on Disarmament document CD/PV.243.
- 4. Conference on Disarmament document CD/494.
- 5. Conference on Disarmament document CD/PV.282.
- 6. Conference on Disarmament document CD/PV.256.
- 7. Conference on Disarmament document CD/PV.271.
- 8. Conference on Disarmament document CD/445.
- 9. Conference on Disarmament document CD/494.
- 10. Public lecture by Ambassador Rolf Ekéus, Chairman of the CD Ad Hoc Committee on Chemical Weapons, given in Stockholm on 5 December 1984.
- 11. Conference on Disarmament document CD/PV.243.
- 12. Conference on Disarmament document CD/500.
- 13. Conference on Disarmament document CD/PV.274.
- 14. Conference on Disarmament document CD/PV.280.
- 15. Conference on Disarmament document CD/PV.260.
- 16. Conference on Disarmament document CD/PV.262.
- 17. UN General Assembly Resolution 37/98D.
- 18. UN document A/39/488.
- 19. UN document S/16433.
- 20. Conference on Disarmament document CD/PV.286.
- 21. UN document S/PV.2524.
- 22. Conference on Disarmament document CD/491.
- 23. Conference on Disarmament document CD/507.
- 24. Conference on Disarmament document CD/531.
- 25. Conference on Disarmament document CD/381.
- 26. Conference on Disarmament documents CD/PV.260 and 262.
- 27. Conference on Disarmament document CD/PV.280.
- 28. Conference on Disarmament document CD/448.
- 29. Conference of the Committee on Disarmament document CCD/558.
- 30. Conference on Disarmament document CD/43.
- 31. Conference on Disarmament document CD/534.
- 32. Oral communication from the Research Institute of the Swedish National Defence.
- 33. Conference on Disarmament document CD/524.
- 34. Conference on Disarmament document CD/PV.276.
- 35. UN document A/C.1/39/5.
- See especially the policy recommendations presented in Westing, A. H. (ed.), Environmental Warfare: A Technical, Legal and Policy Appraisal (Taylor & Francis, London, 1984), chapter 7 [a SIPRI book].
- 37. Enmod Review Conference document ENMOD/CONF. I/10.

Appendix 13A. UN General Assembly resolutions and decisions on disarmament, 1984

I. UN member states and year of membership

The following list of names of the 159 UN member states is provided for convenience in reading the record of votes on the UN General Assembly resolutions and decisions listed in section II. The countries marked with an asterisk are also members of the Geneva-based Conference on Disarmament (CD).

Afghanistan, 1946 Albania, 1955 Algeria, 1962 Angola, 1976 Antigua and Barbuda, 1981 *Argentina, 1945 *Australia, 1945 Austria, 1955 Bahamas, 1973 Bahrain, 1971 Bangladesh, 1974 Barbados, 1966 *Belgium, 1945 Belize, 1981 Benin, 1960 Bhutan, 1971 Bolivia, 1945 Botswana, 1966 ^{*}Brazil, 1945 Brunei Darussalam, 1984 Bulgaria, 1955* Burkina Faso (formerly Upper Volta), 1960 *Burma, 1948 Burundi, 1962 Byelorussia, 1945 Cameroon, 1960 *Canada, 1945 Cape Verde, 1975 Central African Republic, 1960 Chad, 1960 Chile, 1945 *China, 1945 Colombia, 1945 Comoros, 1975 Congo, 1960

Costa Rica, 1945 *Cuba, 1945 Cyprus, 1960 *Czechoslovakia, 1945 Denmark, 1945 Djibouti, 1977 Dominica, 1978 Dominican Republic, 1945 Ecuador, 1945 *Egypt, 1945 El Salvador, 1945 Equatorial Guinea, 1968 *Ethiopia, 1945 Fiji, 1970 Finland, 1955 *France, 1945 Gabon, 1960 Gambia, 1965 *German Democratic Republic, 1973 *FR Germany, 1973 Ghana, 1957 Greece, 1945 Grenada, 1974 Guatemala, 1945 Guinea, 1958 Guinea-Bissau, 1974 Guyana, 1966 Haiti, 1945 Honduras, 1945 *Hungary, 1955 Iceland, 1946 *India, 1945 *Indonesia, 1950 *Iran, 1945 Iraq, 1945 Ireland, 1955

Israel, 1949 *Italy, 1955 Ivory Coast, 1960 Jamaica, 1962 *Japan, 1956 Jordan, 1955 Kampuchea, 1955 *Kenya, 1963 Kuwait, 1963 Lao People's Democratic Republic, 1955 Lebanon, 1945 Lesotho, 1966 Liberia, 1945 Libya, 1955 Luxembourg, 1945 Madagascar, 1960 Malawi, 1964 Malaysia, 1957 Maldives, 1965 Mali, 1960 Malta, 1964 Mauritania, 1961 Mauritius, 1968 *Mexico, 1945 *Mongolia, 1961 *Morocco, 1956 Mozambique, 1975 Nepal, 1955 *Netherlands, 1945 New Zealand, 1945 Nicaragua, 1945 Niger, 1960 *Nigeria, 1960 Norway, 1945 Oman, 1971 *Pakistan, 1947 Panama, 1945 Papua New Guinea, 1975 Paraguay, 1945 *Peru, 1945 Philippines, 1945 *Poland, 1945 Portugal, 1955 Qatar, 1971 *Romania, 1955

Rwanda, 1962 Saint Christopher and Nevis, 1983 Saint Lucia, 1979 Saint Vincent and the Grenadines, 1980 Samoa, 1976 Sao Tome and Principe, 1975 Saudi Arabia, 1945 Senegal, 1960 Seychelles, 1976 Sierra Leone, 1961 Singapore, 1965 Solomon Islands, 1978 Somalia, 1960 South Africa, 1945 Spain, 1955 *Sri Lanka, 1955 Sudan, 1956 Suriname, 1975 Swaziland, 1968 *Sweden, 1946 Syria, 1945 Tanzania, 1961 Thailand, 1946 Togo, 1960 Trinidad and Tobago, 1962 Tunisia, 1956 Turkey, 1945 Uganda, 1962 *UK, 1945 Ukraine, 1945 United Arab Emirates, 1971 Uruguay, 1945 ^{*}USA, 1945 *USSR, 1945 Vanuatu, 1981 *Venezuela, 1945 Viet Nam, 1977 Yemen Arab Republic, 1947 Yemen, People's Democratic Republic of, 1967 *Yugoslavia, 1945 *Zaire, 1960 Zambia, 1964 Zimbabwe, 1980

II. Resolutions and decisions

Only the essential parts of each resolution are given here. The texts have been abridged, but the wording is close to that of the resolution.

The resolutions are grouped according to disarmament subjects, irrespective of the agenda items under which they were discussed in the General Assembly.

400

Nuclear weapons	480
Nuclear tests	483
Atomic radiation	484
Non-use of nuclear weapons and	
prevention of nuclear war	484
Nuclear weapon-free zones	485
Indian Ocean as a zone of peace	486
Non-proliferation of nuclear	
weapons	486
Chemical and biological weapons .	487
Radiological weapons	489
New weapons of mass destruction .	489

Nuclear weapons

3.7 1

39/148 B 17 December 1984

Urges the governments of the USSR and the USA to resume, without delay or preconditions, bilateral nuclear arms negotiations in order to achieve positive results in accordance with the security interests of all states and the universal desire for progress towards disarmament.

In favour 98

Against 16: Afghanistan, Angola, Bulgaria, Byelorussia, Cuba, Czechoslovakia, GDR, Hungary, Lao People's Dem. Rep., Mongolia, Poland, Syria, Ukraine, USSR, Viet Nam, Dem. Yemen

Abstaining 24: Algeria, Argentina, Bahamas, Barbados, Benin, Bhutan, Burkina Faso, Burma, Cape Verde, Congo, Cyprus, Ethiopia, Greece, India, Madagascar, Mauritius, Mexico, Mozambique, Nicaragua, Sao Tome & Principe, Suriname, Uganda, Venezuela, Yugoslavia

Absent: Belize, Central African Rep., Comoros, Dominica, Grenada, Guatemala, Guinea-Bissau, Libya, Malta, Papua New Guinea, Romania, Rwanda, St Christopher & Nevis, Samoa, ^c Saudi Arabia, ^c Solomon Is, Swaziland, Vanuatu, Zimbabwe

(Albania announced that it was not participating in the vote)

Conventional weapons	489
Naval arms race	489
Military expenditures	490
Remnants of war	490
Enmod Convention	491
Outer space	491
Humanitarian laws of war	491
Non-use of force	491
Disarmament and development	492
Confidence-building measures	492
Disarmament machinery	492
Information and training	495

39/148 G 17 December 1984

Regretting the interruption of the two series of bilateral nuclear arms negotiations begun on 30 November 1981 and 29 June 1982, respectively, between the USSR and the USA, urges the governments of the two states to examine, as a way out of the present impasse, the possibility of combining into a single forum these two series of negotiations and of broadening their scope so as to embrace also the "tactical" or "battlefield" nuclear weapons; invites those governments to consider the advisability of conducting henceforward their bilateral negotiations in a subsidiary body of the CD whose membership could be limited to themselves; and reiterates once more its request to the two negotiating parties that they bear in mind that not only their national interests but also the vital interests of all the peoples of the world are at stake in this question.

In favour 100

Against 12: Belgium, Canada, France, FRG, Israel, Italy, Luxembourg, Netherlands, Portugal, Turkey, UK, USA

Abstaining 26: Australia, Bahamas, Barbados, Brazil, Bulgaria, Byelorussia, Colombia, Czechoslovakia, Denmark, Gabon, Gambia, GDR, Haiti, Hungary, Iceland, Japan, Malawi, Mongolia, New Zealand, Niger, Norway, Philippines, Poland, Spain, Ukraine, USSR

Absent: Belize, Central African Rep., Comoros, Congo, Dominica, Grenada, Guinea-Bissau, Iraq, ^c Mozambique, Papua New Guinea, Romania, Rwanda, St Christopher & Nevis, Samoa, ^c Sao Tome & Principe, Saudi Arabia, ^c Solomon Is, Swaziland, Vanuatu

(Albania announced that it was not participating in the vote)

39/148 A 17 December 1984

Takes note of the conclusions of the study on unilateral nuclear disarmament measures prepared by a group of governmental experts, and trusts that they may encourage nuclear weapon states to take the steps necessary to promote and orient adequately disarmament negotiations.

In favour 126

Against 1: USA

Abstaining 13: Belgium, Canada, France, FRG, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Portugal, Turkey, UK

Absent: Belize, Central African Rep., Comoros, Dominica, Grenada, Guatemala, Guinea-Bissau, Papua New Guinea, Rwanda, St Christopher & Nevis, Samoa, ^c Saudi Arabia, ^c Solomon Is, Somalia, Swaziland, Vanuatu, Zimbabwe

(Albania announced that it was not participating in the vote)

39/63 C 12 December 1984

Urges once more the USSR and the USA to simultaneous proclaim, either through unilateral declarations or through a joint declaration, an immediate nuclear arms freeze, which would embrace a comprehensive test ban and the complete cessation of the manufacture of nuclear weapons and of their delivery vehicles, a ban on all further deployment of nuclear weapons and of their delivery vehicles, and the complete cessation of the production of fissionable material for weapon purposes. The freeze would be subject to appropriate measures of verification, such as those which have already been agreed by the parties in the case of the SALT I and SALT II treaties, and those agreed upon in principle by them during the preparatory trilateral negotiations on a comprehensive test ban; it would be of an initial five-year duration, subject to prolongation when other nuclear weapon states join.

In favour 129

Against 12: Belgium, Canada, France,

FRG, Israel, Italy, Japan, Luxembourg, Portugal, Turkey, UK, USA

Abstaining 8: Bahamas, China, Iceland, Netherlands, New Zealand, Norway, St Lucia, Spain

Absent: Gambia, Grenada, Kampuchea, Philippines, St Christopher & Nevis, St Vincent, Solomon Is, Swaziland

(Albania announced that it was not participating in the vote)

39/151 D 17 December 1984

Reaffirms its appeal to all nuclear weapon states to freeze, from a specific date, their nuclear arsenals on a global scale and under appropriate verification; urges once again the USSR and the USA, which possess the largest nuclear arsenals, to freeze, in the first place and simultaneously, their nuclear weapons on a bilateral basis by way of example to the other nuclear weapon states; strongly believes that all the other nuclear weapon states should subsequently and as soon as possible freeze their nuclear weapons; and stresses the urgent need to intensify efforts aimed at the speedy achievement of agreements on substantial limitations on and radical reductions of nuclear weapons, with a view to their complete elimination as the ultimate goal.

In favour 104

18: Belgium, Canada, Denmark, Against France, FRG, Iceland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Turkey, UK, USA Abstaining 18: Australia, Bahamas, Chad, Costa Rica,^c China. Dominican Rep., El Salvador, Guatemala, Guyana, Haiti, Honduras, Ivory Coast, Paraguay, Rwanda, St Lucia, Sweden, Uruguay, Zaire Absent: Belize, Comoros, Dominica, Gambia, Grenada, Guinea-Bissau, Jamaica, Kam-puchea, Liberia,^b Malta, Philippines, St Christopher & Nevis, Sao Tome & Principe, Senegal, Solomon Is, Swaziland, Vanuatu (Albania announced that it was not participating in the vote)

39/63 G 12 December 1984

Once again calls upon all nuclear weapon states to agree to a freeze on nuclear weapons, which would *inter alia* provide for a simultaneous total stoppage of any further production of nuclear weapons and a complete cut-off in the production of fissionable material for weapon purposes.

In favour 127

Against 11: Belgium, Canada, France, FRG, Italy, Luxembourg, Netherlands, Portugal, Turkey, UK, USA Abstaining 11: Australia, Bahamas, China, Guyana, Iceland, Israel, ^c Japan, New Zealand, Norway, St Lucia, Spain Absent: Gambia, Grenada, Jamaica, Kampuchea, St Christopher & Nevis, St Vincent, Solomon Is, Swaziland (Albania announced that it was not participating in the vote)

39/151 H 17 December 1984

Requests the CD 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 and to keep the General Assembly informed of the progress of that consideration.

In favour 140

Against

Abstaining 8: Argentina, Brazil, China, France, India, Mozambique, UK, USA

Absent: Belize, Comoros, Dominica, Gambia, Grenada, St Christopher & Nevis, Solomon Is, Swaziland, Vanuatu

(Albania announced that it was not participating in the vote)

39/148 C 17 December 1984

0

Calls upon the CD to proceed without delay to negotiations on the cessation of the nuclear arms race and nuclear disarmament and to establish for this purpose an *ad hoc* committee.

In favour 102

Against 19: Australia, Belgium, Canada, Denmark, France, FRG, Iceland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Turkey, UK, USA

Abstaining 13: Bahamas, Chad, Dominican Rep., Gambia, Honduras, Ireland, Ivory Coast, Niger, Paraguay, Senegal, Sweden, Uruguay, Zaire

Absent: Belize, Central African Rep., China, Comoros, Dominica, Equatorial Guinea, Grenada, Guatemala, Guinea-Bissau, Jamaica, Kampuchea, Malta, Papua New Guinea, Philippines, Rwanda, St Christopher & Nevis, Samoa, Sao Tome & Principe, Saudi Arabia,^c Solomon Is, Swaziland, Vanuatu, Zimbabwe (Albania announced that it was not participating in the vote)

39/148 F 17 December 1984

Requests the Secretary-General to compile and distribute, as a document of the UN, appropriate excerpts of all national and international scientific studies on the climatic effects of nuclear war, including nuclear winter, published so far or which may be published before 31 July 1985; urges all states and intergovernmental organizations, as well as non-governmental organizations, to transmit to the secretary-General, prior to the above date, the relevant material in their possession which may be useful for this purpose.

In favour 130

Against 0

Abstaining 11: Belgium, Colombia, France, FRG, Israel, Italy, Luxembourg, Netherlands, Turkey, UK, USA

Absent: Belize, Central African Rep., Comoros, Dominica, Grenada, Guinea-Bissau, Kampuchea, Papua New Guinea, Rwanda, St Christopher & Nevis, Samoa,^c Saudi Arabia, Solomon Is, Suriname, Swaziland, Vanuatu (Albania announced that it was not participating in the vote)

39/148 E 17 December 1984

Reaffirms its request to the CD to start without delay negotiations with a view to concluding a convention on the prohibition of the development, production, stockpiling, deployment and use of nuclear neutron weapons.

In favour 71

Against 11: Belgium, Canada, France, FRG, Israel, Italy, Japan, Portugal, Turkey, UK, USA

Abstaining 53: Argentina, Australia, Austria, Bahamas, Bangladesh, Bhutan, Bolivia, Brazil, Brunei, Burma, Chad, Chile, China, Colombia, Costa Rica, Denmark, Djibouti, Dominican Rep., Ecuador, Egypt, El Salvador, Equatorial Guinea, Greece, Haiti, Honduras, Iceland, Ireland, Ivory Coast, Liberia, Luxembourg, Maldives, Morocco, Nepal, Netherlands, New Zealand, Norway, Oman, Pakistan, Paraguay, Peru, Philippines, St Lucia, Senegal, Singapore, Somalia, Spain, Sri Lanka, Sudan, Sweden, Thailand. Uruguay, Venezuela, Zaire

Absent: Belize, Cape Verde, Central African Rep., Comoros, Dominica, Grenada, Guatemala, Guinea-Bissau, Jamaica, Kampuchea, Kuwait, Lebanon, Malta, Papua New Guinea, Rwanda, St Christopher & Nevis, Samoa, Sao Tome & Principe, Saudi Arabia,^c Solomon Is, Swaziland, Vanuatu

(Albania announced that it was not participating in the vote)

Nuclear tests

39/52 12 December 1984

Reiterates, for the eighth time, its strongest condemnation of all nuclear weapon tests and its grave concern that nuclear weapon testing continues unabated against the wishes of the overwhelming majority of states; reaffirms its 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 and that such a treaty would constitute a contribution of the utmost importance to the cessation of the nuclear arms race and an indispensable element for the success of the NPT. Urges once more the three depositaries of the Partial Test Ban Treaty and of the NPT to abide strictly by their undertakings to seek to achieve the early discontinuance of all test explosions of nuclear weapons and to expedite negotiations to this end; urges also all states that have not yet done so to adhere to the PTBT and, meanwhile, to refrain from testing in the environments covered by that Treaty; reiterates its appeal to all members of the CD to initiate immediately the multilateral negotiation of a treaty for the prohibition of all nuclear weapon tests and calls upon the depositaries of the above treaties, by virtue of their special responsibilities and as a provisional measure, to bring to a halt without delay all nuclear test explosions, either through a trilaterally agreed moratorium or through three unilateral moratoria.

In favour 122

Against 3: France,^b UK, USA

Abstaining 23: Australia, Bahamas, Belgium, Brazil, Burma, Canada, China, Denmark, FRG, Iceland, India, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Saint Lucia, Samoa, Spain, Turkey Absent: Dominica, Gambia, Grenada, Haiti, Kampuchea, St Christopher & Nevis, St Vincent, Solomon Is, Swaziland

(Albania announced that it was not participating in the vote)

39/60 12 December 1984

Resolutely urges all states, especially all nuclear weapon states, to exert maximum efforts and exercise political will for the elaboration and conclusion, without any delay, of a multilateral treaty on the prohibition of nuclear weapon tests by all states; and urges the CD to proceed promptly to negotiations with a view to elaborating such a treaty as a matter of the highest priority.

In favour 123

Against 2: UK, USA

Abstaining 24: Australia, Bahamas, Belgium, Canada, China, Denmark, France, FRG, Haiti, Iceland, Israel, Italy, Ivory Coast, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, St Lucia, Samoa, Spain, Turkey, Zaire

Absent: Gambia, Grenada, Kampuchea, Malta, St Christopher & Nevis, St Vincent, Solomon Is, Swaziland

(Albania announced that it was not participating in the vote)

39/53 12 December 1984

Expresses the conviction that a treaty on the prohibition of all nuclear test explosions by all states in all environments for all time would constitute a vital element for the success of efforts to halt and reverse the nuclear arms race and the qualitative improvement of nuclear weapons, and to prevent the expansion of existing nuclear arsenals and the spread of nuclear weapons to additional countries; urges the CD to establish at the beginning of its 1985 session an ad hoc committee under the item "Nuclear-test ban" and to resume immediately its substantive work relating to a comprehensive test ban, including the issue of scope as well as those of verification and compliance, with a view to the negotiation of a treaty on the subject, to monitor nuclear explosions and to determine the capabilities of such a network for monitoring compliance with a comprehensive nuclear test ban treaty; and to initiate detailed investigation of other measures to monitor and verify compliance with such a treaty, including an international network to monitor atmospheric radioactivity.

In favour 124

Against (

Abstaining 24: Afghanistan, Angola, Argentina, Bulgaria, Byelorussia, China, Congo, Cuba, Czechoslovakia, France, GDR. Hungary, India, Lao People's Dem. Rep., Mexico, Mongolia, Mozambique, Nicaragua, Poland, UK, Ukraine, USA, USSR, Viet Nam Absent: Dominica, Gambia, Grenada. Panama, St Christopher & Nevis, St Vincent, Solomon Is, Swaziland, Dem. Yemen (Albania announced that it was not participating in the vote)

Atomic radiation

39/94 14 December 1984

Commends the UN Scientific Committee on the effects of atomic radiation for the valuable contribution it has been making in the course of the past 29 years, since its inception, to wider knowledge and understanding of the levels, effects and risks of atomic radiation and for fulfilling its original mandate with scientific authority and independence of judgement; and requests it to continue its work, including its important co-ordinating activities, to increase knowledge of the levels, effects and risks of ionizing radiation from all sources.

Adopted without vote

Non-use of nuclear weapons and prevention of nuclear war

39/58 12 December 1984

Reaffirms the urgent need to reach agreement on effective international arrangements to assure non-nuclear weapon states against the use or threat of use of nuclear weapons; appeals to all states, especially the nuclear weapon states, to demonstrate the political will necessary to reach agreement on a common approach and in particular on a common formula which could be included in an international instrument of a legally binding character; and recommends that the CD should actively continue negotiations with a view to reaching early agreement, 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 146 Against 0 Abstaining 4: Argentina, Brazil, India, USA Absent: Bhutan, Gambia, Grenada, St Christopher & Nevis, St Vincent, Solomon Is, Swaziland

(Albania announced that it was not participating in the vote)

39/57 12 December 1984

Reaffirms the urgent need to reach agreement on effective international arrangements to assure non-nuclear weapon states against the use or threat of use of nuclear weapons; and considers that the CD should continue to explore ways and means of overcoming the difficulties encountered in the negotiations to reach such an agreement.

In favour 104

Against 19: Australia, Belgium, Canada, Denmark, France, FRG, Iceland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Turkey, UK, USA

Abstaining 20: Argentina, Austria, Bahamas, Brazil, Burma, China, Colombia, Dominica, Dominican Rep., Honduras, India, Ireland, Ivory Coast, Malaysia, Paraguay, St Lucia, Samoa, Sweden, Uruguay, Zaire

Absent: Bhutan, Brunei, Gambia, Grenada, Haiti,^c Jamaica, Kampuchea, Philippines, St Christopher & Nevis, St Vincent, Sao Tome & Principe, Singapore, Solomon Is, Swaziland (Albania announced that it was not participating in the vote)

39/148 D 17 December 1984

Considers that the solemn declarations by two nuclear weapon states made or reiterated at the Second Special Session of the General Assembly devoted to disarmament, concerning their respective obligations not to be the first to use nuclear weapons, offer an important avenue to decrease the danger of nuclear war; expresses the hope that those nuclear weapon states that have not yet done so would consider making similar declarations; and requests the CD to consider the elaboration of an international instrument of a legally binding character laying down the obligation not to be the first to use nuclear weapons.

Against 19: Australia, Belgium, Canada, Denmark, France, FR Germany, Iceland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Turkey, UK, USA Abstaining 17: Austria, Bahamas, Brazil, Burma, Chile, China, Colombia, Costa Rica, Dominican Rep., Haiti, Honduras, Jamaica, Paraguay, Philippines, St Lucia, Uruguay, Zaire

Absent: Belize, Brunei, Central African Rep., Comoros, Dominica, Grenada, Guatemala, Guinea-Bissau, Ivory Coast, Kampuchea, Malta, Papua New Guinea, Rwanda, St Christopher & Nevis, Samoa, Saudi Arabia, Singapore, Solomon Is, Swaziland, Vanuatu (Albania announced that it was not participating in the vote)

In favour 101

39/148 P 17 December 1984

Again requests the CD to undertake negotiations with a view to achieving agreement on appropriate and practical measures for the prevention of nuclear war and to establish for that purpose an *ad hoc* committee at the beginning of its 1985 session; expresses its conviction that it is necessary to devise suitable steps to expedite effective action for the prevention of nuclear war; requests the Secretary-General to prepare a report on steps to that effect and invites all governments to submit to the Secretary-General their views not later than 1 February 1985.

In favour	128
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Against 6: Belgium, France, FRG, Italy, UK, USA

Abstaining 12: Canada, Denmark, Iceland, Israel, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Turkey Absent: Belize, Comoros, Dominica, Grenada, Guinea-Bissau, Papua New Guinea, St Christopher & Nevis, Samoa, Solomon Islands, Swaziland, Vanuatu (Albania announced that it was not par-

(Albania announced that it was not participating in the vote)

Nuclear weapon-free zones

39/151 B 17 December 1984

Requests the Secretary-General to continue the study of the question of nuclear weapon-free zones in all its aspects and to submit the report to the General Assembly at its 40th session.

In favour 143 Against 0 Abstaining 2: India, USA Absent Belize, Brazil,^c Comoros, Dominica, Gambia, Grenada, Guinea-Bissau, Liberia,^c St Christopher & Nevis, Solomon Is, Swaziland, Vanuatu (Albania announced that it was not par-

ticipating in the vote)

39/51 12 December 1984

Deplores that the signature of Additional Protocol I of the Treaty of Tlatelolco by France has not yet been followed by the corresponding ratification, and once more urges France not to delay such ratification.

In favour	139 <i>ª</i>
Against	0

Abstaining 8: Argentina, Belize, Cuba, France, Guyana, Ivory Coast, Malawi, Mali Absent: Cape Verde, Djibouti, Dominica, Gambia, Grenada, Haiti, St Christopher & Nevis, St Vincent, Solomon Is, Swaziland (Albania announced that it was not participating in the vote)

39/61 A 12 December 1984

Strongly renews its call upon all states to consider and respect the continent of Africa and its surrounding areas as a nuclear weapon-free zone; condemns South Africa's continued pursuit of a nuclear capability and all forms of nuclear collaboration by any state, corporation, institution or individual with the racist regime, and calls upon them to desist from further collaboration: demands once again that the regime of South Africa refrain from manufacturing, testing, deploying, transporting, storing, using or threatening to use nuclear weapons; appeals to all states that have the means to do so, to monitor South Africa's research on and development and production of nuclear weapons, and to publicize any information in that regard; demands once again that South Africa submit forthwith all its nuclear installations and facilities to inspection by the IAEA.

In favour 147 Against 0 Abstaining 5: Belgium, France, Israel, UK, USA Absent: Gambia, Grenada, St Christopher & Nevis, St Vincent, Solomon Is, Swaziland

39/54 12 December 1984

Urges all parties directly concerned to consider taking steps required for the implementation of the proposal to establish a nuclear weapon-free zone in the region of the Middle East and, as a means of promoting this objective, invites them to adhere to the NPT; calls upon all countries of the region that have not done so, pending the establishment of the zone, to agree to place all their nuclear activities under IAEA safeguards; to declare their support for establishing such a zone, and deposit those declarations with the Security Council; and not to develop, produce, test or otherwise acquire nuclear weapons or permit the stationing on their territories, or territories under their control, of nuclear weapons or nuclear explosive devices.

Adopted without vote

39/55 12 December 1984

Reaffirms its endorsement, in principle, of the concept of a nuclear weapon-free zone in South Asia; and urges once again the states of South Asia, and other neighbouring non-nuclear weapon states, to continue to make all possible efforts to establish such a zone and to refrain, in the meantime, from any action contrary to this objective.

In favour 100

Against 3: Bhutan, India, Mauritius Abstaining 42: Afghanistan, Algeria, Angola, Argentina, Austria, Bahamas, Belize, Benin, Brazil, Bulgaria, Burkina Faso, Burma, Byelorussia, Cape Verde, Congo, Cuba, Cyprus, Czechoslovakia, Denmark, Ethiopia, Fiji, France, GDR, Hungary, Iceland, Indonesia, Israel, Italy, Lao People's Dem. Rep., Madagascar, Mongolia, Mozambique, Nicaragua, Norway, Poland, Sweden, UK, Ukraine, USSR, Viet Nam, Dem. Yemen, Yugoslavia

Absent: Dominica, Gambia, Grenada, St Christopher & Nevis, St Vincent, Sao Tome & Principe, Seychelles, Solomon Is, Suriname, Swaziland, Syria, Vanuatu

(Albania announced that it was not participating in the vote)

Indian Ocean as a zone for peace

39/149 17 December 1984

Emphasizes its decision to convene the Conference on the Indian Ocean as a necessary step for the implementation of the Declaration of the Indian Ocean as a Zone of Peace, adopted in 1971; requests the Ad Hoc Committee on the Indian Ocean to complete preparatory work relating to the Conference in 1985, in order to enable its opening at Colombo thereafter at the earliest date in the first half of 1986, to be decided by the Committee in consultation with the host country; and decides that preparatory work would comprise organizational matters and substantive issues, including the provisional agenda for the Conference, rules of procedure, participation, stages of conference, level of representation, documentation, consideration of appropriate arrangements for any international agreements that may ultimately be reached for the maintenance of the Indian Ocean as a zone of peace and the preparation of the draft final document of the Conference.

Adopted without vote

Non-proliferation of nuclear weapons

39/61 B 12 December 1984

Condemns the massive build-up of South Africa's military machine, in particular its acquisition of a nuclear weapon capability which constitutes a very grave danger to international peace and security and, in particular, jeopardizes the security of African states and increases the danger of the proliferation of nuclear weapons; condemns all forms of nuclear collaboration by any state, corporation, institution or individual with the racist regime of South Africa, in particular the decision by some member states to grant licences to several corporations in their territories to provide equipment, technical and maintenance services for nuclear installations in South Africa: demands that South Africa and all other foreign interests put an immediate end to the exploration and exploitation of uranium resources in Namibia; requests the Disarmament Commission to consider during its 1985 session, as a matter of priority, South Africa's nuclear capability; requests the Security Council to take enforcement measures to prevent any racist regimes from acquiring arms or arms technology, and to conclude expeditiously its consideration of the recommendations concerning the question of South Africa, with a view to blocking the existing loopholes in the arms embargo, so as to render it more effective and prohibiting, in particular, all nuclear cooperation and collaboration with the racist regime of South Africa; demands once again that South Africa submit forthwith all its nuclear installations and facilities to inspection by the IAEA.

In favour 137

Against4: France, Israel, UK, USAAbstaining11: Australia, Belgium, Canada,FRG, Italy, Japan, Luxembourg, Malawi,Netherlands, New Zealand, PortugalAbsent:Gambia, Grenada, St Christopher &Nevis, St Vincent, Solomon Is, Swaziland

39/147 17 December 1984

Condemns Israel's continued refusal to renounce any possession of nuclear weapons; requests the Security Council to take urgent and effective measures to ensure that Israel places all its nuclear facilities under IAEA safeguards; requests again the Security Council to investigate Israel's nuclear activities and the collaboration of other states, parties and institutions in these activities; reiterates its request to the IAEA to suspend any scientific cooperation with Israel which could contribute to Israel's nuclear capabilities; reiterates further its condemnation of the Israeli threat, in violation of the UN Charter, to repeat its armed attack on peaceful facilities in Iraq and in other countries; reaffirms its condemnation of the continuing nuclear collaboration between Israel and South Africa; and requests the UN Institute for Disarmament Research, in cooperation with the Department for Disarmament Affairs of the Secretariat and in consultation with the League of Arab States and the Organization of African Unity, to prepare a report providing data and other relevant information relating to Israeli nuclear armament and further nuclear developments.

In favour 94

Against 2: Israel, USA

Abstaining 44: Antigua and Barbuda, Australia, Austria, Bahamas, Belgium, Bolivia, Burma, Canada, Chile, Colombia, Costa Rica, Denmark, Dominican Rep., Ecuador, El Salvador, Fiji, Finland, France, FRG, Haiti, Honduras, Iceland, Ireland, Italy, Ivory Coast, Jamaica, Japan, Liberia, Luxembourg, Malawi, Nepal, Netherlands, New Zealand, Norway, Panama, Paraguay, Portugal, St Lucia, St Vincent, Spain, Sweden, UK, Uruguay, Zaire

Absent: Belize, Central African Rep. Comoros, Dominica, Grenada, Guatemala, Guinea-Bissau, ^c Papua New Guinea, Rwanda, St Christopher & Nevis, Samoa, Saudi Arabia, ^c Singapore, Solomon Is, Somalia, ^c Swaziland, Vanuatu, Zimbabwe

39/14 16 November 1984

Considers that Israel's statements contained in its communication of 12 July 1984 do not fulfil or, in the view of some, do not completely fulfil the provisions of General Assembly resolution 38/9 of 10 November 1983 which specifically demanded that Israel withdraw forthwith its threat to attack and destroy nuclear facilities in Iraq and in other countries; further considers that any threat to attack and destroy nuclear facilities in Iraq and in other countries constitutes a violation of the UN Charter; demands that Israel undertake forthwith not to carry out, in disregard to the safeguards system of the IAEA, any attack on nuclear facilities in Iraq, or on similar facilities in other countries, devoted to peaceful purposes; requests the Security Council to consider the necessary measures to deter Israel from repeating its attack on nuclear facilities; reaffirms its call for the continuation of the consideration, at the international level, of legal measures to prohibit armed attacks against nuclear facilities, as a contribution to promoting and ensuring the

safe development of nuclear energy for peaceful purposes.

In favour 106

Against 2: Israel, USA

Abstaining 33: Australia, Barbados. Belgium, Canada, Chile, Colombia, Costa Rica, Denmark, Dominican Rep., Ecuador, Equatorial Guinea, Fiji, Finland, France, FRG, Guatemala, Haiti, Iceland, Italy, Ivory Coast. Jamaica. Liberia, Luxembourg, Malawi, Netherlands, Norway, Panama, Papua New Guinea, Paraguay, Sweden, UK, Venezuela, Zaire Absent: Antigua & Barbuda, Bahamas, Belize,

Burma, Dominica, El Salvador, Gambia, Grenada, Honduras, St Christopher & Nevis, St Lucia, St Vincent, Samoa, Solomon Is, Suriname, Swaziland, Vanuatu

39/12 13 November 1984

Affirms its confidence in the role of the IAEA in the application of nuclear energy for peaceful purposes; and urges all states to strive for effective and harmonious international co-operation in carrying out the work of the IAEA, pursuant to its Statute, in promoting the use of nuclear energy and the application of nuclear science and technology for peaceful purposes, in strengthening technical assistance and co-operation for developing countries, in ensuring the effectiveness and efficiency of the IAEA safeguards system, and in promoting nuclear safety.

Adopted without vote

39/74 13 December 1984

Decides that the UN Conference for the promotion of international co-operation in the peaceful uses of nuclear energy shall be held at Geneva from 10 to 28 November 1986.

Adopted without vote

Chemical and biological weapons

39/65 C 12 December 1984

Urges again the CD as a matter of high priority, to intensify, during its 1985 session, the negotiations on a convention prohibiting chemical weapons and to reinforce further its efforts *inter alia* by increasing the time during the year that the CD devotes to such negotiations, and to re-establish its Ad Hoc Committee on chemical weapons for this purpose with the 1984 mandate.

Adopted without vote

39/65 B 12 December 1984

Urges the CD to intensify the negotiations in the Ad Hoc Committee on chemical weapons with a view to achieving accord on a CW convention at the earliest possible date and, for this purpose, to proceed immediately to drafting such a convention; reaffirms its call to all states to refrain from any action that could impede the negotiations and specifically to refrain from the production and deployment of binary and other new types of chemical weapons, as well as from stationing chemical weapons on the territory of other states.

In favour 84

Against 1: USA

Abstaining 62: Argentina, Australia. Austria, Bahamas, Belgium, Brazil, Brunei, Burma, Canada, Cape Verde, Chad, Chile, China, Colombia, Costa Rica, Denmark, Djibouti, Dominica, Dominican Rep., El Salvador, Finland, France, Gabon, FRG, Greece, Guatemala, Guinea-Bissau, Haiti, Honduras, Iceland, India, Ireland, Italy, Ivory Coast, Jamaica, Japan, Kampuchea, Liberia, Luxembourg, Morocco, Nepal, Netherlands, New Zealand, Niger, Norway, Paraguay, Philippines, Portugal, Rwanda, St Lucia, Samoa, Singapore, Spain, Sri Lanka, Sudan, Suriname, Sweden, Turkey, UK, Uruguay, Venezuela, Zaire

Absent: Gambia, Grenada, Israel, Malta, St Christopher & Nevis, St Vincent, Sao Tome & Principe, Seychelles, Solomon Is, Swaziland (Albania announced that it was not participating in the vote)

39/65 E 12 December 1984

Recalling its resolution 37/98 D of 13 December 1982, in which it requested the Secretary-General to devise procedures for the investigation of information concerning activities that may constitute a violation of the 1925 Geneva Protocol, or of the relevant rules of customary international law; and underlining the importance of impartially and rapidly ascertaining, through an appropriate international procedure, facts that may constitute a violation; takes note of the report by the Secretary-General, to which is annexed the report of the consultant experts, designated by him, concerning the implementation of the provisions of the relevant resolutions.

In favour 87⁸

Against 18: Afghanistan, Bulgaria, Byelorussia, Cuba, Czechoslovakia, GDR, Hungary, India, Lao People's Dem. Rep., Libya, Mongolia, Mozambique, Poland, Syria, Ukraine, USSR, Viet Nam, Dem. Yemen Abstaining 30: Algeria, Argentina, Bahamas,

Abstaining 30: Algeria, Argentina, Bahamas, Bahrain, Benin, Brazil, Burkina Faso, Burma, Cape Verde, Chile, Cyprus, Ethiopia, Finland, Iran, ^c Iraq, Jordan, Kuwait, Madagascar, Mexico, Nicaragua, Oman, Qatar, Saudi Arabia, Sri Lanka, Tanzania, Uganda, Venezuela, Yemen Arab Republic, Yugoslavia, Zimbabwe

Absent: Angola,^b Antigua & Barbuda, Belize, Comoros, Congo, El Salvador, Gambia, Grenada, Guatemala, Iceland, Israel, Lebanon, Lesotho, St Christopher & Nevis, St Lucia, St Vincent, Seychelles, Solomon Is, Swaziland, United Arab Emirates, Vanuatu, Zaire

(Albania announced that it was not participating in the vote)

39/65 A 12 December 1984

Reaffirming the necessity of strict observance by all states of the principles and objectives of the Geneva Protocol for the prohibition of the use in war of asphyxiating, poisonous or other gases, and of bacteriological methods of warfare, and of the adherence by all states to the Convention on the prohibition of the development, production and stockpiling of bacteriological (biological) and toxin weapons and on their destruction; and noting that it has been reported that such weapons have been used: calls for strict observance of existing international obligations regarding prohibitions on chemical and biological weapons and condemns actions that contravene them, and urges the CD to accelerate its negotiations on a multilateral convention on the complete and effective prohibition of the development, production and stockpiling of chemical weapons and on their destruction.

In favour 118^f

Against 16: Afghanistan, Bulgaria, Byelorussia, Cuba, Czechoslovakia, GDR, Hungary, Lao People's Dem. Rep., Libya, Mongolia, Mozambique, Poland, Ukraine, USSR, Viet Nam, Dem. Yemen Abstaining 14: Algeria, Angola, Benin, Burkina Faso, Cape Verde, Congo, Cyprus, Ethiopia, India, Madagascar, Mexico, Nicaragua, Romania, Yugoslavia Absent: Gambia, Grenada, Israel,^c St

Christopher & Nevis, St Vincent, Seychelles, Solomon Is, Swaziland, Syria (Albania announced that it was not participating in the vote)

39/65 D 12 December 1984

Notes that, at the request of a majority of states parties to the Convention on the prohibition of the development, production and siockpiling of bacteriological (biological) and toxin weapons and on their destruction, a second Review Conference of the states parties to the BW Convention will be held in 1986 and that, following appropriate consultations, a preparatory committee is to be established prior to the holding of the Review Conference.

Adopted without vote

Radiological weapons

39/151 J 17 December 1984

Requests the CD to continue its negotiations on the subject of the prohibition of the development, production, stockpiling and use of radiological weapons.

Adopted without vote

New weapons of mass destruction

39/62 12 December 1984

Requests the CD to intensify negotiations with a view to preparing a draft comprehensive agreement on the prohibition of the development and manufacture of new types of weapons of mass destruction and new systems of such weapons, and to draft possible agreements on particular types of such weapons; once again urges all states to refrain from any action which could adversely affect the talks aimed at working out such an agreement or agreements; calls upon the permanent members of the Security Council as well as upon other militarily significant states to make declarations, identical in substance, concerning the refusal to create new types of weapons of mass destruction and new systems of such weapons, as a first step towards the conclusion of a comprehensive agreement on this subject; calls again upon all states to undertake efforts to ensure that ultimately scientific and technological achievements may be used solely for peaceful purposes.

In favour 125 Against 1: USA Abstaining 23: Australia, Austria, Belgium, Canada, China, Denmark, France, FRG, Greece, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Turkey, UK Absent: Gambia, Grenada, Jamaica, Kampuchea, St Christopher & Nevis, St Vincent, Solomon Is, Swaziland (Albania announced that it was not participating in the vote)

Conventional weapons

39/151 C 17 December 1984

Commends the Secretary-General's study on all aspects of the conventional arms race and on disarmament relating to conventional weapons and armed forces and its conclusions to the attention of all UN member states; and invites all member states to inform the Secretary-General, no later than 31 May 1985, of their view regarding the study.

Adopted without vote

39/56 12 December 1984

Notes with satisfaction that an increasing number of states have either signed, ratified, accepted or acceded to the Convention on prohibitions or restrictions on the use of certain conventional weapons which may be deemed to be excessively injurious or to have indiscriminate effects, which was opened for signature in New York on 10 April 1981 and entered into force on 2 December 1983; urges all states that have not yet done so to become parties.

Adopted without vote

Naval arms race

39/151 1 17 December 1984

Appeals once again to all member states, in particular the major naval powers, to refrain from enlarging their naval activities in areas of conflict or tensions, or far from their own shores; reaffirms its recognition of the urgent need to start negotiations with the participation of the major naval powers, the nuclear weapon states in particular, and other interested states on the limitation of naval activities, the limitation and reduction of naval armaments and the extension of confidence-building measures to seas and oceans, especially to areas with the busiest international sea lanes or to regions where the probability of conflict situations is high; invites member states, particularly the major naval powers, to consider the possibility of holding direct consultations, bilateral and/or multilateral, with a view to preparing the opening at an early date of such negotiations; requests the Disarmament Commission to consider this question and to report to the General Assembly at its 40th session.

In favour 70

Against 19: Australia, Belgium, Canada, Denmark, France, FRG, Iceland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Turkey, UK, USA

Abstaining 53: Bahamas, Austria. Bangladesh, Barbados, Bhutan, Bolivia. Brazil, Brunei, Burma, Chad, China, Costa Rica, Djibouti, Dominican Rep., Ecuador, Egypt, El Salvador, Fiji, Finland, Greece, Guatemala, Guinea-Bissau, Haiti, Honduras, India, Indonesia, Ireland, Ivory Coast, Kampuchea, Liberia, Malaysia, Maldives, Mauritius, Morocco, Niger, Oman, Pakistan, Paraguay, Peru, Philippines, Rwanda, St Lucia, Samoa, Senegal, Singapore, Somalia, Sri Lanka, Sudan, Suriname. Sweden, Thailand, Uruguay, Zaire

Absent: Belize, Cape Verde, Comoros, Dominica, Gabon, Gambia, Grenada, Lebanon, Nepal, Papua New Guinea, St Christopher & Nevis, Sao Tome & Principe, Solomon Is, Swaziland, Vanuatu

(Albania announced that it was not participating in the vote)

Military expenditures

39/64 A 12 December 1984

Declares once again its conviction that it is possible to achieve international agreements on the reduction of military budgets without prejudice to the right of all states to undiminished security, self-defence and sovereignty; reaffirms that the human and material resources released through the reduction of military expenditures could be reallocated for economic and social development, particularly for the benefit of the developing countries; calls upon all states, to reinforce their readiness to co-operate in a constructive manner with a view to reaching agreements to freeze, reduce or otherwise restrain military expenditures and pending the conclusion of the agreements to exercise self-restraint in their military expenditures; requests the Disarmament Commission to continue, at its 1985 session, the consideration of the item entitled "Reduction of military budgets".

Adopted without vote

39/64 B 12 December 1984

Stresses the need to increase the number of states reporting their military expenditures with a view to the broadest possible participation from different geographic regions and representing different budgeting systems; reiterates its recommendation that all member states should annually, by 30 April, report their military expenditures for the latest fiscal year for which data are available, to the Secretary-General, using the reporting instrument.

In favour 114^e

Against 16: Afghanistan, Bulgaria, Byelorussia, Congo, Cuba, Czechoslovakia, GDR, Hungary, Israel, Lao People's Dem. Rep., Mongolia, Mozambique, Poland, Ukraine, USSR, Viet Nam

Abstaining 7: Bahamas, Brazil, Burma, China, India, Tanzania, Zambia

Absent: Algeria, Angola, Bahrain, Burkina Faso, Comoros, Ethiopia, Gambia, Grenada, Kuwait, Libya, Madagascar, Nicaragua, Oman, Qatar, St Christopher & Nevis, St Vincent, Solomon Is, Swaziland, Syria, Democratic Yemen

(Albania announced that it was not participating in the vote)

Remnants of war

39/167 17 December 1984

Reiterates its support of the just demands of the developing countries affected by the implantation of mines and the presence of other remnants of war in their territories for compensation and for complete removal of those obstacles by the states that implanted them.

In favour 121

Against 0

Abstaining 24: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Gambia, FRG, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Senegal, Spain, Sweden, UK, USA

Absent: Antigua & Barbuda, Belize, Comoros,

Congo,^c Dominica, Equatorial Guinea, Grenada, Israel, St Christopher & Nevis, St Vincent, Seychelles, Singapore, Solomon Is

Enmod Convention

39/151 A 17 December 1984

Takes note of the positive assessment by the Review Conference of the parties to the Convention on the prohibition of military or any other hostile use of environmental modification techniques of the effectiveness of the Convention since its entry into force, as reflected in its Final Declaration; and calls upon all states to refrain from military or any other hostile use of environmental modification techniques.

In favour 136 Against 0 Mexico. Mozambique, Abstaining 4: Panama, Venezuela Absent: Algeria, Belize, China, Comoros, Dominica, France, Gambia, Grenada, Guinea-Bissau, Liberia, COman, Pakistan, Paraguay, St Christopher & Nevis, Solomon Is, Swaziland, Vanuatu (Albania announced that it was not participating in the vote)

Outer space

39/59 12 December 1984

Recalls the obligation of all states to refrain from the threat or use of force in their space activities; calls upon all states, in particular those with major space capabilities, to contribute actively to the objective of the peaceful use of outer space and to take immediate measures to prevent an arms race in outer space in the interest of maintaining international peace and security and promoting international co-operation and understanding; requests the CD to intensify its consideration of the question of the prevention of an arms race in outer space in all its aspects, taking into account all relevant proposals, and to establish an ad hoc committee at the beginning of its 1985 session, with a view to undertaking negotiations for the conclusion of an agreement or agreements, as apropriate; urges the USSR and the USA to initiate immediately and in a constructive spirit negotiations aimed at preventing an arms race in outer space and to advise the CD regularly of the progress of their bilateral negotiations.

In favour 150

Against 0 Abstaining 1: USA Absent: Gambia, Grenada, St Christopher & Nevis, St Vincent, Solomon Is, Swaziland (Albania announced that it was not participating in the vote)

39/96 14 December 1984

Urges all states, in particular those with major space capabilities, to contribute actively to the goal of preventing an arms race in outer space as an essential condition for the promotion of international co-operation in the exploration and uses of outer space for peaceful purposes.

Adopted without vote

Humanitarian laws of war

39/77 13 December 1984

Reiterates its call to all states to consider at the earliest possible date the matter of ratifying or acceding to the two Protocols Additional to the Geneva Conventions of 1949 and relating to the protection of victims of armed conflicts.

Adopted without vote

Non-use of force

39/81 13 December 1984

Decides that the Special Committee on enhancing the effectiveness of the principle of non-use of force in international relations shall continue its work with the goal of drafting, at the earliest possible date, a world treaty on the nonuse of force in international relations as well as the peaceful settlement of disputes or such other recommendations as the Committee deems appropriate.

In favour 111

Against 15: Belgium, Canada, Denmark, France, Iceland, Israel, Italy, Japan, Luxembourg, Netherlands, Norway, Portugal, Spain, UK, USA

Abstaining 10: Australia, Austria, Brazil, FRG, Ireland, Ivory Coast, New Zealand, Paraguay, Sweden, Turkey

Absent: Albania, Antigua and Barbuda, Belize, Central African Rep., Comoros, Dominica, Equatorial Guinea, Gambia, Grenada, Guinea-Bissau, Kampuchea, Malta, St Christopher & Nevis, St Lucia, St Vincent, Samoa, Seychelles, Solomon Is, Swaziland, Tanzania, Vanuatu, Zimbabwe

Disarmament and development

39/424 17 December 1984

Decides that the preferred venue for the Preparatory Committee for the Conference on the relationship between disarmament and development should be Geneva, provided that this would not entail any additional expenditure for the UN.

Adopted without vote

39/160 17 December 1984

Decides to convene an international conference on the relationship between disarmament and development, which should be preceded by thorough preparation and should take decisions by consensus. The purposes of the conference should be: to review the relationship between disarmament and development in all its aspects and dimensions with a view to reaching appropriate conclusions; to undertake an examination of the implications of the level and magnitude of the continuing military expenditures, in particular those of nuclear weapon states and other militarily important states, for the world economy and the international economic and social situation, particularly for developing countries, and to make recommendations for remedial measures; to consider ways and means of releasing additional resources, through disarmament measures, for development purposes, in particular in favour of developing countries; and further decides to set up a preparatory commmittee composed of 54 members, which should formulate and submit, by consensus, to the General Assembly, at its 40th session, recommendations as to the provisional agenda, procedure, place, date and duration of the conference.

Adopted without vote

Confidence-building measures

39/63 E 12 December 1984

Urges all states to consider the widest possible use of confidence-building measures in their international relations; and requests the Disarmament Commission, at its 1986 session, to continue and conclude its consideration of the item "Elaboration of guidelines for appropriate types of confidence-building measures and for the implementation of such measures on a global or regional level".

Adopted without vote

Disarmament machinery

39/148 O 17 December 1984

Calls upon all states, in particular nuclear weapon states and other militarily significant states, to take urgent measures in order to put an end to the serious aggravation of the international situation, to promote international security on the basis of disarmament, to halt and reverse the arms race and to launch a process of genuine disarmament; calls upon the CD to proceed to negotiations on the cessation of the nuclear arms race and nuclear disarmament, on the prevention of nuclear war as well as the prevention of an arms race in outer space and to elaborate drafts of treaties on a nuclear weapon test ban and on a complete and effective prohibition of all chemical weapons; invites all states engaged in disarmament and arms limitation negotiations outside the framework of the UN to keep the General Assembly and the CD informed on the status and/or results of such negotiations.

In favour 127^d

Against 11: Belgium, Canada, France, FRG, Israel, Italy, Luxembourg, Netherlands, Portugal, Turkey, USA

Abstaining 7: Australia, Iceland, Japan, New Zealand, Norway, Spain, UK

Absent: Belize, Comoros, Dominica, Grenada, Guinea-Bissau, Papua New Guinea, St Christopher & Nevis, St Vincent, Samoa,^c Solomon Is, Swaziland, Vanuatu

(Albania announced that it was not participating in the vote)

39/148 N 17 December 1984

Calls upon the CD to adopt concrete measures on the specific priority issues of disarmament on its agenda, in particular those relating to nuclear disarmament; calls upon the CD to provide the existing *ad hoc* committees with appropriate negotiating mandates and to establish, as a matter of urgency, the *ad hoc* committees under item 1 of its agenda, entitled "Nuclear-test ban", on the cessation of the nuclear arms race and nuclear disarmament, on the prevention of nuclear war and on the prevention of the arms race in outer space; urges the CD to undertake, without further delay, negotiations with a view to elaborating a draft treaty on a nuclear weapon test ban; and also urges the CD to intensify its work on the elaboration of a draft convention on the prohibition of the development, production and stockpiling of all chemical weapons and on their destruction.

In favour 123

Against 1: USA

Abstaining 21: Australia, Belgium, Cameroon, Canada, Denmark, France, FRG, Greece, Iceland, Israel, Italy, Japan, Luxembourg, Nepal,^c Netherlands, New Zealand, Norway, Portugal, Spain, Turkey, UK

Absent: Belize, Comoros, Dominica, Grenada, Guinea-Bissau, Malawi, Papua New Guinea, St Christopher & Nevis, Samoa,^c Solomon Is, Swaziland, Vanuatu

(Albania announced that it was not participating in the vote)

39/63 H 12 December 1984

Reiterates its request to the CD to commence negotiations in order to achieve agreement on an international convention prohibiting the use or threat of use of nuclear weapons under any circumstances, taking as a basis an annexed draft.

In favour 128

Against 17: Australia, Belgium, Canada, Denmark, France, FRG, Iceland, Italy, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Turkey, UK, USA

Abstaining 5: Austria, Greece, Ireland, Israel, Japan

Absent: Gambia, Grenada, Philippines, St Christopher & Nevis, St Vincent, Solomon Is, Swaziland

(Albania announced that it was not participating in the vote)

39/148 K 17 December 1984

Requests the CD to establish an *ad hoc* committee at the beginning of its session in 1985 to submit recommendations to the Conference as to how it could best initiate multilateral negotiations of agreements, with adequate measures of verification, in appropriate stages for: cessation of the qualitative improvement and development of nuclear weapon systems; cessation of the production of all types of nuclear weapons and their means of delivery, and of the production of fissionable material for weapon purposes; and substantial reduction in the existing nuclear weapons with a view to their ultimate elimination.

In favour 124

Against 13: Belgium, Canada, France, FRG, Iceland, Italy, Luxembourg, Netherlands, Norway, Portugal, Turkey, UK, USA Abstaining 9: Australia, Bahamas, Den-

Aostaining 9: Australia, Banamas, Denmark, Israel, Japan, New Zealand, Paraguay, St Lucia, Spain

Absent: Belize, Comoros, Dominica, Grenada, Guinea-Bissau, Papua New Guinea, St Christopher & Nevis, Samoa,^c Solomon Is, Swaziland, Vanuatu

(Albania announced that it was not participating in the vote)

39/148 I 17 December 1984

Urges that all efforts be made so that the CD may resume its work on the elaboration of the comprehensive programme of disarmament early in its 1985 session with a view to submitting to the General Assembly at its 41st session a complete draft of such a programme.

Adopted without vote

39/148 L 17 December 1984

Reaffirms the right of all states not members of the CD to participate in the work of the plenary sessions of the CD on substantive questions; and requests the members of the CD not to misuse the rules of procedure of the CD so as to prevent non-members from participating in its work.

In favour 120^h

Against 0

Abstaining 18: Austria, Belgium, Canada, Ethiopia, FRG, India, Iran, Israel, Italy, Liberia, Luxembourg, Netherlands, New Zealand, Nigeria, Pakistan, Sweden, UK, USA Absent: Belize, Brunei, Burma, Comoros, Cyprus, Dominica, Grenada, Guinea-Bissau, Indonesia, Kampuchea, Papua New Guinea, St Christopher & Nevis, Samoa,^c Seychelles, Singapore, Solomon Is, Swaziland, Thailand, Vanuatu

(Albania announced that it was not participating in the vote)

39/148 R 17 December 1984

Requests the Disarmament Commission to make every effort to achieve specific recommendations, at its next substantive session, on the outstanding items on its agenda.

Adopted without vote

39/148 Q 17 December 1984

Decides to undertake at its 40th session, in 1985, a review and appraisal of the implementation of the Declaration of the 1980s as the Second Disarmament Decade; requests the Disarmament Commission at its session in 1985 to make a preliminary assessment of the implementation of the Declaration, as well as suggestions to ensure progress.

Adopted without vote

39/151 G 17 December 1984

Invites all states to communicate to the Secretary-General, not later than 15 April 1985, their views and suggestions on ways and means by which the UN can more effectively exercise its central role and primary responsibility in the field of disarmament and to transmit them to the Disarmament Commission before the convening of its session in 1985; requests the Disarmament Commission to carry out as a matter of priority a comprehensive review of the UN role in the field of disarmament.

Adopted without vote

39/150 17 December 1984

Renews the mandate of the *Ad Hoc* Committee on the World Disarmament Conference and requests it to continue 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 relevant comments and observations which might be made to the Committee.

Adopted without vote

39/63 I 12 December 1984

Decides to set, at its 40th session, the date of the Third Special Session of the General Assembly devoted to disarmament and to establish the preparatory committee for the Third Special Session.

Adopted without vote

39/151 F 17 December 1984

Requests the Secretary-General to continue the study of the military use of research and development, bearing in mind the savings that might be made from the existing budgetary appropriations, and to submit the final report to the General Assembly at its 40th session.

In favour 141 Against 1: USA Abstaining 5: Belgium, FRG, Luxembourg, Netherlands, Turkey Absent: Belize, Comoros, Dominica, Gambia, Grenada, Mozambique, St Christopher & Nevis, Solomon Is, Swaziland, Vanuatu (Albania announced that it was not participating in the vote)

39/63 K 12 December 1982

Calls upon the Security Council to hold a session devoted to consideration of the escalating arms race—particularly the nuclear arms race—with a view to initiating due procedures, in accordance with the UN Charter, for bringing it to a halt.

In favour 128^e

Against 0

Abstaining 19: Austria, Belgium, Canada, Denmark, Finland, France, FRG, Iceland, Italy, Japan, Luxembourg, Netherlands, Norway, Portugal, Rwanda, Spain, Sweden, UK, USA Absent: Gambia, Grenada, Israel,^b Kampuchea, Malta, St Christopher & Nevis, St Vincent, Solomon Is, Swaziland, Turkey (Albania announced that it was not participating in the vote)

39/423 17 December 1984

Requests the Secretary-General to prepare a study under the title: "Deterrence: its implications for disarmament and the arms race, negotiated arms reductions and international security and other related matters", as recommended by the Advisory Board on Disarmament Studies, and to submit the final report to the General Assembly at its 41st session.

In favour 145 Against 1: USA Abstaining 0 Absent: Albania, Belize, Comoros, Dominica, Grenada, Guinea-Bissau, Papua New Guinea, St Christopher & Nevis, Samoa, Solomon Is, Swaziland, Vanuatu

39/151 E 17 December 1984

Reaffirms its invitation to the specialized agencies and other organizations and programmes of the UN system to broaden further their contribution, within their areas of competence, to the cause of arms limitation and disarmament.

In favour 109

Against 18: Australia, Belgium, Canada, France, FRG, Iceland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Saudi Arabia,^b Turkey, UK, USA

Abstaining 14: Austria, Bahamas, Barbados, Brazil, China, Denmark, Djibouti, Finland, Greece, Ireland, Liberia, Somalia, Spain, Sweden

Absent: Belize, Burma, Comoros, Dominica, Gambia, Grenada, Guinea-Bissau, Jamaica, Kampuchea, Malta, St Christopher & Nevis, Singapore, Solomon Is, Sri Lanka, Swaziland, Vanuatu

(Albania announced that it was not participating in the vote)

Information and training

39/63 A 12 December 1984

Urges the governments of all states, especially the nuclear weapon states and other militarily significant states, in formulating their policies in the field of disarmament, to take into account the main demands of the mass peace and disarmament movements, in particular with regard to the prevention of nuclear war and curbing the nuclear arms race; reaffirms the importance of carrying out the World Disarmament Campaign; again invites member states to co-operate with the United Nations to ensure a better flow of accurate information with regard to the various aspects of disarmament as well as actions and activities of the world public in support of peace and disarmament, and to avoid dissemination of false and tendentious information; and requests the Secretary-General, in implementing the programme of activities of the World Disarmament Campaign, to give wider publicity to the work of the General Assembly in the field of disarmament, paying due attention in particular to the proposals of member states and the action taken thereon.

In favour 117 Against 0 Abstaining 31: Austria, Bahamas, Belgium,

Brazil, Burma, Canada, Chile, Denmark, Finland, France, FRG, Greece, Guatemala, Haiti, Iceland, Ireland, Italy, Japan, Kampuchea, Luxembourg, Netherlands, New Zealand, Norway, Paraguay, Portugal, Spain, Sweden, Turkey, UK, Uruguay, USA

Absent: Gambia, Grenada, Israel,^b Oman, St Christopher & Nevis, St Vincent, Singapore, Solomon Is, Swaziland

(Albania announced that it was not participating in the vote)

39/63 D 12 December 1984

Regrets that most of the states which have the largest military expenditures have not so far made any financial contribution to the World Disarmament Campaign; decides that at its 40th session, there should be a Third United Nations Pledging Conference for the Campaign, and expresses the hope that on that occasion all those member states that have not yet announced any voluntary contribution may do so: and reiterates its recommendation that the voluntary contributions should not be earmarked for specific activities inasmuch as it is most desirable that the Secretary-General enjoy full freedom to take the decisions he deems fit within the framework of the Campaign previously approved by the General Assembly and in exercise of the powers vested in him in connection with the Campaign.

In favour 139 Against 0 Abstaining 12: Bahamas, Belgium, France, FRG, Israel, Italy, Luxembourg, Netherlands, Rwanda, Turkey, UK, USA Absent: Gambia, Grenada, St Christopher & Nevis, St Vincent, Solomon Is, Swaziland (Albania announced that it was not participating in the vote)

39/63 J 12 December 1984

Requests the Secretary-General to provide assistance to such member states in the regions concerned as may request it with a view to establishing arrangements for the implementation of the World Disarmament Campaign, on the basis of existing resources and of voluntary contributions which member states may make to that end.

Adopted without vote

39/148 M 17 December 1984

Stresses the importance of strengthening the effectiveness of the United Nations in fulfilling

its responsibility for maintaining international peace and security in accordance with the UN Charter: emphasizes the necessity of refraining from war propaganda, in particular propaganda for a nuclear war-global or limited, and from the elaboration and dissemination of any doctrines and concepts endangering international peace and justifying the unleashing of nuclear war. Declares that the use of force in international relations as well as in attempts to prevent the full implementation of the Declaration on the granting of independence to colonial countries and peoples is a phenomenon incompatible with the ideas of international co-operation for disarmament: appeals to states which are members of military groupings to promote the gradual mutual limitation of military activities of these groupings, thus creating conditions for their dissolution; calls upon all member states to cultivate and disseminate, particularly in connection with the World Disarmament Campaign, the ideas of international co-operation for disarmament through their educational systems, mass media and cultural policies.

In favour 109ⁱ

Against 19: Australia, Belgium, Canada, Denmark, France, FRG, Iceland, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Turkey, UK, USA

Abstaining 7: Austria, Bahamas, Finland, Greece, Ireland, Paraguay, Sweden

Absent: Belize, Bolivia,^c Brunei, Burma, China, Comoros, Dominica, Grenada, Guinea-Bissau, Jamaica, Kampuchea, Malta, Morocco, Papua New Guinea, Philippines, St Christopher & Nevis, Samoa,^c Senegal, Singapore, Solomon Is, Swaziland, Vanuatu (Albania announced that it was not participating in the vote)

39/63 B 12 December 1984

Recognizing that the UN programme of fellowships on disarmament has continued to expand and intensify, expresses its appreciation to the governments of FRG, Japan, Romania, Sweden and the USA for inviting fellows to their countries in 1984 to study selected activities in the field of disarmament; and requests the Secretary-General to devise a system of evaluating the research papers prepared by the fellows with a view to identifying those that are outstanding, to publish such papers in an annual issue of an appropriate publication to be devoted to the disarmament fellowship programme and to submit proposals for further training in the field of disarmament.

Adopted without vote

39/148 H 17 December 1984

Approves the annexed Statute of the UN Insititute for Disarmament Research; renews the invitations to governments to consider making voluntary contributions to the Institute; and invites the Director of the Institute to report annually to the General Assembly on the activities carried out by the Institute.

In favour 141 Against 1: USA Abstaining 3: Haiti,

Abstaining 3: Haiti, Israel, Japan Absent: Belize, Central African Rep., Comoros, Dominica, Grenada, Guinea-Bissau, Papua New Guinea, St Christopher & Nevis, Samoa,^c Solomon Is, Swaziland, Vanuatu (Albania announced that it was not participating in the vote)

38/148 J 17 December 1984

Recommends to all states to observe Disarmament Week in 1985 in close connection with the celebrations of the 40th anniversary of the foundation of the UN and the International Youth Year, as well as with other commemorative dates; 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, especially the nuclear arms race; also invites the Secretary-General to use the UN mass media as widely as possible to promote better understanding among world public opinion of disarmament problems and the objectives of Disarmament Week.

In favour 124

Against 0

Abstaining 19: Australia, Belgium, Canada, China, Denmark, France, FRG, Iceland, Israel, Italy, Ivory Coast, Luxembourg, Netherlands, New Zealand, Norway, Paraguay, Turkey, UK, USA

Absent: Belize, Comoros, Dominica, Grenada, Guinea-Bissau, Kampuchea, Oman, Papua New Guinea, St Christopher & Nevis, Samoa,^c Singapore, Solomon Is, Swaziland, Vanuatu (Albania announced that it was not participating in the vote) ^a Rwanda later advised the Secretariat that it had intended to abstain.

^b Later advised the Secretariat that it had intended to abstain.

^c Later advised the Secretariat that it had intended to vote in favour.

^d Cameroon later advised the Secretariat that it had intended to abstain.

^e Iran later advised the Secretariat that it had intended not to participate in the vote.

 f Bahamas later advised the Secretariat that it had intended to abstain.

⁸ Egypt later advised the Secretariat that it had intended to abstain.

^h Nepal later advised the Secretariat that it had intended to abstain.

^{*i*} Brazil later advised the Secretariat that it had intended to abstain.

14. Major multilateral arms control agreements

JOZEF GOLDBLAT and RAGNHILD FERM

(For the full texts of the arms control agreements, see Goldblat, J., Agreements for Arms Control: A Critical Survey (Taylor & Francis, London, 1982) [a SIPRI book].)

I. Summaries of the agreements

Protocol for the prohibition of the use in war of asphyxiating, poisonous or other gases, and of bacteriological methods of warfare (Geneva Protocol)

Signed at Geneva on 17 June 1925; entered into force on 8 February 1928

Declares that the parties agree to be bound by the above prohibition, which should be universally accepted as part of international law, binding alike the conscience and the practice of nations. (Reservations made by a number of states have limited the applicability of the Protocol to nations party to it and to first use only.)

Antarctic Treaty

Signed at Washington on 1 December 1959; entered into force on 23 June 1961

Declares the Antarctic an area to be used exclusively for peaceful purposes. Prohibits any measure of a military nature in the Antarctic, such as the establishment of military bases and fortifications, and the carrying out of military manoeuvres or the testing of any type of weapon. Bans any nuclear explosion as well as the disposal of radioactive waste material in Antarctica, subject to possible future international agreements on these subjects.

Representatives of the contracting parties meet at regular intervals to exchange information and consult each other on matters of common interest pertaining to Antarctica, as well as to recommend to their governments measures in furtherance of the principles and objectives of the Treaty.

Treaty banning nuclear weapon tests in the atmosphere, in outer space and under water (Partial Test Ban Treaty—PTBT)

Signed at Moscow on 5 August 1963; entered into force on 10 October 1963

Prohibits the carrying out of any nuclear weapon test explosion or any other nuclear explosion: (a) in the atmosphere, beyond its limits, including outer space, or under water, including territorial waters or high seas; or (b) in any other environment if such explosion causes radioactive debris to be present outside the territorial limits of the state under whose jurisdiction or control the explosion is conducted.

SIPRI Yearbook 1985

Treaty on principles governing the activities of states in the exploration and use of outer space, including the Moon and other celestial bodies (Outer Space Treaty)

Signed at London, Moscow and Washington on 27 January 1967; entered into force on 10 October 1967

Prohibits the placing in orbit around the Earth of any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, the installation of such weapons on celestial bodies, or the stationing of them in outer space in any other manner. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies are also forbidden.

Treaty for the prohibition of nuclear weapons in Latin America (Treaty of Tlatelolco)

Signed at Mexico City on 14 February 1967; entered into force on 22 April 1968

Prohibits the testing, use, manufacture, production or acquisition by any means, as well as the receipt, storage, installation, deployment and any form of possession of any nuclear weapons by Latin American countries.

The parties should conclude agreements with the IAEA for the application of safeguards to their nuclear activities.

Under Additional Protocol I, annexed to the Treaty, the extra-continental or continental states which, *de jure* or *de facto*, are internationally responsible for territories lying within the limits of the geographical zone established by the Treaty (France, the Netherlands, the UK and the USA), undertake to apply the statute of military denuclearization, as defined in the Treaty, to such territories.

Under Additional Protocol II, annexed to the Treaty, the nuclear weapon states undertake to respect the statute of military denuclearization of Latin America, as defined and delimited in the Treaty, and not to contribute to acts involving a violation of the Treaty, nor to use or threaten to use nuclear weapons against the parties to the Treaty.

Treaty on the non-proliferation of nuclear weapons (NPT)

Signed at London, Moscow, and Washington on 1 July 1968; entered into force on 5 March 1970

Prohibits the transfer by nuclear weapon states, to any recipient whatsoever, of nuclear weapons or other nuclear explosive devices or of control over them, as well as the assistance, encouragement or inducement of any non-nuclear weapon state to manufacture or otherwise acquire such weapons or devices. Prohibits the receipt by non-nuclear weapon states from any transferor whatsoever, as well as the manufacture or other acquisition by those states of nuclear weapons or other nuclear explosive devices.

Non-nuclear weapon states undertake to conclude safeguards agreements with the International Atomic Energy Agency (IAEA) with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices.

The parties undertake to facilitate the exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy and to ensure that potential benefits from peaceful applications of nuclear explosions will be made available to non-nuclear weapon parties to the Treaty. They also undertake to pursue negotiations 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.

Treaty on the prohibition of the emplacement of nuclear weapons and other weapons of mass destruction on the sea-bed and the ocean floor and in the subsoil thereof (Sea-Bed Treaty)

Signed at London, Moscow and Washington on 11 February 1971; entered into force on 18 May 1972

Prohibits emplanting or emplacing on the sea-bed and the ocean floor and in the subsoil thereof beyond the outer limit of a sea-bed zone (coterminous with the 12-mile outer limit of the zone referred to in the 1958 Geneva Convention on the Territorial Sea and the Contiguous Zone) any nuclear weapons or any other types of weapons of mass destruction as well as structures, launching installations or any other facilities specifically designed for storing, testing or using such weapons.

Convention on the prohibition of the development, production and stockpiling of bacteriological (biological) and toxin weapons and on their destruction (BW Convention)

Signed at London, Moscow and Washington on 10 April 1972; entered into force on 26 March 1975

Prohibits the development, production, stockpiling or acquisition by other means or retention of microbial or other biological agents or toxins, whatever their origin or method of production, of types and in quantities that have no justification for prophylactic, protective or other peaceful purposes, as well as weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes or in armed conflict. The destruction of the agents, toxins, weapons, equipment and means of delivery in the possession of the parties, or their diversion to peaceful purposes, should be effected not later than nine months after the entry into force of the Convention.

Convention on the prohibition of military or any other hostile use of environmental modification techniques (Enmod convention)

Signed at Geneva on 18 May 1977; entered into force on 5 October 1978

Prohibits military or any other hostile use of environmental modification techniques having widespread, long-lasting or severe effects as the means of destruction, damage or injury to states party to the Convention. The term "environmental modification techniques" refers to any technique for changing—through the deliberate manipulation of natural processes—the dynamics, composition or structure of the Earth, including its biota, lithosphere, hydrosphere and atmosphere, or of outer space.

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The understandings reached during the negotiations, but not written into the Convention, define the terms "widespread," "long-lasting" and "severe."

Convention on the prohibitions or restrictions on the use of certain conventional weapons which may be deemed to be excessively injurious or to have indiscriminate effects ('Inhumane Weapons' Convention)

Signed at New York on 10 April 1981; entered into force on 2 December 1983

The Convention is an 'umbrella treaty', under which specific agreements can be concluded in the form of protocols.

Protocol I prohibits the use of weapons intended to injure by fragments which are not detectable in the human body by X-rays.

Protocol II prohibits or restricts the use of mines, booby-traps and similar devices. Protocol III prohibits or restricts the use of incendiary weapons.

II. Status of the implementation of the agreements, as of 31 December 1984

Number of parties

1925 Geneva Protocol	106
Antarctic Treaty	31
Partial Test Ban Treaty	112
Outer Space Treaty	85
Treaty of Tlatelolco	23
Additional Protocol I	3
Additional Protocol II	5
Non-Proliferation Treaty	124
NPT safeguards agreements	78
Sea-Bed Treaty	75
BW Convention	101
Enmod Convention	47
'Inhumane Weapons' Convention	24

Notes

1. The list of parties records ratification, 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 following table are the earliest dates on which countries deposited their instruments of ratification, accession or succession—whether in London, Washington or Moscow.

Under the 1925 Geneva Protocol, the only depositary is the French government; under the Antarctic Treaty, the US government; under the Treaty of Tlatelolco, the Mexican government; and under the Enmod Convention and the 'Inhumane Weapons' Convention, the UN Secretary-General. The dates given for these agreements are the dates of the deposit of the instruments of ratification, accession or succession with the respective depositaries.

3. Key to abbreviations used in the following 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: Nuclear safeguards agreement in force with the International Atomic Energy Agency as required by the Non-Proliferation Treaty or the Treaty of Tlatelolco, or concluded by nuclear weapon states on a voluntary basis.

4. The footnotes are listed at the end of the table and are grouped separately under the heading for each agreement. The texts of the statements contained in the footnotes have been abridged, but the wording is close to the orginal version.

State	Geneva Protocol	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non- Proliferation Treaty	Sea-Bed Treaty	BW Convention	Enmod Convention	'Inhumane Weapons' Convention
Afghanistan			1964	S		1970 SA	1971	1975		S
Algeria			S				-			
Antigua and Barbuda					1983 ²					
Argentina	1969	1961	S	1969	S1		1983 ¹	1979		S
Australia	1930 ¹	1961	1963	1967		1973 ¹ SA	1973	1977	1984	1983
Austria	1928		1964	1968		1969 SA	1972	19731		1983
Bahamas			1976 ¹	1976 ¹	1977 ²	1976²				
Bangladesh						1979 SA			1979	
Barbados	1976 ²			1968	1969²	1980		1973		
Belgium	1928 ¹	1960	1966	1973		1975 SA	1972	1979	1982	S
Benin			1964 -			1972	S	1975	S	
Bhutan	1978	-	1978					1978		

Bolivia			1965	S	1969²	1970	S	1975	S	
Botswana		1	1968 ¹	S		1969	1972	S		
Brazil	1970	1975	1964	1969²	1968 ³		S ²	1973	1984	
Bulgaria	1934 ¹	-	1963	1967		1969 SA	1971	1972	1978	1982
Burkina Faso (formerly Upper Volta)	1971		S	1968		1970				
Burma			1963	1970		-	S	S	-	
Burundi		-	S	S	1	1971	S	S		
Byelorussia	1970 ³		1963 ³	1967 ³			1971	1975	1978	1982
Cameroon			S ²	S		1969	S			
Canada	1930 ¹		1964	1967		1969 SA	1972 ³	1972	1981	S
Cape Verde			1979			1979	1979	1977	1979	-

State	Geneva Protocol	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco ·	Non- Proliferation Treaty	Sea-Bed Treaty	BW Convention	Enmod Convention	'Inhumane Weapons' Convention
Central African Republic	1970		1964	S		1970	1981	S		
Chad			1965			1971				
Chile	19351	1961	1965	1981	19744			1980		
China	19294	1983		1983	PII: 1974 ⁵			1984 ²		1982 ¹
Colombia			S	S	1972 ² SA	S	S	1983		
Congo						1978	1978	1978		
Costa Rica			1967		1969 ² SA ¹⁶	1970 SA	S	1973		
Cuba	1966	1984		19774			19774	1976	1978	S
Cyprus	1966²		1965	1972		1970 SA	1971	1973	1978	
Czechoslovakia	19385	1962	1963	1967		1969 SA	1972	1973	1978	1982
Denmark	1930	1965	1964	1967		1969 SA	1971	1973	1978	1982

Dominica						1984 ²				
Dominican Republic	1970		1964	1968	1968 ² SA ¹⁶	1971 SA	1972	1973		
Ecuador	1970		1964	1969	1969 ² SA ¹⁶	1969 SA		1975		1982
Egypt	1928		1964	1967		1981 ³ SA		S	1982	S
El Salvador	S		1964	1969	1968 ² SA ¹⁶	1972 SA		S		
Equatorial Guinea						1984	S		N	
Ethiopia	1935		S	S		1970 SA	1977	1975	S	
Fiji	19731.2		1972 ¹	1972 ¹		1972² SA		1973		
Finland	1929	1984	1964	1967		1969 SA	1971	1974	1978	1982
France	1926 ¹	1960		1970	PI: S ⁶ PII: 1974 ⁷	SA ⁴		1984		S ²
Gabon			1964			1974		S		-

State	Geneva Protocol	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non- Proliferation Treaty	Sea-Bed Treaty	BW Convention	Enmod Convention	'Inhumane Weapons' Convention
Gambia	1966²		19651	S		1975 SA	S	S		
German Dem. Republic	1929	1974 ¹	1963	1967		1969 SA	1971	1972	1978	1982
FR Germany	1929	1979²	19644	19715		1975 ⁵ SA	19755	1983 ³	1983 ¹	S
Ghana	1967		1963	S		1970 SA	1972	1975	1978	
Greece	1931		1963	1971		1970 SA	S	1975	1983	S
Grenada				-	1975 ²	1975 ²				
Guatemala	1983		1964²		1970 ² SA ¹⁶	1970 SA	S	1973		1983
Guinea							S			
Guinea-Bissau	Į.		1976	1976		1976	1976	1976		
Guyana	5			S				S		
Haiti			S	S	1969 ²	1970		S		

Holy See (Vatican City)	1966			S.		1971 ⁶ SA			S	
Honduras			1964	S	1968 ² SA ¹⁶	1973 SA	S	1979		
Hungary	1952	1984	1963	1967		1969 SA	1971	1972	1978	1982
Iceland	1967	-	1964	1968		1969 SA	1972	1973	S	S
India	1930 ¹	1983	1963	1982			1973°	1974 ⁴	1978	1984
Indonesia	1971²		1964	S		1979 ⁷ SA		S		
Iran	1929	-	1964	S		1970 SA	1971	1973	S	
lraq -	19311	-	1964	1968	_	1969 SA	19724	S	S	
Ireland	19306		1963	1968		1968 SA	1971	1972 ⁵ .	1982	S
Israel	19697		1964	1977			-			
Italy	1928	1981	1964	1972		1975 ⁸ SA	19747	1975	1981	S ³

State	Geneva Protocol	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non- Proliferation Treaty	Sea-Bed Treaty	BW Convention	Enmod Convention	'Inhumane Weapons' Convention
Ivory Coast	1970		1965			1973 SA	1972	S		
Jamaica	1970²		S	1970	1969 ² SA ¹⁶	1970 SA	S	1975		
Japan	1970	1960	1964	1967		1976 ⁹ SA	1971	1982	1982	1982
Jordan	1977 ⁸		1964	S		1970 SA	1971	1975		
Kampuchea	19839					1972	S	1983		
Kenya	1970		1965	-		1970		1976	- 11	
Korea, Republic of (South)			1964²	19674		1975 ^{10,11} SA	S ⁴	S ⁶	1984	
Kuwait	197110		1965 ^s	19726	1	S		1972 ⁷	1980 ²	
Lao People's Dem. Republic			1965	1972		1970	1971	1973	1978	1983
Lebanon	1969		1965	1969		1970 SA	S	1975	S	

Lesotho	1972²		S	1970 SA	1973	1977		
Liberia	1927	1964		1970	S	S	S	
Libya	197111	1968	1968	1975 SA		1982		
Liechtenstein				1978 ¹² SA				S
Luxembourg	1936	1965	S	1975 SA	1982	1976	S	S
Madagascar	1967	1965	19687	1970 SA	S	S		
Malawi	1970	1964 ¹				S	1978	
Malaysia	1970	1964	S	1970 SA	1972	S		1.5
Maldives	1966²			1970 SA				
Mali		S	1968	1970	S	S		2
Malta	1970 ²	1964 ¹		1970	1971	1975		
Mauritania		1964						

Major multilateral arms control agreements

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State	Geneva Protocol	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non- Proliferation Treaty	Sea-Bed Treaty	BW Convention	Enmod Convention	'Inhumane Weapons' Convention
Mauritius	1970 ²		1969 ¹	1969 ¹		1969 SA	1971	1972		
Mexico	1932		1963	1968	1967 ^{2,8} SA	1969 ¹³ SA	1984 ⁸	1974 ⁸		1982
Monaco	1967						1			
Mongolia	196812		1963	1967		1969 SA	1971	1972	1978	1982
Morocco	1970		1966	1967		1970 SA	1971	S	S	S
Nauru						1982 SA				
Nepal	1969		1964	1967		1970 SA	1971	S		
Netherlands	193013	1967	1964	1969	PI: 1971 ⁹	1975 SA	1976	1981	1983 ³	S
New Zealand	1930 ¹	1960	1963	1968		1969 SA	1972	1972	1984 ⁴	S
Nicaragua	S		1965	S	1968 ^{2,10} SA ¹⁶	1973 SA	1973	1975	S	S
Niger	1967 ²		1964	1967			1971	1972		
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Nigeria	1968 ¹		1967	1967		1968		1973		S
Norway	1932	1960	1963	1969		1969 SA	1971	1973	1979	1983
Pakistan	1960²		S	1968				1974		S
Panama	1970		1966	S	1971 ² SA	1977	1974	1974		
Papua New Guinea	1981'1	1981	1980 ¹	1980 ¹		1982 SA		1980	1980	
Paraguay	193314	-	S		1969 ² SA ¹⁶	1970 SA	S	1976		
Peru		1981	1964	1979	1969² SA	1970 SA		S		
Philippines	1973		1965²	S		1972 SA		1973		S
Poland	1929	1961	1963	1968		1969 SA	1971	1973	1978	1983
Portugal	1930 ¹		S			1977 SA	1975	1975	S	S
Qatar	1976	-		-			1974	1975	-	-

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State	Geneva Protocol	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non- Proliferation Treaty	Sea-Bed Treaty	BW Convention	Enmod Convention	'Inhumane Weapons' Convention
Romania	1929 ¹	1971 ³	1963	1968		1970 SA	1972	1979	1983	S ⁴
Rwanda	1964 ²		1963	S		1975	1975	1975	1	
Saint Lucia						1979²				
Samoa			1965			1975 SA				
Saint Vincent and the Grenadines						1984 ²				
San Marino			1964	1968		1970		1975		
Sao Tome and Principe						1983	1979	1979	1979	
Saudi Arabia	1971			1976			1972	1972		
Senegal	1977		1964			1970 SA	S	1975		
Seychelles				1978			1976	1979		
Sierra Leone	1967		1964	1967		1975	S	1976	S	S

Singapore			1968 ¹	1976		1976 SA	1976	1975		
Solomon Islands						1981²	1981	19819	19815	
Somalia			S	S		1970		S		
South Africa	1930 ¹	1960	1963	1968			1973	1975		
Spain	192915	1982	1964	1968				1979	1978	S
Sri Lanka	1954		1964	S		1979 SA		S	1978	
Sudan	1980		1966			1973 SA	S			S
Suriname			11 1		1977 ² SA ¹⁶	1976 ² SA				
Swaziland			1969			1969 SA	1971			
Sweden	1930	1984	1963	1967		1970 SA	1972	1976	1984	1982
Switzerland	1932		1964	1969		1977 ¹² SA	1976	1976 ¹⁰		1982
Syria	196816		1964	1968 ⁸		196910		S	S ,	

State	Geneva Protocol	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty	Treaty of Tlatelolco	Non- Proliferation Treaty	Sea-Bed Treaty	BW Convention	Enmod Convention	'Inhumane Weapons' Convention
Taiwan	17		1964	1970°		1970	1972 ⁹	197311		
Tanzania	1963		1964	-			S	S		
Thailand	1931		1963	1968		1972 SA		1975		
Togo	1971		1964	S		1970	1971	1976		S
Tonga	1971		19711	1971 ¹		1971²	+	1976		
Trinidad and Tobago	1970²		1964	S	1970 ²	S				
Tunisia	1967		1965	1968		1970	1971	1973	1978	
Turkey	1929		1965	1968		1980 ¹⁴ SA	1972	1974	S ⁶	S
Tuvalu				-		1979 ²		-		
Uganda	1965		1964	1968		1982		-	S	
UK	1930 ¹	1960	19636	1967	PI: 1969 ¹² PII: 1969 ¹²	1968 ¹⁵ SA ¹⁶	1972 ¹⁰	1975 ¹²	1978	S
Ukraine			1963 ³	1967 ³			1971	1975	1978	1982

United Arab Emirates								S		
Upper Volta (see Burkina Faso)										
Uruguay	1977	19804	1969	1970	1968 ² SA ¹⁶	1970 SA	S	1981		
USA	1975 ¹⁸	1960	1963	1967	PI: 1981 ¹³ PII: 1971 ¹⁴	1970 SA ¹⁷	1972	1975	1980	S ⁵
USSR	1928 ¹⁹	1960	1963	1967	PII: 1979 ¹¹	1970 ¹⁸	1972	1975	1978	1982
Venezuela	1928		1965	1970	1970 ^{2.15} SA ¹⁶	1975 SA		1978	1	-
Viet Nam	1980 ¹	-		1980		1982	198011	1980	1980	S
Yemen Arab Republic	1971		S			S	S	S	1977	
Yemen, People's Dem. Republic of			1979	1979	1	1979	1979	1979	1979	
Yugoslavia	1929 ²⁰		1964	S		1970 ¹⁹ SA	1973 ¹²	1973		1983
Zaire		-	1965	S		1970 SA		1977	S	
Zambia			1965 ¹	1973			1972			

The 1925 Geneva Protocol

¹The 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.

²Notification of succession. (In notifying its succession to the obligations contracted in 1930 by the United Kingdom, Barbados stated that as far as it was concerned the reservation made by the UK was to be considered as withdrawn.)

³ In a note of 2 March 1970, submitted at the United Nations, Byelorussia stated that "it recognizes itself to be a party" to the Protocol.

On 13 July 1952 the People's Republic of China issued a statement recognizing as binding upon it the accession to the Protocol in the name of China. China considers itself bound by the Protocol on condition of reciprocity on the part of all the other contracting and acceding powers.

⁵ Czechoslovakia shall cease to be bound by this Protocol towards any state whose armed forces, or the armed forces of whose allies, fail to respect the prohibitions laid down in the Protocol.

⁶The government of Ireland does not intend to assume, by this accession, any obligation except towards the states having signed and ratified this Protocol or which shall have finally acceded thereto, and should the armed forces or the allies of an enemy state fail to respect the Protocol, the government of Ireland would cease to be bound by the said Protocol in regard to such state. In February 1972, Ireland declared that it had decided to withdraw the above reservations made at the time of accession to the Protocol.

⁷ The Protocol is binding on Israel only as regards states which have signed and ratified or acceded to it. The Protocol shall cease to be binding on Israel as regards any enemy state whose armed forces, or the armed forces of whose allies, or the regular or irregular forces, or groups or individuals operating from its territory, fail to respect the prohibitions which are the object of the Protocol.

⁸ The accession by Jordan to the Protocol does not in any way imply recognition of Israel. Jordan undertakes to respect the obligations contained in the Protocol with regard to states which have undertaken similar commitments. It is not bound by the Protocol as regards states whose armed forces, regular or irregular, do not respect the provisions of the Protocol.

⁹ The accession was made on behalf of the coalition government of Democratic Kampuchea (the government in exile), with a statement that the Protocol will cease to be binding on it in regard to any enemy state whose armed forces or whose allies fail to respect the prohibitions laid down in the Protocol. The French government declared that as a party to the Geneva Protocol (but not as the depositary) it considers this accession to have no effect. A similar statement was made by the government of Australia, Bulgaria, Cuba, Czechoslovakia, GDR, Hungary, Mauritius, Netherlands, Poland, Romania, USSR and Viet Nam, which do not recognize the coalition government of Kampuchea.

¹⁰ 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.

¹¹ The accession to the Protocol does not imply recognition of Israel. The Protocol is binding on Libya only as regards states which are effectively bound by it and will cease to be binding on Libya as regards states whose armed forces, or the armed forces of whose allies, fail to respect the prohibitions which are the object of this Protocol.

¹² 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.

¹³As 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.

¹⁴ This is the date of receipt of Paraguay's instrument of accession. The date of the notification by the depositary government "for the purpose of regularization" is 1969. ¹⁵ 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.

¹⁶ 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.

¹⁷ The Protocol, signed in 1929 in the name of China, is valid for Taiwan which is considered to be part of China.

¹⁸ The Protocol shall cease to be binding on the USA with respect to the use in war of asphyxiating poisonous or other gases, and of all analogous liquids, materials, or devices, in regard to an enemy state if such state or any of its allies fail to respect the prohibitions laid down in the Protocol.

¹⁹ The Protocol only binds the USSR in relation to the states which have signed and ratified or which have definitely acceded to the Protocol. The Protocol shall cease to be binding on the USSR in regard to any enemy state whose armed forces or whose allies de jure or in fact do not respect the prohibitions which are the object

of this Protocol. ²⁰ The Protocol shall cease to be binding on Yugoslavia in regard to any enemy state whose armed forces or

The Antarctic Treaty

¹The German Democratic Republic stated that in its view Article XIII, paragraph 1 of the Treaty was

inconsistent with the principle that all states whose policies are guided by the purposes and principles of the United Nations Charter have a right to become parties to treaties which affect the interests of all states. ² The Federal Republic of Germany stated that the Treaty applies also to Berlin (West).

³ Romania stated that the provisions of Article XIII, paragraph 1 of the Treaty were not in accordance with the principle according to which multilateral treaties whose object and purposes concern the international community, as a whole, should be open for universal participation.

⁴ In acceding to the Treaty, Uruguay proposed the establishment of a general and definitive statute on Antarctica in which the interests of all states involved and of the international community as a whole would be considered equitably. It also declared that it reserved its rights in Antarctica in accordance with international law.

The Partial Test Ban Treaty

¹Notification of succession.

² With a statement that this does not imply the recognition of any territory or regime not recognized by this state. ³ The United States considers that Byelorussia and Ukraine are already covered by the signature and ratification by the Soviet Union.

⁴ The Federal Republic of Germany stated that the Treaty applies also to Berlin (West).

⁵ Kuwait stated that its signature and ratification of the Treaty do not in any way imply its recognition of Israel nor oblige it to apply the provisions of the Treaty in respect of the said country.

⁶ The United Kingdom stated its view that if a regime is not recognized as the government of a state, neither signature nor the deposit of any instrument by it, nor notification of any of those acts, will bring about recognition of that regime by any other state.

The Outer Space Treaty

¹Notification of succession.

²The Brazilian government interprets Article X of the Treaty as a specific recognition that the granting of tracking facilities by the parties of the Treaty shall be subject to agreement between the states concerned.

³ The United States considers that Byelorussia and Ukraine are already covered by the signature and ratification by the Soviet Union.

⁴With a statement that this does not imply the recognition of any territory or regime not recognized by this state. ⁵The Federal Republic of Germany stated that the Treaty applies also to Berlin (West).

⁶ Kuwait acceded to the Treaty with the understanding that this does not in any way imply its recognition of Israel and does not oblige it to apply the provisions of the Treaty in respect of the said country.

⁷Madagascar acceded to the Treaty with the understanding that under Article X of the Treaty the state shall retain its freedom of decision with respect to the possible installation of foreign observation bases in its territory and shall continue to possess the right to fix, in each case, the conditions for such installation.

⁸ Syria acceded to the Treaty with the understanding that this should not mean in any way the recognition of Israel, nor should it lead to any relationship with Israel that could arise from the Treaty.

⁹ The People's Republic of China declared as illegal and null and void the signature and ratification of the Outer Space Treaty by the Taiwan authorities.

The Treaty of Tlatelolco

¹Argentina stated that it understands Article 18 as recognizing the rights of parties to carry out, by their own means or in association with third parties, explosions of nuclear devices for peaceful purposes, including explosions which involve devices similar to those used in nuclear weapons.

² The Treaty is in force for this country due to a declaration, annexed to the instrument of ratification in accordance with Article 28, paragraph 2, which waived the requirements for the entry into force of the Treaty, specified in paragraph 1 of that Article: namely, that all states in the region deposit the instruments of ratification; that Protocol I and Protocol II be signed and ratified by those states to which they apply; and that agreements on safeguards be concluded with the IAEA. (Colombia made this declaration subsequent to the deposit of ratification, as did Nicaragua and Trinidad and Tobago.)

³On signing the Treaty, Brazil stated that, according to its interpretation, Article 18 of the Treaty gives the signatories the right to carry out, by their own means or in association with third parties, nuclear explosions for peaceful purposes, including explosions which involve devices similar to those used in nuclear weapons. This statement was reiterated at the ratification. Brazil also stated that it did not waive the requirements for the entry into force of the Treaty laid down in Article 28. The Treaty is therefore not yet in force for Brazil.

⁴ Chile has not waived the requirements for the entry into force of the Treaty laid down in Article 28. The Treaty is therefore not yet in force for Chile.

⁵ On signing Protocol II, China stated, *inter alia*: China will never use or threaten to use nuclear weapons against non-nuclear Latin American countries and the Latin American nuclear weapon-free zone; nor will China test, manufacture, produce, stockpile, install or deploy nuclear weapons in these countries or in this zone, or send its means of transportation and delivery carrying nuclear weapons to cross the territory, territorial sea or airspace of Latin American countries. The signing of the Protocol does not imply any change whatsoever in China's stand on the disarmament and nuclear weapons issue and, in particular, does not affect the Chinese government's stand against the Non-Proliferation Treaty and the Partial Test Ban Treaty.

The Chinese government holds that, in order that Latin America may truly become a nuclear weapon-free zone, all nuclear countries, and particularly the superpowers, must undertake not to use or threaten to use

nuclear weapons against the Latin American countries and the Latin American nuclear weapon-free zone, and implement the following undertakings: (1) dismantle all foreign military bases in Latin America and refrain from establishing new bases there, and (2) prohibit the passage of any means of transportation and delivery carrying nuclear weapons through Latin American territory, territorial sea or airspace.

⁶ On signing Protocol I, France made the following reservations and interpretative statements: the Protocol, as well as the provisions of the Treaty to which it refers, will not affect the right of self-defence under Article 51 of the UN Charter; the application of the legislation referred to in Article 3 of the Treaty relates to legislation which is consistent with international law; the obligations under the Protocol shall not apply to transit across the territories of the French Republic; the Protocol shall not limit, in any way, the participation of the populations of the French territories in the activities mentioned in Article 1 of the Treaty, and in efforts connected with the national defence of France; the provisions of Articles 1 and 2 of the Protocol apply to the text of the Treaty as it stands at the time when the Protocol is signed by France, and consequently no amendment to the Treaty that might come into force under Article 29 thereof would be binding on the government of France without the latter's express consent.

On signing Protocol II, France stated that it interprets the undertaking contained in Article 3 of the Protocol to mean that it presents no obstacle to the full exercise of the right of self-defence enshrined in Article 51 of the United Nations Charter; it takes note of the interpretation of the Treaty given by the Preparatory Commission for the Denuclearization of Latin America and reproduced in the Final Act, according to which the Treaty does not apply to transit, the granting or denying of which lies within the exclusive competence of each state party in accordance with the pertinent principles and rules of international law; it considers that the application of the legislation referred to in Article 3 of the Treaty relates to legislation which is consistent with international law. The provisions of Articles 1 and 2 of the Protocol apply to the text of the Treaty as it stands at the time when the Protocol is signed by France. Consequently, no amendment to the Treaty that might come into force under the provision of Article 29 would be binding on the government of France without the latter's express consent. If this declaration of interpretation is contested in part or in whole by one or more contracting parties to the Treaty or to Protocol II, these instruments would be null and void as far as relations between the French Republic and the contesting state or states are concerned. On depositing its instrument of ratification of Protocol II, France stated that it did so subject to the statement made on signing the Protocol. On 15 April 1974, France made a supplementary statement to the effect that it was prepared to consider its obligations under Protocol II as applying not only to the signatories of the Treaty, but also to the territories for which the statute of denuclearization was in force in conformity with Article 1 of Protocol I.

⁸On signing the Treaty, Mexico said that if technological progress makes it possible to differentiate between nuclear weapons and nuclear devices for peaceful purposes, it will be necessary to amend the relevant provisions of the Treaty, according to the procedures established therein.

⁹ The Netherlands stated that Protocol I shall not be interpreted as prejudicing the position of the Netherlands as regards its recognition or non-recognition of the rights or of claims to sovereignty of the parties to the Treaty, or of the grounds on which such claims are made.

¹⁰ Nicaragua stated that it reserved the right to use nuclear energy for peaceful purposes such as the removal of earth for the construction of canals, irrigation works, power plants, and so on, as well as to allow the transit of atomic material through its territory.

¹ The Soviet Union signed and ratified Protocol II with the following statement:

The Soviet Union proceeds from the assumption that the effect of Article 1 of the Treaty extends, as specified in Article 5 of the Treaty, to any nuclear explosive device and that, accordingly, the carrying out by any party to the Treaty of explosions of nuclear devices for peaceful purposes would be a violation of its obligations under Article 1 and would be incompatible with its non-nuclear status. For states parties to the Treaty, a solution to the problem of peaceful nuclear explosions can be found in accordance with the provisions of Article V of the Non-Proliferation Treaty and within the framework of the international procedures of the IAEA. The signing of the Protocol by the Soviet Union does not in any way signify recognition of the possibility of the force of the Treaty being extended beyond the territories of the states parties to the Treaty, including airspace and territorial waters as defined in accordance with international law. With regard to the reference in Article 3 of the Treaty to "its own legislation" in connection with the territorial waters, airspace and any other space over which the states parties to the Treaty exercise sovereignty, the signing of the Protocol by the Soviet Union does not signify recognition of their claims to the exercise of sovereignty which are contrary to generally accepted standards of international law. The Soviet Union takes note of the interpretation of the Treaty given in the Final Act of the Preparatory Commission for the Denuclearization of Latin America to the effect that the transport of nuclear weapons by the parties to the Treaty is covered by the prohibitions in Article 1 of the Treaty. The Soviet Union reaffirms its position that authorizing the transit of nuclear weapons in any form would be contrary to the objectives of the Treaty, according to which, as specially mentioned in the preamble, Latin America must be completely free from nuclear weapons, and that it would be incompatible with the non-nuclear status of the states parties to the Treaty and with their obligations as laid down in Article 1 thereof.

Any actions undertaken by a state or states parties to the Treaty which are not compatible with their nonnuclear status, and also the commission by one or more states parties to the Treaty of an act of aggression with the support of a state which is in possession of nuclear weapons or together with such a state, will be regarded by the Soviet Union as incompatible with the obligations of those countries under the Treaty. In such cases the Soviet Union reserves the right to reconsider its obligations under Protocol II. It further reserves the right to reconsider its attitude to this Protocol in the event of any actions on the part of other states possessing nuclear weapons which are incompatible with their obligations under the said Protocol. The provisions of the articles of Protocol II are applicable to the text of the Treaty for the Prohibition of Nuclear Weapons in Latin America in the wording of the Treaty at the time of the signing of the Protocol by the Soviet Union, due account being taken of the position of the Soviet Union as set out in the present statement. Any amendment to the Treaty entering into force in accordance with the provisions of Articles 29 and 6 of the Treaty without the clearly expressed approval of the Soviet Union shall have no force as far as the Soviet Union is concerned.

In addition, the Soviet Union proceeds from the assumption that the obligations under Protocol II also apply to the territories for which the status of the denuclearized zone is in force in conformity with Protocol I of the Treaty.

¹² When signing and ratifying Protocol I and Protocol II, the United Kingdom made the following declarations of understanding:

In connection with Article 3 of the Treaty, defining the term "territory" as including the territorial sea, airspace and any other space over which the state exercises sovereignty in accordance with "its own legislation", the UK does not regard its signing or ratification of the Protocols as implying recognition of any legislation which does not, in its view, comply with the relevant rules of international law.

The Treaty does not permit the parties to carry out explosions of nuclear devices for peaceful purposes unless and until advances in technology have made possible the development of devices for such explosions which are not capable of being used for weapon purposes.

The signing and ratification by the UK could not be regarded as affecting in any way the legal status of any territory for the international relations of which the UK is responsible, lying within the limits of the geographical zone established by the Treaty.

Should a party to the Treaty carry out any act of aggression with the support of a nuclear weapon state, the UK would be free to reconsider the extent to which it could be regarded as committed by the provisions of Protocol II.

In addition, the UK declared that its undertaking under Article 3 of Protocol II not to use or threaten to use nuclear weapons against the parties to the Treaty extends also to territories in respect of which the undertaking under Article I of Protocol I becomes effective.

¹³The United States ratified Protocol I with the following understandings: The provisions of the Treaty made applicable by this Protocol do not affect the exclusive power and legal competence under international law of a state adhering to this Protocol to grant or deny transit and transport privileges to its own or any other vessels or aircraft irrespective of cargo or armaments; the provisions of the Treaty made applicable by this Protocol do not affect rights under international law of a state adhering to this Protocol regarding the exercise of the freedom of the seas, or regarding passage through or over waters subject to the sovereignty of a state, and the declarations attached by the United States to its ratification of Protocol II apply also to its ratification of Protocol I.

¹⁴ The United States signed and ratified Protocol II with the following declarations of understanding:

In connection with Article 3 of the Treaty, defining the term "territory" as including the territorial sea, airspace and any other space over which the state exercises sovereignty in accordance with "its own legislation", the US ratification of the Protocol could not be regarded as implying recognition of any legislation which did not, in its view, comply with the relevant rules of international law.

Each of the parties retains exclusive power and legal competence, unaffected by the terms of the Treaty, to grant or deny non-parties transit and transport privileges.

As regards the undertaking not to use or threaten to use nuclear weapons against the parties, the United States would consider that an armed attack by a party, in which it was assisted by a nuclear weapon state, would be incompatible with the party's obligations under Article 1 of the Treaty.

The definition contained in Article 5 of the Treaty is understood as encompassing all nuclear explosive devices; Articles 1 and 5 of the Treaty restrict accordingly the activities of the parties under paragraph 1 of Article 18.

Article 18, paragraph 4 permits, and US adherence to Protocol II will not prevent, collaboration by the USA with the parties to the Treaty for the purpose of carrying out explosions of nuclear devices for peaceful purposes in a manner consistent with a policy of not contributing to the proliferation of nuclear weapon capabilities.

The United States will act with respect to such territories of Protocol I adherents, as are within the geographical area defined in Article 4, paragraph 2 of the Treaty, in the same manner as Protocol II requires it to act with respect to the territories of the parties.

¹⁵ Venezuela stated that in view of the existing controversy between Venezuela on the one hand and the United Kingdom and Guyana on the other, Article 25, paragraph 2 of the Treaty should apply to Guyana. This paragraph provides that no political entity should be admitted, part or all of whose territory is the subject of a dispute or claim between an extra-continental country and one or more Latin American states, so long as the dispute has not been settled by peaceful means.

¹⁶Safeguards under the Non-Proliferation Treaty cover the Treaty of Tlatelolco.

The Non-Proliferation Treaty

¹On 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.

²Notification of succession.

³ On the occasion of the deposit of the instrument of ratification, Egypt stated that since it was embarking on the construction of nuclear power reactors, it expected assistance and support from industrialized nations with a developed nuclear industry. It called upon nuclear weapon states to promote research and development of peaceful applications of nuclear explosions in order to overcome all the difficulties at present involved therein. Egypt also appealed to these states to exert their efforts to conclude an agreement prohibiting the use or threat

of use of nuclear weapons against any state, and expressed the view that the Middle East should remain completely free of nuclear weapons.

⁴ France, not party to the Treaty, declared that it would behave like a state adhering to the Treaty and that it would follow a policy of strengthening appropriate safeguards relating to nuclear equipment, material and technology. On 12 September 1981 an agreement between France, the European Atomic Energy Community (Euratom) and the IAEA for the application of safeguards in France entered into force. The agreement covers nuclear material and facilities notified to the IAEA by France.

⁵ On depositing the instrument of ratification, the Federal Republic of Germany reiterated the declaration made at the time of signing: it reaffirmed its expectation that the nuclear weapon states would intensify their efforts in accordance with the undertakings under Article VI of the Treaty, as well as its understanding that the security of FR Germany continued to be ensured by NATO; it stated that no provision of the Treaty may be interpreted in such a way as to hamper further development of European unification; that research, development and use of nuclear energy for peaceful purposes, as well as international and multinational co-operation in this field, must not be prejudiced by the Treaty; that the application of the Treaty, including the implementation of safeguards, must not lead to discrimination of the nuclear industry of FR Germany in international competition; and that it attached vital importance to the undertaking given by the United States and the United Kingdom concerning the application of safeguards to their peaceful nuclear facilities, hoping that other nuclear weapon states would assume similar obligations.

In a separate note, FR Germany declared that the Treaty will also apply to Berlin (West) without affecting Allied rights and responsibilities, including those relating to demilitarization. In notes of 24 July, 19 August and 25 November 1975, respectively, addressed to the US Department of State, Czechoslovakia, the Soviet Union and the German Democratic Republic stated that this declaration by FR Germany had no legal effect. ⁶On 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 of effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective control.

⁷ On signing the Treaty, Indonesia stated, *inter alia*, that the government of Indonesia attaches great importance to the declarations of the United States, the United Kingdom and the Soviet Union affirming their intention to provide immediate assistance to any non-nuclear weapon state party to the Treaty that is a victim of an act of aggression in which nuclear weapons are used. Of utmost importance, however, is not the action *after* a nuclear attack has been committed but the guarantees to prevent such an attack. The Indonesian government trusts that the nuclear weapon states will study further this question of effective measures to ensure the security of the non-nuclear weapon states. On depositing the instrument of ratification, Indonesia expressed the hope that the nuclear countries would be prepared to co-operate with non-nuclear countries in the use of nuclear energy for peaceful purposes and implement the provisions of Article IV of the Treaty without discrimination. It also stated the view that the nuclear arms race.

⁸ Italy stated that in its belief nothing in the Treaty was an obstacle to the unification of the countries of western Europe; it noted full compatibility of the Treaty with the existing security agreements; it noted further 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 interpeted 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 for any other state.

⁹ On depositing the instrument of ratification, Japan expressed the hope that France and China would accede to the Treaty; it urged a reduction of nuclear armaments and a comprehensive ban on nuclear testing; appealed to all states to refrain from the threat or use of force involving either nuclear or non-nuclear weapons; expressed the view that peaceful nuclear activities in non-nuclear weapon states party to the Treaty should not be discriminated against in favour of other parties in any aspect of such activities. It also urged all nuclear weapon states to accept IAEA safeguards on their peaceful nuclear activities.

¹⁰ A statement was made containing a disclaimer regarding the recognition of states party to the Treaty.

¹¹On 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.

¹²On depositing the instruments of accession and ratification, Liechtenstein and Switzerland stated that activities not prohibited under Articles I and II of the Treaty include, in particular, the whole field of energy production and related operations, research and technology concerning future generations of nuclear reactors based on fission or fusion, as well as production of isotopes. Liechtenstein and Switzerland define the term "source or special fissionable material" in Article III of the Treaty as being in accordance with Article XX of

the IAEA Statute, and a modification of this interpretation requires their formal consent; they will accept only such interpretations and definitions of the terms "equipment or material especially designed or prepared for the processing, use or production of special fissionable material", as mentioned in Article III of the Treaty, that they will expressly approve; and they understand that the application of the Treaty, especially of the control measures, will not lead to discrimination of their industry in international competition.

¹³ On signing the Treaty, Mexico stated, *inter alia*, that none of the provisions of the Treaty shall be interpreted as affecting in any way whatsoever the rights and obligations of Mexico as a state party to the Treaty of Tlatelolco.

It is the understanding of Mexico that at the present time any nuclear explosive device is capable of being used as a nuclear weapon and that there is no indication that in the near future it will be possible to manufacture nuclear explosive devices that are not potentially nuclear weapons. However, if technological advances modify this situation, it will be necessary to amend the relevant provisions of the Treaty in accordance with the procedure established therein. ¹⁴The ratification was accompanied by a statement in which Turkey underlined the non-proliferation

¹⁴ The ratification was accompanied by a statement in which Turkey underlined the non-proliferation obligations of the nuclear weapon states, adding that measures must be taken to meet adequately the security requirements of non-nuclear weapon states. Turkey also stated that measures developed or to be developed at national and international levels to ensure the non-proliferation of nuclear weapons should in no case restrict the non-nuclear weapon states in their option for the application of nuclear energy for peaceful purposes.

¹⁵ The United Kingdom recalled its view that if a regime is not recognized as the government of a state, neither signature nor the deposit of any instrument by it, nor notification of any of those acts, will bring about recognition of that regime by any other state.

¹⁶ This agreement, signed by the United Kingdom, Euratom and the IAEA, provides for the submission of British non-military nuclear installations to safeguards under IAEA supervision.

¹⁷ This agreement provides for safeguards on fissionable material in all facilities within the USA, excluding those associated with activities of direct national security significance.

¹⁸ On 21 February 1985 the Soviet Union and the IAEA signed an agreement for the application of safeguards to peaceful nuclear facilities to be designated by the USSR.

¹⁹ In connection with the ratification of the Treaty, Yugoslavia stated, *inter alia*, that it considered a ban on the development, manufacture and use of nuclear weapons and the destruction of all stockpiles of these weapons to be indispensable for the maintenance of a stable peace and international security; it held the view that the chief responsibility for progress in this direction rested with the nuclear weapon powers, and expected these powers to undertake not to use nuclear weapons against the countries which have renounced them as well as against non-nuclear weapon states in general, and to refrain from the threat to use them. It also emphasized the significance it attached to the universality of the efforts relating to the realization of the Non-Proliferation Treaty.

The Sea-Bed Treaty

¹On signing and ratifying the Treaty, Argentina stated that it interprets the references to the freedom of the high seas as in no way implying a pronouncement of judgement on the different positions relating to questions connected with international maritime law. It understands that the reference to the rights of exploration and exploitation by coastal states over their continental shelves was included solely because those could be the rights most frequently affected by verification procedures. Argentina precludes any possibility of strengthening, through this Treaty, certain positions concerning continental shelves to the detriment of others based on different criteria.

 2 On signing the Treaty, Brazil stated that nothing in the Treaty shall be interpreted as prejudicing in any way the sovereign rights of Brazil in the area of the sea, the sea-bed and the subsoil thereof adjacent to its coasts. It is the understanding of the Brazilian government that the word "observation", as it appears in paragraph 1 of Article III of the Treaty, refers only to observation that is incidental to the normal course of navigation in accordance with international law.

³ In depositing the instrument of ratification, Canada declared: Article I, paragraph 1, cannot be interpreted as indicating that any state has a right to implant or emplace any weapons not prohibited under Article I, paragraph 1, on the sea-bed and ocean floor, and in the subsoil thereof, beyond the limits of national jurisdiction, or as constituting any limitation on the principle that this area of the sea-bed and ocean floor and the subsoil thereof shall be reserved for exclusively peaceful purposes. Articles I, II and III cannot be interpreted as indicating that any state but the coastal state has any right to implant or emplace any weapon not prohibited under Article I, paragraph 1 on the continental shelf, or the subsoil thereof, appertaining to that coastal state, beyond the outer limit of the sea-bed zone referred to in Article I and defined in Article II. Article III cannot be interpreted as indicating any restrictions or limitation upon the rights of the coastal state, consistent with its exclusive sovereign rights with respect to the continental shelf, to verify, inspect or effect the removal of any weapon, structure, installation, facility or device implanted or emplaced on the continental shelf, or the subsoil thereof, appertaining to that coastal state, beyond the outer limit of the sea-bed zone referred to in Article I and defined in Article II. On I2 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.

⁴A statement was made containing a disclaimer regarding recognition of states party to the Treaty.

⁵ On ratifying the Treaty, the Federal Republic of Germany declared that the Treaty will apply to Berlin (West). ⁶ On the occasion of its accession to the Treaty, the government of India stated that as a coastal state, India

has, and always has had, full and exclusive rights over the continental shelf adjoining its territory and beyond its territorial waters and the subsoil thereof. It is the considered view of India that other countries cannot use its continental shelf for military purposes. There cannot, therefore, be any restriction on, or limitation of, the sovereign right of India as a coastal state to verify, inspect, remove or destroy any weapon, device, structure, installation or facility, which might be implanted or emplaced on or beneath its continental shelf by any other country, or to take such other steps as may be considered necessary to safeguard its security. The accession by the government of India to the Treaty is based on this position. In response to the Indian statement, the US government expressed the view that, under existing international law, the rights of coastal states over their continental shelves are exclusive only for the purposes of exploration and exploitation of natural resources, and are otherwise limited by the 1958 Convention on the Continental Shelf and other principles of international law. On 12 April 1976, the Federal Republic of Germany stated that the declaration by India is not of a nature to confer on the government of this country more far-reaching rights than those to which it is entitled under current international law, and that all rights existing under current law which are not covered by the prohibitions are left intact by the Treaty.

⁷ On signing the Treaty, Italy stated, *inter alia*, that in the case of agreements on further measures in the field of disarmament to prevent an arms race on the sea-bed and ocean floor and in their subsoil, the question of the delimitation of the area within which these measures would find application shall have to be examined and solved in each instance in accordance with the nature of the measures to be adopted. The statement was repeated at the time of ratification.

⁸ Mexico declared that in its view no provision of the Treaty can be interpreted to mean that a state has the right to emplace nuclear weapons or other weapons of mass destruction, or arms or military equipment of any type, on the continental shelf of Mexico. It reserves the right to verify, inspect, remove or destroy any weapon, structure, installation, device or equipment placed on its continental shelf, including nuclear weapons or other weapons of mass destruction.

⁹ Ratification of the Treaty by Taiwan is considered by Romania as null and void.

¹⁰ The United Kingdom recalled its view that if a regime is not recognized as the government of a state neither signature nor the deposit of any instrument by it, nor notification of any of those acts, will bring about recognition of that regime by any other state.
¹¹ Viet Nam stated that no provision of the Treaty should be interpreted in a way that would contradict the rights

¹¹ Viet Nam stated that no provision of the Treaty should be interpreted in a way that would contradict the rights of the coastal states with regard to their continental shelf, including the right to take measures to ensure their security.

 12 On 25 February 1974, the Ambassador of Yugoslavia transmitted to the US Secretary of State a note stating that in the view of the Yugoslav government, Article III, paragraph 1, of the Treaty should be interpreted in such a way that a state exercising its right under this Article shall be obliged to notify in advance the coastal state, in so far as its observations are to be carried out "within the stretch of the sea extending above the continental shelf of the said state". On 16 January 1975, the US Secretary of State presented the view of the United States concerning the Yugoslav note, as follows: In so far as the note is intended to be interpretative of the Treaty, the United States cannot accept it as a valid interpretation. In addition, the United States does not consider that it can have any effect on the existing law of the sea. In so far as the note was intended to be a reservation to the Treaty, the United States placed on record its formal objection to it on the grounds that it was incompatible with the object and purpose of the Treaty. The United States also drew attention to the fact that the note was submitted too late to be legally effective as a reservation. A similar exchange of notes took place between Yugoslavia and the United Kingdom. On 12 April 1976, the Federal Republic of Germany stated that the declaration by Yugoslavia is not of a nature to confer on the government of this country more far-reaching rights than those to which it is entitled under current international law, and that all rights existing under current intrernational law which are not covered by the prohibitions are left intact by the Treaty.

The BW Convention

¹Considering 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 China stated that the BW Convention has the following defects: it fails explicitly to prohibit the use of biological weapons; it does not provide for "concrete and effective" measures of supervision and verification; and it lacks measures of sanctions in case of violation of the Convention. The Chinese government hopes that these defects will be corrected at an appropriate time, and also that a convention for complete prohibition of chemical weapons will soon be concluded. The signature and ratification of the Convention by the Taiwan authorities in the name of China are considered illegal and null and void.

³On depositing its instrument of ratification, the Federal Republic of Germany stated that a major shortcoming of the BW Convention is that it does not contain any provisions for verifying compliance with its essential obligations. The Federal Government considers the right to lodge a complaint with the UN Security Council to be an inadequate arrangement. It would welcome the establishment of an independent international committee of experts able to carry out impartial investigations when doubts arise as to whether the Convention is being complied with.

⁴ In a statement made on the occasion of the signature of the Convention, India reiterated its understanding that the objective of the Convention is to eliminate biological and toxin weapons, thereby excluding completely the possibility of their use, and that the exemption with regard to biological agents or toxins, which would be permitted for prophylactic, protective or other peaceful purposes, would not in any way create a loophole in regard to the production or retention of biological and toxin weapons. Also any assistance which might be

furnished under the terms of the Convention would be of a medical or humanitarian nature and in conformity with the Charter of the United Nations. The statement was repeated at the time of the deposit of the instrument of ratification.

⁵ Ireland considers that the Convention could be undermined if the reservations made by the parties to the 1925 Geneva Protocol were allowed to stand, as the prohibition of possession is incompatible with the right to retaliate, and that there should be an absolute and universal prohibition of the use of the weapons in question. Ireland notified the depositary government for the Geneva Protocol of the withdrawal of its reservations to the Protocol, made at the time of accession in 1930. The withdrawal applies to chemical as well as to bacteriological (biological) and toxin agents of warfare.

⁶The Republic of Korea stated that the signing of the Convention does not in any way mean or imply the recognition of any territory or regime which has not been recognized by the Republic of Korea as a state or government.

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 Conventions in respect of the said country.

⁸Mexico 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.

Notification of succession.

¹⁰ The ratification by Switzerland contains the following reservations:

1. Owing to the fact that the Convention also applies to weapons, equipment or means of delivery designed to use biological agents or toxins, the delimitation of its scope of application can cause difficulties since there are scarcely any weapons, equipment or means of delivery peculiar to such use; therefore, Switzerland reserves the right to decide for itself what auxiliary means fall within that definition.

2. By reason of the obligations resulting from its status as a perpetually neutral state, Switzerland is bound to make the general reservation that its collaboration within the framework of this Convention cannot go beyond the terms prescribed by that status. This reservation refers especially to Article VII of the Convention as well as to any similar clause that could replace or supplement that provision of the Convention.

In a note of 18 August 1976, addressed to the Swiss Ambassador, the US Secretary of State stated the following view of the US government with regard to the first reservation: The prohibition would apply only to (a) weapons, equipment and means of delivery, the design of which indicated that they could have no other use than that specified, and (b) weapons, equipment and means of delivery, the design of which indicated that they were specifically intended to be capable of the use specified. The government of the United States shares the view of the government of Switzerland that there are few weapons, equipment or means of delivery peculiar to the uses referred to. It does not, however, believe that it would be appropriate, on this ground alone, for states to reserve unilaterally the right to decide which weapons, equipment or means of delivery fell within the definition. Therefore, while acknowledging the entry into force of the Convention between itself and the government of Switzerland, the US government enters its objection to this reservation.¹¹The deposit of the instrument of ratification by Taiwan is considered by the Soviet Union as an illegal act

because the government of the People's Republic of China is regarded by the Soviet Union as the sole representative of China.

¹² The United Kingdom recalled its view that if a regime is not recognized as the government of a state, neither signature nor the deposit of any instrument by it nor notification of any of those acts will bring about recognition of that regime by any other state.

The Enmod Convention

¹The Federal Republic of Germany declared that the Convention applies also to Berlin (West). The Soviet Union objected to this and stated that the declaration was "illegal". Also the German Democratic Republic considers that the West German declaration has no legal effect.

² Kuwait made the following reservations and understanding: This Convention binds Kuwait only towards states parties thereto; its obligatory character shall ipso facto terminate with respect to any hostile state which does not abide by the prohibition contained therein. It is understood that accession to this Convention does not mean in any way recognition of Israel by Kuwait; furthermore, no treaty relation will arise between Kuwait and Israel.

On 23 June 1980, the UN Secretary-General, the depositary of the Convention, received from the government of Israel a communication stating that Israel would adopt towards Kuwait an attitude of complete reciprocity. ³ The Netherlands accepts the obligation laid down in Article I of the Enmod Convention as extending to states

which are not party to the Convention and which act in conformity with Article I of this Convention.

New Zealand declared that the accession also applies to the Cook Islands and Niue and that, in its interpretation, nothing in the Convention detracts from or limits the obligations of states to refrain from military or any other hostile use of environmental modification techniques which are contrary to international law.

⁵Notification of succession.

⁶On signing the Convention, Turkey declared that the terms "widespread", "long-lasting" and "severe effects" contained in the Convention need to be more clearly defined, and that so long as this clarification was not made, Turkey would be compelled to interpret for itself the terms in question and, consequently, reserved the right to do so as and when required. Turkey also stated its belief that the difference between "miltary or any other hostile purposes" and "peaceful purposes" should be more clearly defined so as to prevent subjective evaluations.

The 'Inhumane Weapons' Convention

¹Upon signature, China stated that the Convention fails to provide for supervision or verification of any violation of its clauses, thus weakening its binding force. The Protocol on mines, booby traps and other devices fails to lay down strict restrictions on the use of such weapons by the aggressor on the territory of the victim and to provide adequately for the right of a state victim of an aggression to defend itself by all necessary means. The Protocol on incendiary weapons does not stipulate restrictions on the use of such weapons against combat personnel.

personnel. ² France stated that it regretted that it had not been possible to reach agreement on the provisions concerning the verification of facts which might be alleged and which might constitute violations of the undertakings subscribed to. It therefore reserved the right to submit, possibly in association with other states, proposals aimed at filling that gap at the first conference to be held pursuant to Article 8 of the Convention and to utilize, as appropriate, procedures that would make it possible to bring before the international community facts and information which, if verified, could constitute violations of the provisions of the Convention and the protocols annexed thereto.

Not being bound by the 1977 Additional Protocol I to the Geneva Conventions of 1949, France considers that the fourth paragraph of the preamble to the Convention on prohibitions or restrictions on the use of certain conventional weapons, which reproduces the provisions of Article 35, paragraph 3, of Additional Protocol I, applies only to states parties to that Protocol. France will apply the provisions of the Convention and its three Protocols to all the armed conflicts referred to in Articles 2 and 3 common to the Geneva Convention of 1949.

³ Italy stated its regret that no agreement had been reached on provisions that would ensure respect for the obligations under the Convention. Italy intends to undertake efforts to ensure that the problem of the establishment of a mechanism that would make it possible to fill this gap in the Convention is taken up again at the earliest opportunity in every competent forum.

⁴ Romania stated that the provisions of the Convention and its Protocols have a restricted character and do not ensure adequate protection either to the civilian population or to the combatants as the fundamental principles of international humanitarian law require. ⁵ The United States stated that it had strongly supported proposals by other countries to include special

⁵The United States stated that it had strongly supported proposals by other countries to include special procedures for dealing with compliance matters, and reserved the right to propose at a later date additional procedures and remedies, should this prove necessary, to deal with such problems.

15. The first year of the Stockholm Conference

KARL E. BIRNBAUM

Superscript numbers refer to the list of notes and references at the end of the chapter.

I. Background

The Stockholm phase of the 35-nation Conference on Confidence- and Security-Building Measures and Disarmament in Europe—or Conference on Disarmament in Europe (CDE)—is part of the multilateral negotiating process of the Conference on Security and Co-operation in Europe (CSCE). The first phase of this process culminated in the signing of the Helsinki Final Act on 1 August 1975. Follow-up meetings to review the implementation of agreed measures and to deepen and develop co-operation between participating states have been held in Belgrade, 1977–78, and Madrid, 1980–83.¹

Participation by 35 formally equal states, and the organization and substance of the Conference, make the CSCE the most comprehensive East-West negotiating forum. It originated during the detente period of the 1970s and has clearly shown how anxious participating states, particularly the smaller European countries, are to find common solutions across political and ideological barriers on issues of common or conflicting interest. Although renewed confrontation between the superpowers and the upheaval in Poland in the early 1980s have complicated these efforts, the common US and Soviet desire not to be seen as the enemy of detente in Europe has made it possible to pursue the CSCE process, even though the more ambitious goals of previous years have had to be set aside. Although the Madrid meeting became acrimonious and lengthier than expected, a total break-down, which at times seemed near, was prevented. The concluding document, unlike that of Belgrade, not only guaranteed the continuity of the multilateral negotiating process but also contained concrete provisions to improve and extend co-operation between the signatory states. These provisions related to all the main substantive areas of the CSCE: security, co-operation in economic and other fields as well as human contacts and the dissemination of information.

The main bones of contention at the Madrid meeting concerned military security. WTO states had persistently argued for a special conference on "military détente and disarmament", while the Western and neutral and non-aligned (NN) groups wished to develop the only

element of the CSCE Final Act with concrete provisions in the security field, the so-called confidence-building measures (CBMs). While this part of the Final Act was genuinely innovative, the regime it introduced had so far been limited to the pre-notification of major military manoeuvres and the voluntary invitation of observers to military exercises. Since increasing international tension in the early 1980s meant that prospects for arms control were poor, it was considered particularly important to explore the CBM approach as a means to the management of conflict between the major powers. The French idea of a disarmament conference of all CSCE states, with a first phase devoted to CBM questions, was endorsed by the Reagan Administration in February 1981. The NATO allies insisted on criteria to ensure that such a conference would produce a significantly improved CBM regime in Europe: measures to enhance confidence in Europe were to be politically binding, militarily significant, verifiable and should comprise the whole of the European continent. The latter criterion produced considerable controversy in Madrid. Since two of the signatories of the Helsinki document had large territories outside Europe-Turkey and the USSR-the Helsinki CBM regime had been applied to a relatively limited part of these countries, stretching 250 km from their western borders. At the end of February 1981 the Soviet government unexpectedly agreed that future CBMs would be applicable to the whole of the European part of the Soviet Union. While this decision was clearly meant to promote a future CDE, agreement was nevertheless delayed by several circumstances. The USSR demanded compensation which to the West seemed unacceptable. The Western powers were anxious to ensure balance in the whole CSCE process and were unwilling to agree on a CDE until agreement had been reached in other areas, particularly human rights and communication across the East-West dividing line. Finally, the Polish crisis and particularly its culmination in December 1981 was a major set-back for the CSCE process and for East-West politics in general. Thus, it was only in the late summer of 1983 that the participating states in the Madrid meeting could agree on a final document which, inter alia, envisaged convening a Conference on Confidence- and Security-Building Measures and Disarmament in Europe. It was to open in Stockholm on 17 January 1984.

II. The Stockholm Conference mandate and East–West relations

The purpose of the Stockholm Conference is set out in general terms in the mandate contained in the final document from the Madrid

meeting: "to undertake, in stages, new, effective and concrete actions designed to make progress in strengthening confidence and security and in achieving disarmament". The Conference was to be "devoted to the negotiation and adoption of a set of mutually complementary confidence- and security-building measures designed to reduce the risk of military confrontation in Europe". The mandate was in line with the criteria insisted upon by the West: the CSBMs adopted were to cover the whole of the European continent including the adjoining sea area and airspace; they were to be of military significance, politically binding and provided "with adequate forms of verification which correspond to their content". The scope for different interpretations of the mandate is considerable, particularly on the provisions regarding the zone of application of agreed measures as well as verification. The mandate left open the possibility of implementing agreed measures before the CDE follow-up meeting to be held in Vienna in November 1986.²

The post-Helsinki CSCE process has hardly been one of the main arenas of world politics. East-West relations have primarily been determined by the bilateral relationship between the superpowers and between the two major military alliances in Europe. The CSCE process, however, has clearly reflected the general political climate and demonstrated the interrelationships between different problem areas. Formally the Conference is an expert meeting within the framework of the CSCE process. But it could be argued that, in view of its history, the central importance of the issues to be dealt with and the comparatively long duration of the meeting, the Stockholm Conference should be viewed as an independent process. When negotiations in Stockholm opened in 1984 tension between East and West, and between the superpowers in particular, had reached a new peak. New deployment of US medium-range nuclear missiles in western Europe had led to a Soviet walk-out from all ongoing arms control negotiations with the West. Stockholm became the only forum at which East and West continued important negotiations, and the agenda of these talks—to create confidence, or rather to dispel massive distrust between East and West-appeared particularly important in the prevailing tense situation. To win the goodwill of the Europeans both superpowers emphasized their preparedness to return to the negotiating table and the Europeans tried to exert pressure on them to renew contacts at the highest possible level. This pressure was successful in so far as the decision of the west European states to send their foreign ministers to the opening ceremony in Stockholm induced all participating states, including the USA and the USSR, to accept a relatively high level for the initial phase of the Conference.

III. The opening of the conference

The introductory addresses brought no surprises. The Swedish Prime Minister recalled the importance that the Conference had acquired as a result of the renewed antagonism and lack of confidence between East and West, and stressed that the negotiations ought to be part of the attempts to lessen dependence on deterrence and to strengthen confidence and co-operation as means to safeguard peace.³

US Secretary of State Shultz appealed to Moscow to return to the various negotiating fora on disarmament and assured the meeting that his government was ready to do so whenever its counterpart had reassessed its negative position. It attracted considerable public attention when he spoke of the "artificially imposed division of Europe" and stressed that the USA did not recognize its legitimacy.⁴ This declaration did not diverge from the previous US position, but it emphasized one of the most sensitive issues in East–West politics in a way hardly likely to lessen East–West tension. His remark could be interpreted as an explicit and demonstrative challenge to the prevailing *status quo* in Europe. Since the early 1970s, the European allies had avoided such a challenging position. They had refused to recognize the *status quo de jure* but had accepted prevailing territorial and political conditions in Europe as a starting point for a process that could eventually transform these conditions by peaceful means.

Soviet Foreign Minister Gromyko used strong language accusing the USA of aggressive behaviour throughout the world: from the deployment of medium-range missiles in western Europe to interventions in Central America, Grenada and Lebanon. He emphasized the interdependence between events in Stockholm and on the international scene in general, but said that in its proposals to the Conference the USSR would exert itself to improve the international climate and to stop the arms race.⁵

It could be argued that the hope that the very existence of a new negotiating forum in Stockholm could break the deadlock in East-West relations was fulfilled in the initial phase of the Conference. The Foreign Ministers of the superpowers had an opportunity for an extended exchange of opinion. This meant a renewal of US-Soviet contacts at that level, which had been in jeopardy since the shooting down of the South Korean airliner in September 1983. The first concrete result of the Shultz-Gromyko talks surfaced shortly afterwards, when it was announced that the Vienna talks on force reductions in central Europe would be resumed in 1984.

The other Foreign Ministers in their introductory speeches did not limit themselves to an analysis of the international situation, but presented a number of proposals for different types of CSBM. These ideas were subsequently expanded in detail in formal proposals by the NATO allies, Romania, the NN states, the USSR and Malta.

IV. The formal proposals

The Western alliance presented a common proposal on 24 January 1984, prepared in numerous consultations within NATO. It aimed at greater openness and predictability in the military activities of the participating states and contained six points:

1. Annual exchange of information among participating states on the structure of ground forces and land-based air forces in the zone of application for agreed CSBMs.

2. Annual exchange of forecasts of activities notifiable in advance.

3. Prior notification of militarily significant out-of-garrison land activities in Europe.

4. Invitation of observers from all other participating states to all pre-notified activities.

5. Non-interference with national technical means of verification and inspection concerning compliance with agreed CSBMs.

6. Arrangements to enhance the means of communication between participating states.⁶

The Romanian proposal of 25 January 1984 described the aim of the Stockholm Conference as being the elimination of suspicion and of the sense of insecurity caused by certain military activities, the limitation of military activities in border areas and other sensitive territories as well as the extension of information, communication and consultations between states, particularly in critical situations. The proposal envisaged four types of measure:

1. Pre-notification of military manoeuvres, major military movements and of alerting national and foreign forces.

2. The establishment of ceilings on manpower and certain types of weapon system in military manoeuvres as well as the creation of restriction zones or corridors with different types of limitation on deployment of specific weapon systems and military activities.

3. A comprehensive system for improved information, communication and consultation between participating states.

4. Stabilizing measures of a more general kind, such as a pan-European treaty on the non-use of force and a freeze on military expenditure at the 1984-level.⁷

The proposal of the NN states, tabled on 9 March 1984, was not meant as a compromise between Eastern and Western positions but was rather a compromise between the national interests of those states themselves. Intended to further develop the Helsinki document, it emphasized concrete steps to improve the exchange of information and to constrain military activities. In addition, it aimed to introduce qualitatively new elements, particularly with regard to constraints. The proposal included the pre-notification of major manoeuvres; smaller military exercises close in time and space; manoeuvres involving amphibious, sea-transported, airborne and air-mobile forces; and major military movements. In the area of constraints, ceilings were envisaged on forces engaged in manoeuvres as well as restrictions on the deployment of forces vital to sustained offensive operations. Without specific reference to WTO initiatives in this field, the proposal emphasized the importance of non-use of force. The wording reflected the notion that a reconfirmation of this principle could serve its purpose only when combined with concrete CSBMs. The document stressed the importance of an early implementation of agreed measures of the second, disarmament phase of the CDE exercise.⁸

The formal Soviet proposal was presented only in early May, but the Soviet position had been clarified in earlier statements. It was argued that to redress the set-back in East–West relations resulting from US medium-range missile deployments in western Europe, something more than "technical" measures of the kind contained in the Western proposal and in that of the NN states would be required. Only within the framework of a forceful political initiative could such limited technical measures, which the Soviet Union in no way opposed, have the desired confidence- and security-building effect. The Soviet Union proposed:

1. That participating nuclear weapon states should assume a no-firstuse obligation, either unilaterally or in the context of an international agreement.

2. That a treaty on the non-use of military force and the maintenance of peaceful relations be concluded between the participating states.

3. To promote a commitment on the part of these states to freeze and reduce military expenditure.

4. To promote an agreement to eliminate chemical weapons from Europe and above all a commitment not to station such weapons in areas where they were not at present deployed.

5. To promote the creation of nuclear weapon-free zones in the Balkans and in northern Europe as well as the establishment of a zone in Europe free from battlefield nuclear weapons on both sides of the East-West divide.

6. To adopt concrete measures regarding the exchange of information on military activities and the invitation of observers to major manoeuvres as well as quantitative limitations on the scale of groundforce exercises, including amphibious and airborne troops in Europe and adjoining sea area and airspace.⁹

The four major proposals¹⁰ provided a basis for future negotiations at least in their similar ideas on the development of the CBM regime agreed upon at Helsinki in 1975. At the same time, however, the documents clearly reflected fundamentally diverging views between East and West about the purpose of the Stockholm Conference. In plenary sessions and during informal exchanges Western representatives argued that the 'declaratory' elements of the Soviet proposal could not be reconciled with the mandate for the Conference. The USSR and the other WTO states on the other hand adopted the position that negotiations on "technical" measures could only be conducted if all the political elements contained in the Soviet proposal were seriously considered. Transition to substantive negotiations was further complicated by continued acrimony in superpower relations. During spring and summer 1984 Soviet leaders were clearly anxious to avoid any moves that could be construed as a concession to Washington and thereby promote the re-election of Ronald Reagan as President of the United States. When in the early autumn his victory appeared almost certain, the negative Soviet attitude began to soften. Signals began to surface suggesting Soviet willingness to renew the bilateral dialogue with the USA on central issues of arms control and disarmament, culminating in Foreign Minister Gromyko's visit to Washington and talks with the US Secretary of State in September 1984. It is hardly a coincidence that at about the same time the USSR was beginning to adopt a more forthcoming attitude in Stockholm.

V. Organization: a tug-of-war and its outcome

Throughout most of 1984 plenary sessions were the only official body of the Stockholm Conference, a working arrangement not conducive to penetrating discussion of substantive issues, which pre-suppose the creation of working groups. It proved difficult to find an acceptable solution to this problem since several states were concerned that a given procedure might prejudge the outcome of substantive negotiations. In an informal contact group the NN states were active in trying to promote a solution of the procedural issues. They and, finally, the NATO group endorsed the Swedish delegation's proposal, but it was not accepted by the USSR when the Conference adjourned for the summer.

During the autumn sessions the initiative in the contact group was taken over by the Finnish delegation. Continued efforts were made to guarantee equal treatment of all proposals by the proposed working groups without, however, prejudging the outcome of substantive negotiations and the structure of a final document. Faced with a Soviet unwillingness to adopt a clear-cut position the NATO countries and the NN group decided to pursue more detailed discussions in the plenary of their own proposals, which concentrated on the problems of notification and observation. Only the WTO states commented on the five political proposals to which Moscow had given priority. The subsequent protest by a member of the Soviet delegation was hardly surprising but, unlike earlier complaints, was concluded on a conciliatory note: the Soviet diplomat assured his audience that Moscow was interested in reaching agreement on the working arrangements for the Conference. Subsequently the Soviet delegation reacted positively to the continued Finnish attempt to smooth the way for an agreement. This coincided with the beginning of the above-mentioned rapprochement in relations between the superpowers and was generally interpreted as an indication of Soviet willingness to be involved in serious negotiations also in Stockholm. This impression was reinforced soon after President Reagan's re-election by the agreement to initiate "negotiations about negotiations" at a meeting of US and Soviet Foreign Ministers in early January 1985.

The improvement in the international climate was immediately reflected in Stockholm and stimulated the efforts to reach agreement on organizational matters. It remained to find a solution that would satisfy the demands of the WTO states—and of the USSR in particular—that all proposals should receive equal treatment, without structuring substantive negotiations in such a way that questions not considered negotiable by the Western powers would have to be dealt with in the final document. The US delegation in particular was anxious to emphasize that its agreement to discuss a given proposal did not imply its acceptance as a possible element of future CSBMs.

These contradictory positions were taken into account in the proposal which the Finnish delegation presented to the plenary on behalf of the whole NN group in late November and which became the basis of a formal decision on the working arrangements for the Conference, adopted on 3 December 1984.¹¹ Like the original Swedish proposal the decision envisaged the creation of two working groups, one to deal with all proposals on notification and observation of military activities and the other with all other proposals. In order to ensure equal treatment of all proposals a special Annex to the *Conference Journal* established the exact number of working group meetings for each week: three for the first group and two for the second. In addition it was decided that all proposals would be dealt with "in a structured way and on the basis of a balanced and adequate allocation of time".¹² The interests of the NATO group were satisfied by the fact that no further subdivision of the different proposals could be deduced from the decision.¹³ In addition a specific passage in the Annex established that agreements to discuss a proposal did not imply its acceptance and that it did not prejudice the right of each delegation to assess the conformity of the proposal with the Madrid mandate.

This work structure was to continue until the end of the sixth session whereupon, in mid-1985, it would be reviewed in the light of experience gained in the meantime. The working arrangements were put into effect during the last two working weeks of 1984 which meant that discussions of substance could be initiated in the newly established working groups. The organizational agreement in no way implied a breakthrough on substantive issues. In spite of the improved negotiating atmosphere the conflicting positions of the parties emerged quite clearly in formal and informal exchanges.

VI. Substantive issues, power constellations and prospects for the future

Since informal discussions of substantive issues had been conducted within the framework of the Stockholm Conference before agreement was reached on the work structure, developments in 1984 did not imply total deadlock on these issues. Most noteworthy is the thinking and exchange of opinion by the Western participants regarding two central issues: the reaffirmation of the non-use of force principle and measures implying physical limitations of military activities, so-called constraints.

While the other political or 'declaratory' elements in the Soviet proposal were consistently rejected by the West as non-negotiable, representatives of the NATO group relatively soon indicated a willingness to discuss some form of reaffirmation of the non-use of force principle. The West German government was first and most explicit in signalling its interest in reaffirming a principle that has played a central role in its policy towards the East for more than one and a half decades. Spokesmen for the West German government were anxious to emphasize, however, that such a reaffirmation should be only "the crowning glory" of a negotiating process that yielded substantive agreements on concrete CSBMs. The US position was initially totally negative but softened during the year under the influence of west European and especially West German arguments. This change was reflected not only in the informal exchanges in Stockholm but also in public pronouncements by US officials, including President Reagan.¹⁴

The Western position on the sensitive issue of constraints also developed. Both WTO and NN states want to see constraints included in a comprehensive negotiating package emerging from the Stockholm Conference. It is, of course, no coincidence that this category of CSBMs does not feature in the NATO group's own proposal. All such restrictions-whether geographical, quantitative or qualitativeconfront NATO as a multinational defensive alliance, whose forces are concentrated on limited, densely populated territory in FR Germany, with formidable-some would say intractable-problems. The distinct interest shown by other participating states, not least the NN group, in CSBMs that would, in fact, imply constraining military options has induced the Western powers to indicate-although as yet in rather noncommittal terms-their willingness to consider proposals for constraints. During autumn 1984 a thorough investigation of constraints was initiated within the NATO group. At the time of writing, however, it is an open question whether the NATO countries will in the final analysis accept that constraints be included in a set of CSBMs to result from the Stockholm negotiations.

Decisions at the Stockholm Conference are taken in accordance with the rules adopted at previous CSCE meetings, that is, by consensus. Representatives of participating states must voice explicit dissent if they want to prevent a given proposal from being accepted by the Conference. This rule, intended to guarantee the formal equality and independence of all participating states, does not reflect the real power constellation and the actual pattern of the negotiating process. The latter is determined by consultation and bargaining between and within a number of informal groupings. The most important of these caucuses in Stockholm are the NATO, WTO and NN groups. By virtue of its position in eastern Europe, the Soviet Union holds a decidedly dominant position in its own group. Contrary to the pattern of previous CSCE negotiation, the USA has played a most prominent role in Stockholm. Typically, the final breakthrough in the tug-of-war on working arrangements for the Conference occurred at a bilateral meeting between the heads of the US and Soviet delegations. The Western group of EC member states, which at earlier CSCE meetings

has been the main counterpart and negotiating partner of the Soviet Union, has played a minor role in Stockholm, partly due to the fact that defence questions do not fall within the purview of the political consultative machinery established by the EC member states.

Prospects for achieving tangible, satisfactory results at the impending substantive negotiations in the Swedish capital will continue to depend on the development of the international situation and on relations between the two superpowers in particular. This does not mean that the process started in Stockholm lacks an inherent importance of its own. The Stockholm Conference could conceivably produce initiatives and stimulate developments which over time may well change not only the general political atmosphere in Europe, but also the wider framework of East–West relations. This, however, would seem to require that the CDE becomes part and parcel of a comprehensive pattern of conduct on the part of the major powers, reflecting a more genuine concern with peace-keeping as a *common* task to which top priority should henceforth be accorded by governments in East and West.

The CDE negotiations are likely to confront many European states, and particularly the NN countries, with difficult problems and trade-offs. These states have a strong interest in the success of the first phase: that is, in bringing about a situation in which a new series of CSBMs can be adopted. This could open the way for negotiations on disarmament in Europe.

However, the anxiety to achieve positive results should not lead to wishful thinking. A successful first phase requires in the first instance a compromise between East and West on a combination of political commitments and concrete CSBMs. But it is likely to require more than that, namely, the acceptance of constraints. The NN states may be unwilling to provide sensitive information about their military dispositions, which are unambiguously defensive, unless the major powers accept *some* constraints on their military activities. The NATO powers have particular difficulty in accepting such constraints; however, they need the support of the NN group if they are to achieve their main objective—greater openness and predictability with regard to military postures in Europe.

Notes and references

 The CSCE process is well documented in previous SIPRI Yearbooks. For an analysis and the text of the Helsinki Final Act, see SIPRI Yearbook 1976, chapter 8 and appendix 8A, pp. 297-352; for an analysis of the proposals of the Belgrade meeting, see SIPRI Yearbook 1979, chapter 17, pp. 656-62; for an evaluation of first-generation CBMs, see SIPRI Yearbook 1980, chapter 15, pp. 407-16; for the Madrid meeting and CBM proposals, see SIPRI Yearbook 1981, chapter 17, pp. 483-94; for background to the CSCE and proposals for a European disarmament conference, see SIPRI Yearbook 1983, chapter 19, pp. 595-608; and for an introduction to the Stockholm Conference, details of participation and a description of its early stages, see SIPRI Yearbook 1984, chapter 15, pp. 557-69.

- 2. 'Concluding Document, CSCE Follow-up Meeting in Madrid', Department of State Bulletin, October 1983, pp. 54-55.
- 3. Record of the Opening Statements, 17-20 January 1984, CSCE/SC/R.1, pp. 1-9.
- 4. CSCE/SC/R.2 (note 3), pp. 17-24.
- 5. CSCE/SC/R.3 (note 3), pp. 11-25.
- 6. Summarized from CSCE/SC.1, 24 January 1984.
- 7. Summarized from CSCE/SC.2, 25 January 1984.
- 8. CSCE/SC.3, 9 March 1984.
- 9. Summarized from CSCE/SC.4, 8 May 1984.
- 10. Malta's proposal (CSCE/SC.5), which referred mainly to conditions in the Mediterranean, was presented on 8 November 1984. It did not influence the exchange of opinion at the Conference during the first year and is not discussed in this survey.
- 11. CSCE/SC, Journal No. 117 from 123rd plenary meeting.
- 12. Note 11, Annex.
- 13. An earlier version of the Finnish paper had envisaged a sub-division in the enumeration of the proposals within the two working groups, which could create the impression that *five* working groups had in fact been established. This in turn, it was feared, could become the basis for Soviet arguments to the effect that all five "components" should be reflected in the final document from the Stockholm Conference.
- 14. Compare, for example, Under-Secretary Lawrence S. Eagleburger's pronouncement before the start of the Conference (as reported in New York Times, 13 January 1984) with President Reagan's speech in Dublin, 4 June 1984 (Weekly Compilation of Presidential Documents, 4 June 1984, p. 833) as well as with his speech before the UN General Assembly on 24 September 1984 (*ibid.*, p. 1357).

Appendix 15A. Notifications of military manoeuvres in 1984, in compliance with the Final Act of the CSCE

State giving notification	Date of notification	Duration of manoeuvre	Designation of manoeuvre	Number of troops involved ^a	Area of manoeuvre
Norway	16 Feb	16–21 Mar	Avalanche Express	25 000	Troms, northern Norway
USSR	6 Jun	28 Jun-5 Jul		60 000	German DR, Czechoslovakia, Poland, South Baltic Sea
France	8 Aug	8-14 Sep	Doubs	20 000	Belfort–Montbéliard– Valdahon–Dijon– Chamont–Joinville– Vaucouleurs–Epinal
FR Germany	10 Aug	3–29 Sep	Lionheart	132 000	Münster–Osnabrück– Hannover–Helmstedt– Braunlage–Schloss Neuhaus–Unna
FR Germany	10 Aug	3-21 Sep	Full Flow		FR Germany
FR Germany	10 Aug	17-29 Sep	Spearpoint	70 000	See Lionheart
Poland	21 Aug	Begin Sep	Shield	60 000	Czechoslovakia
FR Germany	22 Aug	13-20 Sep	Flinker Igel	55 000	Regensburg-Passau- Landshut-Ingolstadt- Eichstädt
Denmark	24 Aug	15-20 Sep	Bold Gannet	21 000	The Sjaelland group of islands
FR Germany	27 Aug	17-28 Sep	Certain Fury	50 000	Augsburg–Anspach– Würzburg–Mannheim– Schwäbisch Hall– Göppingen

^a It is not advisable to add together the number of troops in different manoeuvres taking place during the same period of time, as some troops may participate in more than one manoeuvre.

16. The Sinai peacekeeping experience: a verification paradigm for Europe

DAVID BARTON

Superscript numbers refer to the list of notes and references at the end of the chapter.

I. Summary

The Sinai peacekeeping experience is an early-warning, inspection, monitoring and verification system which contributed to the process of peace between Israel and Egypt. Modern technical capabilities proved to be effective in reassuring Israel and Egypt that adherence to agreements could be guaranteed. More ambitious moves towards peace were thus taken with reasonable confidence that compliance with new agreements could also be ensured and monitored.

The Sinai experience was not only an effective system but also a successful confidence-building measure which contributed to a reduction in the fears of surprise attack and to an improvement in the political climate. Large military forces disengaged from Sinai. Military manoeuvres and probing did occur on the outskirts of the monitored zones, but effective surveillance, corrective instructions and accurate reporting of violations ensured that these military activities did not develop into serious violations. The practical success of the Sinai system provided support and reassurance to the political search for accommodation and peace between Israel and Egypt. This success was remarkable considering the high level of hostility and suspicion between the two countries.

The Sinai model may be applicable to other border areas where military concentrations and confrontations exist, including the central front in Europe where the concentration of conventional military forces is the largest in the world.

Two million troops in the WTO and NATO, equipped with enormously destructive firepower, face each other across the border in central Europe. This military face-off has been called "the largest and most potent peacetime military confrontation in the history of the world".¹ Estimates place current annual military expenditures on this military confrontation in Europe at about one-half of total world military expenditure, or about \$310–360 billion in 1983 US dollars.²

A trial early-warning, inspection, monitoring and verification zone in central Europe could provide a basis for a new approach. If such a zone, modelled to some degree on the Sinai experience, could bring about a noticeable improvement in European security, it might encourage the European countries and the USA and the USSR to adopt more ambitious arms control measures which would constrain and reduce military forces and activities in formalized verification zones. Since early-warning and verification capabilities superior to those used in Sinai already exist on both sides of the border in central Europe, it is their application in an arms control context and their public demonstration which would be the important features of such a trial zone.

Significant elements of the Sinai system could be duplicated, for example, in one of the attack corridors between the two Germanies and along the inter-German border. The early-warning system that worked for four years in the Giddi and Mitla Passes could be set up in the Fulda Gap. In addition, an inspection and verification system similar to the one which covered the limited-forces zones on two-thirds of the Sinai peninsula could be established along the inter-German border as a buffer/border zone arrangement. However, the implementation of such zones in central Europe on either a trial or formal basis could only occur if there were a strong political willingness in Europe to make changes in the military confrontation. If this willingness were there, verification zones of this kind would serve as reassurance that national security was not threatened by the changes.

II. The Sinai peacekeeping experience

The Sinai peacekeeping experience of 1975–82 lasted six years and four months. It culminated in an Egyptian–Israeli peace treaty which restored Egyptian sovereignty in the Sinai peninsula for the first time since 1967. That peace also guaranteed the Egyptian–Israeli border, with a narrow buffer zone patrolled by a multinational peacekeeping force called the Multinational Force and Observers (MFO). The Sinai experience had two phases: an early-warning and a verification/inspection phase.³

Early-warning phase

The Second Sinai Disengagement Agreement of 1 September 1975 set in motion the establishment of a US electronic early-warning system to monitor the approaches to the strategically important Giddi and Mitla Passes within a larger demilitarized buffer zone monitored by the United Nations Emergency Force (UNEF).⁴ Egypt and Israel also maintained strategic surveillance stations at opposite ends of the Giddi Pass, thereby enabling them to have their own early-warning capability and to make independent assessments of military movements and preparations by the other side. The US early-warning system added tactical monitoring of the two passes; it was also responsible for verifying the operation of the Egyptian and Israeli surveillance stations according to agreed restrictions on the number and kind of weapons, personnel and vehicles at the stations. This system of divided responsibilities and co-operative operation performed well.

The US electronic early-warning system covered the two passes (620 km^2) by setting up four unmanned sensor fields to scan the pass entrances and three manned watch stations to oversee the sensor fields and monitor the Egyptian and Israeli surveillance stations (see figures 16.1, 16.2 and 16.3). A fourth watch station was operated by remote control.

The Second Sinai Disengagement Agreement also called for US reconnaissance flights over all the areas: the UNEF buffer zone, the limited-arms and limited-forces zones for Israel and Egypt, and the Giddi and Mitla Passes. The photographic reconnaissance information was relayed directly to Egypt, Israel, the USA and the UN forces command. US reconnaissance overflights were carried out about once a week, and additional flights were requested from time to time to verify certain military activities and investigate possible violations. Later, Egypt and Israel were allowed seven reconnaissance flights a week, with two aircraft following a strict flight pattern over the middle of the buffer zone at not less than 4 570 m altitude (see figure 16.2).

The buffer zone under the control of UNEF separated the two sides into limited force zones. The military force restrictions were straightforward: a limit of 8000 troops, 75 tanks and 72 artillery pieces under 120 mm in size and 12 km in range. Therefore, owing to the width and inviolability of the buffer zone, armour could not be used to bombard the other side from the limited military force zone, and all intrusions into the buffer zone could be monitored by UNEF. UNEF had not only complete inspection and verification control of the buffer zone but also responsibility for monitoring the limited-forces zones by on-site inspection. To accomplish these tasks the UN used a force of approximately 4000 troops drawn from seven nations.

The original sensors and communications gear used for the Sinai early-warning system were standard equipment, with a history of good performance and low maintenance. Improvements and innovations maintained the record of quality performance and low maintenance. Even the original equipment could detect intrusions by helicopters,





military vehicles and Bedouins with camels and could distinguish between them. The equipment was also quickly installed and operational. For example, the four sensor fields were installed in only four days as US specialists followed the Israel Defence Force minesweepers, and then were quickly made operational.



Figure 16.2. The Second Sinai Disengagement Agreement: buffer zones

Tools of the ground verification trade

The watch station operators used line sensors, point sensors and imaging sensors to detect intrusions, place their positions on a map, and then determine the size, speed, nature and direction of the intruder. Any unauthorized movement or even preparations for such a movement



Figure 16.3. The Sinai early-warning zone: The Mitla and Giddi Passes

were verified and immediately reported through secure communications to Egypt, Israel and UNEF. The communications link to Egypt and Israel was not only to their watch stations but also by a direct teletype link to the Egyptian Ministry of War in Cairo and the Israel Defence Force in Jerusalem.

Five types of sensor and several different visual detection devices were used in the early-warning system. Ground sensors operated using the basic detection principles of seismic, acoustic, infra-red, magnetic, electromagnetic, pressure, electric and earth-strain disturbances. The following five sensors were used in Sinai.

SSCS. A Strain Sensitive Cable Sensor was a type of invisible electromagnetic fence composed of a coaxial cable covering several hundred metres and buried in the ground. It transmitted a signal whenever movement was registered. Movements by people and vehicles were easily detected.

PIRCS. A Passive Infrared Confirming Scanner detected intrusions into the area it scanned, and registered an infra-red picture. This picture allowed a trained operator to distinguish between people and vehicles, to count numbers and to specify direction and speed. This device performed well; however it was the only device to experience maintenance problems. Thermal imaging devices were tested as replacements since they had good night-vision capability.

MINISID 3. Miniature Seismic Intrusion Detectors registered earth vibrations. They had the ability to detect a vehicle at 500 m and a person at 50 m even in the sand of Sinai. They were small, tamper-proof, battery-operated devices which were positioned just beneath the surface of the ground, around the entrance of the passes.

AAU. Acoustical Add-on Units were used in combination with the MINISID. The MINISID detected the movement and triggered the AAU which then transmitted the sound of the intruder to the operator for identification.

DIRID. Directional Infrared Intrusion Detectors registered temperature differences between the background and the intruder. The DIRID was an optical device which was aimed to confirm the presence of an intruder and read the direction of movement.

At first, signals from the sensors were recorded automatically on a chart, but rapid improvements in the system eventually enabled the operators to observe all the signals registering on a display board map of the early-warning area. At a glance the operators were able to tell the location of the intrusion, the number and nature of the intruders, and the direction and speed of their movement.

Intrusions were also confirmed visually by observation from the watch stations and in the case of the unmanned watch station at Giddi West by remote-controlled observation using sophisticated television equipment with a night-vision capability.

Visual identification and monitoring were extremely important to confirm authorized movements by approved vehicles and to identify the exact nature of unauthorized intruding vehicles. The visual tools of the watch station were powerful wide-angle Zeiss 15×60 prism binoculars, a Questar terrestrial telescope and a high-power wide-angle image intensifier for night use. These tools gave the watch station observers a potential range of 20 km during the day and 5 km at night. Even at night people were easily picked out at a distance of 1 km. The night-vision devices collected all the available night light from the moon, stars and glow of the sky in order to intensify the image 50 000 times so that it was visible to the human eye.³

The Sinai record—effective early warning

The Sinai early-warning system was effective in detecting intrusions, monitoring them, verifying whether or not the intrusions were violations, reporting violations and securing corrective action.

An average day involved detection of over 200 vehicular intrusions which then had to be identified as either authorized movements or violations. Perhaps 100 or more other daily intrusions which activated the sensors were also identified as aeroplane or helicopter overflights, earth tremors, jogging UN troops, camels and Bedouins in order to filter them out of the violation category.

In the four years of operation of the early-warning phase between 1976 and 1980, a total of 90 violations were reported to Israel, Egypt and the UNEF. All the violations were judged to be small incidents which were normally corrected easily and quickly due to the structure of the reporting mechanism. There were 67 violations by Israel, 2 by Egypt, 19 unidentified aircraft overflights, and 2 unidentified personnel intrusions. The high number of Israeli violations was explained by the fact that the Israeli limited-force zone shared a common border with the early-warning zone, whereas the buffer zone separated the early-warning zone from the Egyptian limited-force zone (see figures 16.2 and 16.3, refer to lines K, J and E).

There were no armed conflicts or major military incidents in Sinai, and the early-warning system was partially credited for this. Both sides came to trust the verification system for its speed, accuracy, reliability and comprehensiveness. It facilitated peaceful disengagement from a potentially volatile military situation and area. Its importance was underlined when both sides expressed a desire to have it continue with a different and expanded role even after they had signed their 1979 peace treaty.

Inspection/verification phase

The second phase of the Sinai peacekeeping experience began after the signing of the Egyptian–Israeli Peace Treaty on 26 March 1979. The treaty formally ended a state of war which had lasted over 30 years.⁵

The US early-warning role changed to one of verifying compliance with the peace treaty. This change was necessitated by the lack of a continuing UN mandate for the UN forces in Sinai. The new US responsibility was to verify force levels and armaments at Egyptian military facilities in the buffer zones and at four Israeli technical sites within an interim buffer zone. Aerial and on-site inspection patrols carried out the verification by checking all military activities and installations in the
new zones. US responsibility now covers 38850 km^2 rather than only 620 km^2 , or approximately two-thirds of the total area of the Sinai peninsula. The early-warning system was taken out but some of the infrastructure remained to support the observer inspection teams. Inspection teams used three Bell 212 helicopters and one short take-off and landing aircraft-a Fairchild Pilatus Porter. Surveillance flights were also performed once a week to verify compliance with the armaments and personnel limitations specified in the peace treaty

Verification by helicopter inspection teams was carried out at least twice a month with additional inspections performed within 48 hours of a request from either Israel or Egypt. Again, the USA served as the trusted third party and ultimate inspection authority, even though a small UN Truce Supervisory Organization (UNTSO) presence was permitted to continue in Sinai.

The Sinai on-site inspection teams carried out a total of 50 bi-monthly inspections of Egyptian military forces in the two-force limitation zones which were known as Zones A and B and at the four Israeli technical sites (T-1, -2, -3, -4) in Zone C (see figure 16.4). The inspection teams did not visit Zone D, the Israeli force-limitation zone, which was monitored by UN observers. In Zone A Egypt was permitted one mechanized infantry division with its installations and field fortifications. The main elements of that mechanized infantry division were to consist of not more than 22000 troops, up to 480 armoured personnel vehicles of all types, up to 230 tanks, 7 anti-aircraft artillery battalions including surface-to-air missiles and up to 126 anti-aircraft guns of 37 mm and above, 7 field artillery battalions including up to 126 field artillery pieces, 1 armoured brigade and 3 mechanized infantry brigades. In Zone B Egypt was permitted 4 battalions of border units and up to 4000 personnel, equipped with light weapons and wheeled vehicles. In Zone D Israel was permitted 4 infantry battalions and 180 armoured vehicles but no tanks, artillery or anti-aircraft missiles except individual surface-to-air missiles (see appendix 16B).

Four inspection teams visited all of the Egyptian military units in Zones A and B during two-day inspection tours conducted twice each month. The inspection teams performed low-level aerial reconnaissance and on-site inspections. The on-site inspections of each Egyptian military unit included visual checks and counts of weapons and personnel. Inspection teams walked through all major buildings including armouries and drove through all areas where armoured and other vehicles were parked. Reports were filed by teletype to Egypt and Israel within 24 hours of the inspection. Five special inspections were performed: one prompted by an aerial reconnaissance flight, one requested by Egypt and three requested by Israel.



Figure 16.4. The US Sinai Field Mission area of verification

Problems of interpretation inevitably arose regarding, for example, the number and type of field fortifications appropriate to a mechanized infantry division and the classification of 160-mm mortars as artillery. Mapping and demarcation problems also arose. Most of these problems were easily resolved by the Joint Commission, the bilateral Egyptian-Israeli group established by the peace treaty to resolve problems arising during the period of Israel's interim withdrawal; the Commission also corrected the reported violations or deviations. Over the two-year period a total of 29 violations or deviations were reported: 27 involved the Egyptian zones, Zones A and B, and 2 involved the Israeli technical sites. No violation was judged to be serious enough to pose any problem for the treaty and they were all resolved or corrected through the work of the Joint Commission.

III. Sinai, a paradigm for Europe

The Sinai peacekeeping experience has many characteristics and features which could recommend it as a paradigm for Europe and elsewhere. European arms control fora could refer to the Sinai experience as a useful model for early-warning, monitoring and verification tasks that they may be considering. For example, a demonstration early-warning and verification zone could be implemented along the border between the two Germanies in one of the attack corridors such as the Fulda Gap (see figures 16.5 and 16.6). If successful as a demonstration, such a zone might then be enlarged and formalized to cover other attack corridors (Hof, Göttingen, North German Plain) and eventually a larger border/buffer area in central Europe. It is assumed that both NATO and the WTO consider these to be the most likely attack corridors and that they can be used in both directions. But this assumption is based on the similarity of terrain close to these border areas, not on any published assessments about attack corridors by the WTO. Obviously both sides would have to share similar military assessments about the importance of the attack corridor if there is to be agreement to co-operate in initiating a verification zone there.

The following characteristics of the Sinai peacekeeping experience illustrate its potential usefulness as a model. They also indicate some of the problems and some of the other elements which would be required to make the model work successfully.

1. A successful verification regime can help political securitybuilding processes. The success of the Sinai early-warning, monitoring and verification system contributed to the improvement of political relations between Israel and Egypt. It made it more possible for political leaders to consider imaginative steps to solve some of their seemingly intractable political problems.

The political climate in Europe would have to improve before there would be enough political will to institute any trial verification zones.

There is also the reluctance on the part of both Germanies to have their territory singled out as a special arms control zone. However, if such zones were implemented they might be able to demonstrate that practical movement towards some disarmament measures could be achieved without jeopardizing the national security of the countries involved.

2. Political gestures can produce an environment which requires that solutions be found to technical problems. Bold political gestures for peace by President Anwar Sadat of Egypt broke through barriers of political and military problems and required that practical ways be found to implement peace in Sinai. In March 1975 President Sadat reopened the Suez Canal and extended the mandate for UNEF, a gesture which initiated the negotiations for the Second Sinai Disengagement Agreement. This set in motion the practical search for effective ways of separating and monitoring the military forces and ensuring early warning of attack. It was Sadat's trip to Jerusalem in November 1977 which started substantive political progress towards peace resulting in the 1979 peace treaty which, in turn, mandated new verification responsibilities and monitoring challenges. The Sinai experience demonstrated that the technical know-how and practical ingenuity is there if the political will can be found to make the decisions to proceed with arms control steps and to demand verification systems that work.

3. A trusted third party can help to ensure success in operating a verification regime. The fact that the Sinai system was mainly the responsibility of a third party, the USA, helped to deter serious violations and was a confidence-building factor in the verification system. The USA had also made substantial political and financial commitments to both Israel and Egypt. During 1978-83, Egypt and Israel received over \$25 billion in military, economic and food aid from the USA, or nearly one-third of the USA's world total.⁶

In central Europe a trusted third party might be more difficult to identify. UN peacekeeping efforts have received mixed reviews, particularly in the USSR and the USA, so the UN might not be a popular choice. However, if the decision to have a compliance and verification system was made at the Vienna M(B)FR negotiations, a joint NATO/WTO group might be assigned the responsibility. If the Stockholm Conference initiated the idea, then a trilateral grouping of NATO/WTO/neutral-non-aligned states might be the choice, or simply the neutral-non-aligned states.

The third-party states could organize themselves into a compliance commission modelled on the SALT Standing Consultative Commission and the Joint Israeli–Egyptian Military Commission to adjudicate complaints and administer the implementation of the zones. In addition to monitoring compliance and serving as a central location for the exchange of military information, such a compliance commission could also be a forum for dialogue between the nations involved concerning military strategy, doctrine and tactics.

4. High-level military commissions can provide an effective decisionmaking, planning and arbitration forum for an arms control and verification regime. The Joint Israeli–Egyptian Military Commission began meetings as a result of the Ismailiya summit in December 1977. The military commission meetings not only focused on the specific security arrangements to be made in Sinai but also had broader discussions involving military doctrines, military planning and long-term security concerns.⁷ This type of military contact at high levels could be valuable in Europe as well.

A military commission can also handle crisis complaints involving questionable military activities. The Israeli–Egyptian Joint Military Commission took responsibility for implementing and co-ordinating the military realignment, disengagement and disarmament in Sinai. It resolved many of the military disputes over, for example, definitions of artillery and field fortifications.

5. The technological and practical success in Sinai could be repeated elsewhere. The Sinai experience proved that an early-warning system or an inspection/verification system can be operational in a matter of months at relatively low cost with a small number of personnel.

The monitoring and communications equipment used in Sinai performed well, with low maintenance costs. Technological improvements and refinements in the equipment were made which illustrated the equipment's potential for dealing with the problems of larger territorial areas. Official reports about the Sinai experience estimated that, by using modern surveillance technology along a border, the reliance on visual observation posts and larger border patrols could be reduced by as much as 75 per cent.³

A verification system introduced in the Fulda Gap or along the inter-German border could use new surveillance equipment and technological options developed since the Sinai experience. Unattended ground sensors can now not only detect an intrusion but also classify it as a soldier, jeep, tank or aircraft. Watch stations can now be remotely controlled. Improvements in ground radars, imaging sensors and night-vision devices can now enable surveillance stations to detect and classify any military movements, personnel or equipment, at a range of $10-20 \text{ km.}^3$

The communications network in Sinai was secure and effective and, in itself, a confidence-building measure since Egypt, Israel and the UN forces command knew that they could receive a teletype report of a violation within five minutes of its occurrence. The same kind of communications network used in Sinai could be established in a European zone.³

A trial verification zone could serve as a testing ground to check the verifiability of a wide range of different force limitations and reductions. Rear-basing of tanks, artillery, bridging equipment, tactical strike aircraft, battlefield nuclear weapons and nuclear ammunition could be tried. Locking up all ammunition in its current locations with tamperproof locks and subjecting those sites to periodic inspections could also be tried.⁸ Electronic tags containing small radio transmitters could also be placed on all tanks so that, when those tanks move beyond a certain radius from the receiver at the tank base, the receiver automatically signals a central computer to report the tank's departure. Any tampering with the tag on the receiver would also signal the computer.⁹ Tagging tanks and locking up ammunition may seem to be simple ideas, but they could prove to be very effective.

6. Treaties and agreements provide the basis for the task of verification. The Second Sinai Disengagement Agreement and the Egyptian-Israeli Peace Treaty both provided the legal framework for the earlywarning and verification systems which were given the responsibility of assuring compliance (see appendices 16A and 16B).

Agreements or treaties implementing a trial zone would not need to resolve all the technical issues of implementation if there were a compliance commission, similar to the Sinai one, to monitor and adjust its implementation and regular functioning.

7. A combination of forces can work together successfully in a verification system. As in the Sinai system, a combination of forces could work, UN observers could assist, and a multinational monitoring group could be considered for verification work in the Fulda Gap, in central Europe, or elsewhere. Options available could, therefore, include a variety of possible arrangements such as a neutral-non-aligned monitoring group operating remotely controlled early-warning posts, calling upon UN quick-reaction inspection teams to verify detected violations, reporting to a trilateral military commission (NATO/WTO/ neutral-non-aligned), communicating violations to the states involved, and co-ordinating with WTO and NATO observation outposts on opposing sides of the border zone.

8. Zones which gradually thin out military forces in border areas can reduce the threat of attack. The Egyptian–Israeli Peace Treaty set up a graduated schema for Egyptian military forces in Sinai (see figure 16.4).⁵ At a certain distance east of Suez, Egypt was allowed one mechanized infantry division, then in the next zone, four battalions of

border patrol units equipped with only light weapons and wheeled vehicles. A border/buffer zone was the third zone with only UN forces (eventually a multinational force and observers) and Egyptian civilian police. The system of thinning out the military forces at intervals as they approached the border worked and fulfilled the security needs of both sides.

A set of graduated zones could also be envisioned along the inter-German border. An initial thin buffer/border zone could be limited to civilian national police and some number of border patrol units. The early-warning control areas could be located in the invasion corridors within this initial buffer/border zone. The next zone could allow limited military forces, perhaps local self-defence forces. And finally there could be a zone for the standing armies.

Similar schemes have for political reasons been opposed by the Federal Republic of Germany and the German Democratic Republic because they single them out for special security status and because they are diametrically opposed to the security concept of both states, which want allied defence of their territory in forward positions. However, if the FRG and the GDR are to continue along the political course of detente, sooner or later they will have to consider some of the military changes which detente clearly implies.

9. Inspection to detect violations need not offend. The experience with on-site inspection in Sinai indicated that inspections can be intensive enough to uncover violations and yet not be offensive in terms of revealing military intelligence data. The inspection report focused only on certain criteria such as troop counts, weapon counts for controlled items, and analysis of the military units according to the force limitations specified in the treaty. Military intelligence data was not sought. Undoubtedly observers were able to see a limited number of things with military intelligence value; however, there were no complaints of this nature during the Sinai experience. This experience suggests that arms control inspections can be conducted without being used for intelligence-gathering purposes.

10. Demilitarized zones and buffer zones can be effective barriers to military activity. There is a continuing debate in military and peace research circles over whether or not demilitarized zones or buffer zones would make much difference, particularly in central Europe, in a fullscale surprise attack by WTO or by NATO. Tanks can move quickly to traverse such zones, but such movement can expose them to attack before they can begin to damage the opposing force's troops and defensive fortifications. A demilitarized Sinai was preferred by both Israel and Egypt. Egypt's forward deployments in Sinai had twice made it vulnerable to Israeli surprise attacks. A demilitarized Sinai took away both countries' incentives to strike first since to do so would leave the attacker in an exposed position at an early stage.⁷

Buffer and demilitarized zones can make a marginal but important difference in limiting a potential attacker's military options. An earlywarning and verification buffer zone along the inter-German border might be one way of demonstrating, particularly to the German governments and publics, its effectiveness in increasing security.

11. The marginal improvement in warning time provided by an early-warning system and demilitarized zone can make an important difference. The Sinai early-warning system with its buffer and forcelimitation zones only provided a marginal increase in the strategic and tactical warning time of an attack. Nonetheless, that margin was considered important by both Israel and Egypt.

The Sinai system also made any warning of attack less ambiguous, reducing the risk of a miscalculation or a misreading. This was also considered important by both parties. The reassurance that the Sinai system provided added a security factor which did not exist before.

12. Military asymmetries do not have to be altered before Sinai-type arrangements are made. Military asymmetries between Egypt and Israel existed before the Sinai peacekeeping experience and they persisted after a peace treaty was signed. The Sinai early-warning, disengagement and verification process still increased security and confidence on both sides.

European arms control fora have attempted with little success to eliminate perceived military assymmetries before proceeding with constraints or mutual reductions in military arms and forces. The Sinai experience suggests that, even with persisting asymmetries, verified disengagement zones could improve the security of both sides.

13. A successful verification regime can defuse a crisis. The Sinai verification system calmed political tensions and resolved escalating accusations on a number of occasions during its six years of operation. One official Sinai report cited this example:

Even as it was preparing for its phaseout, SFM (Sinai Field Mission) was called upon to play one last critical verification role. Political tensions were rising in Israel as the date for the final withdrawal from the Sinai approached, fanned by television scenes of Jewish settlers being evicted from the Sinai settlement of Yamit by the Israeli Defense Force. Amid these tensions, the Israeli Government on 15 April 1982 unexpectedly and publicly alleged numerous violations by Egypt of the military limitations of the Peace Treaty. SFM was asked by both Parties to conduct a special inspection to check on the alleged violations. The inspection, carried out with great care on 17 April, could not confirm the existence of the alleged violations, most of which related to past deviations which had since been corrected. The submission of this SFM report helped ease the tensions of the

moment. The confidence and respect that SFM had won from the Parties for the even-handed and professional way it conducted its inspections thus paid political dividends at this critical juncture.¹⁰

There are many examples of the destructive effect of international incidents, crises and accusations in the absence of any verification system or complaints commission to defuse the crisis, disprove false accusations and facilitate communication.

IV. The paradigm's problems—can the Sinai model work in Europe?

In order to judge whether the Sinai model was in any way applicable to Europe, European arms control for a could request a demonstration based on site surveys and feasibility studies conducted either by a government agency or by a private firm similar to the US contracting firm E-Systems, which handled both the early-warning and inspection/verification phases of the Sinai operation. Such a demonstration could use the technological capabilities which are now available, and would establish the limitations of those capabilities in a European setting along the inter-German border or in the Fulda Gap. Obviously, there are differences in terrain, political setting and military circumstances. The early-warning verification system currently in use along the inter-German border is secret, but undoubtedly has technical capabilities superior to those tested in Sinai. Implementation of an early-warning, inspection and verification system on a trial basis in the Fulda Gap or along the inter-German border would allow a public demonstration and test to see whether the Sinai model is a relevant one despite the differences.

Terrain and traffic

The Sinai peninsula and the inter-German border have different natural barriers to military activity. In Sinai there are desert escarpments and shifting sands almost everywhere. The Giddi and Mitla Passes are the only places where trucks, armoured vehicles and tanks can pass. Along the inter-German border four attack corridors are usually mentioned. There are natural barriers to military penetration in all four attack corridors and on both sides of the inter-German border: mountains, rivers, canals, heaths, bogs and dense forests all pose obstacles to large-scale armoured attacks. Urbanized industrial areas are also barriers.¹¹ These barriers are not insurmountable but they delay and channel large

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attacking armoured forces, which makes their routes of advance predictable. Therefore, even though the barriers are different in Sinai and in the inter-German border attack corridors, in both places they tend to channel the attacking forces. If there are more possible attack routes in an area of the inter-German border of comparable size to the Sinai early-warning zone, then more sensors and watch stations could probably solve the problem.

In figure 16.5 the Sinai early-warning zone is superimposed on one of the attack corridors, the Fulda Gap; in figure 16.6 the topography of the area is sketched. The same superimposition can be done with the inspection and verification zones in the second phase of the Sinai experience. As also illustrated in figure 16.5, those zones would cover almost the entire inter-German border to a depth of approximately 50 km on either side of the border.



Figure 16.5. Area of the Sinai zones, superimposed on central Europe



Figure 16.6. The topography of the Fulda Gap area

In addition, the area covered by aerial inspections almost totally covers the inter-German border. Monitoring by aerial reconnaissance over Europe would require greater technical capabilities than in Sinai; these are, of course, available. The demands of such aerial reconnaissance over the inter-German border would probably be less than those required by existing military intelligence operations.

Figure 16.6 shows the topographical features of the Fulda Gap. Obviously there are more people, villages and roads on both sides of the border in the Fulda area. However, there are mountains (Geblarberg, 528 m; Kleinberg, 522 m; and Wasserkuppe, 950 m), forests (Thüringer Wald) and mountain ranges with forests (Hohe Rhön and Vorder Rhön) which tend to channel any military advances through the cross-border passes and through about 10 entry points. As much as 50–60 per cent of the area is heavily forested hills and mountains.¹² Most of the roads are small country roads, not heavily travelled, connecting small villages of 20–30 homes; and the roads run in all directions, but more often north–south than east–west. This suggests that early-warning stations on either side of the border could monitor the passes in much the same way as those in Sinai, except that the Fulda area would appear to require more watch stations.

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Although an area like Fulda would have more 'clutter' (traffic, urban areas, industries and people) to filter out of any early-warning system, the Sinai early-warning system was able to filter out a good deal of clutter of this kind.⁸ Every day over 200 vehicles in Sinai triggered the detection devices; and every vehicle was visually spotted and identified. Every month there were thousands of other sensor activations including numerous activations caused by some of the 80 000 Bedouins living in Sinai with their herds of camels. Monitors in Sinai were able to detect small intrusions and distinguish between types of intrusion. Judging from the small roads and villages in an area such as the Fulda Gap, the civilian clutter problem may not be as damaging to a verification system as one might expect. How much clutter exists in the Fulda Gap and how easily an early-warning system could identify alarming military movements are questions that can only be answered by actually implementing a trial zone.

Political setting

The political setting in Sinai was different from that in Europe. The Sinai experience followed 30 years of a state of war between Israel and Egypt, whereas Europe has experienced 40 years of peace. The Sinai system was established to facilitate the return of Sinai territory to Egyptian sovereignty, to secure a disengagement of military forces, and to impose a buffer zone between the two sides. In central Europe the FRG and the GDR have been at peace and have traditionally resisted suggestions that imply that their countries become special military or arms control zones, or that would appear to perpetuate the division of Germany.

Military disengagement plans for central Europe and specifically for the FRG and the GDR have been proposed for many years. The reluctance to consider such plans might be overcome if a verification system similar to the Sinai experience were seen as a useful mechanism for the two German states to co-operate in taking more independent control of their defence, if the decision to implement such a system had the approval of their respective alliances, and if it were part of a larger process of political detente.

The Soviet position on verification has tended to be that verification is justified when there are specific reductions and limitations to verify: this suggests that the ideas presented here would be more acceptable if they were part of a treaty or formal agreement which embodied actual reductions in forces or weaponry. There are earlier Soviet proposals which put forward suggestions on similar lines to the Sinai-type arrangements. On 21 July 1955 Chairman Bulganin, chairman of the Soviet Council of Ministers, proposed control points in Europe with observers to monitor military movements at key positions.¹³ In 1958 there was another proposal from the USSR for 28 jointly manned control points in central Europe and an 800 km wide zone for aerial inspection along the East–West border.¹⁴ In 1982 at the M(B)FR talks in Vienna the WTO powers agreed to monitoring posts on east European territory during the proposed seven-year reduction period. There seems no reason to conclude, therefore, that the ideas suggested here would necessarily be unacceptable.

The Four Powers Agreement

There is a further reason for thinking that a monitoring system might be acceptable: it already exists in a limited way under the implementation of the Four Powers Agreement.

There has been both formal and informal security co-operation between the four former occupying powers in Germany (the UK, France, the USA and the USSR). Former Brigadier-General Christian Krause of the FRG has cited this co-operation as an effective confidence-building measure:

Even during the Cold War the links between the four powers have never been severed. Common bodies, like the Allied Air Traffic Control Center in Berlin, unilateral measures, like the allied responsibility for the airspace and at the German/German border, as well as long-standing contacts like the exchange of military missions, ensure that for each of the four powers the military behaviour of the other side is transparent and that in practical terms no real danger of a surprise attack exists.¹⁵

General Krause has described a network of relations among the four former occupying powers which has been established through formal mechanisms such as the Allied Control Council, the exchange of military missions, the Four Power Air Traffic Control Center in Berlin and through informal mechanisms such as personal contacts and consultations between the military leadership of the French, British and US commands in the FRG and the Soviet command in the GDR. This system of formal and informal mechanisms has apparently given these four powers considerable access to monitor air and ground military activities on opposite sides of the inter-German border. The USSR has had three military missions in the FRG located in Bünde, Frankfurt and Baden-Oos while Britain, France and the USA have had military missions in the GDR, all located in Potsdam. According to General Krause, these military missions have had considerable freedom to travel. Intelligence gathering seems to be a mutually accepted part of

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their work. The Four Power Air Traffic Control Center in Berlin has provided such extensive airspace monitoring capabilities to all four powers that General Krause has asserted that "practically no air traffic could take place in the GDR air space which would escape observation by the Western powers".¹⁶ Other assessments of the functioning of the exchange of military missions are not as optimistic as General Krause, and they point to the more restricted access allowed France, the UK and the USA in GDR when compared to the more extensive access available to the Soviet missions in the FRG.¹⁷ The experience of the Four Powers Agreement implementation and the recent agreement by the WTO at the M(B)FR talks to allow inspections of troop reductions and monitoring posts at exit and entry points both indicate that the idea of surveillance stations on either side of the Fulda Gap or on either side of a buffer/border zone along the inter-German border could be acceptable propositions to the WTO and NATO.

Military circumstances

There are obvious differences between the military circumstances of Sinai and of central Europe—and also some similarities. In both areas, there was the concern to find ways of preventing surprise attacks.

However, NATO and the WTO have both emphasized forward defence and forward basing of troops and equipment in central Europe, since neither side was willing to relinquish territory if hostilities broke out. Israel and Egypt—partly, of course, because Sinai is largely virtually uninhabited desert—have come to a different conclusion. War experience has suggested that there are no clear military advantages to be gained by controlling Sinai and pre-positioning troops and certain weapons there.⁷ They therefore agreed to choose the option of arms control, early-warning and verification measures in a buffer zone. This choice was, of course, part and parcel of a more general process of establishing a peace treaty between the two countries.

It is not inconceivable that, if there was some more general progress in building confidence between the two sides in Europe, NATO and the WTO might also see advantages in a zone from which certain constraints are put on military deployment: the Sinai experience might then be found to be useful and applicable.

There are obviously problems in adapting the Sinai paradigm for Europe and superimposing it on the Fulda Gap or along the inter-German border. The differences are important ones. Some of them can be overcome, some cannot. The terrain is different and more complicated to monitor. The political problems are different, difficult and unresolved at the moment. The military situation is more complex. However, the Sinai experience seems to have enough strong, adaptable features and characteristics to still recommend it for serious consideration as a model, particularly on a trial basis. It may be a useful model if there is also a common European effort to address the underlying political and military problems. Then, this might be one way in which progress could be made toward a more secure and less confrontational military situation in Europe.

Notes and references

- 1. Dean, J., 'MBFR: from apathy to accord', International Security, Spring 1983, p. 116.
- 2. The calculation of military expenditures for central Europe is based on proportions cited by Jonathan Dean (note 1). SIPRI figures have been used to update and replace the world military expenditure figures of the United Nations cited in the following paragraph from Dean's article:

"Not only the risks, but the actual costs of the confrontation in Central Europe are immense. In the early 1980s, the United Nations estimated the world expenditure for armed forces at over \$500 billion annually. About half of this sum is spent on NATO and Warsaw Pact forces in Central Europe. The United States spends roughly 50 percent and the Soviet Union about 60 percent of their total military budgets on these forces. The NATO countries with forces in the area—the Federal Republic of Germany, United Kingdom, Canada, and the Benelux countries—are also spending about 60 percent of their combined military expenditures on these forces. The Warsaw Pact countries located in the MBFR reduction area—the German Democratic Republic, Czechosolvakia, and Poland—are spending about 95 percent of their total estimated annual outlay on armed forces, on their ground and air forces in central Europe, for a total, from both alliances of nearly \$250 billion annually."

See note 1, p. 117.

- 3. Details regarding the operation of the Sinai peacekeeping experience are drawn from the following publications: Crawford, A., Cleminson, F.R., Grant, A.A. and Gilmore, E., Compendium of Arms Control Verification Proposals, 2nd ed., ORAE Report No. R81, March 1982, Department of National Defence, Ottawa, Canada, Proposal abstracts A12-14, pp. 16-23; Kolcum, E., 'New sensors evaluated in Sinai buffer', Aviation Week & Space Technology, 23 August 1976, pp. 40-42; Peace in the Sinai, US Department of State publication, 1982; Watch in the Sinai, US Department of State publication, 1980; General Foreign Policy Series 321; and SSM. US Sinai Support Mission Reports to US Congress, 13 bi-annual reports, 1976-1982, Washington, DC (c/o Department of State).
- 4. Second Sinai Disengagement Agreement, 1 September 1975 (see Appendix 20A).
- 5. Treaty of Peace between the Arab Republic of Egypt and the State of Israel, 26 March 1979 (see appendix 16B).
- 6. Hamilton, L., editorial, The New York Times, 28 March 1982.
- Evron, Y., 'Arms control in Middle East: some proposals and their confidence-building roles', *The Future of Arms Control: Part III. Confidence-Building Measures*, Adelphi Paper No. 149 (International Institute of Strategic Studies, London, 1979).
- 8. Alford, J., 'Confidence-building measures in Europe: the military aspects', The Future of Arms Control: Part III (note 7).
- 9. 'New products and processes', Newsweek, 1 August 1983, p. 3. This article describes how electronic bracelets are now being used in the United States to monitor the movement of prisoners who are confined to their homes for committing minor crimes. The bracelets contain radio transmitters that broadcast signals to a receiver attached to the prisoner's home phone. If the bracelet moves beyond a 60-m radius, the receiver automatically contacts a central computer to report the prisoner's departure. Any tampering with the bracelet or receiver also signals the computer. Tagging tanks or bridging equipment can be technically done in the same way and could prove to be effective.

- 10. See Peace in the Sinai (note 3), p. 22.
- 11. Mearsheimer, J., 'Why the Soviets cannot win quickly in central Europe', International Security, Summer 1982, pp. 3-39.
- 12. Karber, P., 'In defense of forward defense', Armed Forces Journal International, May 1984. This article includes a satellite photo/map entitled 'Terrain defensibility of West Germany' (pp. 33-34), which is described thus:

Luckily, much of the terrain of West Germany is particularly favorable for the defense ... While there are no insurmountable obstacles and the Rhine is the only significant anti-tank barrier, most of the terrain is broken by stretches of forest (the hilly woods of central and southern Germany) or soft soil (the marshes of northern Germany) ... Likewise, one looks in vain for the Fulda *gap*, which in reality is merely a series of narrow mini-gaps...

See also note 11 for another description of the Fulda Gap.

- 13. Krause, C., 'Theory and conception of CBM in East and West', study for the Research Institute of the Friedrich-Ebert-Stiftung, Bonn, FR Germany, 1980, pp. 16-17.
- Frye, A. 'Building confidence between adversaries: an American's perspective', in Birnbaum, K. (ed.), Confidence Building and East-West Relations, Luxembourg Papers, March 1983.
- 15. Krause, C., 'How effective are military confidence-building measures?' papers for the Friedrich Ebert-Stiftung, Bonn, FR Germany, July 1982.

17. See note 8; and Hansen, L., 'Confidence building in Europe: problems and perspectives', in Birnbaum (note 14).

^{16.} See note 15, p. 3.

Appendix 16A. Second Sinai Disengagement Agreement, Egypt and Israel, September 1, 1975

A. Egyptian-Israeli Accord

The Government of the Arab Republic of Egypt and the Government of Israel have agreed that:

ARTICLE 1

The conflict between them and in the Middle East shall not be resolved by military force but by peaceful means.

The agreement concluded by the parties Jan. 18, 1974, within the framework of the Geneva peace conference, constituted a first step towards a just and durable peace according to the provisions of Security Council Resolution 338 of Oct. 22, 1973: and they are determined to reach a final and just peace settlement by means of negotiations called for by Security Council Resolution 338, this agreement being a significant step towards that end.

ARTICLE II

The parties hereby undertake not to resort to the threat or use of force or military blockade against each other.

ARTICLE III

(1) The parties shall continue scrupulously to observe the cease-fire on land, sea and air and to refrain from all military or paramilitary actions against each other.

(2) The parties also confirm that the obligations contained in the annex and when concluded, the protocol, shall be an integral part of this agreement.

ARTICLE IV

A. The military forces of the parties shall be deployed in accordance with the following principles:

(1) All Israeli forces shall be deployed east of the lines designated as lines J and M on the attached map.

(2) All Egyptian forces shall be deployed west of the line designated as line E on the attached map.

(3) The area between the lines designated on the attached map as lines E and F and the area between the lines designated on the attached map as lines J and K shall be limited in armament and forces. (4) The limitations on armament and forces in the areas described by paragraph (3) above shall be agreed as described in the attached annex.

(5) The zone between the lines designated on the attached map as lines E and J will be a buffer zone. On this zone the United Nations Emergency Force will continue to perform its functions as under the Egyptian-Israeli agreement of Jan. 18, 1974.

(6) In the area south from line E and west from line M, as defined in the attached map, there will be no military forces, as specified in the attached annex.

B. The details concerning the new lines, the redeployment of the forces and its timing, the limitation of armaments and forces, aerial reconnaissance, the operation of the early warning and surveillance installations and the use of the roads, the U.N. functions and other arrangements will all be in accordance with the provisions of the annex and map which are an integral part of this agreement and of the protocol which is to result from negotiations pursuant to the annex and which, when concluded, shall become an integral part of this agreement.

ARTICLE V

The United Nations Emergency Force is essential and shall continue its functions, and its mandate shall be extended annually.

ARTICLE VI

The parties hereby establish a joint commission for the duration of this agreement. It will function under the aegis of the chief coordinator of the United Nations peace-keeping missions in the Middle East in order to consider any problem arising from this agreement and to assist the United Nations Emergency Force in the execution of its mandate. The joint commission shall function in accordance with procedures established in the protocol.

ARTICLE VII

Nonmilitary cargoes destined for or coming from Israel shall be permitted through the Suez Canal.

ARTICLE VIII

(1) This agreement is regarded by the parties as a significant step toward a just and lasting peace. It is not a final peace agreement.

(2) The parties shall continue their efforts to negotiate a final peace agreement within the framework of the Geneva peace conference in

B. U.S. Proposal for an Early-Warning System

In connection with the early-warning system referred to in Article 1V of the agreement between Egypt and Israel concluded on this date and as an integral part of that agreement (hereafter referred to as the basic agreement), the United States proposes the following:

[1]

The early-warning system to be established in accordance with Article IV in the area shown on the attached map will be entrusted to the United States. It shall have the following elements:

A. There shall be two surveillance stations to provide strategic early warning, one operated by Egyptian and one operated by Israeli personnel. Their locations are shown on the map attached to the basic agreement. Each station shall be manned by not more than 250 technical and administrative personnel. They shall perform the functions of visual and electronic surveillance only within their stations.

B. In support of these stations, to provide tactical early warning and to verify access to them, three watch stations shall be established by the United States in the Mitla and Gidi passes as will be shown on the agreed map.

These stations shall be operated by United States civilian personnel. In support of these stations, there shall be established three unmanned electronic-sensor fields at both ends of each pass and in the general vicinity of each station and the roads leading to and from those stations.

[2]

The United States civilian personnel shall perform the following duties in connection with the operation and maintenance of these stations:

A. At the two surveillance stations described in paragraph 1A, above, United States personnel will verify the nature of the operations of the stations and all movement into and out of each station and will immediately report any detected divergency from its authorized role of visual and electronic surveillance to the parties to the basic agreement and the UNEF. accordance with Security Council Resolution 338.

ARTICLE IX

This agreement shall enter into force upon signature of the protocol and remain in force until superseded by a new agreement.

B. At each watch station described in paragraph 1B above, the United States personnel will immediately report to the parties to the basic agreement and to UNEF any movement of armed forces, other than the UNEF, into either pass and any observed preparations for such movement.

C. The total number of United States civilian personnel assigned to functions under these proposals shall not exceed 200. Only civilian personnel shall be assigned to functions under these proposals.

[3]

No arms shall be maintained at the stations and other facilities covered by these proposals, except for small arms required for their protection.

[4]

The United States personnel serving the early-warning system shall be allowed to move freely within the area of the system.

[5]

The United States and its personnel shall be entitled to have such support facilities as are reasonably necessary to perform their functions.

[6]

The United States personnel shall be immune from local criminal, civil, tax and customs jurisdiction and may be accorded any other specific privileges and immunities provided for in the UNEF agreement of Feb. 13, 1957.

[7]

The United States affirms that it will continue to perform the functions described above for the duration of the basic agreement.

[8]

Notwithstanding any other provisions of these proposals, the United States may withdraw its personnel only if it concludes that their safety is jeopardized or that continuation of their role is no longer necessary. In the latter case the parties to the basic agreement will be informed in advance in order to give them the opportunity to make alternative arrangements. If both parties to the basic agreement request the United States to conclude its role under this proposal, the United States will consider such requests conclusive.

[9]

Technical problems including the location of the watch stations will be worked out through consultation with the United States.

C. Annex to the Sinai Agreement

Within five days after the signature of the Egypt-Israel agreement, representatives of the two parties shall meet in the military working group of the Middle East peace conference at Geneva to begin preparation of a detailed protocol for the implementation of the agreement. In order to facilitate preparation of the protocol and implementation of the agreement, and to assist in maintaining the scrupulous observance of the cease-fire and other elements of the agreement, the two parties have agreed on the following principles, which are an integral part of the agreement, as guidelines for the working group.

1. Definitions of Lines and Areas

The deployment lines, areas of limited forces and armaments, buffer zones, the area south from line E and west from line M, other designated areas, road sections for common use and other features referred to in Article IV of the agreement shall be as indicated on the attached map (1:100,000–U.S. edition).

2. Buffer Zones

(a) Access to the buffer zones shall be controlled by the UNEF, according to procedures to be worked out by the working group and UNEF.

(b) Aircraft of either party will be permitted to fly freely up to the forward line of that party. Reconnaissance aircraft of either party may fly up to the middle line of the buffer zone between E and J on an agreed schedule.

(c) In the buffer zone, between line E and J, there will be established under Article IV of the agreement an early-warning system entrusted to United States civilian personnel as detailed in a separate proposal, which is a part of this agreement.

(d) Authorized personnel shall have access to the buffer zone for transit to and from the earlywarning system; the manner in which this is carried out shall be worked out by the working group and UNEF.

3. Area South of Line E and West of Line M

(a) In this area, the United Nations Emergency Force will assure that there are no military or paramilitary forces of any kind, military fortifications and military installations; it will establish checkpoints and have the freedom of movement necessary to perform this function.

(b) Egyptian civilians and third-country civilian oil-field personnel shall have the right to enter, exit from, work and live in the aboveindicated area, except for buffer zones 2A, 2B and the U.N. posts. Egyptian civilian police shall be allowed in the area to perform normal civil police functions among the civilian population in such numbers and with such weapons and equipment as shall be provided for in the protocol.

(c) Entry to and exit from the area, by land, by air or by sea, shall be only through UNEF checkpoints. UNEF shall also establish checkpoints along the road, the dividing line and at other points, with the precise locations and number to be included in the protocol.

(d) Access to the airspace and the coastal area shall be limited to unarmed Egyptian civilian vessels and unarmed civilian helicopters and transport planes involved in the civilian activities of the area, as agreed by the working group.

(c) Israel undertakes to leave intact all currently existing civilian installations and infrastructures.

(f) Procedures for the use of the common sections of the coastal road along the Gulf of Suez shall be determined by the working group and detailed in the protocol.

4. Aerial Surveillance

There shall be a continuation of aerial reconnaissance missions by the U.S. over the areas covered by the agreement following the same procedures already in practice. The missions will ordinarily be carried out at a frequency of one mission every seven to 10 days, with either party or UNEF empowered to request an earlier mission. The U.S. will make the mission results available expeditiously to Israel, Egypt and the chief coordinator of the U.N. peace-keeping mission in the Middle East.

5. Limitation of Forces and Armaments

(a) Within the areas of limited forces and armaments the major limitations shall be as follows:

(1) Eight (8) standard infantry battalions.

(2) Seventy-five (75) tanks.

(3) Sixty (60) artillery pieces, including heavy mortars (i.e. with caliber larger than 120 mm), whose range shall not exceed twelve (12) km.

(4) The total number of personnel shall not exceed eight thousand (8,000).

(5) Both parties agree not to station or locate in the area weapons which can reach the line of the other side.

(6) Both parties agree that in the areas between lines J and K, and between line A (of the disengagement agreement of Jan. 18, 1974) and line E, they will construct no new fortifications or installations for forces of a size greater than that agreed herein.

(b) The major limitations beyond the areas of limited forces and armament will be:

(1) Neither side will station nor locate any

weapon in areas from which they can reach the other line.

(2) The parties will not place antiaircraft missiles within an area of 10 kilometers east of line K and west of line F, respectively.

(c) The U.N. Force will conduct inspections in order to insure the maintenance of the agreed limitations within these areas.

6. Process of Implementation

The detailed implementation and timing of the redeployment of forces, turnover of oil fields and other arrangements called for by the agreement, annex and protocol shall be determined by the working group, which will agree on the stages of this process, including the phased movement of Egyptian troops to line E and Israeli troops to line J. The first phase will be the transfer of the oil fields and installations to Egypt. This process will begin within two weeks from the signature of the protocol with the introduction of the necessary technicians, and it will be completed no later than eight weeks after it begins. The details of the phasing will be worked out in the military working group.

Implementation of the redeployment shall be completed within five months after signature of the protocol.

Appendix 16B. Treaty of Peace between the Arab Republic of Egypt and the State of Israel

The Government of the Arab Republic of Egypt and the Government of the State of Israel;

PREAMBLE

Convinced of the urgent necessity of the establishment of a just, comprehensive and lasting peace in the Middle East in accordance with Security Council Resolutions 242 and 338;

Reaffirming their adherence to the "Framework for Peace in the Middle East Agreed at Camp David," dated September 17, 1978;

Noting that the aforementioned Framework as appropriate is intended to constitute a basis for peace not only between Egypt and Israel but also between Israel and each of its other Arab neighbors which is prepared to negotiate peace with it on this basis;

Desiring to bring to an end the state of war between them and to establish a peace in which every state in the area can live in security;

Convinced that the conclusion of a Treaty of Peace between Egypt and Israel is an important step in the search for comprehensive peace in the area and for the attainment of the settlement of the Arab-Israeli conflict in all its aspects;

Inviting the other Arab parties to this dispute to join the peace process with Israel guided by and based on the principles of the aforementioned Framework;

Desiring as well to develop friendly relations and cooperation between themselves in accordance with the United Nations Charter and the principles of international law governing international relations in times of peace;

Agree to the following provisions in the free exercise of their sovereignty, in order to implement the "Framework for the Conclusion of a Peace Treaty Between Egypt and Israel";

ARTICLE I

1. The state of war between the Parties will be terminated and peace will be established between them upon the exchange of instruments of ratification of this Treaty.

2. Israel will withdraw all its armed forces and civilians from the Sinai behind the international boundary between Egypt and mandated Palestine, as provided in the annexed protocol (Annex I), and Egypt will resume the exercise of its full sovereignty over the Sinai. 3. Upon completion of the interim withdrawal provided for in Annex I, the Parties will establish normal and friendly relations, in accordance with Article III (3).

ARTICLE II

The permanent boundary between Egypt and Israel is the recognized international boundary between Egypt and the former mandated territory of Palestine, as shown on the map at Annex II, without prejudice to the issue of the status of the Gaza Strip. The Parties recognize this boundary as inviolable. Each will respect the territorial integrity of the other, including their territorial waters and airspace.

ARTICLE III

1. The Parties will apply between them the provisions of the Charter of the United Nations and the principles of international law governing relations among states in times of peace. In particular:

a. They recognize and will respect each other's sovereignty, territorial integrity and political independence;

b. They recognize and will respect each other's right to live in peace within their secure and recognized boundaries;

c. They will refrain from the threat or use of force, directly or indirectly, against each other and will settle all disputes between them by peaceful means.

2. Each Party undertakes to ensure that acts or threats of belligerency, hostility, or violence do not originate from and are not committed from within its territory, or by any forces subject to its controls or by any other forces stationed on its territory, against the population, citizens, or property of the other Party. Each Party also undertakes to refrain from organizing, instigating, inciting, assisting or participating in acts or threats of belligerency, hostility, subversion or violence against the other Party, anywhere, and undertakes to ensure that perpetrators of such acts are brought to justice.

3. The Parties agree that the normal relationship established between them will include full recognition, diplomatic, economic and cultural relations, termination of economic boycotts and discriminatory barriers to the free movement of people and goods, and will guarantee the mutual enjoyment by citizens of the due process of law. The process by which they undertake to achieve such a relationship parallel to the implementation of other provisions of this Treaty is set out in the annexed protocol (Annex III).

ARTICLE IV

1. In order to provide maximum security for both Parties on the basis of reciprocity, agreed security arrangements will be established including limited force zones in Egyptian and Israeli territory, and United Nations forces and observers, described in detail as to nature and timing in Annex I, and other security arrangements the Parties may agree upon.

2. The Parties agree to the stationing of United Nations personnel in areas described in Annex I. The Parties agree not to request withdrawal of the United Nations personnel and that these personnel will not be removed unless such removal is approved by the Security Council of the United Nations, with the affirmative vote of the five Permanent Members, unless the Parties otherwise agree.

3. A Joint Commission will be established to facilitate the implementation of the Treaty, as provided for in Annex I.

4. The security arrangements provided for in paragraphs 1 and 2 of this Article may at the request of either party be reviewed and amended by mutual agreement of the Parties.

ARTICLE V

1. Ships of Israel, and cargoes destined for or coming from Israel, shall enjoy the right of free passage through the Suez Canal and its approaches through the Gulf of Suez and the Mediterranean Sea on the basis of the Constantinople Convention of 1888, applying to all nations. Israeli nationals, vessels and cargoes, as well as persons, vessels and cargoes destined for or coming from Israel, shall be accorded non-discriminatory treatment in all matters connected with usage of the canal.

2. The Parties consider the Strait of Tiran and the Gulf of Aqaba to be international waterways open to all nations for unimpeded and non-suspendable freedom of navigation and overflight. The Parties will respect each other's right to navigation and overflight for access to either country through the Strait of Tiran and the Gulf of Aqaba.

ARTICLE VI

1. This Treaty does not affect and shall not be interpreted as affecting in any way the rights

and obligations of the Parties under the Charter of the United Nations.

2. The Parties undertake to fulfill in good faith their obligations under this Treaty, without regard to action or inaction of any other party and independently of any instrument external to this Treaty.

3. They further undertake to take all the necessary measures for the application in their relations of the provisions of the multilateral conventions to which they are parties, including the submission of appropriate notification to the Secretary General of the United Nations and other depositaries of such conventions.

4. The Parties undertake not to enter into any obligation in conflict with this Treaty.

5. Subject to Article 103 of the United Nations Charter, in the event of a conflict between the obligations of the Parties under the present Treaty and any of their other obligations, the obligations under this Treaty will be binding and implemented.

ARTICLE VII

1. Disputes arising out of the application or interpretation of this Treaty shall be resolved by negotiations.

2. Any such disputes which cannot be settled by negotiations shall be resolved by conciliation or submitted to arbitration.

ARTICLE VIII

The Parties agree to establish a claims commission for the mutual settlement of all financial claims.

ARTICLE IX

1. This Treaty shall enter into force upon exchange of instruments of ratification.

2. This Treaty supersedes the Agreement between Egypt and Israel of September, 1975.

3 All protocols, annexes, and maps attached to this Treaty shall be regarded as an integral part hereof.

The Treaty shall be communicated to the Secretary General of the United Nations for registration in accordance with the provisions of Article 102 of the Charter of the United Nations.

DONE at Washington, D.C. this 26th day of March, 1979, in triplicate in the English, Arabic, and Hebrew languages, each text being equally authentic. In case of any divergence of interpretation, the English text shall prevail. For the Government of the Arab Republic of Egypt:

Mohamed Anwar El-Sadat

For the Government of Israel:

Menachem Begin

Annex 1. Protocol Concerning Israeli Withdrawal and Security Arrangements

ARTICLE I

Concept of Withdrawal

1. Israel will complete withdrawal of all its armed forces and civilians from the Sinai not later than three years from the date of exchange of instruments of ratification of this Treaty.

2. To ensure the mutual security of the Parties, the implementation of phased withdrawal will be accompanied by the military measures and establishment of zones set out in this Annex and in Map I, hereinafter referred to as "the Zones".

3. The withdrawal from the Sinai will be accomplished in two phases:

a. The interim withdrawal behind the line from east of El Arish to Ras Muhammed as delineated on Map 2 within nine months from the date of exchange of instruments of ratification of this Treaty.

b. The final withdrawal from the Sinai behind the international boundary not later than three years from the date of exchange of instruments of ratification of this Treaty.

4. A Joint Commission will be formed immediately after the exchange of instruments of ratification of this Treaty in order to supervise and coordinate movements and schedules during the withdrawal, and to adjust plans and timetables as necessary within the limits established by paragraph 3, above. Details relating to the Joint Commission are set out in Article IV of the attached Appendix. The Joint Commission will be dissolved upon completion of final Israeli withdrawal from the Sinai.

ARTICLE II

Determination of Final Lines and Zones

1. In order to provide maximum security for both Parties after the final withdrawal, the lines and the Zones delineated on Map 1 are to be established and organized as follows: Witnessed by:

Jimmy Carter, President of the United States of America

a. Zone A

(1) Zone A is bounded on the east by line A (red line) and on the west by the Suez Canal and the east coast of the Gulf of Suez, as shown on Map 1.

(2) An Egyptian armed force of one mechanized infantry division and its military installations, and field fortifications, will be in this Zone.

(3) The main elements of that Division will consist of:

- (a) Three mechanized infantry brigades.
- (b) One armored brigade.
- (c) Seven field artillery battalions including up to 126 artillery pieces.
- (d) Seven anti-aircraft artillery battalions including individual surface-to-air missiles and up to 126 anti-aircraft guns of 37 mm and above.
- (e) Up to 230 tanks
- (f) Up to 480 armored personnel vehicles of all types.
- (g) Up to a total of twenty-two thousand personnel.
- b. Zone B

(1) Zone B is bounded by line B (green line) on the east and by line A (red line) on the west, as shown on Map 1.

(2) Egyptian border units of four battalions equipped with light weapons and wheeled vehicles will provide security and supplement the civil police in maintaining order in Zone B. The main elements of the four Border Battalions will consist of up to a total of four thousand personnel.

(3) Land based, short range, low power, coastal warning points of the border patrol units may be established on the coast of this Zone.

(4) There will be in Zone B field fortifications and military installations for the four border battalions.

c. Zone C

(1) Zone C is bounded by line B (green line) on the west and the International Boundary and the Gulf of Aqaba on the east, as shown on Map 1.

(2) Only United Nations forces and Egyptian civil police will be stationed in Zone C.

(3) The Egyptian civil police armed with light weapons will perform normal police functions within this Zone.

(4) The United Nations Force will be deployed within Zone C and perform its functions as defined in Article VI of this Annex.

(5) The United Nations Force will be stationed mainly in camps located within the following stationing areas shown on Map 1, and will establish its precise locations after consultations with Egypt:

- (a) In that part of the area in the Sinai lying within about 20 km of the Mediterranean Sea and adjacent to the International Boundary.
- (b) In the Sharm el Sheikh area.

d. Zone D

Zone D is bounded by line D (blue line) on the east and the international boundary on the west, as shown on Map 1.
In this Zone there will be an Israeli limited force of four infantry battalions, their military installations and field fortifications, and the United Nations observers.

(3) The Israeli forces in Zone D will not include tanks, artillery and anti-aircraft missiles except individual surface-to-air missiles.

(4) The main elements of the four Israeli infantry battalions will consist of up to 180 armored personnel vehicles of all types and up to a total of four thousand personnel.

2. Access across the international boundary shall only be permitted through entry check points designated by each Party and under its control. Such access shall be in accordance with laws and regulations of each country.

3. Only those field fortifications, military installations, forces, and weapons specifically permitted by this Annex shall be in the Zones.

ARTICLE III

Aerial Military Regime

1. Flights of combat aircraft and reconnaissance flights of Egypt and Israel shall take place only over Zones A and D, respectively.

2. Only unarmed non-combat aircraft of Egypt and Israel will be stationed in Zones A and D respectively.

3. Only Egyptian unarmed transport air-

craft will take off and land in Zone B and up to eight such aircraft may be maintained in Zone B. The Egyptian border units may be equipped with unarmed helicopters to perform their functions in Zone B.

4. The Egyptian civil police may be equipped with unarmed police helicopters to perform normal police functions in Zone C.

5. Only civilian airfields may be built in the Zones.

6. Without prejudice to the provisions of this Treaty, only those military aerial activities specifically permitted by this Annex shall be allowed in the Zones and the airspace above their territorial waters.

ARTICLE IV

Naval Regime

1. Egypt and Israel may base and operate naval vessels along the coasts of Zone A and D, respectively.

2. Egyptian coast guard boats, lightly armed, may be stationed and operate in the territorial waters of Zone B to assist the border units in performing their functions in this Zone.

3. Egyptian civil police equipped with light boats, lightly armed, shall perform normal police functions within the territorial waters of Zone C.

4. Nothing in this Annex shall be considered as derogating from the right of innocent passage of the naval vessels of either party.

5. Only civilian maritime ports and installations may be built in the Zones.

6. Without prejudice to the provisions of this Treaty, only those naval activities specifically permitted by this Annex shall be allowed in the Zones and in their territorial waters.

ARTICLE V

Early Warning Systems

Egypt and Israel may establish and operate early warning systems only in Zones A and D respectively.

ARTICLE VI

United Nations Operations

1. The Parties will request the United Nations to provide forces and observers to supervise the implementation of this Annex and employ their best efforts to prevent any violation of its terms.

2. With respect to these United Nations forces and observers, as appropriate, the Parties agree to request the following arrangements:

a. Operation of check points, reconnaissance patrols, and observation posts along the international boundary and line B, and within Zone C.

b. Periodic verification of the implementation of the provisions of this Annex will be carried out not less than twice a month unless otherwise agreed by the Parties.

c. Additional verifications within 48 hours after the receipt of a request from either Party.

d. Ensuring the freedom of navigation through the Strait of Tiran in accordance with Article V of the Treaty of Peace.

3. The arrangements described in this article for each zone will be implemented in Zones A, B and C by the United Nations Force and in Zone D by the United Nations Observers.

4. United Nations verification teams shall be accompanied by liaison officers of the respective Party.

5. The United Nations Force and Observers will report their findings to both Parties.

6. The United Nations Force and Observers operating in the Zones will enjoy freedom of movement and other facilities necessary for the performance of their tasks.

7. The United Nations Force and Observers are not empowered to authorize the crossing of the international boundary.

8. The Parties shall agree on the nations from which the United Nations Force and Observers will be drawn. They will be drawn from nations other than those which are permanent members of the United Nations Security Council.

9. The Parties agree that the United Nations should make those command arrangements that will best assure the effective implementation of its responsibilities.

ARTICLE VII

Liaison System

1. Upon dissolution of the Joint Commission, a liaison system between the Parties will be established. This liaison system is intended to provide an effective method to assess progress in the implementation of obligations under the present Annex and to resolve any problem that may arise in the course of implementation, and refer other unresolved matters to the higher military authorities of the two countries respectively for consideration. It is also intended to prevent situations resulting from errors or misinterpretation on the part of either Party.

2. An Egyptian liaison office will be established in the city of El-Arish and an Israel liaison office will be established in the city of Beer-Sheba. Each office will be headed by an officer of the respective country, and assisted by a number of officers.

3. A direct telephone link between the two offices will be set up and also direct telephone lines with the United Nations command will be maintained by both officers.

ARTICLE VIII

Respect for War Memorials

Each party undertakes to preserve in good condition the War Memorials erected in the memory of soldiers of the other Party, namely those erected by Israel in the Sinai and those to be erected by Egypt in Israel, and shall permit access to such monuments.

ARTICLE IX

Interim Arrangements

The withdrawal of Israeli armed forces and civilians behind the interim withdrawal line, and the conduct of the forces of the Parties and the United Nations prior to the final withdrawal, will be governed by the attached Appendix and Maps 2 and 3.

Part V. A conflict study: Afghanistan

Chapter 17. The conflict in Afghanistan

Introduction / Historical background / Administration by the PDPA, 1978-79 / The Soviet military intervention / Soviet strategy and tactics / The Afghan resistance / Regional consequences: Pakistan / Proposals for a political solution / Conclusion

17. The conflict in Afghanistan

JEAN-CHRISTOPHE VICTOR, political scientist, France

Superscript numbers refer to the list of notes and references at the end of the chapter.

I. Introduction

An analysis of the conflict in Afghanistan poses a dual problem of data and sources. Neither of the two parties involved in the war—the Red Army and the armed Afghan resistance—provides precise, quantified information. The Soviet Defence Ministry does not give casualty figures (for dead or wounded), describe the type of equipment used, or give the strength of its forces on Afghan soil. As for the armed Afghan resistance groups, they are wholly unfamiliar with modern methods of providing information to the media. Pride and bravado, rather than a desire to make propaganda, almost always lead them to exaggeration. They provide no reliable written data, quite simply because they have none.

The analyst of the conflict must therefore rely on oral rather than written sources, on testimony rather than facts and figures, and on accounts of seemingly reliable eye-witnesses—observers from the West in general, and France in particular; Western military analysts; members of the Afghan resistance, many of whom were educated in the German–Afghan or French–Afghan secondary schools; deserters from the Afghan Army; and prisoners or deserters from the Red Army. It proved impossible to interview any Soviet officer stationed in Afghanistan.

In this chapter, a brief reminder of the historical rivalry between Russia and Great Britain over Afghanistan in the 19th century is followed by an account of relations between the Soviet Union and Afghanistan in the 20th century; the purpose is to put the two pro-Soviet *coups d'état* of April 1978 and December 1979 in a historical perspective. In the next sections the Soviet military intervention is discussed, with an analysis of the changes in Soviet tactics during the past five years.

On the Afghan side, an explanation of some of the socio-cultural causes of the divisions in Afghanistan is followed by a description of the various assault tactics devised by the resistance.

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Finally, after consideration of the direct repercussions of the war and the enormous migration to Pakistan it has provoked, a brief look is taken at the diplomatic aspects of the situation. No serious effort has been made to date to find a political solution to the conflict, and attempts by the personal representative of the United Nations Secretary-General to narrow the gap between the Afghan–Soviet and Pakistani positions have so far proved to be in vain.

II. Historical background

The 19th century

Throughout the 19th century the rivalry between Tsarist Russia and the British Empire in India encompassed central Asia, Persia and Afghanistan.

The Romanov conquests, while modest, were always directed towards the south. The response of the British Empire, deeply involved in consolidating its presence in India, was constant vacillation between the use of persuasion and the use of force. The first evidence of disquiet in London was the Treaty of Calcutta, signed by Great Britain and Afghanistan in 1809. However, it did nothing to stop the Russian thrust into Persia, which lost the Caucasus in 1813. Subsequently Persia was forced to accept exclusive Russian tutelage over its affairs under the 1828 Treaty of Torkamanchai as the price to be paid after a further defeat at the hands of Russian troops.

From that time on, British governments paid particular attention to the security of the Kingdom of Afghanistan, considered to be the 'key to India'. When the town of Herat was encircled for eight months in 1838 by the Qajars troops, assisted by Russian military advisers, the British were finally convinced of the expansionist designs of their neighbours to the north and of the need to have a friendly Afghan ruler in Kabul.

In April 1839 the British representative in India, Lord Auckland, moved a substantial force of British and Indian troops towards Afghanistan. He succeeded in replacing the Afghan Emir, Dost Muhammad, by a friendly ruler, Shah Shuja, a signatory of the Treaty of Calcutta, who was subsequently placed under the supervision of a resident British representative. However, popular resistance against what the Afghan peasants considered to be the invader grew in intensity. In 1841 the British garrison in Kabul was completely encircled and the resident British representative assassinated.

During the retreat to India, 1 500 British soldiers were wiped out by Afghan tribes in the gorge of the famous Khyber Pass in January 1842. Dost Muhammad returned to the throne for a further 20 years and died in 1863.

While his successor, Emir Shir Ali Khan, was having difficulty in consolidating his power in Kabul, the Russians resumed their thrust in the direction of southern Asia in 1869 and transformed Bukhara into a protectorate. The Tsarist advance towards the little independent Muslim principalities of Turkestan was to continue for over two decades; one after the other, Samarkand, Khiva and Mary (Merv) capitulated. In 1872 the British and Russian governments agreed to recognize the Amu-Dar'ya River as the southern limit of the Russian sphere of influence, but the arrival in Kabul of a military mission from St Petersburg in 1878 provided the British with a pretext to invade Afghanistan for a second time on 21 November 1878. On 28 May 1879 Yakub Khan (son of Shir Ali Khan) signed the Treaty of Gandamak, considered to be the most humiliating diplomatic document ever accepted by an Afghan leader, since it recognized Britain's right to control the country's foreign policy. Thus Afghanistan became for 40 years a British protectorate—a fortress closed to foreigners, even to British merchants. In 1884 the oasis of Mary was absorbed into the Russian Empire, and the following year Tsarist troops annexed Panjdeh which lies directly north-west of Herat. This roused serious misgivings in Britain, where reservists were called up. When the Russians also mobilized their forces, it was evident that the two powers were heading for a direct confrontation. Consequently the two empires set about fixing clear boundaries, and it took them 10 years to agree where Russia ended and Afghanistan began. The choice fell fairly naturally on the course of the Amu-Dar'ya. Since neither the British nor Russian governments wished to be in direct contact with the other, the Wakhan 'Strip', with its distinctive panhandle shape, was marked out in northwest India. In 1907 the Russians and the British signed the St Petersburg Convention which set the seal on their alliance. As far as the Asian sector was concerned, this document determined not only the fate of Persia and Tibet (where the influence of China was recognized), but also that of Afghanistan, which Nicholas II finally recognized as a British protectorate.

In May 1919 Emir Amanullah seized the opportunity afforded by the serious disturbances which had broken out in Amritsar and elsewhere in India against the British colonial regime to start the third Anglo-Afghan war, with the objective of forcing Britain to recognize the full sovereignty of his country. Worried by the upsurge of Indian nationalism and reluctant to fight another war, Britain signed the Treaty of Rawalpindi in August 1919, restoring sovereignty to Afghanistan.

The 20th century

The first diplomatic act of the independent Kingdom of Afghanistan was to send a mission to the fledgling Bolshevik government. Lenin was the first head of state to recognize Afghan independence in 1919. A Soviet-Afghan friendship treaty was signed in August 1921. Afghanistan's first international act after regaining its independence has been regularly renewed ever since.¹

The peace treaty with Great Britain was not signed until three months later, on 22 November 1921. Although the Durand line, established in 1893 by the British Empire, which divided the Pushtun tribes, left a great dispute between Afghanistan and its southern neighbour, Afghanistan immediately sought to distance itself from the confrontation in which it had been caught up throughout the 19th century and which seemed destined to continue into the 20th. To the east, the first rumblings were heard in the British Indian Empire. To the north, the Red Army was engaged for almost 20 years in 'pacifying' Muslim central Asia by crushing the Turkmen and Uzbek resistance fighters known as Basmachis to whom King Amanullah had offered protection in the north of Afghanistan. The King stepped up his international contacts with the governments of Reza Shah in Persia and Atatürk in Turkey and opened the secondary schools of his capital to German and French teachers.²

In December 1927 King Amanullah visited Italy, France and Great Britain, and his neighbouring countries of Turkey, Iran and the Soviet Union. On his return to Kabul in July 1928, he declared a number of reforms in Afghanistan, including the use of European dress for men, abolition of the veil (*chador*), and a modern educational system for both boys and girls. He faced very strong opposition from the Islamic and traditionalist groups led by Bachah-i-Saqao, and left the country after his resignation in January 1929. The Afghan civil war ended in November 1929 with the victory of Nadir Khan over Bachah-i-Saqao. During his four years of reign, King Nadir Shah Khan maintained good relations with both the British and Soviet governments, and a new treaty of neutrality and mutual non-aggression was concluded by Afghanistan and the Soviet Union in June 1931. King Nadir Shah was assassinated by an Afghan student in 1933, and his son, Zahir Shah, succeeded him.

In 1933 King Zahir Shah, who reigned until 1973, introduced the policy of playing foreign donors of aid against each other. Afghanistan thus became one of the biggest recipients of aid in the world. The presence of the United States, which did not recognize Afghanistan until 1936, was felt in full force after World War II, by which time Afghanistan had proclaimed and maintained its neutrality. The question was which power would replace Britain, whose departure from India in 1947 was seen as having created a geopolitical vacuum in south and south-west Asia.

The US government launched a project to reintroduce agriculture to the Helmand Valley in the south-west of the country. A resounding failure led the USA to channel its aid to road and hospital construction. For its part, the Soviet Union had no intention of losing the gains made in Afghanistan during the first quarter of the century, which were fully justified in its eyes by its position as a neighbour. From 1950 on, for every road asphalted by Washington in the area south of the Hindu Kush, Moscow asphalted one in the north. A US-built airport in Kandahar was matched by a Soviet cement works in Pul-i-Khumri.

The years 1953-56 were decisive. The new Afghan Prime Minister, Prince Muhammad Daoud, a first cousin of King Zahir Shah and a nationalist who came to power in 1953 with the intention of modernizing economic planning, was greeted with scant enthusiasm by Washington. It was at this time that US Secretary of State Dulles set out to increase the number of military pacts between the USA and what was still only rarely termed 'the Third World' in order to stem the tide of Communism.

While the Pakistanis willingly agreed to join the Baghdad Pact for the defence of south-west Asia, an attitude which earned them substantial economic and military aid from the USA, the Afghan leaders continued to proclaim their neutrality. As a result all the requests for arms made to the United States by Prince Muhammad Daoud fell on deaf ears.

In 1956 the Afghan government finally asked the USSR for military assistance in the face of what it considered to be a threat from Pakistan. The USSR delivered its first tanks and aircraft and economic co-operation increased. In March 1956 the Salang Tunnel project, designed to facilitate the crossing of the Hindu Kush, was approved. Moscow agreed to supply Afghanistan, through barter agreements, with petrol, cement and textiles in return for natural gas, cotton, wool and fruit. Trade between the two countries boomed from 1950 to 1960, and the Soviet Union came to account for almost half of the external trade of its small neighbour.

With the assistance of Soviet advisers, Afghanistan's first five-year plan was launched in 1956. As a result the Ministry of Planning, together with the armed forces and the Geological Survey Department, became particularly pro-Soviet. Daoud, like other Afghan prime ministers before him, tried to westernize the country to some extent. He resigned in 1963 and a new constitution, instating more freedoms, was approved by Loya Jirgah (the constitutional assembly) in 1964.

A free election was organized in 1965 to select members of the new Assembly; the pro-Soviet members of the People's Democratic Party of Afghanistan (PDPA) won only 4 seats out of a total of 210. Foreign trade was increased with Britain, Italy, France and above all the Federal Republic of Germany and Japan. The United States, which had well-established strategic positions in Pakistan and Iran, showed little interest in Afghanistan. During 1964–73, five prime ministers (Dr Yousuf, Maiwandwal, Etemadi, Dr Zahir and Moosa Shafigh), despite the constitutional and parliamentary system, failed to settle the basic problems of Afghanistan. The social programmes of the government were thwarted by the opposition of tribal chieftains and political groups. Moosa Shafigh was executed after the coup of July 1973.

Returned to power in 1973 by a *coup d'état* which ousted King Zahir Shah, Daoud came to terms with several members of the PDPA during the first two years of his presidency. Then, after forcing them into the opposition, he endeavoured in 1975 to establish closer relations with China, the Arab countries, Pakistan (then the sworn enemy) and Iran. On 17 April 1978, reacting to the assassination of his Minister of Mines and Industry, Daoud imprisoned the leaders of the PDPA. Ten days later the Afghan Army rebelled under the leadership of some 20 officers who supported the PDPA. It took them less than 24 hours to topple the regime, backed by tanks and MiG-19 aircraft. The following day the army handed over power to the Revolutionary Council which had been promptly set up by the PDPA.

III. Administration by the PDPA, 1978–79

On the morning of 28 April 1978 Afghans learned from the radio of the death of the President of the Republic. Within the space of a few hours he became a "demagogue and a traitor to the Nation".³

The news left the people indifferent and in Kabul there was neither spontaneous rejoicing nor hostility, since only some $20\,000-30\,000$ people knew of the party which had just seized power. A few thousand people had hoped and prepared the ground for the *coup d'état*; a few hundred carried it out.

The Revolutionary Council appointed to the post of Prime Minister of the new Democratic Republic of Afghanistan Nur Muhammad Taraki, Secretary General of the People's Democratic Party of Afghanistan, head of the Khalq ('The People') faction and a "leading national and revolutionary figure". Babrak Karmal, head of the Parcham ('The Flag') faction, was elected Vice-President of the Revolutionary Council and Deputy Prime Minister; Hafizullah Amin became Deputy Prime Minister and Minister of Foreign Affairs; and General Abdul Qader Deputy Prime Minister and Minister of Defence. The Council declared: "For the first time in the history of Afghanistan the last vestiges of the monarchy, of tyranny and of the despotism of the tyrant, Nadir Khan, have been eliminated".⁴

On 30 April 1978 the USSR became the first country to recognize the new Democratic Republic, followed by India and Bulgaria on 1 May, Mongolia and Czechoslovakia on 2 May, Hungary on 3 May, Cuba and Viet Nam on 4 May, Turkey, Pakistan, South Yemen and Yugoslavia on 5 May and Iran on 6 May.

The presence in the country of some 3 000 Soviet civilian and military advisers, together with the turn events took 18 months later, have led many observers to believe that the PDPA coup was prepared and carried out with the help of the USSR and its advisers. In particular the Soviet officers with the army were bound to have known of the intention to carry out such an operation. The rapidity with which it succeeded would seem to bear this out. Another interpretation of events, however, introduced a nuance into this judgement. The coup d'état might have been jointly prepared, but the actual date of the operation could have been chosen by the Afghan members of the PDPA acting alone. The coup may therefore have been premature in view of the fact that the PDPA was ill-prepared to wield power. Subsequent events may lend support to this second theory. Several reforms were decided in the early months of the new regime. Of the three most important-land reform, the cancellation of mortgage debts and the gradual abolition of dowry-the first two had long been sought by a large number of Afghan peasants. Their introduction (or attempted introduction), however, was carried out with excessive haste, a total lack of preparation and a complete ignorance of the rural milieu by the officials responsible. The physical brutalities which resulted were no doubt one of the causes of the subsequent revolt.

The land reform⁵ limited family land-holdings to 6 hectares in irrigated areas and 60 in arid areas. Access to irrigated land was, however, no guarantee that it would in fact be irrigated, since the decree modified land distribution but did not interfere with the powers of the "master of the sluice gates", responsible for water distribution. Moreover, no survey of land ownership was carried out prior to the redistribution of the land, which was frequently settled by force. Through the cancellation of crop mortgages the peasant gradually recovered the full right to the use of his land and was able gradually to rid himself of his perpetual debt. However, this reform also meant that peasants were deprived of any possibility of borrowing money, since they no longer had a security to offer potential lenders. During the period of three to four years which farmers needed to establish their own reserves—seed, 'bridging resources' and provisions against drought—from whom were they to borrow, as there was no agricultural credit fund? With what were they to buy farm implements, as there were no agricultural co-operatives? What the peasants wanted was a reduction in interest rates or even the cancellation of the requirement of a loan guarantee, traditionally provided by their land, which had prevented them from making any profit on their own crops until their debts had been repaid. Moreover, since they could no longer contract a loan, they could no longer amass a dowry to buy a wife.

In October 1978, however, dowries were also abolished under another decree. It was unsuccessful, however, in breaking a tradition which guaranteed the family against the possible repudiation of the daughter who had been 'taken' from it. Fathers considered that the measure degraded their daughters and therefore took it as a personal insult. Incidents constantly occurred in the villages where the Sunni Mullahs tried to mediate between the peasants and the PDPA officials from the city, who made no effort to conceal their contempt for anything rural or religious. The fact that priests were physically assaulted in public also helped to spark off the rebellion. As a result a spontaneous, unco-ordinated, armed insurgency broke out across the country within the space of a few months—not against the ideas of the regime, but against its method of implementing them; not against a political party, but against brutal state intervention in the people's way of life.

Deeply shocked by these methods—to which they were unaccustomed, to say the least—the Afghan peasants gradually took up arms to oppose any representative of the state, or at any rate to oppose any decision which was not properly explained to them. On the other side, the officials and military officers of the PDPA interpreted opposition in terms of 'class struggle', whereas in Afghanistan it has to be understood in terms of ethnic opposition. The isolated revolts were therefore considered as a 'reactionary movement' by the Kabul regime, which hardened its attitude and imprisoned or executed without trial a large number of people in the capital and dispatched armoured vehicles against pockets of rebellion in the provinces.

The situation deteriorated rapidly. It is worth noting some of the dates and events which marked the 18 months prior to the arrival of Soviet troops.⁶
July 1978: Split between the two factions of the PDPA. The Khalq remained in power and the leaders of the Parcham were sent abroad as ambassadors. Babrak Karmal was in Prague.

5 December 1978: Signing of the Soviet-Afghan Treaty of Friendship, Goodneighbourliness and Cooperation (see appendix 17A).

13 February 1979: Kidnapping and assassination of the US ambassador. Neither the identity of those responsible nor the political allegiance of the kidnappers was ever clearly established.

March 1979: Revolt in the town of Herat. Eleven Soviet advisers were killed. Afghan Army reinforcements were sent in and 1000-2000 people were killed.

6 April 1979: Arrival in Kabul of General A. A. Epishev, Chief, Main Political Directorate of the Red Army, and a member of the Central Committee of the Communist Party of the Soviet Union, at the head of a military delegation.

April 1979: Increasing number of outbreaks of rebellion throughout the country.

July 1979: Hafizullah Amin combined the posts of Prime Minister, Minister of the Interior and Minister of Defence, and assumed command of the KHAD, the regime's political police. Tension ran high between Taraki and Amin.

August 1979: Military uprising in the Port of Kabul, directed primarily against Amin himself. It was violently repressed and failed.

August 1979: Arrival in Kabul of several thousand Soviet advisers.

13 September 1979: On his return from the Non-Aligned Conference in Cuba, Taraki stopped in Moscow, where he met Brezhnev and Karmal. On returning to Kabul he died "as a result of a long illness". All the evidence suggests that he was killed in the presidential palace by the bodyguards of Amin, who took over as head of state. Amin asked Moscow to recall its ambassador in Kabul since 1971, who was later replaced.

20 September 1979: Major attack by Afghan Army armoured vehicles in the province of Pakhtia, on the Pakistani border. 200000 Afghans had already sought refuge in Pakistan.

25 December 1979: Beginning of Soviet military operations.

IV. The Soviet military intervention

This section begins by briefly describing two versions of the event— the Soviet version and the Western version.

The Soviet version of events

The April 1978 revolution in Afghanistan triggered off a strong reaction in the country among the reactionary "forces of the past", which were first encouraged and then supported by external forces.

Thousands of armed rebels trained abroad were brought into Afghanistan. In fact Imperialism launched an undeclared war against revolutionary Afghanistan.... These acts of aggression were encouraged by Amin who, on seizing power, launched a campaign of barbaric repression against broad segments of Afghan society.... Led by the PDPA with Babrak Karmal at its head, the people then put an end to Amin's tyranny.⁷

The Afghan leaders asked the Soviet Union several times for assistance before it was finally granted. As a result of the plot by external reactionary forces Afghanistan was in danger of losing its independence and of "being transformed into an imperialist military parade-ground on the southern border" of the USSR. In its appeal for assistance Afghanistan invoked the terms of the Soviet–Afghan friendship treaty signed by the two countries on 5 December 1978. The decision to send military contingents to Afghanistan was not an easy one. However, the Central Committee of the Soviet Communist Party and the Soviet government shouldered their responsibilities and weighed all the facts. The military contingents were therefore sent to lend support to the Afghans and help them to repel the foreign aggressors. They would be withdrawn as soon as the circumstances which caused the Afghan leaders to request assistance had been eliminated.

The Western version of events

The Western version of events has a different chronology. After the arrival of the Soviet troops in Kabul, Radio Moscow announced that the Afghan request to the USSR was made on 26 December 1979.⁸ Radio Kabul announced on the morning of 28 December the death of Amin and the appointment of Babrak Karmal to the post of Secretary General of the PDPA. Thus the request had come either from Karmal, who had no legal authority to make it since he was not yet Secretary General, or from Amin, who died a few hours after it was granted. It seems likely that the first troops landed on the 26th and that Amin was liquidated the same day or on the 27th. On the evening of 27 December the Afghan people heard a recorded message from Babrak Karmal broadcast from Termez in central Asia on the frequency used by Radio Kabul; then again on the 28th early in the morning, broadcast this time by the Kabul transmitters.⁹

The Western and Soviet versions of events agree on one point: the

vital need from Moscow's point of view to lend support, even by military intervention, to a faltering Communist Party whose own errors had triggered off rebellion, followed by general resistance. On the other hand, observers who were on the spot in 1978 and 1979 are inclined to be highly sceptical about foreign aid to the Afghan insurrection and the presence of foreigners in "its ranks.

While support for a Communist Party in power in a country sharing almost 2000 km of common frontier with the USSR would appear to have been a primary motive, there may well have been others. For example, the Soviet Union may have been concerned to prevent the establishment of an 'Islamic axis' (Tehran-Kabul-Islamabad) on the borders of the Soviet Muslim republics of Tadzhikistan, Uzbekistan and Turkmenistan. Moreover, while the departure of the Shah from Iran on 16 January 1979 had, from the Soviet point of view, the advan tage of causing the Americans also to leave, it had at the same time the disadvantage of creating a period of instability in the region. Moscow had therefore to 'stabilize' the situation in Afghanistan. Nor should it be forgotten that the USSR is as much an Asian power as a European one. As an Asian power it might consider that it had suffered two setbacks: the establishment of diplomatic relations between China and the United States on 1 January 1979, and the signing of a peace and friendship treaty between China and Japan on 12 August 1978. Finally the 'dual-track decision' taken by NATO on 12 December 1979 to deploy medium-range missiles in western Europe may have convinced the Soviet leaders that the period of detente was over.¹⁰ It only remained for them to take advantage of the comparative weakness of the US Administration under President Carter and the fact that the attention of the Western world was riveted at the time on the US hostages held prisoner in Tehran.

The military means employed

The operation was well prepared and came as a complete surprise. On 25 December 1979 units of the 105th airborne division of the Red Army took control of Kabul airport in less than five hours. They were thus able to clear the runway for the airlift consisting of 250 shuttle trips by An-22s, An-12s and Il-76s. In the space of 24 hours they ferried in preliminary supplies, the remainder of the 105th division and paratroops of the 103rd and 104th divisions. The radio station, the Ministry of the Interior and the Ministry of Defence were captured on 26 December, while a special KGB task force wearing Afghan Army uniforms stormed the Darulaman Palace, where Hafizullah Amin and his family were killed. In the meantime the forces joined up on the ground. The 66th, 201st, 357th and 360th motorized divisions¹¹ moved south by road from the Soviet-Afghan border to the capital, through the Salang Tunnel in the Hindu Kush mountains. The division was given air cover by MiG-21 aircraft. By early January 1980 some 25 000 troops, for the most part reservists and enlisted men, were in position in the capital and the country. The majority of them came from the 12th and 13th military regions, known as Turkestan and Central Asia. Consequently many of the enlisted men were Muslim.

The initial phase of the operation was therefore a complete success. It was prepared by a reconnaissance mission and carried out by some 50 senior Soviet officers, led by Marshal Ivan Pavlovsky, Vice-Minister of Defence and Commander in Chief of Ground Forces, in the Afghan capital and the countryside in August 1979.¹² At the end of December, shortly before the *coup d'état*, the Soviet advisers persuaded the Afghan officers stationed in the garrisons around Kabul that maintenance work had to be done on the tanks. In another garrison, technical modifications were the pretext given. In yet another an opportune date was chosen for a party at which large quantities of alcohol were imbibed.¹³

It is estimated that there were about 60 000 troops in Afghanistan by the beginning of February, under the Command, at Begram, of Marshal Serguei Sokolov, First Vice-Minister of Defence.¹⁴ Several Western analysts have expressed surprise that the USSR should mobilize and dispatch five of its divisions simply to ensure the success of a *coup d'état*. However, the coup was to be followed by a police operation which was to last 2–4 months, designed to reduce and then eliminate the armed opposition to the PDPA scattered throughout the country. Things did not turn out as planned. A simple 'demonstration of strength' by the Red Army in Afghanistan did not succeed either in bolstering up the Afghan Army—which in theory was in charge of the operations—or in intimidating the insurgents.

V. Soviet strategy and tactics

Three successive phases can be identified in the conduct of Soviet operations on Afghan soil: (a) 1980-81—military operations on a medium scale, with only belated realization of the numerous operational errors committed; (b) 1982-83—gradual adaptation of military operations to the mountain terrain and the tactics of the adversary, accompanied by the beginning of political and intelligence activities; and (c) 1984—military operations on an increased scale combined with

the continuation of the political actitivities. The modifications and developments seem to have been of a strictly tactical nature, since the strategy does not appear to have altered. In all likelihood the Soviet Union's aim is to keep Afghanistan in the Soviet camp. The following means are used to achieve this end: (a) keeping the PDPA in power in Kabul; (b) training Communist cadres in the USSR so that they can take over in a few years' time and establish a reformed Afghan Communist Party; and (c) bringing military pressure to bear both on the Afghan resistance groups and on the civilian population. Repeated bombing of non-military rural areas has led to a mass exodus of the Afghan population: 2.8 million have gone to Pakistan,¹⁵ 1.5 million to Iran and half a million to other countries, out of a total population of 16 million.

First phase of the operations, 1980-81

In the light of the military objectives of the Red Army after its intervention in Afghanistan, the first two years can be considered both a success and a failure: a success because the air-raids carried out by the Mi-24 helicopters or the MiG-23 aircraft in the eastern regions drove more than a million civilians into exile in Pakistan, primarily into the northwest Frontier Province and Pakistani Baluchistan, Exodus on such a scale disrupted the economy of several regions and thus made it harder for the Afghan resistance groups to obtain food supplies. However, these tactics were a failure insofar as the latter were neither defeated nor even weakened. The intelligence information available to the Soviet leaders does not appear to have given them an accurate picture of the situation inside the country; the will and ability of the Afghan people to resist were underestimated, as was the leadership role which would be played by the mullahs, the priests in the Sunni Muslim villages. On the other hand, the influence of the PDPA in the provinces was overestimated. The arrival in Kabul of Babrak Karmal certainly reduced this influence still further. As the head of the 'pro-Soviet' Parcham and a bourgeois city-dweller, he was bound to lose support from the militants of the Khalq faction. Led by Nur Muhammad Taraki and Hafizullah Amin, they had had a good following in the provinces, were more strongly nationalist and came from a lower social class. The Kabul regime of January 1980 therefore found itself in a very weak position in the provinces. The Afghan Army melted into the resistance as the Red Army established itself in the country; the Soviet forces therefore had to intervene more directly, and with practically no Afghan support. What tactics did they adopt, and what errors did they commit during those first two years?

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Selective bombings were carried out with two objectives: to seek out the areas where the resistance fighters were most active and bomb the villages to which they withdrew; and to bomb systematically the villages and valleys which were transit points for supplies and members of the resistance coming from Pakistan, such as the Kunar and Pakhtia regions in the east of the country. The air-raids led to the departure of the civilians, the destruction of the villages and the temporary closure of some of the transit routes. However, they did not interrupt the activity of the resistance, who could live in the mountains and choose new crossing points along the Pakistani border, a region of high mountains and areas of semi-desert and desert.

The mining of mountain tracks was also designed to hamper or even prevent movement between Pakistan and the eastern region of Afghanistan. The mines, dropped by low-flying Mi-80 helicopters, were painted to blend in with the ground vegetation, and their explosive charge was calculated to maim, not to kill.

The Soviet Army proceeded to reinforce garrisons in many parts of Afghanistan and to increase their number. These garrisons, installed in forts on hilltops built a century ago mainly by the British Army, were used to watch the transit routes and provided forward bases for forays into the surrounding areas. However, they became targets for night attacks by the resistance groups. Since they were situated in isolated places, they had to be kept regularly supplied. The land convoys carrying out these supply missions were frequently ambushed, with heavy losses of men and equipment. Several witnesses have been struck by the Soviet mechanized divisions' ignorance of the mountain environment and the slowness of their manoeuvres. For example, if the leading vehicle of a convoy was destroyed during an attack, it blocked the entire column which, instead of overtaking it when there was room to do so, came to a halt behind. The soldiers did not leave the vehicles but waited for helicopter support if it could be summoned by radio. Waiting in the stationary BTR-60s led to heavy casualties.

Second phase of the operations, 1982-83

Whereas the Soviet civil and military press made scant reference to the problems of the war in 1980–81, they reported on them more fully during the second phase, in which the errors committed during the first years were noted and some attempt was made to adopt a more political approach to the enemy—to play on its divisions and to exploit intelligence reports. The treatment of the subject in the military press differed from that of the national papers. Whereas the national press referred only to giving a "helping hand" and "support for an imperilled

revolution",¹⁶ the descriptions of operations in the military press gave a very different impression.

Convoys of lorries protected by armoured vehicles *en route* from the capital to the garrisons were constantly attacked in the gorges if they did not have helicopter cover; the leading vehicle was blown up by a mine, or the resistance fighters set off an avalanche of stones to block the convoy. The latter tactic was apparently used with sufficient frequency to justify the distribution of a leaflet among the ranks of the Red Army describing ways of extricating oneself from an avalanche.¹⁷ The military journal *Znamenoset* contains criticisms of the "countless breakdowns, inadequate maintenance and mediocre ability of the tank drivers in mountain areas".¹⁸ There are also criticisms of the inability of tank crews to recognize a target, their poor firing techniques both at a standstill and on the move, and their lack of ability to correct their aim and to estimate distances in mountain areas.

The armoured troop-carriers are not treated any more lightly. An article written in April 1981 criticizes the crews for "driving them on mountain tracks scarcely able to support their weight and being unable either to repair them en route or tune the engines so that they are not fed too rich a mixture for the altitude".¹⁹ Despite the fact that these articles are purely technical and intended only for Soviet military personnel, they nonetheless reveal the weaknesses of the army and the difficulties faced by the soldiers. Pravda's accusation that the "counterrevolutionaries" were using US mines which could not be detected obviously serves a propaganda purpose: as flagrant proof of "foreign interference". An article like this may also have been designed to convince the Soviet public that the use of such devices made casualties in the field inevitable. In January 1983 the Communist Youth daily published a detailed account of the life of two voluntary Soviet nurses in Afghanistan and of a helicopter mission to rescue an Afghan officer wounded in action.²⁰

Greater familiarity with the terrain resulted in various tactical improvements and led the Red Army to introduce four new types of operation, two of which have remained unchanged since 1980:

1. Massive air strikes (which cause few casualties among the Soviet troops and are intended to provoke a civilian exodus), discouraging support for the resistance (the villages are systematically destroyed after skirmishes with the resistance) and destroying crops (in order to deprive the resistance of food supplies).

2. Maintenance of road communications, in which main roads are kept open by mine-clearing squads composed of six men, a dog and a support and protection helicopter (useful in the frequent ambushes). Two types of operation were introduced in 1982:

3. Clearing of areas surrounding the large towns—Herat, Kabul, Kandahar, Mazar-i-Sharif and Kunduz—and the big military bases— Begram, Shindand and Qalagai. These are combined operations involving infantry and troops transported by helicopter behind the resistance lines in the plains and to the high mountain areas.

4. Parachute and helicopter operations: during the 1982 offensives in the Panjshir Valley, which runs north—south and opens onto the Begram base and the city of Kabul, the Soviet Army parachuted troops into the high mountain areas in order to catch the resistance fighters in a vice or to cover vehicles advancing along the valleys. In addition they established semi-permanent posts as they advanced.

Some mopping-up operations were also carried out to trap resistance groups in a net cast by battalions of BMP-1 armoured vehicles, light PT-76 tanks and helicopter-borne troops. However, their effectiveness was reduced by their slowness. Lastly, the Soviets set up several night ambushes. Since the improvements made were countered by the adaptability of the resistance, they failed to lift the poor morale of the Soviet troops (see the 1984 phase). Their implementation was also considerably hampered by the excessive centralization of the Soviet command:

The commanding officer of a unit in danger does not seem to have the authority to call the airforce to his assistance; everything goes through the General Staff. An isolated unit is easily scattered. The officers in the field do not take advantage of the circumstances but conduct their manoeuvres according to the initial plan, however the situation may develop. Section and company commanders cannot take any initiative, which explains why these units remain stationary when a convoy comes under fire. It is only at battalion level that some degree of initiative is to be found, and that is too high for a guerrilla war.²¹

Political and intelligence activities

From 1981 some attempt to organize intelligence activities in a systematic manner was made by the Red Army services—the GRU— and the political services—the KGB and its Afghan subsidiary, the KHAD.

Activities in the towns, in particular in the capital, will be mentioned only briefly here, since they have no direct bearing on the military situation. Basically they involve identifying the opponents of the regime, counter-espionage designed to pinpoint the very large number of informers helping the resistance, and lastly seeking out young Afghan boys subject to government decrees on conscription into the army at the age of 15. Apparently the work done in the provinces by the GRU has proved comparatively ineffective. The intelligence information takes so long to reach the decision makers—the Chief of Staff or General Command—that by the time the decision is taken it is frequently no longer valid and the operation has to be cancelled.

For their part the Soviet and Afghan intelligence agencies, the KGB and the KHAD, first try to exploit the weaknesses of the enemy and its rigid social structures. The development of intelligence work in Afghanistan coincided with the year when Andropov was the Soviet leader. Moreover, the PDPA plays no part in these political activities, which are entirely in the hands of the more-or-less secret services in no way answerable to the legal machinery of the state, even supposing the latter to be independent, a rather moot point.

For the ethnic, cultural and geographical reasons analysed in section VI, the Afghan guerrilla movement is divided or at least scattered in its resistance to the Soviet intervention. The KHAD, the KGB and the Afghan Ministry of Tribes and Nationalities exploit these divisions in various ways.

The medium-term objective is to undermine the organizational and psychological foundations of the Afghan resistance and thus complement the work of the army. Numerous intelligence agents infiltrate the resistance groups for the purpose of obtaining information of all sorts—on the political organization of the parties, the military structure of the resistance fronts, the tracks used to transport food and arms supplies, the location of headquarters, and so on.

In addition, disinformation operations are designed to exploit traditional rivalry between groups by setting them against each other, and at the same time to present the regime in a favourable light. In fact it is the fear of infiltrated agents and a general climate of suspicion which hinder the resistance groups rather than the use to which the information is put, since there is little co-ordination between the political services and the Chiefs of Staff.

The political services try to rally people to the regime. This is possible because of the extreme segmentation of Afghan society, but there are frequent reconversions to the other camp. Those primarily involved are prominent local citizens, merchants and owners of large estates—the very persons who in official statements are denounced as the most 'feudal' and 'reactionary'. Having lost some of their authority and prestige in their resistance groups, they agree to cross to the side of the regime in return for privileges in kind or honorary appointments.

In addition there are the militiamen who go over to the regime either out of sympathy for it—which does not mean for political motives—or for financial reasons, since the monthly wages offered in such cases are substantial. Depending on their location and their willingness to fight, the militiamen form a buffer between the resistance and the PDPA bases, or co-operate effectively with the Afghan Army—a seemingly very necessary, not to say indispensable role. The Afghan Army has not been built up again since the arrival of the Red Army. Desertions are still numerous and are not offset by conscription or forced enlistment. Some sources estimate that there are some 60000 Afghans in the army subsidized by the USSR, more than 75000 in the paramilitary forcesthe militia—and more than 25000 in the secret police.²² The estimate of the author is that the first figure should be halved, with the strength of the Afghan Army at 30000, compared with 100000 in 1978. The relative failure on the political front (at least until now), the weakness of the Afghan Army, the lack of co-ordination between the political and military authorities and the fighting spirit of the opposition would all appear to be borne out by the considerable reinforcement of the Red Army and its change of tactics in 1984.

Third phase of the operations, 1984

Since April 1984 new offensives of unprecedented scope in the Kabul region have extended as far as Logar to the south, Panjshir to the north, Kandahar to the south and Herat to the west. These offensives differ from earlier ones in four respects. Land offensives by mechanized units are preceded by two or three days of intensive air strikes carried out at high altitude by Tu-16s. These strikes take place simultaneously in two or three parts of the country. They are followed by the advance into the Panjshir Valley of T-55 and T-62 tanks and greater numbers (several hundred) of troop-transport vehicles carrying more men—a Soviet division and around 2000 Afghan troops from the regular army. Instead of withdrawing after two or three weeks of fighting in the valley, the Red Army, as it advanced, has established 10 to 50 small garrisons to "hold the valley".

All of this has led the resistance, observers based in Pakistan and numerous Western analysts to estimate that the "limited Soviet contingent" in Afghanistan was reinforced by several divisions in March 1984. According to various sources, the size of the contingent may have risen from 140 000 to 180 000 men. This would explain the Red Army's increased ability to establish and hold garrisons and to undertake several operations simultaneously.

The equipment traditionally used by the units of the mechanized divisions has been only slightly modified to meet the requirements of war in mountain terrain. A modified version of the conventional BTR-60 armoured personnel carrier with easier access to the exit hatches has been introduced. The BMP-2 is a new version of the BMP-1, equipped with a 30-mm gun with a greater angle of elevation in order to cover the mountain tops.

The troops are equipped with AK-74 assault rifles with a 5.45-mm barrel, AGS-17 30-shot automatic grenade-launchers, RPG-16 antitank weapons in place of RPG-7s, and RPO flame-throwers.

Sources in the French, US and British Defence Ministries concur in estimating the number of helicopters at 600. It is estimated that there are 240 Mi-24 Hind Es (with AT-6 missile-launching tubes); the Mi-26, a new transport helicopter, has been sighted in Afghanistan; and the Mi-8 Hip is now fitted with a 20-mm rear machine-gun.

An-22 aircraft are used for the transport shuttle to Termez in the south of the USSR, Tu-16s for high-altitude air-raids, MiG-21s and -23s for conventional bombing raids and tactical support, while the new Su-25 Frogfoot is very effective in providing supporting firepower, as it is slow and silent.

Allegations of the use of chemical gases in Afghanistan are reported in chapter 6.

Troop strength and organization

Afghanistan is now divided into seven military zones, in which the troops are unevenly distributed. Some airborne or bombing operations appear to leave from Soviet territory, and the eastern region of Afghanistan seems to have the biggest concentration of troops. The three main bases are Begram, Qalagai and Shindand (see figure 17.1). However, the last-mentioned base, which is in the south-west of the country, is used only for anti-guerrilla air-raids; this base is alleged in the United States to have the potential to carry out external operations in the direction of the Indian Ocean or the Persian Gulf.²³

The 40th Army from the 12th and 13th military regions of the USSR has some 105 000 men. Its strength remained more or less stable until the beginning of 1984, namely six mechanized divisions, one airborne division—the 105th—five special airborne assault brigades and 4 000 military advisers to the Afghan Army. These figures, which have been deduced by cross-checking information provided by the French, British and US Ministries of Defence, obviously cannot be confirmed on the spot, and the USSR does not divulge any data regarding the size of its 'limited contingent'. It is highly likely that these figures were increased in 1984 to enable larger-scale operations to be carried out simultaneously; further, two or three divisions stationed in Termez or Dushanbe, located close to Afghanistan, can regularly intervene on Afghan territory.

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Morale and casualties

There is a good deal of evidence on morale derived from accounts by resistance fighters, deserters from the Red Army crossing into Pakistan, deserters from the Afghan Army, and Soviet prisoners held in Pakistan or sent to Switzerland under the aegis of the Red Cross. They refer to a number of problems. Food is said to be scarce and of poor quality. There is a good deal of illness—particularly dysentery. There are complaints of victimization by higher ranks, and complaints by Uzbek and Turkmen conscripts of ill-treatment by Russian NCOs. There is an extensive black market, and widespread use of drugs is alleged. Deserters say they were given very little information on why they were in Afghanistan.²⁴

No official figures of casualties are available. Estimates can be made

using the same sources as for assessing troop morale. Other evaluations have been made by Western observers on the spot and military experts in guerrilla warfare. A reasonable assessment would be a monthly toll of 300 killed or wounded. According to other calculations 6000 dead and wounded have been repatriated since the war began. Expenditure for specifically military purposes is generally estimated at \$4 million per day.

VI. The Afghan resistance

Observers of the Soviet-Afghan conflict are struck by two phenomena: on the one hand, the fighting spirit, perseverance and military achievements of the Afghan resistance; on the other, its divisions and political immaturity. The origin of these divisions has to be examined since they directly affect the conduct of the war.

Afghanistan has five main ethnic groups distributed unevenly over the country (see figure 17.2). Before the war they made up a population totalling some 16 million: Pashtuns, Tadzhiks, Hazaras, Turkmens and Uzbeks, all of different ethnic and geographical origin. They differ in both social structure and economic activity, which does not contribute to homogeneity.²⁵

Stated very simply, these ethnic groups are subdivided into tribes, clans, extended families and smaller family units. Another important element is the traditional allegiance to persons of prominence in the region—mullahs, landowners, merchants, moneylenders and Sufi spiritual leaders.

Afghanistan is a land of mountains and deserts. Communications are difficult, and goods—and therefore also information—circulate slowly. These geographical obstacles have been slightly overcome by the trucks and buses which ply the circular main road linking the major towns, and the north—south Salang—Kabul road, the country's only tarmac roads. There are few aircraft. Telephone and radio communications have been developing slowly since 1955. The people therefore still live very much within the confines of the village, the small town, the plateau or the valley.

The parliamentary system dates from 1965, when the first elections by direct universal suffrage took place. There is practically no sense of a nation-state.

As a consequence of all these factors, the state, officials, administration and capital are seen in the provinces and by peasants (95 per cent of the population) as a nuisance or even a danger, rather than as a source of aid or appeal. Events since 1978 will have done nothing to

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Figure 17.2. The geographical distribution of Afghanistan's 10 ethnic groups

reduce this antagonism between state and country, between capital and province.

On the other hand, three factors forge a common link between the Afghans to varying degrees: close communion with nature and great physical stamina; a fighting, not to say warlike, tradition (even in the 20th century disputes within a group were still settled by force of arms); and Sunni Islam (only the Hazaras—20 per cent of the population—are Shi'ites). These factors cast some light on the military and sociopolitical behaviour of the Afghan resistance.

The major political factions

The individualism of the Afghans, together with their strong sense of group loyalty and respect for their elders, have resulted in extreme fragmentation of the armed resistance. The resistance understandably began with spontaneous, unco-ordinated local revolts. It grew into a wider insurrection under the banner of Islam, with the *umma*, the "community of believers", waging a *jihad* or "holy war of liberation". It continues to this day after splitting up along various lines.

Command of the resistance fronts within Afghanistan, originally in the hands of prominent elders, has now frequently been taken over by the younger, more capable and more politically minded leaders. Antagonism frequently exists between the "combatants inside the country" and the parties in exile, even if the former claim links with the latter and need them as sources of funds, grain, ammunition and weapons. Outside the country, along the Pakistani–Afghan border, and more particularly in the town of Peshawar in the North-West Frontier Province, the opposition parties in exile split at the outset into three main political factions—a split which has continued to this day.

The radical Islamic faction is represented in particular by the Hezb-i-Islami (Islamic Party) and its leader, Gulbundin Hekmatiar. This party, of Pushtu origin, is headed by intellectuals who are influenced by the theories of the Muslim Brotherhood—omnipresence of the state and the Koran—and has been favourably impressed by the Khomeini revolution in Iran. Its sectarian and doctrinaire behaviour in Afghanistan has lost it many supporters.

The moderate Islamic faction has played an increasing role in the resistance since 1982. It is represented primarily by the Jamiat-i-Islami (Islamic Assembly) headed by Professor Borhanudin Rabbani. The party, whose leaders are intellectuals (ulema, scholars of religious law), is Tadzhik in origin. The Commander of the Panjshir Valley has links with the faction. Other adherents of this second faction are the Hezb-i-Islami led by Yunos Khales, and the Harakat-e-Enqelab (Revolutionary



Figure 17.3. The geographical distribution of the Afghan resistance political parties

Movement) led by Muhammad Nabi and headed by traditionalist mullahs and ulema from the religious schools.

The third faction has closer links with the former monarchy and the establishment of the old regime, and is clearly pro-Western. It includes the Jabhe-i-Melli-Ye-Nejat led by Sibqatullah Mujjadedi, which has links with the Pushtu tribes and the Sufi brotherhoods of the Kabul region, and the Nahzat-e-Melli (National Front) led by the monarchist Sayeed Ahmed Gailani and headed by tribal chiefs and former prominent citizens. Among the Shi'ite parties, rooted in the centre of the country and made up of members of the Hazara ethnic group, are the pro-Iranian, radical Islamic Nasr Party and the moderate Harakat-i-Islami headed by a small number of intellectuals.

These different factions became sharp divisions because of the

inflated egos of their respective leaders and their desire for a personal following. The divisions are less in evidence in Afghanistan, where co-operation and even co-ordination are essential in combat. Moreover, certain young leaders, such as the Commander of the Panjshir Valley, Ahmad Shah Massood, have acquired regional authority and even international repute. However, since the aim of each party chief is to bring the others under his authority and into his faction, no lasting alliance or united front has been established to this day. This lack of unity is more detrimental to the international representation of the resistance than to its military operations.

Sources of arms supply

The USSR is the main source of arms for the resistance. Arms are obtained through two separate channels: the fighting itself and Afghan Army deserters. Whereas in 1980 the resistance possessed only their traditional British Lee Enfield .303 rifles, their arsenal has gradually been built up from arms taken from the enemy in attacks on road convoys. In particular they have acquired Kalashnikov assault rifles which are now common among the insurgents.

Many deserters from the Afghan Army join the resistance, bringing with them mortars, mines and guns, all of Soviet manufacture. This was how the new AK-74 5.45-calibre rifle made its appearance in the ranks of the resistance²⁶ and this is no doubt the reason why the Afghan Army is no longer equipped with RPG anti-tank rocket launchers, which were regularly 'passed on' to the resistance.

While the USSR contends that there is "foreign aggression in Afghanistan", it never specifies the nationality of the soldiers supposedly fighting alongside the resistance. Although numerous doctors and journalists, accompanied by Mujahideen (fighters of the faith), have entered Afghanistan from Pakistan, in five years there has been no authenticated report of the presence of foreign soldiers. On the other hand, an uncertain amount of arms supplies for the resistance are now coming from abroad. Practically all these arms supplies pass through Pakistani territory, enabling Pakistan to control both the quantity and the quality. Pakistani authorities consider this to be necessary, because they fear that the western part of their territory might be turned into 'another Lebanon' or that a highly independent Afghan resistance might try to establish a state within a state. Moreover, visible support for the resistance would give the Red Army a pretext to invoke a 'right to pursuit' into Afghan sanctuaries in west Pakistan. The Afghan resistance therefore receives through this channel somewhat meagre supplies of equipment of Soviet design manufactured in Egypt and China, the two principal suppliers.

Egyptian and Chinese versions of the Kalashnikov, Chinese recoilless rifles—the 82-mm B-10 and the 75-mm Type-56—60-mm M-63 mortars, and a small number of anti-aircraft weapons such as the Chinese copy of the Soviet 14.5-mm ZPU-2 heavy machine-gun have been seen in the field. Several light ground-to-air SAM-7s, as well as numerous Dashaka or Ziguyak heavy machine-guns, have also been observed.

Saudi Arabia has given the Pakistani government very substantial financial backing for its aid to the Afghan refugees and provided funds to the Afghan resistance for the purchase of arms. The USA through the CIA is estimated to have given \$325 million worth of aid to the resistance since 1980.²⁷ The House Appropriations Committee publicly approved additional aid to the resistance, amounting to \$50 million in July 1984.

US officials say \$280 million has been earmarked in covert military aid for the Afghan insurgents during the 1985 fiscal year, more than doubling the aid in the 1984 fiscal year, which ended Oct. 1. This will bring total US aid to \$625 million since Soviet troops intervened in Afghanistan in December 1979. The amount does not include an estimated \$100 million provided last year by Saudi Arabia, other Arab countries, China and Israel.²⁸

Military tactics

As a result of the political divisions and the total lack of technical means of communication, the guerrilla operations are not co-ordinated. Only a few commanders succeed in extending their authority and sphere of influence beyond the boundaries of their own regions.

It is impossible to estimate the number of guerrilla forces, since they vary according to the region, season (a fighter may leave his group to sow or reap his crop) and prevailing military organization. There is a difference, for example, between the tribal areas in the south, where every man is duty-bound to fight, and the Tadzhik regions to the northeast, where a complete system of logistic support has been established by the civilian population. As a rough estimate, it can be said that the resistance is believed to number several hundred thousand. The local population provides it with constant support and shelter, which is why Soviet bombing strategy is specifically designed to 'make refugees' in order to cut off supplies and support for the resistance.

The resistance undertake operations of various kinds which, for reasons of clarity, can be artificially divided into four categories.

1. Attacks on garrisons are frequently carried out at night, using

mortars and grenade launchers. Their purpose is to create a climate of insecurity, rather than to capture a target, and thus encourage defections from the Afghan Army. Loudspeakers are used to convey to the Afghan Army conscripts the message that they are on the 'wrong side'. The attackers withdraw at dawn to avoid helicopter attacks. Hit-andrun tactics are often used for ambushing road convoys. The gorges lend themselves to such attacks, but attacks are also carried out on the plains. The road is mined beforehand. The leading vehicle is blown up, blocking the way for the rest of the convoy, and every armoured vehicle then comes under fire from rocket launchers. The objective is to capture the munitions and food carried by the convoys and to interrupt all traffic. The difficulty is in avoiding the helicopters, which are now summoned more rapidly than at the start of hostilities and against which the resistance is powerless.

2. Attacks in urban areas are on the increase, particularly in the capital, the primary targets being government or military installations—there have been rocket attacks on the Soviet Embassy, explosions in the Ministry of the Interior, assassinations of pro-Soviet personalities and attacks on jeeps carrying military personnel.

3. It was during the nine Soviet offensives in the Panjshir Valley that the resistance fighters of the Jamiat-i-Islami under the command of Massood developed tactics for stemming and repelling the Soviet advance. The valley is divided into 16 geographical areas, each of which has a permanent 'defence group' of some 50 men. Their first duty is to ensure the safety of the civilian population—in other words, to be on the spot in case the USSR makes a surprise attack. They are responsible for the orderly evacuation of families. All paths, passages, passes and hiding-places have been surveyed; shelters have been installed under the mountainsides and among the rocks; and attempts are made to enlarge them and camouflage their entrances by low stone walls. The defence groups are called upon to protect their areas and bear the brunt of the enemy attack. Since they are not designed to cover long distances, they are equipped with heavy 12-mm Dachaka anti-aircraft machine-guns.

The first shock of the offensive has to be borne by the 'strike groups'. These are commandos of 33 men who take the initiative by making the first strike against the enemy column advancing into the valley. By delaying its progress they give the families time to escape. They try to inflict as much damage as possible on the enemy column, using RPG-7 rocket launchers against the armoured vehicles, and PKS M-65 heavy machine-guns against the troops brought in by helicopter.

4. Finally, the 'mobile groups', comprising some 30 men each, harass the enemy as they advance. Their role is to strike where least expected. They must hit and withdraw, scattering to avoid directly

engaging the enemy, but not until the enemy has been thrown into disarray. Overall strategy is defined by Massood, and tactics and orders are implemented by the commanders he appoints. Permanently attached to each of the groups under their command are a male nurse trained by the French doctors who take turns working in the valley, a mullah to lead the five daily prayers and ensure the good behaviour and the moral purity of the groups, and a 'political agent' who acts as a kind of roving ambassador. He explains military decisions to the civilian population and ensures their support, since in some regions retaliatory Soviet air-raids have succeeded in driving a wedge between the Mujahideen and the civilian population. As a result of the bombing, the villagers are evacuated either to the mountains (at present there are hundreds of thousands of displaced families in the country who have the greatest difficulty in obtaining food), to Kabul (the capital's population has doubled since 1980, and it is the only place in the country which is certain not to be bombed), or to neighbouring Pakistan, which is suffering badly as a result of the largest influx of population the world has seen since 1945.

VII. Regional consequences: Pakistan

In figure 17.4 the distribution of the approximately 3 million Afghans in the west of Pakistan can be seen. By January 1985 Pakistani government records had confirmed the presence of over 2.8 million Afghan refugees. The majority of them live in some 340 villages, 80 per cent in the North-West Frontier Province and 20 per cent in Baluchistan. By mid-1982 the government had begun to plan the transfer of some of the refugees from the North-West Frontier Province to the western part of Punjab Province in order to relieve the pressure caused by the presence of a very large number of refugees in the north-west. Many Afghans have settled more or less permanently in Pakistan and a large proportion of them have found work, chiefly in the transport sector driving their own vehicles or as day-labourers in agriculture. The majority, however, are still dependent on the Pakistani government, the international community and bilateral assistance. In 1983 the government's contribution amounted to \$260 million,²⁹ the international community contributed \$62 million,³⁰ and bilateral assistance of all kinds to Pakistan from Saudi Arabia alone totalled \$579 million.³¹ Assistance from Pakistan and foreign governmental and non-governmental sources has not entirely solved the problem of ensuring the survival of Afghan refugees in Pakistan. They live under difficult, even precarious conditions. However, the international community is making a





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substantial effort to help them financially, and the Pakistanis as a whole have given the Afghans a decent reception, primarily thanks to their common language and religion. The problems are rather of a political nature: a chain reaction set off by the population influx. Incidents between the Afghan community and the Pakistani villagers are now frequent. This in no way contradicts the preceding statement, but it is a fact that the number of incidents at wells, on grazing land and on the labour market is increasing. In the long run, some hostility towards the Afghans may increase among non-Pushtu Pakistanis, especially Baluchis.

Moreover, traffic in arms, drugs and emeralds is growing, and the Afghans are not alone in profiting from it. This does nothing to simplify matters for the various Pakistani police services, concerned at the greater ease with which anti-government movements in Pakistan can procure arms by comparison with the period before 1979.

At the same time, a very large number of intelligence agents have infiltrated the refugee camps, which in fact means the countryside, since the Afghans are permitted to circulate freely. These agents not only gather information but also set the communities against one another. Several bombs exploded in towns in west Pakistan in 1983 and 1984. Finally, Pakistan can neither exercise complete control over the activities of the Afghans on its soil nor physically close its common frontier with Afghanistan. It is afraid that the Afghan government and the Red Army—may decide to invoke a 'right of pursuit' into the Afghan refugee camps, as has already occurred on several occasions. Pakistani airspace has been violated several hundred times since 1980. The Miram-Shah camp was bombed on 14 January 1984 and 12 Pakistanis were killed.

The Soviet–Afghan conflict also led to the signing of an agreement by Pakistan and the USA on 15 May 1981. The agreement, which provides for US aid to Pakistan worth \$3.5 billion over a period of five years, has enabled the USA to regain a military foothold in a region where they had lost an important ally after the departure of the Shah of Iran in January 1979. From the Pakistani point of view the agreement has above all enabled it to begin to modernize its armed forces, thanks in particular to the delivery of 40 F-16 aircraft.³² It also served to demonstrate that it is possible to remain on speaking terms with Moscow without yielding to intimidation. Thus the rearmament of the Indian sub-continent since 1980 has been triggered off by the intervention and continued presence of the Red Army in Afghanistan. In May 1980 the USSR agreed to a \$1.63 billion credit for India to buy weapons over a 10-year period. Then in May 1981 came the US–Pakistani agreement. At the present time Pakistan's top priority remains the return of the Afghans to their own country.

VIII. Proposals for a political solution

Although the United Nations General Assembly condemns the military intervention in Afghanistan (see appendix 17B) every autumn by an overwhelming majority—some 115 countries condemning the USSR and some 20 supporting it—little imagination or effort of any kind has been devoted to the search for a political solution.

On 14 May 1980 Babrak Karmal proposed that the governments of Afghanistan, Pakistan and Iran should meet to seek a solution to the problem of 'foreign interference' in Afghanistan. The proposal went unanswered by the Iranian and Pakistani governments, which wished neither to recognize the legitimacy of the government of Karmal nor to 'regionalize' the Afghan affair in view of the military intervention by the Red Army.

On 29 January 1981 the President of France, Giscard d'Estaing, proposed in a television address the convening of a conference on 'foreign interference'. He suggested that invitations be extended to the permanent members of the UN Security Council, the states neighbouring Afghanistan and the states which were interfering or accused of interfering in that country (e.g., Egypt). The absence of representatives of Afghanistan—a point which aroused considerable criticism circumvented the dual problem of accepting Karmal as a negotiating partner and drawing attention to the fact that the opponents of the regime were not united. However, neither this suggestion nor the revised proposal made by the European Council in Luxembourg on 31 May 1981 (in which the 10 members added to the original concept a second phase, providing for the presence of "representatives of the Afghan people") was acceptable to Moscow. The USSR could hardly be expected to tolerate the exclusion of the Karmal regime or to agree to hold discussions at a later date with an opposition whose representative nature it totally rejected. Moreover, the prospect of China becoming a partner in this debate did not appeal to Moscow. It does seem significant, nonetheless, that the principle of a meeting on noninterference has never been taken up by Soviet diplomats, despite the fact that the sole argument used to justify the presence of the Red Army in Afghanistan is precisely the existence of foreign interference.

In his address to the 26th Congress of the Communist Party of the USSR on 24 February 1981, Brezhnev stated his country's willingness to discuss the Afghan question in conjunction with the problems of the Persian Gulf.

The Soviet Union is prepared to reach agreement on the subject of the Persian Gulf as an independent problem. Naturally it is also ready to participate in a separate settlement of the situation which has arisen in relation to Afghanistan. However, we have no objection either to the questions relating to Afghanistan being discussed together with those of security in the Persian Gulf. In that case it goes without saying that only the international aspects of the Afghanistan. The sovereignty of that country must be fully respected, as well as its status as a non-aligned state.³³

The UN General Assembly resolution of 1980 provided the Secretary-General, Mr Waldheim, with the legal basis for appointing a personal representative, Mr Perez de Cuellar, in autumn 1981 and entrusting him with a mediation mission to the various parties. After he had shuttled between Moscow, Tehran, Kabul and Islamabad, the first session of a series of talks opened in Geneva. The participants were the Iranian Ministry of Foreign Affairs, attending as an observer, the Pakistani Ministry of Foreign Affairs and the "representative of the Afghan party in power".

The four sessions which so far have been held in Geneva have recalled the four points contained in the UN resolution, namely: "withdrawal of the Soviet (or foreign) troops, preservation of the independence and non-aligned character of Afghanistan, selfdetermination for the Afghan people, honourable return of the refugees". Until now it has been possible to discuss only the first point, but there is total disagreement on the modalities, the timetable for withdrawal and the date on which it should commence.

IX. Conclusion

No resolution of the conflict seems in sight. On the one hand, the Soviet Union gives no sign of considering the Afghan issue to be 'negotiable'.³⁴ On the other hand, the Afghans are so deeply convinced of the justice of their struggle and have inherited a fighting tradition so strong that they are evidently going to oppose the Soviet presence with just as much obstinacy as the Vietnamese in their day opposed the Americans.

Western government views on the conflict differ: two different approaches can be categorized as the 'diplomatic' and the 'military'. The diplomatic view tends to be that Afghanistan had for long been effectively in the Soviet 'camp'—or at least that it had been lost to the Western 'camp'—and that this was not a matter of much concern to Western governments. The military view concerns Soviet basesparticularly the Shindand base in the south-west; this, so it is argued, could at some future date pose a threat to Western lines of communication through the Straits of Hormuz.

Western policy—which has been mainly US policy—has not been much concerned with any search for a compromise solution since the continued conflict is damaging to the Soviet Union.

Any more positive policy approach must be based on some appraisal of Soviet objectives in Afghanistan. If the Soviet concern is simply with military security, then there should be room for a compromise: maintenance of Soviet bases in Afghanistan in exchange for a regime politically acceptable to the Afghans. Concessions would have to be made on both sides in order to achieve such a compromise.

If the Soviet objective is to maintain a communist regime in Kabul at all costs, then in all probability the Soviet expeditionary force will have to remain in Afghanistan for a long time. The regime appears no more acceptable now to Afghans than it was five years ago.

The Soviet objective may be to have a government in Afghanistan which presents no danger for the Muslim republics of the USSR and is not too favourably inclined towards the Islamic republic of Iran. It is possible that lengthy negotiations might establish areas where flexibility is possible: and if such an agreement were to emerge, Afghanistan's neutrality would have to be guaranteed by the international community, including China and the United States. These are matters which neutral or non-aligned nations—either collectively or individually might pursue more vigorously than they have done in the past.

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Appendix 17A. Treaty of Friendship, Goodneighbourliness and Cooperation between the U.S.S.R. and the Democratic Republic of Afghanistan, 5 December 1978

The Union of Soviet Socialist Republics and the Democratic Republic of Afghanistan,

Reaffirming their commitment to the aims and principles of the Soviet-Afghan treaties of 1921 and 1931, which laid the basis for friendly and goodneighbour relations between the Soviet and Afghan peoples and which meet their basic national interests,

Willing to strengthen in every way friendship and all-round cooperation between the two countries,

Being determined to develop social and economic achievements of the Soviet and Afghan peoples, to safeguard their security and independence, to come out resolutely for the cohesion of all the forces fighting for peace, national independence, democracy and social progress,

Expressing their firm determination to facilitate the strengthening of peace and security in Asia and the whole world, to make their contribution toward developing relations among states and strengthening fruitful and mutually beneficial cooperation in Asia, attaching great importance to the further consolidation of the contractual-legal basis of their relations,

Reaffirming their dedication to the aims and principles of the United Nations Charter,

Decided to conclude the present Treaty of Friendship, Goodneighbourliness and Cooperation and agreed on the following:

Article 1

The high contracting parties solemnly declare their determination to strengthen and deepen the inviolable friendship between the two countries and to develop all-round cooperation on the basis of equality, respect for national sovereignty territorial integrity and noninterference in each other's internal affairs.

Article 2

The high contracting parties shall make efforts to strengthen and broaden mutually beneficial economic, scientific and technical cooperation between them. With these aims in view, they shall develop and deepen cooperation in the fields of industry, transport and communications, agriculture, the use of national resources, development of the powergenerating industry and other branches of economy, and give assistance in the training of national personnel and in planning the development of the national economy. The two sides shall expand trade on the basis of the principles of equality, mutual benefit, and most-favoured nation treatment.

Article 3

The high contracting parties shall promote the development of cooperation and exchange of experience in the fields of science, culture, art, literature, education, health services, the press, radio, television, cinema, tourism, sport, and other fields.

The two sides shall facilitate the expansion of cooperation between organs of state power and public organisations, enterprises, cultural and scientific institutions with a view to making a deeper acquaintance of the life, work experience and achievements of the peoples of the two countries.

Article 4

The high contracting parties, acting in the spirit of the traditions of friendship and goodneighbourliness, as well as the U.N. Charter, shall consult each other and take by agreement of the two sides appropriate measures to ensure the security, independence, and territorial integrity of the two countries.

In the interests of strengthening the defense capacity of the high contracting parties they shall continue to develop cooperation in the military field on the basis of appropriate agreements concluded between them.

Article 5

The Union of Soviet Socialist Republics respects the policy of nonalignment which is pursued by the Democratic Republic of Afghanistan and which is an important factor for maintaining international peace and security.

The Democratic Republic of Afghanistan respects the policy of peace pursued by the Union of Soviet Socialist Republics and aimed at strengthening friendship and cooperation with all countries and peoples.

Article 6

Each of the high contracting parties solemnly declares that it shall not join military or other alliances or take part in any groupings of states, as well as in actions or measures directed against the other high contracting party.

Article 7

The high contracting parties shall continue to make every effort to defend international peace and the security of the peoples, to deepen the process of relaxation of international tension, to spread it to all areas of the world, including Asia, to translate it into concrete forms of mutually beneficial cooperation among states and to settle international disputed issues by peaceful means.

The two sides shall actively contribute towards general and complete disarmament, including nuclear disarmament, under effective international control.

Article 8

The high contracting parties shall facilitate the development of cooperation among Asian states and the establishment of relations of peace, goodneighbourliness and mutual confidence among them and the creation of an effective security system in Asia on the basis of joint efforts by all countries of the continent.

Article 9

The high contracting parties shall continue their consistent struggle against machinations by the forces of aggression, for the final elimination of colonialism and racism in all their forms and manifestations.

The two sides shall cooperate with each other and with other peaceloving states in supporting the just struggle of the peoples for their freedom, independence, sovereignty and social progress.

Article 10

The high contracting parties shall consult each other on all major international issues affecting the interests of the two countries.

Article 11

The high contracting parties state that their commitments under the existing international treaties do not contradict the provisions of the present treaty and undertake not to conclude any international agreements incompatible with it.

Article 12

Questions which may arise between the high contracting parties concerning the interpretation or application of any provision of the present treaty, shall be settled bilaterally, in the spirit of friendship, mutual understanding and respect.

Article 13

The present treaty shall remain in force within twenty years of the day it becomes effective. Unless one of the high contracting parties declares six months before the expiration of this term of its desire to terminate the treaty it shall remain in force for the next five years and so on until one of the high contracting parties warns in writing six months before the expiration of current five-year term, about its intention to terminate the treaty.

Article 14

If one of the high contracting parties expresses the wish in the course of the twentyyear term of the treaty to terminate it before its expiration date, it shall notify in writing the other high contracting party, six months before its suggested date of expiration of the treaty, about its desire to terminate the treaty before the expiration of the term and may consider the treaty terminated as of the date thus set.

Article 15

The present treaty shall be ratified and take effect on the day of exchange of the instruments of ratification, which is to take place in Kabul.

The present treaty is done in duplicate, each in the Russian and Dari languages, both texts being equally authentic.

Done in Moscow on December 5, 1978.

For the Union of	For the Democratic
Soviet Socialist	Republic of
Republics	Afghanistan
L. Brezhnev	N. Mohammad Taraki

Source: The Global Significance of the Occupation of Afghanistan by the U.S.S.R., US International Communications Agency (also in *Pravda* and Foreign Broadcast Information Service, 6 December 1978).

Appendix 17B. UN General Assembly resolution 39/13: The situation in Afghanistan and its implications for international peace and security, 21 November 1984

The General Assembly,

Having considered the item entitled "The situation in Afghanistan and its implications for international peace and security",

Recalling its resolutions ES-6/2 of 14 January 1980, 35/37 of 20 November 1980, 36/34 of 18 November 1981, 37/37 of 29 November 1982 and 38/29 of 23 November 1983,

Reaffirming the purposes and principles of the Chapter of the United Nations and the obligation of all States to refrain in their international relations from the threat or use of force against the sovereignty, territorial integrity and political independence of any State,

Reaffirming further the inalienable right of all peoples to determine their own form of government and to choose their own economic, political and social system free from outside intervention, subversion, coercion or constraint of any kind whatsoever,

Gravely concerned at the continuing foreign armed intervention in Afghanistan, in contravention of the above principles, and its serious implications for international peace and security,

Noting the increasing concern of the international community over the continued and serious sufferings of the Afghan people and over the magnitude of social and economic problems posed to Pakistan and Iran by the presence on their soil of millions of Afghan refugees, and the continuing increase in their numbers,

Deeply conscious of the urgent need for a political solution of the grave situation in respect of Afghanistan,

Taking note of the report of the Secretary-General,¹ and the status of the diplomatic process initiated by him,

Recognizing the importance of the initiatives of the Organization of the Islamic Conference and the efforts of the Movement of Non-Aligned Countries for a political solution of the situation in respect of Afghanistan,

1. *Reiterates* that the preservation of the sovereignty, territorial integrity, political independence and non-aligned character of Afghanistan is essential for a peaceful solution of the problem;

2. *Reaffirms* the right of the Afghan people to determine their own form of government and to choose their economic, political and social system free from outside intervention, subversion, coercion or constraint of any kind whatsoever;

3. Calls for the immediate withdrawal of the foreign troops from Afghanistan;

4. *Calls upon* all parties concerned to work for the urgent achievement of a political solution, in accordance with the provisions of the present resolution, and the creation of the necessary conditions which would enable the Afghan refugees to return voluntarily to their homes in safety and honour;

5. *Renews its appeal* to all States and national and international organizations to continue to extend humanitarian relief assistance with a view to alleviating the hardship of the Afghan refugees, in co-ordination with the United Nations High Commissioner for Refugees;

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6. Expresses its appreciation and support for the efforts and constructive steps taken by the Secretary-General, especially the diplomatic process initiated by him, in the search for a solution to the problem;

7. *Requests* the Secretary-General to continue those efforts with a view to promoting a political solution, in accordance with the provisions of the present resolution, and the exploration of securing appropriate guarantees for the non-use of force, or threat of force, against the political independence, sovereignty, territorial integrity and security of all neighbouring States, on the basis of mutual guarantees and strict non-interference in each other's internal affairs and with full regard for the principles of the Charter of the United Nations;

8. *Requests* the Secretary-General to keep Member States and the Security Council concurrently informed of progress towards the implementation of the present resolution and to submit to Member States a report on the situation at the earliest appropriate opportunity;

9. Decides to include in the provisional agenda of its fortieth session the item entitled "The situation in Afghanistan and its implications for international peace and security".

¹A/39/513-S/16754.

Part VI. Conscientious objection

Chapter 18. Conscientious objection to military service

Introduction: history / Conscription and human rights / Tables of conscription and conscientious objection

18. Conscientious objection to military service

PETER WHITTLE, former Director, Quaker United Nations Office, Geneva

Superscript numbers refer to the list of notes and references at the end of the chapter.

I. Introduction: history

Resistance to compulsory military service has become a well-established form of protest against the demands of the state, and challenges long accepted concepts about the relationship between state and individual. Considerations of national security have in general been considered sovereign, an area in which government might legitimately and necessarily call upon the individual to forgo some of his rights; indeed, the argument is that he should do so in order to defend those rights and for the common good.

There have, however, long been supra-national considerations. Until the time of the emperor Constantine, the Christian church was pacifist; since then, within the Christian church the doctrine of the Just War has left the exercise of a pacifist conscience largely to the individual. Islam countenances the Jihad, or Holy War, and attempts to regulate military activity to limit its cruelty. Followers of Buddha are enjoined to respect all life.

What have become known as 'the historic peace churches' in the Christian tradition have developed corporate testimonies against taking life. More recently, Jehovah's Witnesses have declared their allegiance to a higher authority than the states 'of this world' and refuse to be conscripted into any state activity related to military service. Most recently of all, the policy of apartheid in South Africa has been singled out by the General Assembly of the United Nations: conscientious objection to serving in forces that support apartheid has been encouraged,¹ and an Anglican Archbishop has declared that relations between black and white currently constitute 'an unjust war' which the church could not conscientiously support.²

Conscription as we know it today is a product of the Napoleonic era. When the crowned heads of Europe joined forces to attack the France of the Revolution, the French people responded by reviving the ancient militia idea and called for a mass levy to defend the principles of the Revolution. Napoleon adopted this system for his own imperial purposes. When he imposed limitations on the size of the Prussian army, the Prussian military authorities cleverly avoided the consequences by introducing the training of year groups, thus keeping the numbers below the ceiling imposed by Napoleon, but holding vast numbers of trained men in reserve formations to be called upon as required.³ In a short time, every man was a potential soldier at the disposal of the state. Thus was born the idea of training all male citizens in the military arts, maintaining a small professional army with a massive reserve force ready for mobilisation.

This ingenious system rapidly spread to the other nation states of Europe, and by the end of the century had become common practice in peace and war. The development was accompanied by two concurrent changes which exercised a profound influence on the nature of war. First, the industrial revolution introduced the means of supplying military equipment by mass production, which fostered the development of mass armies through the accessibility of relatively cheap equipment in addition to cheap manpower.

The second feature which developed concurrently with conscription and industrialization was the evolution of a concept of the state which associated itself very closely with the armed forces, and especially the army. This was the militarized nation state⁴ for which the prime service the citizen could offer was in the army. The state became the supreme authority, its executive arm was the forces, and the forces were based on conscription. This notion created a chauvinist spirit, which, linked to the expansionist policies of the newly industrialized states, presented a new and revised form of balance-of-power politics in international affairs. The spread of these ideas throughout the nations of Europe in the 19th century elevated military service to an unprecedented height and permeated society through the family, the school and even the church.⁵ It was a psychology of potential danger which culminated in World War I, of which Liddell Hart asserted that military conscription was a major cause.⁶

In the period since World War II, the form of militarization has changed, with much greater emphasis on the rapid advance of military technology and the devising of new weapon systems. It might have been supposed that, with the increased capital intensity of the military sector, this sector's demand for labour would have been much reduced: consequently that the numbers in the world's armed forces would have been falling sharply. That has not happened. There has been little change in the numbers on either side of the dividing line in Europe. Some Third World countries—North Korea, South Korea and Viet Nam—maintain very large armies. There are also some countries—such as Switzerland—where the idea of a citizen army is strongly defended; such a system, it is argued, helps to democratize the army, and reduces the risk of a professional military elite which could have political aspirations.

II. Conscription and human rights

There are some countervailing tendencies to the existing preoccupation of many states with questions of military force. One such tendency is the increasing awareness, even at the international level, of the need to recognize and legislate for human rights, including in particular the right to refuse to kill.

In the report by A. Eide and C. Mubanga-Chipoya for the United Nations Commission on Human Rights, dated 27 June 1983,⁷ the authors make a thorough examination of the concepts of conscientious objection and the relevant international standards relating to those concepts; they analyse a mass of relevant information on the current state of legislation world-wide, and go on to make conclusions and recommendations for action in the United Nations' system. The relevant international standards are contained in the following documents: the Universal Declaration of Human Rights of 1948 (article 18); the International Covenant on Civil and Political Rights of 1966 (article 18); the European Convention on Human Rights and Fundamental Freedoms of 1950 (article 9); the American Declaration on the rights and duties of man (article 3); the American Convention on Human Rights (article 12); and the African Charter on Human and Peoples' Rights (article 8).

They point out, however, that: "The freedom to have a conscience with regard to a certain issue is one thing; to act in accordance with that conscience is another".⁸ One of the functions of this legislation is to delimit or extend the right to act in accordance with the conscience it recognizes as a fundamental human right. The Hague Conventions of 1899 and 1907 and the various Geneva Conventions are efforts to give substance to the provision that no one shall be deprived arbitrarily of his or her life—in other words, to establish international norms or dividing lines between justified and unjustified taking of the life of others. "Again, therefore, the question that arises is should an individual who, for reasons of conscience, refuses to participate in an action which in his or her view would go beyond the borderline of legitimate armed action have the right to act in accordance with his or her conscience?"⁹

The Nuremberg Principles are also cited, since these make the individual personally responsible for certain actions contrary to international law; the plea of 'obeying orders' from a military or other authority may thus be rendered inadmissible.¹⁰

Adequate definitions on conscientious objection have so far eluded legislators nationally and internationally; the more widely defined the concept, the less clear it becomes. The lack of a clear definition has led to problems both for objectors and legislators: the latter will inevitably fall back on administratively convenient interpretations. Where the whole of society is implicated in preparations for military action, 'objectors against the military' might be a more adequate, if clumsy, formulation than 'conscientious objector'. Most legislation, however, restricts itself to considering only 'conscientious objection to military service'.

Defining and testing conscience itself has been a problem that seems to have been resolved by the simple expedient of noting that "no court or commission can penetrate the conscience of an individual and that a declaration setting out the individual's motives must therefore suffice in the vast majority of cases to secure the status of conscientious objector".¹¹ In practice, of course, many objectors of conscience founder at the first hurdle of achieving recognition.

The absolute objector, one who refuses to take up arms for any purpose, and usually for religious reasons, has been the easiest objector of conscience with whom a state has had to deal, and was the first category of conscientious objector to be recognized and tolerated. Except as a charge upon the state, or in the case of his inciting others to follow his example, he has constituted no threat in time of war.

At the other extreme, the contingent or selective objector of conscience who, from political motives, refuses to support his country in a particular war, presents grave problems: to countenance such grounds for objection to military service might reduce the ability of a state to fulfil one of its prime functions, the defence of its national interests.

III. Tables of conscription and conscientious objection

The following tables illustrate the widely diverse situations in which conscientious objectors find themselves. Statistics for Europe are much easier to come by than for other parts of the world, but even here they are incomplete. The attempts by the United Nations to gather information have resulted in a patchwork which hardly offers enough to make a comparative study between states. Within Europe itself it is probably better to make comparisons within the states rather than between them. Many factors contribute to a distortion of the situation. Where, for instance, objection to military service was accepted upon the application of a formula, as happened in France and the Federal Republic of Germany, the numbers of those applying so disturbed the
administrators that they brought the process to a halt after only a short time.¹²

Even the current numbers of recognized conscientious objectors cannot be accurately assessed since there is no record of those in non-combatant service in the army. The vagaries of the process of callup often exempt those who might otherwise seek recognition; and in the Philippines, for instance, legislation is simply not applied to large areas of the countryside. In the USSR, while there is no official recognition of conscientious objection, local arrangements are made to allow freedom of conscience. Despite new laws in Portugal, the administrative process is such that it may be some time before existing patterns of sentencing of objectors changes. Where development service is quoted as not being called 'a non-combatant service', as in Mexico, it is difficult to interpret what that means for an objector of conscience; does it mean no more than that soldiers can be drafted into agriculture?

About half the countries in the world have some form of conscription (compare tables 18.1 and 18.2). Measured by population, the proportion liable to conscription is rather larger. Nearly 60 per cent of the world's population live in countries where there is some form of conscription for military service.

In turn, of those countries with conscription, just over half have some formal provision for conscientious objection (see table 18.1); some 38 countries have no such formal provision—though there may be arrangements for possible assignment to non-combatant duties.

The statistics are inadequate to provide any general assessment of the trend of conscientious objection to military service. In the United States, the proportion of men liable for conscription who registered as conscientious objectors has shown some slight tendency to rise—0.14 per cent in World War I, 0.42 per cent in World War II, and 1.26 per cent in 1970. These percentages are low compared to current figures in western Europe (see table 18.3). In many countries, any appraisal of the trend is made impossible by changes in the law: for instance, in the Federal Republic of Germany the peak figure for conscientious objector status only required a postcard to the authorities.

In table 18.4, a comparison is made of the liberality of the provisions for conscientious objection, for 15 European countries and for two time periods. In western Europe, there has been a clear tendency towards a more liberal (or tolerant) treatment of conscientious objection. In all of the 15 countries, the 'liberality' score was higher in 1978 than in 1968, and there are no countries which show a movement in the

Country	Legislation	Length of service	Country	Legislation	Length of service
† Afghanistan			† Jordan	1967*	2 yrs
† Albania		24 mos	Kampuchea	1959	
† Algeria			† Korea, Dem.		
† Angola		3 yrs (4 yrs for higher	People's Rep.		
		ranks)	Korea, Rep.	1958	18-27-36
† Argentina	1853/1947		· •		mos
Austria	Austro-Hungarian	6 mos/8 mos	Kuwait	1976	
	Empire 1918-38/		Laos	1954	
	1945/1955*/1966*		† Libva	1978	3-4 vrs
Belgium	1870/1937/1964*	10 mos or 8 mos if	Madagascar		
		in FRG	† Mali		
† Benin		18 mos men, 12 mos	Mexico	1921/1936 ^a /1940	
		women n.e.	Mongolia		
Bolivia	1880/1907/1930*/1962*		Morocco		
Brazil	1923/1979*		Namibia		
† Bulgaria	1920/1947	24/36 mos	Netherlands	1912/1917*/1922*/	12-14 mos
† Burma	1959	n.e.		1923*/1946*/1964*	12 11 1100
Cape Verde			† Niger		
† Chile	1931	Up to 2 yrs	Norway	1866/1902*/1914*/	12-15 mos
† China	1965	3-5 vrs		1922*/1923*/1925*/	12 13 1100
† Colombia	1945			1937/1953*/1965*	
† Cuba	1942		Paraguay	1921 + 5/1927	
† Cyprus	1964/1966	6 mos	† Peru	1949	
† Czechoslovakia	1919/1945/1948/1960	24-27 mos	Philippines	1935/1942 n.e.	
Denmark	1848/1907*/1917*/	9 mos	Poland	1919/1944/1950	2-3 vrs
200000	1933* (1953*	2	Portugal	1910/1933/1956/1977*	18 mos
† Ecuador	1921		Puerto Rico	1948 n.e	io mos
† Egypt	1947		t Romania	1868/1921/1947	30 mos
El Salvador	1929/1941		t San Marino	1000, 1721, 194,	50 1105
† Equatorial Guinea			t Saudi Arabia		
Finland	1919/1931*/1941*/	8 mos	† Singapore	1939/1957	2-3 vrs
			Gingaporo		y 10

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Table 18.1. Countries practising conscription, as of 1984

reserve

France	1792/1798/1928/1959/ 1963*/1983*	12 mos	Spain	1873/1940/1968/1978 [*] /	15-18 mos
† Gabon German DR Germany, FR	1962/1964* 1949*/1954*/1956*/	18 mos, 2 yrs reserve 15 mos	Sweden	1892/1902*/1920*/ 1925*/1943*/1966*/ 1978	9–13 mos
Gibraltar Greece	1972* 1940/1944* 1930/1952/1975/1977*/	22-26 mos + reserve	Switzerland	1848/1874/1907/1968	4 mos + 11 mos reserve
Guatemala † Guinea	1982 1965		† Syria † Thailand † Tunisia	1946	
Haiti Honduras	n.e. 1965 n.e.		† Turkey Upper Volta	1927/1961 n.e.	20 mos
† Hungary Iran	1919/1938/1946/1949 1925	18–24 mos	(Burkina Faso) Uruguay	1940°	2.2
Iraq Israel	1935 1949/1953 [*] /1952	2426 mos men, 1220 mos women	† USSK	1/63 / 1800/18/4/ 1919**/1921*/1926*/ 1929/1939/1967/1977	2-3 yrs
Italy	1861/1934/1935/1936/ 1966*/1972*	12 mos	† Venezuela	1811/1908/1936/1942/ 1947/1961 n.e.	
† Ivory Coast	n.e.		Yemen Arab Republic † Yugoslavia Zaire	1919/1946/1955 1964 n.e.	18-24 mos

Key:

[†] Countries marked thus have at present no formal provisions for conscientious objection. The second column gives dates of significant legislation (constitutions, acts or amendments). Where a span of years is given, this indicates the life of the legislation.

* Indicates that at that date some recognition was given to conscientious objection (though this may have been minimal).

____ Indicates the abrogation or repeal of earlier legislation on conscientious objection or conscription, though basic provision for call-up may still be preserved. n.e. Indicates that powers are enacted but not enforced, or enforced unsystematically or only partially.

- ^a Exempted Mennonites; reaffirmed 1936.
- ^b Exempted Mennonites.
- ^c Exempted Mennonites.
- ^d Exempted Tolstoyans.

Source: Eide, A. and Mubanga-Chipoya, C., 'Questions of Conscientious Objection to Military Service', United Nations Commission on Human Rights, E/CN.4/Sub.2/1983/30, War Resistors International Publications.

Table 18.2. Countries not practising conscription, as of 1984

Australia, ^a Bahamas, Bahrain, Bangladesh, Barbados, Bhutan, Botswana, Brunei, Burundi, Cameroon, Canada, ^b Central African Republic, ^c Chad, Congo, ^d Costa Rica, ^e Dominican Republic, ^f Ethiopia, Fiji, Gambia, ^g Ghana, Grenada, Guyana, ^h Holy See, Hong Kong, ⁱ Iceland, India, ^j Indonesia, ^k Ireland, Jamaica, Japan, Kenya, ^l Lebanon, ^m Lesotho, Liberia, Liechtenstein, ⁿ Luxembourg, ^o Malawi, Malaysia, ^p Maldives, Malta, Mauritania, Mauritius, Monaco, Nauru, Nepal, New Zealand, ^q Nigeria, Oman, Pakistan, ^r Panama, Papua New Guinea, Qatar, Rwanda, Samoa, Senegal, ^s Sierra Leone, Sikkim, Somalia, Sri Lanka, ^l Sudan, Suriname, Swaziland, Tanzania, Togo, Tonga, Trinidad & Tobago, Uganda, United Arab Emirates, United Kingdom, ^w United States, ^v Zambia, Zimbabwe

- * Indicates that at that date some recognition was given to conscientious objection (though this may have been minimal).
- Indicates the abrogation or repeal of earlier legislation on conscription or conscientious objection, though basic provisions for call-up may still be preserved.
- n.e. Indicates that powers are enacted but not enforced, or enforced unsystematically or only partially.

The footnotes give dates of significant legislation (constitutions, acts or amendments):

" 1903^{*}/1911-12^{*}/1930/1939^{*}/1942^{*}/ ⁿ 1868 ° 1944/1963* 1951-65*/1973 ^b 1919/1939/1941/1943*/1945* ^p 1939/1940^{*}/1952^{*} ^{*q*} 1909/1912*/1916*/<u>1930</u>/1940*/1949*/ ^c 1966 conscription 'amended' 1951*/1956*/<u>1959</u>/1961 selective C/<u>1973</u> ^d 1969 e 1949 ' Military training at college age ^f 1947/1961 ^s 1960 n.e. ⁸ 1942^{*} ^t 1971 Public Service Act: graduates to ^h 1942 perform 5 years' service ⁱ 1922/1939/1951*/<u>1961</u> ["] 1832^{*}/1916^{*}/1918^{*}/1919/1939^{*}/1941^{*} ^j 1940*/1948 established National Cadet women/1947/1949/1950/1957 * 1863/1864*/1917*/1919/1940*/1948*/ Corps * 1919 (Dutch rule)/1945/1958 1955/1959/1963/1967/1973 ¹ 1939/1943*/1951*/<u>1963</u> ^m Student training compulsory

Source: See source for table 18.1.

other direction. There has also been some move towards greater uniformity of treatment: the differences between the countries are noticeably smaller in 1978 than they were 10 years earlier.

Appendix 18A sets out the details of the provisions which exist for conscientious objection in 37 countries for which some information is available. This includes information, for some countries which do not have conscription, about the provisions for conscientious objection for those in the armed forces.

There certainly appears to be a measure of agreement in the various recommendations of international bodies for the treatment of conscientious objection. The most significant documents in this regard are reproduced in appendix 18B, and they present a very uniform picture of recommendations for appropriate treatment of conscientious objection.

Country	Min. length of basic military	Min. length of alternative	Type of alternat service available	tive	No. of men	No. of applicants	Ratio of COs/ military	Year
	(months)	(months)	Within army	Outside army	conscription	CO status	(per cent)	taken
Albania	24	None		n.a.				
Austria	6	8	yes	yes		4 242		1982 ^b
Belgium	10	15	ves	ves	c.49250	2 428	4.93	1982 ^b
Bulgaria	24	None ^a	n.a.	n.a.				_
Cyprus	6	None	n.a.	n.a.				_
Czechoslovakia	24	None ^{<i>a</i>}	n. a .	n. a .				_
Denmark	9	11	ves	ves	46 498	816	1.75	1980 ^b
Finland	8	12	yes	yes	c.42000	1 174	2.8	1982 <i>°</i>
France	12	24	yes	yes		1 508		1981 ^b
German DR	18	18	yes	no				—
FR Germany	15	20	yes	yes	c.295000	68 3 3 4	c.23.0	1983 ^b
Greece	26	48	yes	no	c.152000	None	n.a.	1982°
Hungary	24	None ^a	n.a.	n.a.				_
Italy	12	20	yes	yes		c.7000		1981 ^b
Netherlands	14	18	no	yes	122 636	1 460	1.2	1982 ^b
Norway	12	16	no	yes	c.34000	c.2810	8.3	1982 ^b
Poland	24	None ^a	n.a.	n.a.		••		<u> </u>
Portugal	18	None	n.a	n.a.	c.18700	c.4000	c.20.0	1982°
Romania	30	None	n.a.	n.a.	n.a.	••		_
Spain	15	(22)	()	(yes)	c.234000			1982°
Sweden	9	12	no	yes	57 579	4138	7.18	1981 ^{<i>b</i>}
Switzerland	11	None	n.a.	n.a.	n.a.	745	n.a.	1983 ^{<i>b</i>}
Turkey	20	None	n.a.	n.a.	c.489000			1982°
USSR	24	None	n.a.	n.a.		••	••	_
Yugoslavia	18	None	n.a.	n .a.	••			

Table 18.3. Europe: certain data on conscription, conscientious objection and alternative service

^{*a*} No official alternative service provided, although another form of work may be accepted as an alternative, or cases where administrative arrangements to serve in non-combatant units of the armed forces have been possible.

^bOfficial government statistics.

^c Statistics taken from organizations or private sources.

Key:

n.a. = not applicable

 $\ldots = not known$

() = conditions of projected law

Source: The study by the Quaker Council for European Affairs, submitted to and published by the Legal Affairs Committee of the Parliamentary Assembly of the Council of Europe, AS/Jur(36)4.

Table 18.4. A comparison of the liberality of provisions for conscientious objection in 15 European countries

The extent of the provisions for objection, both conscientious and political, and the manner in which such provisions are administered allow some general comparisons to be made between the provisions of different countries. Such a comparison can be based upon the criteria contained in the Council of Europe Resolution 337 (see appendix 18B). In the table below such an attempt is made, by allocating a 'score' under the several headings of Resolution 337 (plus one other, concerned with the manner in which the law is administered). The scale is based on weights given to various characteristics of the way in which conscientious objectors are treated. Like all similar exercises, it inevitably therefore involves value judgements; but since the same criteria have been used in the various countries, and in the two time periods chosen, some valid comparisons can be drawn from the data.

Scale of points:

a	Tribunal composition	Military	1
		Mixed	2
		Civilian	3
b	Grounds for recognition	Religious only	1
		Moral, ethical, etc.	2
		Political	3
с	Timing of claim	15 days	1
		30 days	2
		60 days or open	3
d	Penalties	Severe	1
		Light	2
e	Availability of information	General	1
		Specific	2
f	Alternative service	Military or defence	1
		Limited civil	2
		Wide range	3
g	Administration	Dissuasive	1
		Restrictive	2
		Neutral or sympathetic	3

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	Co	Comparative scores														
	1968								1978							
Country	a	b	с	d	e	f	g	Total	a	b	c	d	e	f	g	Total
Austria	2	2	2	2	1	1	3	13	3	3	2	2	1	3	3	17
Belgium	3	2	3	2	2	2	3	17	3	3	3	2	2	3	3	19
Denmark	2	2	3	2	1	3	3	16	2	3	3	2	1	3	3	17
Finland	1	2	1	1	1	1	3	10	2	2	1	1	1	2	3	12
France	1	1	1	1	1	2	1	8	1	1	2	1	1	2	1	9
FR Germany	2	2	3	2	2	3	3	17	3	2	3	2	2	3	3	18
Greece	-	-	-	-	-	-	-	0	1	1	1	1	1	1	1	7
Italy	-	-	-	-	-	-	-	0	2	1	3	2	1	2	2	13
Netherlands	3	2	3	2	1	3	3	17	3	3	3	2	1	3	3	18
Norway	3	3	1	2	1	3	3	16	3	3	1	2	1	3	3	16
Portugal ^a	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	0
Spain	-	-	-	-	-	-	-	0	1	1	1	1	1	2	1	8
Sweden	3	2	2	2	1	2	3	15	3	3	2	2	1	3	3	17
Switzerland ^b	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	0
Turkey	-	-	-	-	-	-	-	0	-	-	-	-	-	-	-	0

"Portugal allows for conscientious objection in its new constitution, but there is no legislation to implement it.

^bSwitzerland has no legislation, but allows unarmed service and has reduced sanctions in the military penal code.

Source: McKean, J., 'Military Conscription in Western Europe, 1968-1978' (see note 6).

Notes and references

- 1. UN General Assembly Resolution 33/165, 20 December 1978, adopted without a vote.
- 'Church and Conscience', a collection of Church and other statements on conscientious objection in South Africa, Christian Citizenship Department of the Methodist Church of Southern Africa, 1980, p. 16. Statement by Archbishop Hurley in Durban.
- 3. Burrell-Smith, G., Outline of European History (Arnold, London, 1920), p. 30, cited in McKean, note 6.
- 4. Van Doorn, J., *The Soldier and Social Change* (Sage, London, 1975), p. 96, cited in McKean, note 6.
- 5. Note 4.
- Liddell-Hart, B.H., Why Don't We Learn from History? (Allen and Unwin, London, 1972 edn.), pp. 23-24, cited in McKean, J., 'Military Conscription in Western Europe, 1968-1978', unpublished doctoral thesis, University of Bradford School of European Studies, 1982.
- 7. E/CN.4/Sub.2/1983/30. See appendices 18A and 18B.
- 8. Note 7, p. 7.
- 9. Note 7, p. 9.
- 10. Note 7, p. 9.
- 11. Resolution of the European Parliament on Conscientious Objection, adopted on 7 February 1983, article 3. See appendix 18B.
- 12. "From 1 August 1977 to 1 April 1978, special legislation confirmed the right to refuse military service, (according to a constitutional provision in the Federal Republic of Germany) and young people had only to register their objection on a postcard and send it to their draft board." Woods, D., unpublished paper, 'Tests of Conscience and Convictions as regards Conscientious Objection to War and Military Service', Geneva, October 1982.

Number of applications in FR Germany moved from 40 618 in 1976 to 69 959 in 1977, although subsequent figures are misleading because of the change in the counting system in 1978.

"In France, from 1971 to 1978, the Jurisdictional Committee accepted as grounds for granting the CO status a legally unattackable form letter which the CO's had prepared so as to limit arbitrary decisions. Hundreds of men who sent in the letter were given CO status. By the end of 1978 the same letter was no longer considered proof of the religious and philosophical convictions of the would-be objector." Note 7.

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- ⁶Conscientious objection to military service in Europe⁷, a study submitted by the Quaker Council for European Affairs Committee of the Parliamentary Assembly of the Council of Europe (AS/Jur(36) 4), Strasbourg, 17 May 1984.
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- The Right to Refuse to Kill (International Peace Bureau, Geneva, 1971).

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Appendix 18A. The recognition of conscientious objection

This Appendix sets out the provisions which exist for conscientious objection in 37 countries. For some countries where there is no conscription, it includes information on the provisions for servicemen who develop a conscientious objection while in the services.

The information is taken from the report by A. Eide and C. Mubanga-Chipoya, 'Questions of Conscientious Objection to Military Service', United Nations Commission on Human Rights, E/CN.4/Sub.2/1983/30.

Headings

- (a) Recognition
- (b) Grounds recognized as valid
- (c) Timing of the claim
- (d) Possible penalties for refusal to perform military service
- (e) Dissemination of information about conscientious objection
- (f) Alternative and development service

Australia

(a) Conscientious objection would become relevant if compulsory military service were reintroduced (National Service Act 1951). Conscientious objection is seen as having two forms: beliefs which do not allow persons to engage in any form of defence service and beliefs which do not allow persons to engage in duties of a combatant nature.

(b) Conscientious beliefs are recognized as valid. Objection to service of a particular kind or in a particular case does not provide a basis for exemption. (Government reply to UN)

(c) (d) (e) No information.

(f) No provision is made for an alternative service for persons totally exempt from defence service on grounds of conscientious belief. Persons so exempted are under no further liability for any service.

Persons exempted from combatant duties on grounds of conscientious belief would, of course, be employed in the Defence Force on non-combatant duties.

It is possible that, in circumstances which warranted the introduction of compulsory military service, the government would also assume powers to direct the non-military labour force. In that event, persons having the status of conscientious objectors would, in common with the rest of the civilian labour force, be subject to employment controls, but this is not a compulsory alternative to military service. (Government reply to UN.)

Austria

(a) Conscientious objection is recognized in peace and wartime.

(b) Sincere religious beliefs and humanitarian, ideological and other serious grounds are recognized as valid.

(c) The claim for conscientious objector status has to be effected within 10 days of receipt of call-up papers and before receipt of call-up papers in subsequent recalls to

service, but not during engagement in military service; this claim is possible for serving soldiers after six months of service.

(d) For those not recognized as conscientious objectors or who do not attend for enrolment, three to six months' gaol is possible. They might face repeated imprisonment.

(e) Conscripts must be informed of the right to be released from military service on conscientious grounds. Information on application procedure can be obtained from the police.

(f) Alternative service exists and consists of non-combatant service or civilian service including social work, hospital work, rescue service, highway maintenance, etc. When the provincial government permits, it is possible to do educational work. Control is effected by the Ministry of the Interior. There were about 3900 conscientious objectors in alternative service in 1980.

Belgium

(a) Conscientious objection is recognized; it can be claimed in peace and wartime.

(b) Valid grounds are conscientious grounds and feeling of inability to use arms even in case of national danger; reasons challenging fundamental state institutions are not acceptable; all grounds are accepted (religious, moral) but exclusively political reasons are not allowed.

(c) The claim has to be made before call-up; application for conscientious objector status is not possible for serving soldiers.

(d) Conscripts refusing all forms of national service can receive a prison sentence of up to three years.

(e) There is easy access to information (official publications—rights to refuse military service defined in call-up papers; an official leaflet is published by the Ministry of the Interior).

(f) Alternative service exists. It constitutes a derogation for the benefit of conscientious objectors but not a right for them (Law of 20 February 1980). Conscientious objectors are subject to the same conditions as conscripts but no allowance for clothing and housing. They serve in civil defence, health and social services, educational services, peace service and international service.

Bolivia

(a) Conscientious objector status is only partially recognized. Only members of the Mennonite Church are exempted.

(b) (c) (d) No information.

(e) (f) Not applicable.

Brazil

(a) Constitutional provisions exist for conscientious objection.

(b) (c) No information.

(d) The possible prison penalty is from four months to one year in peacetime and from two to five years in war. Under article 210 of the Constitution, loss of civil rights, and under article 149, loss of political rights may occur. Special taxation can also result from refusal to serve.

(e) Not applicable.

(f) There is no alternative service; some army units work on civilian construction.

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Denmark

(a) Conscientious objector status is recognized (Act No. 427, Ministry of Interior, 30 September 1980).

(b) Genuine conscientious grounds are valid (religious, philosophical and political reasons are acceptable).

(c) The claim must be made within the four weeks following receipt of the call-up order.

(d) Imprisonment for nine months can occur (Jehovah's Witnesses released after three to four months). Conscripts refusing all forms of national service can be imprisoned for a maximum of 15 months.

(e) Information is not automatically provided. Two official schools for recognized conscientious objectors exist (four weeks).

(f) Alternative service is available: civilian work, 11 months; possibility of transfer to the medical corps; kindergartens, hospitals, forestry, libraries, museums, United Nations movement, etc.; alternative service abroad; two years in developing countries. Application for transfer to civilian work is submitted to the Directorate for Conscientious Objector Service; possibility of appeal to the Ministry of the Interior exists.

Finland

(a) Conscientious objection is recognized (Act and Statutory Decree on Unarmed and Civilian Service, 1969).

(b) Conscientious grounds of a serious nature based on religious or ethic convictions are accepted in peacetime.

(c) Application has to be entered before the conscript has been called up for military service. In case of application made after that, the conscript is transferred to unarmed service pending the examination board's decision.

(d) Conscripts refusing alternative service may face imprisonment (no more than one year). There is no possibility of conditional sentence.

(e) Information on the right to refuse military service as a conscientious objector is given by the draft board.

(f) Alternative service exists (unarmed service and civilian service). The Ministry of Labour approves institutions for civilian service. Alternative service is accomplished in hospitals, social welfare institutions, prisons, etc. The length of service (unarmed and civilian) is longer than regular service.

France

(a) Conscientious objection is recognized in peace and wartime (Law 63-1255 of 1963, Law 71-424 of 1971, Code du Service National, Decree of Bregançon 1972).

(b) Religious or philosophical grounds are accepted (Law 71-424).

(c) The claim must be made one month after publication of call-up; no possibility exists for conscripts already engaged in military service or reservists to make such a claim, but the legislation may well be changed. Conscientious objectors shall be subject to the same regime as persons required to perform military service. Thus the general discipline of the armed forces shall be applicable to them, subject to the special arrangements laid down in Decree 72-805 of 17 August 1972 in regard to subordination, duties and obligations, punishment and the leave system. They shall, furthermore, be subject to the discipline of the authority or organization to which they are assigned.

(d) For refusing all forms of military service and not claiming conscientious objector status, or whose claims are rejected, 2-24 months' prison sentence by military tribunal is possible. In practice fewer than 10 per cent of defaulters are brought to trial.

Deserters and recognized conscientious objectors refusing to register for civil service risk a prison sentence of from three to six years and could lose their civil rights for five years upon decision of a civilian tribunal (civil consequences: job restriction).

(e) The right of information is not legally recognized. Propaganda "likely to incite potential conscripts to benefit from the provisions of the law recognizing conscientious objection" is punishable by a fine or imprisonment.

(f) Alternative service is recognized (Decree of Bregançon). The Ministry of Agriculture and the Cultural Secretariat or Office of Social Aid are responsible for organizing civil service. The Ministry of Defence approves the organization and administration of civilian service. (Forestry work, cultural or social work. Possibility of non-combatant service within the army.) Service is twice as long as ordinary military service.

Young persons granted the status of conscientious objector come under the authority of the Ministry of Agriculture. As such they shall be employed either by the National Forestry Commission or by other public bodies attached to various ministries or by private bodies performing tasks of public interest.

A draft law modifying the French National Service Code was submitted to the Parliament in April 1983 and as Law No. 83/605 came into force on 8 July 1983. According to its provisions, conscientious objectors can perform their national service in civilian services under state administration or for the local community, or in a social or humanitarian body. The length of service would be twice the length of military service. The request for civilian service must be made with the agreement of the Minister of Defence. If it is not accepted, a recourse procedure can be initiated before an administrative tribunal.

German Democratic Republic

(a) Conscientious objector status is recognized in an amendment to the Army Act ratified on 16 September 1964.

(b) Religious or similar motives are accepted.

(c) The claim for conscientious objector status is not possible for a serving soldier or reservist.

(d) Prison sentence of up to 21 months might be faced. The law allows for sentences of up to 5 years, although usually they are no more than 24 months. Those who object for religious reasons may receive slightly shorter sentences for refusing reserve service. Sentences of from six to eight months have been imposed.

(e) There is no automatic release of information.

(f) Non-combatant service is available and lasts 18 months, including road building, reparation of military exercise grounds and emergency services.

Germany, Federal Republic of

(a) Conscientious objection is recognized (article 413 of the Basic Law).

(b) Conscientious grounds are valid with reference to the relevant part of the Constitution (no one shall be forced to do armed war service against his conscience); there is no possibility of selective objection.

(c) The claim can be made at any time.

(d) Refusal to respond to call-up obligations may result in a prison sentence of up to five years. Possible penalty for refusing registration is a fine of up to DM 1000 (for refusing the tribunal's decision: three years, in practice maximum 15 months).

(e) Usually there is no information on the right to refuse military service for conscripts. Propaganda on conscientious objection is not authorized within barracks. An official training session for recognized conscientious objectors exists.

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(f) Alternative service exists. An option can be taken to perform a development service inside FRG or in developing countries. Civilian service must be for the benefit of the public at large (priority to the social sphere). Recognized conscientious objectors objecting to the performance of any kind of service can be released from obligations if they show willingness to engage in a voluntary way for a health or similar institution for two and a half years. Length of normal alternative service corresponds to normal military service.

Greece

(a) Recognition of conscientious objection to armed military service exists, but not to unarmed military service. The designation of conscientious objector is only given to Jehovah's Witnesses whose objection is based on religious beliefs. No special procedure exists for granting them formal status. Such persons can perform military service without bearing arms, but for a period double that of regular military service.

(b) Only religious grounds are valid.

(c) At time of call-up.

(d) Although initial sentences of up to 12 years may be imposed, these are reduced to $4\frac{1}{2}$ years on appeal. In practice they are reduced still further. Some prisoners have been released early under Law 1240/82 of 29 March 1982, but many of these have been called up again. On their refusal some have been sentenced to 1–8 years' imprisonment.

(e) Information is not automatically given.

(f) The Ministry of Defence is responsible for organizing non-combatant service. Unarmed military service for twice the duration of armed service is provided by Law 731/77.

Guatemala

(a) There is no provision for conscientious objection. However, the possibility of paying a special tax may exempt some individuals from conscription.

(b) (c) No information.

(d) Prison may result from failure to comply.

(e) Not applicable.

(f) There is no alternative service.

Guyana

(a) Conscientious objector status is recognized in the Constitution of 1966.

- (b) (c) No information.
- (d) Imprisonment and fines may result from failure to comply.
- (e) Not applicable.
- (f) Both alternative and development services exist.

Israel

(a) The concept of conscientious objection is not completely ignored but is of limited application. Statutory exemption is only applicable to women. Men can also be exempt under the Law of Security Service 1959, article 28(c).

(b) Statutory exemption exists for women of military age who have proved that reasons of conscience or religious conviction prevent them from serving the defence service. A few people have been exempted by the Ministry of Defence on grounds of conscience.

(c) Not applicable.

(d) Repeated short prison terms or loss of civil rights may result from failure to comply. Jews refusing only service in the occupied territories in Lebanon are usually given sentences of 35 days (sometimes repeatedly). Some Jehovah's Witnesses and Druze who refuse all military service are sentenced to more than a year's imprisonment. Although some objectors are eventually given documents of exemption, it is often still hard to find work, obtain a driving licence, enter a university or receive social service assistance, as reserve booklets are often requested.

(e) Not applicable.

(f) Women of military age exempted from defence service are liable to national service for 24 months. This service may be in agricultural work or training, labour service for the Defence Army or other State institutions, service in an educational or social welfare institution or medical care. In some cases permission has been granted for conscripts to serve only within the 1967 borders.

Italy

(a) Conscientious objection is recognized (Act No. 772, 1972, amended in 1974).

(b) Opposition to use of arms in all circumstances for profound conscientious motives; profound religious, philosophical or moral convictions are considered valid grounds.

(c) The claim must be made within 60 days of call-up. On receipt of the application the candidate is suspended until his claim is examined. Normal delay for the Ministry of Defence decision is six months (applicants who have waited more than 26 months are exempt from all service).

(d) Refusal of all forms of national service may lead to a prison sentence of 2-4 years. Loss of recognized conscientious objector status may occur for failing to report for alternative service or behaving inconsistently with such status.

(e) The release of information is not automatic. Special training sessions for conscientious objectors are held at the beginning of the period of alternative service.

(f) Alternative service exists (welfare organizations, civil defence institutions, forestry, with Defence Minister's prior agreement), and is eight months longer than normal service. Unarmed military service exists. Voluntary service in developing countries may be considered as performance of national service.

Madagascar

(a) There is no recognition of conscientious objector status; some form of legal recognition has been reported since 1968.

(b) (c) No information.

(d) Penalties ranging from imprisonment to capital punishment may arise (articles 124 and 138 of Penal Code). Loss of civil rights or imprisonment may occur.

(e) No information.

(f) There is no alternative service. However, since 1968 it has been possible to perform national service in work projects in underdeveloped areas. There is development service, but it is not called a non-combatant service.

Malta

(a) Conscientious objector status would be envisaged in case of introduction of conscription (article 36(2)(c) of the Constitution).

(b)(c)(d) No information.

(e) Not applicable.

(f) An alternative service for people refusing military obligations would be envisaged in case of introduction of conscription.

Mexico

(a) Partial recognition of conscientious objection exists.

(b) (c) No information.

(d) Failure to comply may result in loss of civil rights or imprisonment.

(e) Not applicable.

(f) Development service is available for conscripts, but it is not called a non-combatant service.

Morocco

(a) There is no recognition of conscientious objector status. However, some persons have reportedly been allowed to do service in underdeveloped parts of the country instead.

(b) (c) No information.

(d) Imprisonment may arise from failure to comply.

(e) (f) No further information.

Netherlands

(a) Conscientious objection is recognized (article 196 of the Constitution, Conscientious Objection to Military Service Act 1962 amended in 1978).

(b) In article 02 of the amended Conscientious Objection Act, serious conscientious objection is defined as insurmountable conscientious objection to personal performances of military service in connection with the use of instruments of violence. Selective objection may be possible (use of nuclear weapons).

(c) The claim must be made any time after receipt of call-up papers. Call to service is suspended on receipt of application.

(d) If they ignore a lawful summons to perform alternative service, conscientious objectors may face a prison sentence not exceeding two years. In case of non-deliberate offence, they face a prison term not exceeding nine months.

(e) There is easy access to information on the rights of conscientious objectors (defined in call-up papers). In case of an unsuccessful claim, conscripts receive details of legal rights and how to appeal.

(f) Alternative service exists (two types: ordinary, which lasts at least 18 months; extraordinary, in case of war, emergency or belonging to a group summoned to perform alternative service only in urgent cases). Status is similar to ordinary conscripts. Alternative service is performed in bodies designated by the Ministry of Social Affairs.

Norway

(a) Conscientious objector status is recognized (Act of 1965 relating to Exemption from Military Service for Reasons of Personal Conviction).

(b) Fundamental pacifist attitudes are considered as a point of departure, acceptance of self-defence or selective use of force does not preclude exemption. Criteria are under review at present.

(c) The claim can be made at any time prior to induction or during military training.

(d) Refusal of all forms of national service leads to three months' imprisonment (12 months for continued refusal). There is the possibility of assignment to civilian service in prison.

(e) Information is available at call-up time. An official school exists for recognized conscientious objectors for two months.

(f) Civilian service is available (16 months in non-combatant service, development service, civil defence, humanitarian work, health or social work).

Panama

(a) There is no recognition of conscientious objector status. Interest is shown in the review of the conscientious objection problem by the United Nations, but procedures are needed to protect integrity and defence. The view is expressed that conscientious objector status should not apply in the event of war.

(b) (c) (d) No information.

(e) (f) Not applicable.

Papua New Guinea

(a) Conscientious objector status exists.

(b) (c) (d) (e) No further information.

(f) The Constitution provides for the performance of labour of a reasonable amount and kind as an alternative to compulsory military service in case of conscientious objection. Such law must be reasonably justifiable and passed by a two-thirds majority in the National Parliament.

Philippines

(a) There is no statute for conscientious objection but youths failing to register may be ignored. University courses include military training.

(b) (c) No information.

(d) Failure to comply may result in fines or imprisonment.

(e) Not applicable.

(f) There is no alternative service.

Poland

(a) There is no legal provision for conscientious objection. Conscientious objectors could however be invited to take advantage of the law on civilian service as an alternative to military service.

(b) (c) No information.

(d) Refusal to register for national service can lead to imprisonment or a fine. Persistent refusal could lead to a prison sentence of 3-5 years. Non-completion of military training can involve discrimination or loss of civil rights. An attempt to evade military service permanently has been punishable by up to eight years' imprisonment since 1979.

(e) No information is available.

(f) There is a 24-month civilian service (Law of June 1969) organized by the Ministry of Employment. Activities include work in hospitals, social and public institutions, emergency and conservation work, non-combatant duties within the army.

Portugal

(a) Conscientious objector status exists (article 41, No. 5 of the Constitution). Conscientious objector status is not yet regulated (Draft Law 164/I submitted in 1978 but not discussed). A temporary decision of 1976 entitles conscientious objectors to postpone joining the army until the entry into force of new legislation.

(b) (c) Not yet in force.

(d) Prison sentence may result for refusal to perform military service. One case is reported of imprisonment for the conscript's refusal to bear arms, with an ultimate sentence of three and half years for desertion.

(e) No information.

(f) Alternative service is not yet performed in practice. The Constitution states that

conscientious objectors must complete unarmed service of the same duration as compulsory military service.

South Africa

(a) No provision exists for selective objectors.

(b) The Defence Force Act provides that those liable to conscription who demonstrate unconditional and universal objection to the use of armed force on religious grounds may qualify for non-combatant service within the national armed forces.

(c) No information.

(d) Military detention may occur (see Centre Against Apartheid, Notes and Documents 27/29). Members of recognized 'peace churches' who are recognized as conscientious objectors usually receive prison sentences of three years and are kept apart from military prisoners. Objectors to the South African Defence Force are, however, court martialled as military defaulters and, although they are usually only sentenced to one year's detention, they remain liable for future call-up. They are kept with ordinary military prisoners and if they object they are discharged but detained for a further year in a civilian prison for refusing to obey orders.

(e) No information.

(f) There is no alternative service.

Spain

(a) Royal Order 1976 provides for conscientious objection. Until implemention of the law, there is deferred call-up (Draft Military Service Bill on conscientious objection). Legislation passed in 1984 may alter the situation.

(b) Religious or ethical reasons could be recognized.

(c) No information.

(d) Refusal to perform military service leads to up to three years' imprisonment (Military Penal Code). Refusal to perform alternative service leads to eventual prison sentence. The most recent legislation of 1984 may alter the situation.

(e) Information is not automatically given.

(f) Alternative service exists (as provided in the Draft Bill on Conscientious Objection). The length of alternative service is 27 months. Possibilities for alternative service would include work for the public welfare in environmental protection, rural improvements, protection of natural resources, social services, etc.

Suriname

(a) Article 122, para. 6 of the Constitution declares by law the conditions on which exemption for conscientious objection can be obtained, but no statutory provision has been enacted.

(b) (c) (d) (e) (f) No information.

Sweden

(a) Conscientious objection is recognized.

(b) Valid grounds are: serious conscientious objections to carrying arms (no political considerations are accepted), pacifism, religious belief.

(c) The claim can be made at any time, irrespective of whether the conscript has been called up or not.

(d) Civil courts deal with refusal to perform military or non-military service. First refusal leads to suspended sentence and fine. Second refusal results in reasonably severe prison sentence (four months' open prison, possible release after three months).

(e) A pamphlet is distributed before registration concerning opportunities of alternative service. Applicants are informed of legislation regarding conscientious objectors and alternative service.

(f) Alternative service exists. Non-military service can be performed in fields approved by the government: civil defence, repair and maintenance sectors on railways, power stations, telephone network, health, agriculture, social services, education, etc. The length is 420 days. Service can be performed in developing countries.

Switzerland

(a) No provision exists concerning conscientious objector status.

(b) Exemption is granted only when a conscript can prove that performance of armed service will result in a severe conflict of conscience on religious or ethical grounds. Religious opinions do not constitute grounds for securing exemption (article 49 of the Federal Constitution). Persons whose armed military service would cause a serious conflict of conscience for religious or ethical reasons may be allowed to perform unarmed military service.

(c) The decision is taken at the time of recruitment.

(d) Refusal to perform military service is punishable by military tribunals. A distinction is drawn by the Law between a conscientious objector and an insubordinate person (for whom the penalty ranges from three days' to three years' imprisonment). Conscientious objectors face a maximum penalty of six months' imprisonment in semi-liberty. Arrêts répressifs allow certain prisoners to work outside prison boundaries during the daytime.

(e) Not applicable.

(f) No provision exists for alternative civilian service. There is only the possibility of performing military service in a non-combatant role. There is no alternative civilian service; such service would require the amendment of article 18 of the Federal Constitution and a draft amendment to that end was rejected in December 1977. A new initiative advocating the introduction of civilian service was rejected by public vote in 1984.

UK

(a) Conscientious objector status exists for servicemen (administrative arrangements).

(b) It is not practicable to specify the grounds. The applicant has to convince those concerned that his conscientious objection is genuine.

- (c) No information.
- (d) Not applicable.
- (d) Information is not automatic.

(e) There is no alternative service.

Uruguay

(a) Conscientious objector status is recognized. The conscientious objector is allowed to perform non-combatant service within the army.

(b) (c) (d) (e) (f) No information.

USA

(a) Conscientious objection is recognized for servicemen (privilege granted by Act of Constitution). (b) Valid grounds are firm and sincere objection to participation in war in any form or the bearing of arms, by reason of religious training and belief.

- (c) No information.
- (d) Penalties exist.
- (e) No information.

(f) Alternative service is not currently applicable, but the Military Selective Service Act contains parts relating to conscientious objection and alternative service. Alternative service is 24 months long, as in the armed forces; currently under revision.

USSR

(a) There is no provision concerning conscientious objection although conscientious objector status was recognized by special decree in 1919. This regulation lapsed with the introduction of the Universal Military Service Law of 1939.

(b) (c) No information.

(d) The treatment is on an *ad hoc* basis. There have been some cases of prison sentences or loss of civil rights. Peacetime penalties can be five years' imprisonment; during wartime the death penalty is possible.

(e) Not applicable.

(f) There is no official alternative service. Possible assignment to non-combatant duties or offer of volunteer work may occur.

Zaire

(a) Conscientious objector status is recognized in principle, but only certain categories may be exempted.

(b)(c)(d)(e) No information.

(f) Some youths are involved in semi-obligatory development projects.

Zambia

(a) The Constitution recognizes conscientious objection to military service.

(b) (c) (d) (e) No information.

(f) Conscientious objectors can perform alternative labour in place of military service.

Appendix 18B. Documents of international bodies ruling on conscientious objection

United Nations Commission on Human Rights, Sub-Commission on Prevention of Discrimination and Protection of Minorities, Thirty-sixth session, Item 16 of the provisional agenda, E/CN4/Sub.2/1983/30, 27 June 1983: Question of Conscientious Objection to Military Service, Report by Mr Eide and Mr Mubanga-Chipoya

Recommendations

153. The Special Rapporteurs request the Sub-Commission to consider making the following recommendations to the Commission on Human Rights.

1. The right to conscientious objection.

154. The Commission on Human Rights, recalling its resolution 40 (XXXVII) and General Assembly resolution 33/165 of 1978, as well as General Assembly resolutions 34/151 of 1979, 35/126 of 1980, 36/28 of 1981 and 37/48 of 1982 on the International Youth Year, recommends that the Economic and Social Council should request the General Assembly to make the following recommendations, preferably in connection with the preparations for the International Youth Year, 1985: States should recognize by law the right of persons who—for reasons of conscience or profound conviction arising from religious, ethical, moral, humanitarian or similar motives—refuse to perform armed service to be released from the obligation to perform military service.

155. States should, as a minimum, extend the right of objection to persons whose conscience forbids them to take part in armed service under any circumstances (the pacifist position).

156. States should recognize by law the right to be released from service in armed forces which the objector considers likely to be used to enforce *apartheid*.

157. States should recognize by law the right to be released from service in armed forces which the objector considers likely to be used in action amounting to or approaching genocide.

158. States should recognize by law the right to be released from service in armed forces which the objector considers likely to be used for illegal occupation of foreign territory.

159. States should recognize the right of persons to be released from service in armed forces which the objector holds to be engaged in, or likely to be engaged in, gross violations of human rights.

160. States should recognize the right of persons to be released from the obligation to perform service in armed forces which the objector considers likely to resort to the use of weapons of mass destruction or weapons which have been specifically outlawed by international law or to use means and methods which cause unnecessary suffering.

2. Procedural aspects.

161. States should maintain or establish independent decision-making bodies to

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determine whether a conscientious objection is valid under national law in any specific case. There should always be a right of appeal to an independent, civilian judicial body.

162. Applicants should be granted a hearing and be entitled to be represented by legal counsel and to call witnesses.

163. States should disseminate information about the right of objection, and allow non-governmental organisations to do likewise.

3. Alternative service.

164. States should provide alternative service for the objector, which should be at least as long as the military service, but not excessively long so that it becomes in effect a punishment. States should, to the extent possible, seek to give the alternative service a meaningful content, including social work or work for peace, development and international understanding.

4. Trial and penalties where the objection is not found valid.

165. Even when States give effect to the above recommendations, there will be some cases where the objection is not found valid, and where penalties will be imposed on persons who persist in their objection.

166. Imposition of such penalties should be decided upon by an impartial civilian court applying the normal criteria of fair trial.

167. Penalties should not be excessively severe, and should take due account, as mitigating factors, of the conscience or conviction of the person concerned.

5. Asylum.

168. Taking into account the existence of rules of international law, under which an individual retains the right and the duty to refuse illegal orders under national law, and the provisions of General Assembly resolution 33/165, as well as the basic right to freedom of conscience, international standards should be established which will ensure a favourable attitude towards conscientious objectors requesting asylum in conformity with obligations under international law. Furthermore it appears to be the practice of many countries not to refuse asylum to conscientious objectors to military service. International legislation on this practice might clarify an area of human rights in which there are international and individual obligations.

Resolution of the European Parliament on Conscientious Objection

Adopted: 7 February 1983 Vote: 112 in favour, 15 against, 35 abstained

The European Parliament,

having regard to Article 9 of the European Convention on Human Rights which guarantees the right to freedom of thought, conscience, and religion,

having regard to Resolution 337 (1967) and Recommendation 816 (1977) of the Consultative Assembly of the Council of Europe on the right to conscientious objection,

having regard to the laws of the Member States of the European Community

concerning the right to conscientious objection,

having regard to the case law of the Court of Justice of the European Communities and the Joint Declaration of the Parliament, Council and Commission in which these institutions stressed the prime importance they attach to the protection of fundamental rights as derived in particular from the European Human Rights Convention,

having regard to motions for resolutions Doc. 1-796/80, Doc. 1-803/79 and Doc. 1-244/80,

having regard to Petitions Nos 14/80, 19/80, 26/80 and 42/80,

having regard to the report of the Legal Affairs Committee and the opinion of the Political Affairs Committee (Doc. 1-546/82),

1. Recalls that the right to freedom of thought, conscience and religions is a fundamental right;

2. Notes that protection of freedom of conscience implies the right to refuse to carry out armed military service and to withdraw from such a service on grounds of conscience;

3. Points out that no court or commission can penetrate the conscience of an individual and that a declaration setting out the individual's motives must therefore suffice in the vast majority of cases to secure the status of conscientious objector;

4. Stresses that the performance of alternative service as provided for in Resolution No. 337 (1967) of the Consultative Assembly of the Council of Europe may not be regarded as a sanction and must therefore be organized in such a way as to respect the dignity of the person concerned and benefit a community, particularly in the social field and in the field of aid and development cooperation;

5. Considers that the duration of such alternative service when carried out within a civil administration or organization should not exceed the period of normal military service including military exercises following the period of basic military training;

6. Emphasizes the need to approximate the legislation of the Member States of the Community governing the right to conscientious objection, the status of conscientious objector, the procedure to be applied and the alternative forms of service;

7. Stresses the need for the procedure to be designed in such a way that they involve no additional waiting period and administrative complications as it is often the case at present;

8. Calls on the governments and parliaments of the Member States of the Community to examine their respective legislation in this field;

9. Supports efforts to include a right of conscientious objection in the Convention on Human Rights;

10. Instructs its President to forward this resolution to the Commission, the governments and parliaments of the Member States, and the Parliamentary Assembly of the Council of Europe.

Parliamentary Assembly of the Council of Europe, Twentyninth Ordinary Session: Recommendation 816 (1977) on the right of conscientious objection to military service

The Assembly.

1. Wishing to promote legal status for conscientious objectors in Council of Europe member states;

2. Recalling its Recommendation 478 (1967) and Resolution 337 (1967), on the right of conscientious objection;

3. Re-asserting the principles stated in Resolution 337 (1967), which form an integral part of this recommendation,

4. Recommends that the Committee of Ministers:

a. urge the governments of member states, in so far as they have not already done so, to bring their legislation into line with the principles adopted by the Assembly;

b. introduce the right of conscientious objection to military service into the European Convention on Human Rights.

Parliamentary Assembly of the Council of Europe, Twenty-ninth Ordinary Session: Order No. 366 (1977) on the right of conscientious objection to military service

The Assembly,

1. Having regard to Recommendation 816 (1977), on the right of conscientious objection to military service.

2. Instructs its Legal Affairs Committee to report to it as necessary on the action taken on this recommendation.

Consultative Assembly of the Council of Europe, Eighteenth Ordinary Session: Resolution 337 (1967) on the right of conscientious objection

The Assembly,

Having regard to Article 9 of the European Convention on Human Rights which binds member States to respect the individual's freedom of conscience and religion,

Declares:

A. Basic Principles

1. Persons liable to conscription for military service who for reasons of conscience or profound conviction arising from religious, ethical, moral, humanitarian, philosophical or similar motives, refuse to perform armed service shall enjoy a personal right to be released from the obligation to perform such service.

2. This right shall be regarded as deriving logically from the fundamental rights of the individual in democratic Rule of Law States which are guaranteed in Article 9 of the European Convention on Human Rights.

B. Procedure

1. Persons liable for military service should be informed when notified of their callup or prospective call-up, of the rights they are entitled to exercise.

2. Where the decision regarding the recognition of the right of conscientious objection is taken in the first instance by an administrative authority, the decision-taking body shall be entirely separate from the military authorities and its composition shall guarantee maximum independence and impartiality.

3. Where the decision regarding the recognition of the right of conscientious objection is taken in the first instance by an administrative authority, its decision shall be subject to control by at least one other administrative body, composed likewise in the manner prescribed above, and subsequently to the control of at least one independent judicial body.

4. The legislative authorities should investigate how the exercise of the right claimed can be made more effective by ensuring that objections and judicial appeals have the effect of suspending the armed service call-up order until the decision regarding the claim has been rendered.

5. Applicants should be granted a hearing and should also be entitled to be represented and to call relevant witnesses.

C. Alternative Service

1. The period to be served in alternative work shall be at least as long as the period of normal military service.

2. The social and financial equality of recognised conscientious objectors and ordinary conscripts shall be guaranteed.

3. The Governments concerned shall ensure that conscientious objectors are employed in social work or other work of national importance—having regard also to the manifold needs of the developing countries.

Resolution adopted by the General Assembly of the United Nations on the status of persons refusing service in military or police forces used to enforce apartheid

Date: 20 December 1978 Adopted without a vote

The General Assembly

Mindful that the Charter of the United Nations sets forth, as one of the purposes of the organisation, the achievement of international co-operation in promoting and encouraging respect for human rights and for fundamental freedoms for all without distinction as to race, sex, language or religion,

Recalling Article 18 of the Universal Declaration of Human Rights (1) which states that everyone has the right to freedom of thought, conscience and religion,

Conscious that the Proclamation of Teheran (2), the Lagos Declaration for Action against Apartheid (3) and other United Nations declarations, conventions and resolutions have condemend *apartheid* as a crime against the conscience and dignity of mankind,

Having regard to section 11, paragraph 11, of the Lagos Declaration, which proclaims that the United Nations and the international community have a special responsibility towards those imprisoned, restricted or exiled for their struggle against apartheid,

Taking note of the report of the Special Committee against Apartheid (4),

1. *Recognises* the right of all persons to refuse service in military or police forces which are used to enforce *apartheid*;

2. Calls upon member states to grant asylum or safe transit to another state in the spirit

of the Declaration of Territorial Asylum (5) to persons compelled to leave their country of nationality solely because of a conscientious objection to assisting in the enforcement of *apartheid* through service in military or police forces;

3. Urges member states to consider favourably the granting to such persons of all the rights and benefits accorded to refugees under existing legal instruments;

4. Calls upon appropriate United Nations bodies, including the United Nations High Commissioner for Refugees, the specialized agencies and non-governmental organisations to provide all necessary assistance to such persons.

⁽¹⁾ Resolution 217A (III).

⁽²⁾ See Final Act of the International Conference on Human Rights (United Nations publication, Sales No. E.68.XIV.2).

⁽³⁾ A/CONF.91/9 (United Nations publication, Sales No. E.77.XIV.2) sect. X.

⁽⁴⁾ Official Records of the General Assembly, Thirty-third Session, Supplement No. 22 (A/33/22).

⁽⁵⁾ Resolution 2312 (XXII) annex.

Chronology of major events related to arms control issues

JOZEF GOLDBLAT and RAGNHILD FERM

January-December 1984

10 January A proposal to make Europe free of chemical weapons is handed to the representatives of NATO countries at the Soviet Ministry of Foreign Affairs.

17 January The 35-member Conference on Confidence- and Security-Building Measures and Disarmament in Europe opens in Stockholm.

22 January The Palme Commission, meeting in Rome, issues a statement proposing a one-year moratorium on nuclear weapon deployments.

23 January The US President sends to the Congress a report listing seven cases of alleged non-compliance by the Soviet Union with its obligations under arms control agreements.

30 January Pravda announces that the Soviet embassy in Washington has recently delivered to the US Department of State an *aide-memoire* listing cases of alleged non-compliance by the USA with its obligations under arms control agreements.

30 January The representative of Iran transmits to the President of the Conference on Disarmament a report containing a description of an attack with chemical weapons in Iran.

7 *February* In a speech at The Hague, the President of France says that if Europe were able to launch its own manned space station allowing it to observe, transmit and consequently avert all possible threats, it would take a big step towards its own defence.

21 February The Soviet representative at the Conference on Disarmanent declares the readiness of the USSR to consider "the proposal for the permanent presence of the representatives of international control at the special facilities for the destruction of stocks of chemical weapons".

23 February The President of the Conference on Disarmament receives a letter from the representative of Czechoslovakia transmitting the Warsaw Treaty Organization states' proposal for a Europe free from chemical weapons (see 10 January).

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26 March A report of the specialists appointed by the UN Secretary-General to investigate allegations by Iran concerning the use of chemical weapons by Iraq is made public. It says that chemical weapons have undoubtedly been used.

9 April Nicaragua asks the International Court of Justice to declare illegal US support for raids on its territory in an effort to overthrow its government, and the US role in the mining of its harbours.

18 April At the Conference on Disarmament the United States submits a draft convention on the prohibition of chemical weapons which provides, *inter alia*, for special inspections permitting unimpeded access to any facilities, including military ones.

19–20 April The foreign ministers of the Warsaw Treaty Organization countries, meeting in Budapest, declare that they will not allow the building up of a military superiority against them. They address an appeal to NATO member states to halt the deployment of new intermediate-range nuclear missiles and to withdraw those already deployed.

19 April The Western participants at the Vienna talks on the mutual reduction of forces in Europe present a new proposal. They ask for an exchange of data (before any reductions take place) only on a portion of the ground forces of both sides—the combat and combat-support forces—setting aside the service-support forces (where much of the discrepancy has been) and air forces.

26 April The Soviet representative to the Conference on Disarmament criticizes the US draft convention of 18 April, stating that the demands for unimpeded access to the territories of other states block the achievement of agreement on a chemical-weapon ban.

7 May The Warsaw Treaty Organization's proposal for the conclusion of a treaty on non-use of force is handed to the ambassadors of NATO member states in Budapest.

10 May The International Court of Justice, acting on the application of Nicaragua (see 9 April), unanimously indicates, as a provisional measure, that the USA should immediately cease and refrain from any action restricting, blocking or endangering access to or from Nicaraguan ports, and in particular the laying of mines.

14 May The Soviet Defence Ministry announces that the Soviet Union is deploying additional "missile complexes of operational-tactical designation" in the GDR to counter a continuing build-up of US medium-range missiles in western Europe. 16-17 May The ministers participating in a meeting of the NATO Defence Planning Committee accuse the Soviet Union of using the implementation of the 1979 NATO 'double track' decision as a pretext to carry out an already planned programme of modernization and upgrading of its intermediate-range nuclear force potential in Europe, which began even before the NATO decision.

16 May The US House of Representatives rejects, once again, the Administration's request for funds to produce a new generation of chemical nerve gas weapons.

22 May The presidents of Argentina, Mexico and Tanzania and the prime ministers of India, Greece and Sweden issue a joint declaration in which they urge the United States and the Soviet Union, as well as the United Kingdom, France and China, to halt all testing, production and deployment of nuclear weapons and their delivery systems, and to proceed immediately to substantial reductions in nuclear forces.

1 June The Prime Minister of the Netherlands announces that the decision on deploying US cruise missiles has been postponed until 1 November 1985.

4 June In a speech to the Irish Parliament, the US President says that if discussions on reaffirming the principle not to use force will bring the Soviet Union to negotiate agreements which will give new concrete meaning to that principle, the USA will enter into such discussions.

6 June The prime ministers of Finland, Greece and Sweden sign an appeal for the creation of nuclear weapon-free zones in Scandinavia and the Balkans, and also in central Europe along an agreed 'corridor'.

7 June The Soviet delegate to the Vienna talks on the mutual reduction of forces in Europe says that the new Western proposal (see 19 April) has aggravated the differences between the two sides and set back the talks.

12 June The French representative at the Conference on Disarmament proposes strict limitations on anti-satellite systems and the prohibition, for a renewable period of five years, of the deployment on the ground, in the atmosphere or in space of beam-weapon systems capable of destroying ballistic missiles or satellites at great distances and, as the corollary to this, the banning of the corresponding tests.

29 June The Soviet Union proposes to begin talks in September to prevent the militarization of outer space. The United States responds that it is prepared to discuss resumption of negotiations on the reduction of strategic and intermediate-range nuclear weapons and feasible negotiating approaches which could lead to verifiable and effective limitations on anti-satellite weapons.

2-3 July Talks between the West German Social Democratic Party (SPD) and the East German Socialist Unity Party (SED) on chemical weapons start in Berlin; a chemical weapon-free zone in Europe is considered.

4 July The NATO Commander calls for improved chemical munitions for NATO, which he considers necessary for retaliation in kind in case of chemical attack.

9 July A report of a group of scientists that has inspected the French nuclear test site at Mururoa atoll in the Pacific is released. The Australian Minister for Foreign Affairs says that the report's conclusion that the levels of radioactive fall-out are relatively low is reassuring, but that he is concerned at the conclusion that, in the long term, radioactive leakage could occur from the detonation chambers.

11 July The Agreement governing the activities of states on the Moon and other celestial bodies, which was opened for signature on 18 December 1979, enters into force.

15 July The Prime Minister of New Zealand says that his government has no desire for a confrontation with the USA over the issue of debarring nuclear-powered or nuclear-armed ships entering New Zealand waters, but that he will stand by his election pledge to implement such a policy.

16 July It is reported that, after a meeting in Luxembourg, Western suppliers of nuclear technology have decided to strengthen controls on nuclear exports to prevent the spread of nuclear weapons.

17 July The United States and the Soviet Union reach agreement to expand and improve the operations of the Direct Communications Link (the 'Hot Line').

21 July The USSR proposes that a joint US-Soviet communiqué be published stating the consent of the two countries to open talks and to conclude an agreement on the prevention of the militarization of outer space. The communiqué should include a moratorium on the testing and deployment of outer space weapons from the date of the opening of the talks.

26 July The US Secretary of Defense says that there is no point in a meeting restricted to the Soviet agenda, as proposed on 21 July.

24–28 August On the initiative of the Contadora Group, the foreign

ministers of Colombia, Mexico, Panama and Venezuela meet with their counterparts from Costa Rica, El Salvador and Nicaragua, and representatives of Guatemala and Honduras, at Panama City, to ascertain the views of the Central American governments on the Act of Peace and Co-operation in Central America previously transmitted to the heads of state.

27–28 August The 15th South Pacific Forum, held in Tuvalu, agrees on the desirability of establishing a nuclear weapon-free zone in the region at the earliest possible opportunity.

10-12 September Officials from six ASEAN countries, meeting in Kuala Lumpur, agree in principle that South-East Asia should become a nuclear weapon-free zone.

10-21 September The first Review Conference of the parties to the Convention on the prohibition of military or any other hostile use of environmental modification techniques (the Enmod Convention) is held in Geneva.

13 September The foreign ministers of the non-aligned Mediterranean countries meet in Malta and adopt a final document—the Valletta declaration on peace in the Mediterranean.

24 September In an address to the UN General Assembly, the US President proposes that the USA and the USSR agree to embark on periodic consultations at policy level about regional problems. In the field of non-proliferation of nuclear weapons he suggests close cooperation to strengthen the relevant international institutions and practices together with redoubled efforts to meet the legitimate expectations of all nations that the Soviet Union and the United States will substantially reduce their own arsenals.

27 September In an address to the UN General Assembly, the Soviet Foreign Minister urges the US government to recognize that the militarization of outer space threatens mankind. He expresses the hope that the USA will refrain from actions which would render irreversible the process of turning outer space into an arena of military rivalry and would be willing to engage in talks with a view to reaching agreement.

2 October A group of experts submits a report specifying the criteria to guide the UN Secretary-General in deciding whether or not to initiate an investigation, as well as guidance for its organization and implementation in case of allegations of violations of the 1925 Geneva Protocol or the relevant rules of customary international law prohibiting the use of chemical and biological weapons. 10 October The US Congress prohibits until 1 March 1985 any tests of an anti-satellite weapon directed against a target in space.

10 October A report of the White House Advisory Panel is published saying that the Soviet Union has consistently followed "a pattern of pursuing military advantage" by selectively disregarding its arms control commitments.

13 October The Soviet Union announces that it has begun deploying long-range cruise missiles aboard Soviet strategic aircraft and submarines.

23 October The Prime Minister of Spain calls for a reduction of US forces in Spain and announces that he will call a national referendum on Spain's membership of NATO in early 1986.

27 October The foreign and defence ministers of France, FR Germany, the UK, Italy, Belgium, the Netherlands and Luxembourg confirm the lifting of all remaining controls on the production and stockpiling of conventional weapons by FR Germany and agree to reorganize the Western European Union in order to harmonize European attitudes on arms control and to develop European co-operation in the manufacture of advanced armaments.

22 November The United States and the Soviet Union announce that Secretary of State Shultz and Foreign Minister Gromyko will meet in Geneva on 7 and 8 January 1985 to lay the groundwork for arms control negotiations.

29 November The foreign ministers of Argentina and Chile sign, at the Vatican, a treaty settling their claims over the Beagle Channel in South America.

3 December The Stockholm Conference sets up two working groups to deal with the proposals submitted to the Conference.

Errata

World Armaments and Disarmament, SIPRI Yearbook 1984

Page 60, table II: The total for 1969 should read "46"

Page 98, under table 3.11: Delete line "Figures are average annual percentage increases."

Page 168, table 6.1, column "Fiscal year begins": Norway, should read 1 Jan Spain, should read 1 Jan USA, should read Pre-1975/76, 1 Jul 1976/77-, 1 Oct

Page 291, line 1 of text: Should read "In an era of ..."

- Page 540, line 4: Should read "to be considerably less peremptory than the Cancún Declaration or the"
- Page 541, line 1: Should read "Neither the United Nations nor the Organization of American States has"

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Arms control and disarmament treaties will be found together under Disarmament and arms control treaties and agreements; weapons will be found under the major classes of weapon, e.g., Aircraft, Missiles, ballistic.

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