World Armaments and Disarmament

SIPRI yearbook 1973

Stockholm International Peace Research Institute

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Stockholm International Peace Research Institute

SIPRI is an independent institute for research into problems of peace and conflict, with particular attention to the problems of disarmament and arms regulation. It was established in 1966 to commemorate Sweden's 150 years of unbroken peace.

The financing is provided by the Swedish Parliament. The staff, the Governing Board and the Scientific Council are international. As a consultative body, the Scientific Council is not responsible for the views expressed in the publications of the Institute.

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Almqvist & Wiksell
Stockholm

Humanities Press
New York

Paul Elek
London

Sveavägen 166
S-113 46 Stockholm, Sweden

First published by Almqvist & Wiksell
26 Gamla Brogatan, S-111 20 Stockholm

in collaboration with

Humanities Press, Inc.
450 Park Avenue South
New York, N.Y. 10016

and

Paul Elek Limited
At the Ibex
54–58 Caledonian Road
London N1 9RN

ISBN 91-85114-19-7

(USA) SBN 391-00292-9

Library of Congress Catalog Card Number: 76-12210

Previous volumes in this series

SIPRI Yearbook of World Armaments and Disarmament 1968/69
SIPRI Yearbook of World Armaments and Disarmament 1969/70
World Armaments and Disarmament, SIPRI Yearbook 1972

Printed in Sweden by
Almqvist & Wiksell Informationsindustri AB, Uppsala 1973

PREFACE

The fourth issue of the SIPRI Yearbook continues our analysis of the world's arms races, and the attempts to stop them, up to 31 December 1972. As in all SIPRI publications, information has been obtained from open sources only.

The preparation of the Yearbook was directed and supervised by Frank Barnaby.

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Acknowledgements

The Yearbook team wish to thank the Institute's librarians (Gunnel von Döbeln and Janet Meurling), the press cutters (Lars Ståhle and Michal Lucki) and the secretarial staff for their assistance in preparing the Yearbooks. Ragnhild Jansson assisted in preparing the disarmament chronology and the appendices in Part IV.

February 1973

Frank Barnaby
Director

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ABBREVIATIONS, CONVENTIONS AND CONVERSIONS

Abbreviations

mg	milligram
lb	pound
m	metre
km	kilometre
in	inch
ft	foot
yd	yard
mn	million
bn	billion (one thousand million)
FY	fiscal year

Country terminology

For the convenience of the reader, we have tended to use the geographical rather than the formal official name of certain countries. In addition, several states have recently changed their official names. Examples are given here.

North Viet-Nam	Democratic Republic of Viet-Nam (DRV)
South Viet-Nam	Republic of Viet-Nam
North Korea	Democratic People's Republic of Korea
South Korea	Republic of Korea
China	People's Republic of China
Taiwan	Republic of China
Congo	People's Republic of Congo
Zaïre	formerly Democratic Republic of Congo (Congo, Kinshasa)
Egypt	Arab Republic of Egypt (formerly United Arab Republic)
Bangla Desh	formerly East Pakistan
Khmer Republic	formerly Cambodia
Sri Lanka	formerly Ceylon

Conversions

Units of length

1 millimetre = 0.039 inch
1 inch = 25.4 millimetres
1 metre = 1.1 yard = 3.28 feet
1 foot = 30.480 centimetres
1 yard = 3 feet = 36 inches = 0.91 metre
1 kilometre = 0.62 statute mile = 1 094 yards
1 statute mile = 1.61 kilometres = 1 760 yards
1 nautical mile = 6 076 feet = 1 852 metres

Units of mass

1 (long) ton = 2 240 pounds, avoirdupois = 1.12 short ton = 1.02 tonne
1 short ton = 2 000 pounds = 0.89 ton = 0.91 tonne
1 tonne (metric ton) = 1 000 kilograms = 2 205 pounds = 0.98 ton = 1.1 short ton
1 kiloton = 1 000 tons
1 megaton = 1 000 000 tons
1 kilogram = 2.2 pounds
1 pound = 0.45 kilograms

Introduction

The SIPRI Yearbooks are about armaments and disarmament. The aim is to describe, as factually as possible, the major quantitative and qualitative changes that take place in the world's arsenals, and to analyse the efforts made to control these arsenals. Each of the first three Yearbooks was a record of vast increases in weaponry of all kinds, a process virtually unhampered by arms-control or disarmament agreements. This Yearbook, which continues our analysis of the world's arms races and the attempts to stop them up to 31 December 1972, shows that the situation has not changed.

The subjects of the *SIPRI Yearbook 1973* are divided into four parts. The first part analyses the initial results of the bilateral attempt to control the nuclear arms race, namely the strategic arms limitation agreements between the United States and the Soviet Union, signed in 1972. The second part deals with three topical issues: European security, the prohibition of inhumane and indiscriminate weapons and UN peacekeeping forces.

The third part describes the world-wide spread of arms during 1972 and the consequences of this spread, including world military expenditures, the resources devoted to military research and development, the arms trade with the third world, domestic defence production in third world countries, and the link between disarmament and the economic development of the third world. The final part analyses the multilateral arms-control and disarmament efforts made during 1972, as well as the status of the implementation of the arms-control agreements already in force. In particular, the arms-control experiment in the Antarctic is examined.

SALT and the nuclear arms race

On 26 May 1972, the United States and the Soviet Union signed in Moscow the first strategic arms limitation agreements (the SALT I agreements). This was the major arms-control event of the year. The two powers have committed themselves, under the ABM Treaty, to limiting anti-ballistic missile systems to the defence of their national capitals and to the defence of one of the areas on the territory of each party where intercontinental ballistic missiles (ICBMs) are deployed. An Interim Agreement on offensive arms provides for a freeze, for up to five years, of the aggregate number of fixed land-based ICBM

launchers and ballistic missile launchers on modern submarines. A Protocol to the agreement specifies numerical levels allowed for modern ballistic missile submarines and ballistic missile launchers on submarines, as well as replacement procedures.

The political importance of SALT I is undeniable. Along with other documents signed during President Nixon's visit to the Soviet Union they may signify the beginning of closer cooperation between the two countries. This can bring direct benefits to the two powers concerned and some indirect positive repercussions for the cause of international peace, at least in so far as the likelihood of a world war started by design has been reduced. However, from the point of view of disarmament, the value of SALT I is questionable.

It is generally conceded that the ABM systems now in existence provide a poor means of defence—they offer negligible resistance to the penetration of offensive missiles. Nevertheless, instead of abolishing them altogether, the two powers have decided merely to restrict their numbers and characteristics. In fact, the ABM Treaty will result in the deployment of missiles which were not operational at the time the treaty was signed. Their modernization and replacement, including testing, is allowed. Moreover, the imposed limitations do not cover the development of new means of anti-ballistic missile protection which may be devised, based on novel physical principles, even though their deployment would be subject to limitations yet to be discussed and agreed upon. Apparently, the big powers have not fully reconciled themselves to the idea that they both are, and will remain, vulnerable to massive retaliation, and that the ABM is irrelevant to the military equilibrium between them. Otherwise, there would be no justification for linking the obligations under the ABM Treaty with the levels of offensive weapons. It is hard to resist the assumption that the USA and the USSR still entertain hopes that they may be able, in the future, to create better, more effective ABM systems.

So far as offensive weapons are concerned, the situation is even more precarious. A stop has been put to an excessive proliferation of fixed land-based ICBMs, but their importance is, in any case, rapidly diminishing in favour of sea-based deterrence. Indeed, the overall number of ballistic missile launchers on nuclear-powered submarines has been allowed to rise by almost 20 per cent, compared with the levels in mid-1972. Mobile land-based ICBMs and strategic bomber aircraft are not prohibited.

There are no restrictions whatsoever on the improvement of the quality—survivability, accuracy, penetrability and range—of ballistic missiles and their launchers. This is a major weakness of SALT I. The technological arms race is encouraged and even legitimized, and the replacement procedures make it possible to substitute better weapons for those which become obsolete. Most significant is the lack of control of the number of nuclear warheads each missile can

carry. And an open-ended competition in the field of multiple independently targetable re-entry vehicles (MIRVs), as well as in other areas not covered by the agreements, is certain.

The SALT agreements do, however, contain some positive arms-control aspects. For the first time, the most powerful nations discussed the sensitive issue of nuclear armaments—weapons which they consider central for their security—in concrete, technical detail, and reached a measure of understanding. They established ceilings on the production of such armaments, introduced a ban on nationwide ABM deployment and restricted the size of ICBM launchers. It is noteworthy that the problem of verification, which has plagued all previous disarmament negotiations, was overcome in the SALT I agreements with relative ease. Each party will use its own "national technical means" of verification—chiefly reconnaissance satellites—to provide assurance of compliance.

It is public knowledge that, for years now, both sides have been using artificial Earth satellites for intelligence gathering, although neither has admitted it. During the 10 years preceding the conclusion of the agreements about 40 per cent of the several hundred satellites launched by the USA and the USSR were photographic reconnaissance satellites. This practice has now been promoted to the rank of an internationally sanctioned and mutually useful activity, and the parties have undertaken not to interfere with or impede it.

But the positive features of the SALT I agreements do not counterbalance the shortcomings so far as disarmament is concerned. To be truly constructive, the follow-on negotiations (SALT II) must result in a total prohibition of anti-ballistic missile defences of any kind, in a ban on the multiplication of nuclear warheads, in a substantial numerical reduction in offensive strategic missiles, in a restriction on anti-submarine means of warfare and in a ban, or at least a limitation, on military research and development relating to all these systems. The nuclear arms race will then be curbed not only quantitatively but also qualitatively. If this does not come about, the effects of SALT I, far from being inhibitory, will prove escalatory. The habit of acquiring "bargaining chips" to conduct negotiations from a position of strength may well lead to ever larger weapon programmes, the competition being fueled by new technological advances. Limitation may turn into escalation, unless competitive bargaining and the pursuit of relative advantage is replaced by acceptance of strategic sufficiency. The strategic nuclear arms race should be recognized as a malignancy and dealt with cooperatively by those responsible for it.

The spread of arms races

Almost all nations seem bent on acquiring more abundant and more lethal armaments. Although the USA and USSR are the principal actors, the arms races taking place elsewhere could have grave consequences for world security. A conflict in any area could escalate into general nuclear war.

For the past quarter of a century, the general course of military expenditure has been for it to rise very rapidly during periods of crisis or war, and then to level off, without reverting to the pre-crisis figures. Following the rapid rise from 1965 to 1969, it appears that another levelling-off period has begun. Although the cease-fire in Viet-Nam was not signed until early 1973, US disengagement began in 1969, and it is since then that this trend has emerged.

World military expenditure is still dominated by a few countries: the six main spenders (USA, USSR, China, FR Germany, UK and France) are responsible for more than 80 per cent of the total, while the underdeveloped countries together, although their share is increasing, still only account for less than 10 per cent. In current prices, the world total for 1971 was $190 billion, but in real terms (taking inflation into account) there seems to have been a slight fall. Indications are that there will be little change in total expenditure in 1973. The insanity of these levels of military expenditure is impressively indicated by the fact that the sums spent annually on arms are about equal to the total national income of the poorer half of mankind.

The levelling-off periods could be considered merely as temporary breaks in the inexorable upward trend in expenditure in absolute terms over the past 25 years. In each of the top five industrialized military spenders, however, military expenditure as a percentage of total resources has shown substantial overall falls between 1952 and 1971. Since military expenditures absorb a larger proportion of the combined GNP of the developed than of the underdeveloped countries, a general (proportional) reduction in military expenditures would increase the non-military part of the GNP of the first group of countries proportionally more than that of the second group. As the proportion of total resources devoted to military expenditure by the five main industrialized military spenders seems to have resumed a declining trend, they could take the lead in making a simultaneous increase in the fraction of GNP allocated to international development assistance.

During the 1960s, an estimated $15 billion annually was spent on military research and development (R&D). Military R&D lies at the heart of the technological arms race since it leads to the acquisition of more advanced and expanded weaponry. Most of the world's military R&D is supported by industrialized countries, and in particular by the USA, USSR, UK and France. These countries, which account for about 75 per cent of world military spending, support an estimated 95 per cent of the world's military R&D. The pro-

grammes of the United States and the Soviet Union are by far the largest (85 per cent of the world total). Between these two, the United States appears to have produced a larger number of new weapons, and to have supported more advanced technological improvements in the case of some of the most expensive types. The US programme, which has risen to a level of $9.3 billion in 1972, is estimated to be about equally divided among (1) the development of strategic nuclear weapons, (2) the development of conventional (non-nuclear) weapons, and (3) the support of basic research and development of various kinds of equipment and components.

Most of the military research and development conducted in other countries is directed at the development of new conventional weapons and equipment. Only France and China have active nuclear weapon development programmes, and these are much smaller than those of the USA and USSR, and involve much less advanced technology. China also lags considerably behind the main industrialized countries in the development of advanced conventional weapons; and its total military R&D effort appears to be, relatively, very small (about 1 per cent of the world total).

Within the next decade, it is likely that Japan and the Federal Republic of Germany will join the United Kingdom and France as major developers and producers of conventional weapons. In general, the conventional weapon development efforts of other industrialized countries, including Australia, Canada, Italy and Sweden, involve work at the forefront of technology, and these programmes contribute to the technological race in conventional arms. The efforts of the few non-industrialized countries which support weapon development, such as Argentina, Brazil and India, generally involve less advanced technology: they appear to be directed more at providing independence from main weapon suppliers and demonstrating military strength than at keeping up in the technological arms race.

Since 1950, there has been an increase in the number of arms-producing countries in the third world, and this trend continues, although at a slow rate. One major factor behind the decision to allocate the large resources needed at the initial stage of a defence industry build-up has been a break with the traditional arms suppliers—either because of arms embargoes or because of a general political conflict between the supplier and the recipient.

Among the consequences for an underdeveloped economy concentrating on the production of the most sophisticated modern armaments, is the fact that much of whatever little industry or skilled manpower the country possesses or manages to build up is geared to military production, necessarily at the expense of a build-up of civilian production.

Independence from outside arms suppliers, put forth as the main motivation for the build-up of local defence industries, is very difficult to achieve. What

is achieved, in the initial stage, is just another form of dependence on outside suppliers, for the supply of licences and of most components and raw materials. The choice of suppliers is very limited, for various reasons, and the costs are very high. The development and production costs finally mean that more and more countries are bound to enter the arms export market.

In 1972 there was a continuation of the long-term upward trend in major arms supplies to the third world which has persisted since the early 1960s. However, in the more erratic year-to-year movements, the all-time peak of 1971 has not been surpassed and Viet-Nam is the only area where there has been a significant increase in supplies between 1971 and 1972. There has been a considerable fall in supplies to the major recipients—the Far East, South Asia and the Middle East. In these and other areas there are, however, large amounts of equipment on order, for delivery over the next few years, which are almost certain to lead to a continuation of the long-term upward trend. Moreover, the world-wide spread of increasingly sophisticated weapons continues.

In 1972, the Soviet Union was the largest supplier, by value, of major arms to the third world (excluding Viet-Nam), but it must be noted that the USA is still far ahead of the Soviet Union in the value of *total* world arms supplies. The four main suppliers—the USA, the Soviet Union, Britain and France—together accounted for 80 per cent of major arms supplies to the third world, or slightly less than in previous years.

Security in Europe

After a long period of uncertainty and hesitation, the question of security in Europe has been taken up at two different parleys—one in Helsinki, primarily concerned with political, economic and cultural issues, and one in Vienna, dealing with the military aspects of the problem. The two consultative meetings are expected to prepare the ground for full-scale negotiations on these issues to begin later.

Broadly speaking there are two areas within which agreement on some military measures, which are an essential part of any possible European security arrangement, could be reached. They are on the one hand the confidence-building measures and on the other hand arms-regulation and disarmament measures.

Confidence-building measures most often referred to in the European context include advance notification of military manoeuvres, the exchange of observers on manoeuvres and the prohibition of manoeuvres in border areas. These would only marginally affect the military tension in Europe, but nevertheless could be useful in paving the way towards more significant steps.

The range of possible arms-regulation and disarmament measures that could

be applied to Europe is rather large, but only a few of them appear realistic under present circumstances. It may be assumed that the freezing of the levels of forces is the most probable area where an agreement could be reached in the foreseeable future, taking into consideration the declared intention of the two military alliances in Europe to negotiate reductions of their forces. An agreement on the freezing of the levels of forces, pending the outcome of the negotiations on a more comprehensive agreement for force reductions, would in no way jeopardize the security of the countries concerned. This measure could be complemented with an agreement on the prohibition of the establishment of new foreign military bases in Europe which would guard against possible loopholes in an agreement on force reductions such as, for example, attempts to redeploy forces in some other parts of Europe.

The problem of reductions of forces raises several questions, such as, whether it should cover only foreign or both foreign and indigenous forces, whether it should apply to Europe as a whole or only to certain parts of it, and whether it should provide for absolute or relative reductions of forces. It seems that, to be meaningful, an agreement on force reductions would have to provide for substantial reductions of both foreign and indigenous forces, especially in the central part of Europe along the line of direct confrontation between the two opposing military alliances, as well as substantial reductions in the levels of armaments, including nuclear armaments.

There should, however, be no illusion that Europe will be transformed into a continent of undisturbed peace as long as the strategic arms race on a global scale continues.

Prohibition of inhumane and indiscriminate weapons

The laws of war do not recognize in belligerents an unlimited power in the adoption of means of injuring the enemy. The means of combat are restricted in two ways: weapons should not cause 'superfluous injuries' and they should not be employed indiscriminately, against non-combatants as well as combatants. There is increasing concern that this is being undermined by current means of warfare.

Modern technology has given rise to a great range of weapons, some of which apparently inflict wounds similar to those caused by weapons which are already prohibited, but whose mode of action is not specifically covered by the formulations of the existing international law. It is necessary to define these weapons and effectively ban their use.

The massive firepower of modern weapon systems, the use of chemical sprays, area weapons, delayed-action fuses and a variety of means of environmental destruction tend to undermine those regulations intended to offer

civilian populations some measure of protection from the exigencies of armed conflict. It is imperative that these regulations be reaffirmed and developed.

Among the so-called conventional weapons being given serious consideration at the United Nations and in the International Committee of the Red Cross for possible prohibitive measures are napalm, white phosphorus and other incendiary weapons, hypervelocity rifles and anti-personnel bombs. Napalm and other incendiary weapons may well be the first candidates for prohibition.

Two parameters related to the wounding power of penetrating projectiles have recently been exploited in the war in Indo-China. The first factor is the *velocity* of the projectile. At low velocity, the wound created by a bullet is of similar diameter to the bullet. At high velocity (for example, over 800 metres per second), a conical wound tract can be formed which may have a diameter many times that of the bullet. These effects are increased where the projectile tumbles due to ballistic instability, creating a wound as devastating as that caused by the prohibited dum-dum bullet.

The second parameter is the *number* of projectiles. The greater the number of small projectiles, the larger the number of wounds inflicted, and thus the greater the lethal effect and the higher the number of casualties caused. This principle has led to the development of anti-personnel cluster bombs which may distribute as many as 192 000 steel balls over an area of up to 1.0×0.3 km.

An early prohibition of these as well as of other inhumane and indiscriminate weapons is urgent to prevent the complete erosion of human rights in armed conflict.

Arms control and disarmament

The nuclear arms race between the USA and the USSR is undoubtedly the greatest single threat to Man's survival—the enormity of which increases year by year. But even halting the nuclear arms race is proving to be as difficult as reversing it would probably be. Twenty-five years of active negotiations have produced seven multilateral treaties but the dangerous momentum of the arms race has not even been slowed. If eventually the elimination of nuclear weapons is to be achieved there must soon be a comprehensive ban on the testing of new weapons and all the five nuclear-weapon powers must become involved in international negotiations based on a concrete disarmament programme.

History shows that remoteness of economic and military interests make easier agreement on disarmament issues. Thus a biological weapon disarmament convention was signed last year. Under it, parties are committed to continue negotiations with a view to reaching agreement on effective measures for the prohibition of the development, production and stockpiling of chemical

weapons and for their destruction. So far, no significant progress has been recorded in these negotiations—chemical weapons are more highly regarded by the military than are biological ones. Apart from verification, the most controversial question is the scope of the ban.

To be comprehensive, so as to reduce to a minimum the possibility of chemical weapons ever being used, a chemical disarmament convention would have to prohibit all chemical warfare agents and all activities related to preparation for chemical warfare. From the disarmament point of view this would clearly be the most desirable approach.

But partial agreements, covering selected categories of agents and only certain activities, although deficient in many respects, may also have some merit, the central issue being the treatment of stockpiles. Thus, for example, if the stocks of super-toxic chemical warfare agents and of munitions filled with these agents were destroyed, and their development and production prohibited, a type of weapon would be eliminated whose destructive force is second only to that of nuclear weapons. Elimination of the relevant productive capacity would enhance the cause of chemical disarmament even further. If, however, the existing arsenals were left intact, a prohibition on the development, production and transfer of super-toxic agents and, for that matter, of other chemical warfare agents and weapons designed to use them, would not be a disarmament measure; it would have no more than a preventive effect. An arrangement of this kind would resemble the treaty on the non-proliferation of nuclear weapons, with the sole but important difference that, while the nuclear arms race has been allowed to continue and the use of nuclear weapons has not been formally banned, the chemical potential would be frozen and the use of chemical weapons would remain prohibited.

Any partial disarmament measure is presumed to be a phase in a process of dismantling warfare capabilities. A partial agreement concerning chemical weapons, if reached, could not be an exception. There could be no justification for perpetuating a situation where the great powers possessing the most modern armaments (conventional and nuclear) or, for that matter, other militarily important powers, would remain the exclusive possessors of the most dangerous chemical weapons.

The expectations of many nations that the SALT agreements would provide an immediate impulse to an agreement on the cessation of all nuclear-weapon tests have not been fulfilled. Testing has continued. Since the Partial Test Ban Treaty of 1963, the total number of tests, so far as is known, approaches 1 000.

In 1972, five tests were conducted in the atmosphere—three by France and two by China. The explosions provoked a wave of strong international protests, particularly concerning the contamination of the environment by radioactive

debris. Most criticism is directed against French tests, probably because, unlike China, France has been conducting them not on its own territory, but in the Pacific. Nevertheless, France is planning further tests this year in the same area.

The French and Chinese atmospheric tests are, no doubt, objectionable, but underground tests, conducted by the other nuclear powers, contribute most to the on-going nuclear arms race. In 1972, according to preliminary reports, the Soviet Union conducted at least 19 tests (seven of which were apparently for peaceful purposes) and the USA carried out seven tests. The USA and the USSR are in a weak moral position to urge the cessation of tests by others. The continued reluctance of the USA and the USSR to engage in substantive negotiations on a comprehensive test-ban treaty adds to the doubts, widely entertained, as to their willingness to stop testing soon.

In November 1972, the UN General Assembly adopted a resolution on the renunciation of the use or threat of force in international relations and the permanent prohibition of the use of nuclear weapons. For the first time, the non-use of nuclear weapons has been proposed as an obligation indissolubly associated with a UN Charter provision regarding the non-use of force in general. But precisely because of this linkage, the value of the resolution is doubtful: a breach of the principle of non-use of force could be taken by the attacked nation, or its ally, as freeing it from the associated obligation, and as justifying resort to all means of warfare, without restraint. Were it accepted by all—which it is not—the proclaimed prohibition of the use of nuclear weapons, instead of being "permanent", would be tantamount to licensing their first use under certain circumstances.

The non-use of force, the primordial obligation of states, must be read in close conjunction with the remaining Charter obligations—among others, with that concerning peaceful settlement of disputes. However, no adequate machinery for settling disputes has been established. There is no common understanding of the peacemaking and peacekeeping role of the United Nations. With the exception of a few countries, the UN members have not even made adequate technical preparations, in the military or civilian fields, to contribute to peacekeeping operations which may be decided in the future. There is a clear interrelationship between progress in disarmament, in peacemaking and in peacekeeping. Progress in one will assist progress in the others.

The prohibition of nuclear weapons is a major topical arms-control issue. Although the UN Charter, in prohibiting the use of force, makes no distinction between conventional weapons and nuclear weapons, the prohibition of the latter cannot be taken simply as a function of the non-use of force, or as a law already in existence. Neither can it be imposed by majority resolutions against the will of the countries directly concerned. Given the nature of the weapons

in question, it requires a separate negotiated international agreement which would take into account relations between the nuclear-weapon powers and relations between them and non-nuclear-weapon states.

The treaty on the non-proliferation of nuclear weapons (NPT) has been in force for three years now, and yet many militarily significant and near-nuclear states, except Australia, Canada, the German Democratic Republic and Sweden, still remain outside the non-proliferation régime. The danger of nuclear weapon proliferation has not receded, in spite of the treaty. One issue that has delayed the adherence to the treaty, especially in Europe, is the implementation of Article III, providing for safeguards agreements with the international Atomic Energy Agency (IAEA) to prevent the diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices. When the five non-nuclear-weapon members of the European Atomic Energy Community (Euratom) signed the NPT, they stated that they would ratify it only after a satisfactory agreement with the IAEA had been negotiated. Now, as a result of negotiations which had lasted from November 1971 to July 1972, this obstacle seems to have been overcome. In September 1972, the Board of Governors of the IAEA approved an agreement between Euratom, the five non-nuclear-weapon states of the Community and the IAEA which those countries are required to conclude for the application of safeguards under the NPT. This agreement will, no doubt, facilitate wider adherence to the NPT by both European and non-European states, although in some cases the parliamentary procedure for treaty ratification may require an extended period of time. By 31 December 1972, no more than one-third of the total number (77) of parties to the NPT had signed safeguards agreements provided for by the treaty. Whatever the practical considerations and commercial interests of the countries concerned, continued supplies of fissionable material as well as relevant equipment to states which have not concluded safeguards agreements with the IAEA, as stipulated by the NPT, are contrary to the letter and spirit of that treaty. They are certainly illegal with regard to non-parties to the NPT.

The idea of a world disarmament conference is overwhelmingly supported by UN members. There is a general understanding that the conference would serve its purpose only if all the nuclear-weapon states, as well as all the other militarily significant countries, were to participate. However, in view of the positions of the USA and China, it is unlikely that the disarmament conference will be held in the foreseeable future.

The fate of multilateral disarmament negotiations depends to a large extent on the attitude of China. It seems that China will not be ready to enter into disarmament commitments so long as it is in a position of marked nuclear inferiority compared with the USA and the USSR. What remains unclear is whether China actually intends to catch up with the other powers and attain

a similar military status. If this were so, the nuclear arms race would be doomed to continue indefinitely, unless the USA and the USSR decided drastically to bring down the levels of their nuclear arsenals, and by reducing the present disparity between the nuclear-weapon powers, allay China's apprehensions about possible unequal treatment.

The talks between the USA and the USSR cannot be a substitute for multilateral approaches to nuclear arms control. Advances of the other nuclear-weapon states in the field of intercontinental ballistic missiles, both land- and sea-based, may reduce the practical effects of the bilateral exchanges.

Part I. Strategic arms limitation

Chapter 1. Strategic arms limitation agreements

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The foundations of strategic arms policies The impact of SALT I The problems for SALT II

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1. Strategic arms limitation agreements

I. *Introduction*

On 26 May 1972, two agreements were signed in Moscow between the United States of America and the Union of Soviet Socialist Republics relating to nuclear arms control—the Treaty on the limitation of anti-ballistic missile systems (ABM Treaty) and the Interim Agreement on certain measures with respect to the limitation of strategic offensive arms. A Protocol to the Interim Agreement, specifying numerical levels of modern ballistic missile submarines and ballistic missile launchers on submarines, as well as replacement procedures, was also signed.[1]

These are the first arms-control accords which have emerged from the 127 sessions of the Strategic Arms Limitation Talks (SALT) between the USA and the USSR held since their initiation in 1969. The previous agreements, concluded on 30 September 1971, to reduce the risk of outbreak of nuclear war between the USA and the USSR,[2] and to improve the "hot line", that is, the USA–USSR direct communications link[3] (the latter being an extension of the 20 June 1963 Memorandum of understanding on the same subject), do not affect the weapons in the possession of the parties and are essentially technical and subsidiary in nature; they belong to the category of confidence-building rather than arms-control measures, and could have been concluded independently of SALT.

The political importance of the Moscow arms-control agreements is clear. Along with several other documents adopted during the US President's visit to the Soviet Union, from 22 to 30 May 1972—namely, on co-operation in the exploration and use of outer space for peaceful purposes, prevention of incidents on and over the sea,[4] cooperation in the fields of science and technology, medicine and public health, and environment protection, and, particularly, on basic principles of US–Soviet relations—the Moscow arms-control agreements may signify the beginning of a steady rapprochement and closer cooperation between the two powers. This would

[1] For the text of the documents, see appendices 1 A, 1 B and 1 C respectively.
[2] See appendix 1 D.
[3] See appendix 1 E.
[4] See appendix 1 F.

bring direct benefits to the powers themselves, and indirect positive repercussions for the cause of international peace in so far as the likelihood of a world war, started by design, has been reduced.

It is also noteworthy that, for the first time, the most powerful nations discussed the sensitive issue of nuclear armaments, which they consider central for their security, in concrete, technical detail, and reached a measure of understanding; that for the first time they consented to establishing ceilings on the production of such armaments, overcoming the problem of verification which has plagued disarmament negotiations for years; and that for the first time they agreed to accept limitations on their own military arsenals, without requiring sacrifices or contributions from other countries.

However, from the point of view of disarmament, in the proper sense of the term, the value of the Moscow agreements is less obvious. The purpose of this chapter is to assess it.

The agreements are closely interrelated. They have been conceived as a package and will therefore be treated jointly, even though their legal status is different. The ABM Treaty, of unlimited duration, is subject to ratification and enters into force upon the exchange of instruments of ratification. The Interim Agreement, which has a five-year duration, enters into force upon exchange of written notices of acceptance. And the Protocol is an integral part of the Interim Agreement. But the Interim Agreement can come into effect only simultaneously with the ABM Treaty, and, if the situation deteriorates, the two may also lapse simultaneously. In a formal statement the United States made it clear that if an agreement providing for more complete strategic offensive arms limitations were not achieved within five years, US supreme interests could be jeopardized, and that, should that occur, it would constitute a basis for withdrawal from the ABM Treaty.

The agreements entered into force on 3 October 1972.

To facilitate the analysis of the agreements, the activities explicitly prohibited and allowed will be placed in juxtaposition. The quantitative and qualitative changes in the nuclear arsenals of the USA and the USSR, resulting from the agreed limitations, will then be examined, along with procedures for verification, and the impact on the main arms race will be appraised. Account is also taken of agreed US–Soviet interpretations (initialed statements and common understandings), and of significant unilateral interpretative statements by the parties, both challenged and unchallenged.

II. *Main obligations under the agreements*

Activities prohibited

The parties agreed:

1. Not to deploy ABM systems for the defence of the territory of the USA and the USSR, not to provide a base for such a defence and not to deploy ABM systems for defence of an individual region, except as provided for in the agreement (see p. 6).

For the purposes of the Treaty, an ABM system is a system to counter strategic ballistic missiles or their elements in flight trajectory, currently consisting of: ABM interceptor missiles, which are interceptor missiles constructed and deployed for an ABM role, or of a type tested in an ABM mode; ABM launchers, which are launchers constructed and deployed for launching ABM interceptor missiles; and ABM radars, which are radars constructed and deployed for an ABM role, or of a type tested in an ABM mode. The ABM system components listed above include those which are operational, under construction, undergoing testing, undergoing overhaul, repair or conversion, or mothballed.

The USA stated that it would consider a launcher, missile or radar to be "tested in an ABM mode" if, for example, any of the following events occur: (1) a launcher is used to launch an ABM interceptor missile, (2) an interceptor missile is flight-tested against a target vehicle which has a flight trajectory with characteristics of a strategic ballistic missile flight trajectory, or is flight-tested in conjunction with the test of an ABM interceptor missile or an ABM radar at the same test range, or is flight-tested to an altitude inconsistent with interception of targets against which air defences are deployed, or (3) a radar makes measurements on a cooperative target vehicle of the kind referred to in item (2) above during the re-entry portion of its trajectory or makes measurements in conjunction with the test of an ABM interceptor missile or an ABM radar at the same test range. Radars used for purposes such as range safety or instrumentation would be exempt from application of these criteria.

The parties agree that in the event of ABM systems based on other physical principles and including components capable of substituting for ABM interceptor missiles, ABM launchers or ABM radars being created in the future, specific limitations on such systems and their components would be subject to discussion and agreement in accordance with the amendments procedure.

2. Not to develop, test or deploy ABM systems or components which are sea-based, air-based, space-based or mobile land-based. It is understood

that the prohibitions on mobile ABM systems apply to ABM launchers and radars which are not permanent fixed types.

3. Not to develop, test or deploy ABM launchers for launching more than one ABM interceptor missile at a time, nor to modify deployed launchers to provide them with such a capability, nor to develop, test or deploy automatic, semi-automatic or other similar systems for rapid reload of ABM launchers. It is understood that the development, testing or deployment of ABM interceptor missiles with more than one independently guided warhead are also prohibited.

4. Not to give non-ABM missiles, launchers or radars capabilities to counter strategic ballistic missiles or their elements in flight trajectory. This undertaking would, for example, prohibit the modification or upgrading of air-defence missiles (SAMs) to give them a capability against strategic ballistic missiles.

5. Not to test non-ABM missiles, launchers or radars in an ABM mode, that is, for ABM purposes.

6. Not to deploy phased-array radars having a potential (the product of mean emitted power in watts and antenna area in square metres) exceeding three million, except as provided for in the treaty, or except for the purposes of tracking objects in outer space or for use as national technical means of verification (an undertaking contained in the initialed statement of an agreed interpretation). The reason for the prohibition is that such phased-array radars, though deployed for non-ABM missions, such as air defence or air traffic control, would have an inherent capacity for ABM use.

7. Not to deploy in the future radars for early warning of strategic ballistic missile attack except at locations along the periphery of the national territory and oriented outward. Existing ballistic missile early-warning radars are not affected, and no limitation is imposed on radars for national means of verification.

The USA stated that since Hen House radars (Soviet ballistic missile early-warning radars) can detect and track ballistic missile warheads at great distances, and have therefore a significant ABM potential, any increase in the defences of such radars by surface-to-air missiles would be regarded by the USA as inconsistent with the agreement.

8. Not to transfer to other states, and not to deploy outside the national territory, ABM systems or their components limited by the treaty. The first undertaking is understood as including the obligation of the USA and the USSR not to provide to other states technical descriptions or blueprints specially worked out for the construction of ABM systems and their components limited by the treaty.

9. Not to start construction of additional fixed land-based intercontinental ballistic missile (ICBM) launchers after 1 July 1972. The ICBM launchers referred to in the Interim Agreement are understood to be launchers for strategic ballistic missiles capable of ranges in excess of the shortest distance between the northeastern border of the continental USA and the northwestern border of the continental USSR. Launchers for fractional orbital bombardment systems are considered to be ICBM launchers. It is also understood that fixed land-based ICBM launchers under active construction as of the date of signature of the agreement may be completed.

The USA agreed to defer the question of limitation of mobile land-based ICBM launchers to the subsequent negotiations but stated that it would consider the deployment of operational land-mobile ICBM launchers during the period of the Interim Agreement as inconsistent with the objectives of that agreement.

10. Not to convert land-based launchers for light ICBMs or for ICBMs of older types deployed prior to 1964 into land-based launchers for heavy ICBMs of types deployed after that time.

All currently operational ICBMs other than the Soviet SS-9 are either "light" (the US Minuteman and the Soviet SS-11 and SS-13) or "older" ICBM launchers of types first deployed prior to 1964 (the US Titan and the Soviet SS-7 and SS-8). Conversion of a launcher for an SS-7, SS-8, SS-11 or SS-13 ICBM into a launcher for an SS-9 or any new modern heavy ICBM, and also a launcher for a Minuteman or Titan into a launcher for a modern heavy ICBM, will thus be prohibited. There is, however, no common definition of a heavy missile. The USA stated that it would consider any ICBM having a volume significantly greater than that of the largest light ICBM now operational on either side to be a heavy ICBM.

11. Not to exceed the numbers of submarine-launched ballistic missile (SLBM) launchers and modern ballistic missile submarines operational and under construction on the date of signature of the Agreement, except in cases of replacement under the established procedures (see p. 7).

12. Not to interfere with national technical means of verification of the other party. This provision would, for example, prohibit interference with a satellite in orbit used for verification.

13. Not to use deliberate concealment measures which impede verification, by national technical means, of compliance with the obligations. No changes are required in current construction, assembly, conversion or overhaul practices.

Activities allowed

1. To conduct research on, as well as develop and test, ABM systems not limited by the treaty (see p. 3) and strategic offensive arms.

2. (a) To deploy up to 100 ABM launchers, 100 ABM interceptor missiles and ABM radars within no more than six ABM radar complexes (the permitted area of each complex being circular with a diameter of no more than three kilometres), within one ABM system deployment area having a radius of 150 km and centered on the party's national capital.

It is understood that, in addition to the ABM radars which may be deployed as specified above, those non-phased-array ABM radars (mechanical-scan radars) operational on the date of signature of the treaty within the ABM system deployment area for defence of the national capital may be retained. Such radars are deployed by the USSR.

(b) To deploy up to 100 ABM launchers and 100 ABM interceptor missiles, as well as two modern large phased-array ABM radars (scanning by electronic means) comparable in potential to corresponding ABM radars operational or under construction on the date of signature of the treaty, in an ABM system deployment area containing ICBM silo launchers, and up to 18 ABM radars each with a potential less than the potential of the smaller of the two large phased-array ABM radars, within one ABM system deployment area on the territory of each party, having a radius of 150 km and containing ICBM silo launchers.

The parties understand that the potential of the smaller of the two large phased-array ABM radars referred to above is considered for purposes of the treaty to be three million.

The only two large phased-array ABM radars operational or under construction in a deployment area on the date of signature were the US perimeter acquisition radar (PAR) and missile site radar (MSR) under construction near Grand Forks Air Force Base, North Dakota.

It has been agreed that the centre of the ABM system deployment area centred on the national capital and the centre of the ABM system deployment area containing ICBM silo launchers for each party shall be separated by no less than 1 300 km. The US ABM system deployment area for defence of ICBM silo launchers, located west of the Mississippi River, will be centred on the Grand Forks ICBM silo launcher deployment area. The Soviet missile-defence site may be located east of the Ural Mountains.

ABM systems or their components in excess of the numbers or outside the areas specified in the treaty, as well as ABM systems or components prohibited by the treaty, shall be destroyed or dismantled under agreed

procedures within the shortest possible agreed period of time. As far as the USA is concerned, this provision will apply to the ABM components previously under construction in the vicinity of Malmstrom Air Base in Montana.

3. To have up to 15 ABM launchers at current and additionally agreed test ranges. It is understood that ABM test ranges encompass the area within which ABM components are located for test purposes, and that non-phased-array radars of types used for range safety or instrumentation purposes may be located outside ABM test ranges. The current US test ranges for ABM systems are located at White Sands, New Mexico, and at Kwajalein Atoll in the Pacific. The current Soviet test range for ABM systems is located near Sary Shagan, Kazakhstan. ABM components are not to be located at any other test ranges without prior agreement between the parties.

4. To retain the fixed land-based ICBM launchers now in the possession of both powers.

5. To have: USA—up to 710 ballistic missile launchers on submarines and 44 modern ballistic missile submarines; USSR—up to 950 ballistic missile launchers on submarines and 62 modern ballistic missile submarines.

6. Up to the above levels, additional SLBM launchers—in the USA, over the present figure of 656 ballistic missile launchers on nuclear-powered submarines, and in the USSR, over 740 ballistic missile launchers on nuclear-powered submarines, operational and under construction—to become operational as replacements for equal numbers of ballistic missile launchers of types deployed prior to 1964, or of ballistic missile launchers on older submarines. The deployment of modern SLBMs on any submarine, regardless of type, will be counted against the total level of SLBMs permitted for the USA and the USSR.

It is understood that dismantling or destruction of launchers being replaced by new SLBM launchers on modern submarines will be initiated at the time of the beginning of sea trials of a replacement submarine, and will be completed in the shortest possible agreed period of time.

The parties agree that there shall be no significant increase in the number of ICBM or SLBM test and training launchers, or in the number of such launchers for modern land-based heavy ICBMs. Construction or conversion of ICBM launchers at test ranges shall be undertaken only for purposes of testing and training.

7. To modernize and replace ABM systems or their components, subject to the provisions of the ABM Treaty.

8. To modernize and replace strategic offensive ballistic missiles and launchers covered by the Interim Agreement. The parties agree that in

the process of modernization and replacement the dimensions of land-based ICBM launchers will not be significantly increased, and that this means that any increase will not be greater than 10–15 per cent of the present dimensions.

9. To use national technical means of verification, at the disposal of each party, for the purpose of assuring compliance with the obligations.

III. *Quantitative restrictions*

In an agreement which freezes arms at numerical levels it may not be necessary to specify the number of weapons in the possession of each party at the time of signing, if the deployment, or even construction, of items exceeding the set ceilings can be relatively quickly detected by the opposite side. This seems to be the case with the strategic defensive and offensive systems subject to limitation under the Moscow agreements. However, the base figures are helpful when a judgement is to be passed about the value of the arms-control undertaking.

The difficulty in drawing up an accurate balance sheet in the case of the Moscow agreements is considerable. While the figures for the USA are generally known, the figures for the USSR have never been made public. All, or almost all, that is known about the latter comes from Western intelligence sources, which in some cases have supplied divergent estimates. The difficulty is compounded by the vagueness of the term "under construction" used with regard to strategic systems. It may refer to different stages—to the production of sections of a system at different plants or to the putting together of such sections at an assembly plant. This has contributed to the confusion about the actual numbers. A computation of approximate figures is bound to provide an equally approximate balance.

Anti-ballistic missile defence

When SALT started, both sides were in the initial stage of strategic defence programmes, each viewing the ABM problem from a different angle. The Soviet aim was to protect the capital; the US plans concentrated on protecting the retaliatory forces. In the course of negotiations the parties compromised their approaches.

At the time the Moscow agreements were concluded, the USA had no anti-ballistic missiles deployed. One ABM complex for the protection of ICBM silo launchers at Grand Forks, North Dakota, was about 80–90 per cent complete; another complex—in the vicinity of Malmstrom Air

Base in Montana—was at an early stage of construction. As a result of the ABM Treaty, the Grand Forks site will become operative with no more than 100 ABM launchers and 100 ABM interceptor missiles. The Malmstrom construction will stop and the US 12-site Safeguard programme will be terminated. The USA has the right to build an ABM system around Washington, also with 100 launchers and 100 interceptor missiles.

The USSR had 64 ABM launchers deployed around Moscow, and the system had been static since 1968. It had no special ABM protection of ICBM sites. Under the ABM Treaty, the Soviet Union has the right to expand the capital defence system to 100 launchers and 100 interceptor missiles and construct one new site with the same number of launchers and missiles to protect some of its ICBMs.

Thus, the treaty provides for a possible parity of ABM launchers and missiles. The same applies to radars installed in the deployment areas. Considering, however, Soviet superiority in the numbers of land-based intercontinental ballistic missiles, the site defence system in the USSR may protect a smaller proportion of ICBMs than in the USA.

Offensive weapons

The Interim Agreement deals with selected categories of strategic offensive weapons—land-based intercontinental ballistic missile launchers and ballistic missile launchers on modern submarines. Their aggregate number is frozen at approximately current levels, with a certain freedom to choose the mix.

Only those launchers which are capable of firing missiles reaching the territories of the two powers are included in the agreement. Soviet intermediate-range rockets aimed at US European allies, or at other countries, but unable to reach the USA, are not covered. If this approach is based, as it appears to be, on the principle of mutual vulnerability, it is lacking in consistency, since the US forward-based aircraft in Europe and bombers aboard US aircraft carriers are not covered by the agreement either. It is true that these weapons do not belong to the category of ballistic missile launchers, but they can, nevertheless, deliver nuclear strikes on the USSR.

The number of land-based ICBM launchers possessed by the USA at the time of signing the agreement was 1 054 (1 000 Minuteman and 54 Titan missiles), all operational, and none under construction. The total number of Soviet ICBMs operational and under construction has not been specified by the USSR. The USA stated that it considered it to be 1 618,

and made it clear that if its intelligence should in the future reveal numbers which significantly exceeded that number, a basic premise of the agreement would be in question. (ICBM launchers for testing and training purposes are excluded in each case.)

While the USA had by 1969, that is, by the date SALT started, no active or planned programmes for deploying additional ICBMs and invested instead in qualitative improvements of the existing missiles, the USSR continued to build land-based missiles. According to the agreement, neither party may start new construction, nor resume previously suspended construction, of fixed ICBM launchers, except test and training launchers. A sub-ceiling has been imposed on land-based launchers for modern "heavy" missiles: it is prohibited to convert land-based launchers for light ICBMs or for ICBMs of older types into such launchers. In practice, the restriction applies only to Soviet SS-9 missiles, of which there are now 313 (according to US estimates), each presumably capable of carrying a 20–25 megaton warhead or three five-megaton warheads. (The maximum payload of a US Minuteman warhead does not exceed two megatons.)

With regard to submarines the situation is as follows: the USA possesses 41 modern nuclear-powered submarines with 656 launchers aboard (16 launchers on each submarine). The corresponding figures for the Soviet Union are in dispute. The USSR claimed 48 submarines with 768 missiles; the US estimate was less. Eventually, a baseline was adopted only for launchers—740.

The number of US submarines and SLBMs had remained stationary since 1967. The USSR, however, was reportedly building about eight modern submarines and more than 100 SLBMs a year. Under the agreement, the permissible ceilings are 710 SLBMs on 44 modern submarines, for the USA, and 950 SLBMs on 62 modern submarines, for the USSR. The figures for SLBMs—more than 656 for the USA and more than 740 for the USSR—could be reached only through replacement for equal numbers of ballistic missile launchers of types deployed prior to 1964, or of ballistic missile launchers on older submarines.

The replacement procedure has actually been devised only for the USSR. The US sea-based nuclear delivery system consists of nuclear-powered submarines with Polaris and Poseidon missiles aboard and the differences between the classes of submarines are not significant from the point of view of the agreement. As pointed out above, the USA is no longer building these submarines; it is engaged in developing a new under-sea system with a new model of launchers, which will not be ready for deployment until 1978. By producing submarines with 24 launchers each (instead of 16), the USA may end up with a lower total

number of submarines than it is now allowed. The USA could, of course, if it found it desirable, use the option of increasing the current number of submarines and SLBMs at the expense of its Titan ICBMs, before the expiration of the Interim Agreement, but this would require a precipitate programme which would hardly be sensible. Its SLBM launcher level will in all likelihood remain constant at least through 1977.

The Soviet submarine fleet for nuclear delivery is more varied. The ceiling of 62 has been set for the USSR on the number of modern ballistic missile submarines. The only Soviet submarines now operational which could be so classified are "Y"-class nuclear-powered submarines (roughly equivalent in performance to the early models of US Polaris submarines), the number of which is estimated at 25. The Soviet ceiling of 950 SLBM launchers is to include all launchers on nuclear-powered submarines, that is, of "Y"-class and "H"-class, and modern launchers on "G"-class diesel-powered submarines. To reach the permissible limit, the USSR must retire older ballistic missile launchers, specifically those for SS-7 and SS-8 ICBMs and on "H"-class submarines. It could retain, in addition to 950 launchers on modern submarines, the existing launchers on "G"-class submarines for short-range missiles, but any launchers for modern SLBMs on these older submarines would be counted against the 950 total. One can presume that the USSR will use the option of replacing old types of launchers by more modern ones; it would seem unlikely, however, that it would install modern launchers on obsolete ships.

Assuming that the USSR will take full advantage of the replacement possibilities and that the USA will not, the resulting balance of missile launchers as of 26 May 1977 will be as follows:

	USA	**USSR**
ICBM launchers	1 054 (unchanged	1 408 (1 618 − 210)
SLBM launchers	656 (unchanged)	950 (740 + 210)
Total	**1 710**	**2 358**

To accommodate the increased number of SLBMs, the USSR would have to use virtually all its quota of 62 modern ballistic missile submarines, unless it builds submarines with more launchers aboard than there are at present. A modified class of submarines which it is now building will have fewer but longer-range missiles than its current fleet. In addition, the USSR reserved its right to an appropriate increase in the number of its submarines, in case the US allies in NATO should increase the number of their modern submarines to exceed the numbers of submarines

they had operational or under construction on the date of signature of the agreement; it accepted that for the period of effectiveness of the agreement, the USA and its NATO allies would have up to 50 such submarines with a total of up to 800 ballistic missile launchers. The NATO allies in question are the United Kingdom, with four modern ballistic missile submarines and no current plans for expansion, and France, which by 1976 may have four comparable submarines. The Soviet position can be interpreted as denying the USA the right fully to use its option, that is, to increase the number of its submarines by three (from 41 to 44). The United States did not accept the validity of the Soviet Union's claim to compensation for SLBM submarines belonging to third countries, but the question will most certainly not arise: the USA is unlikely to increase the number of its submarines and the United Kingdom and France, taken together, will not acquire more than eight submarines within the next five years.

The agreed numerical ceilings for offensive weapons are asymmetrical. They seem to favour the Soviet Union by permitting it an edge of 40 per cent more ICBMs and missile-launching submarines, and one-third more SLBMs. But there would be a numerical gap against the USA in land- and sea-based missiles anyway, whether there were an agreement or not. Without an agreement, the gap may have widened in the next few years, if the USSR really had the capability and intended to build a strategic missile force larger than the levels now permitted—which is not at all certain.

The difference in the overall numbers of nuclear-delivery vehicles is in fact smaller than that indicated above, if account is taken of US preponderance, both numerical (*ca.* 450 against 140) and qualitative, in heavy bombers, which are not included in the limitations, but which continue to be considered an important element of the strategic offensive forces. Moreover, because of geographic reasons and the fact that the USA has bases at Holy Loch in Scotland, Rota in Spain, and on Guam, the USSR may need three submarines for two American ones to keep an equal number on station. The USSR drew attention to this imbalance, but its considerations were rejected by the USA on the grounds that the overseas bases do not give an advantage not compensated for in the agreements. Yet other factors which cannot be ignored in a strategic equation between the USSR and the USA are the strength and potential of their respective allies, and the threats the two powers may face outside their mutual confrontation.

IV. *Qualitative restrictions*

Anti-ballistic missile defence

The main restriction imposed on ABM systems is the prohibition of their nationwide deployment and of "thick" regional defences. Permitted deployments will be limited to two widely separated areas in each country. To prevent the creation of a base for territorial defence, the types of ABM radars to be kept by the parties, their potential and location have been strictly defined. Modernization and replacement of ABM systems and their components is allowed, including testing at agreed test ranges, but there is a ban on the development and deployment of ABMs other than land-fixed ABMs, launchers capable of launching more than one interceptor missile, automatic systems and ABM missiles with multiple independently guided warheads. The upgrading of air-defence missiles by giving them an ABM capability is also prohibited.

The specified limitations concern ABMs in the form in which they exist now. New means of anti-ballistic missile protection which may be devised, based on other physical principles than the present ABM systems (using, for example, laser beams instead of missiles to shoot down incoming ICBMs), are not covered. The treaty, however, is being interpreted by the USA as forbidding the deployment of such means unless and until its provisions are appropriately amended.

Offensive weapons

The only qualitative restriction in the field of offensive weapons is the freezing of the size of ICBM launchers. Otherwise, the parties may improve the quality of missiles, both land-based and sea-based, and conduct appropriate research, development and testing. Even mobile land-based ICBMs, which could be highly resistant to counter-attack, are not subject to limitations. The replacement procedures make it possible for the parties to scrap older types of weapons and replace them by modern models. The USA may or may not retire the Titan missiles. It is more likely that the Soviet Union, which has an on-going programme of missile construction, will trade in the SS-7s and SS-8s deployed prior to 1964, as well as missiles on older types of submarines ("H"-class), for modern SLBMs.

The most significant feature of the offensive arms limitation agreement is the lack of circumscription on the number of nuclear warheads each missile can carry. In this field the USA has indisputable superiority. Multiple independently targetable re-entry vehicles (MIRVs), which can

be directed to separate targets, are being installed on US Minuteman and Poseidon missiles. The USSR has reportedly started to deploy multiple, but not independently guided, re-entry vehicles (MRVs), probably on its smaller ICBMs, and may have tested a missile for MIRVs, but there is no evidence that it has so far tested a MIRV itself. According to US estimates, the USSR may be more than a year away from developing a MIRV capability. Thus, while the USSR has more missile launchers, including launchers for "heavy" missiles of a type which does not exist in the USA, and while the Soviet megatonnage of total missile payload is about three times as much as the American, the USA has more than twice as many deliverable strategic warheads, including bombs, as the USSR (5 700 against 2 500), and at the end of the freeze, in five years, may increase this advantage. The number and size of missiles are less important than the destruction they can inflict. If a given missile is used with several smaller warheads, it can destroy a larger area than when it carries a single, though more powerful, warhead. US missiles are also considered to be more accurate than Soviet missiles, and those installed on submarines have a longer range than their Soviet counterparts.

There is little doubt that the USSR can, in time, improve the quality of its missiles, and deploy multiple independently targetable re-entry vehicles in quantities matching those of the USA. Given its superiority in the number of launchers, the USSR would then gain superiority in the overall missile offensive strength. This, however, is unlikely to happen within the life-span of the agreement.

Whatever the relative nuclear strength of the USA and the USSR, and whatever standards are used to measure it, the destructive power accumulated in their arsenals is already more than sufficient to cover every significant target on their territories, and even a retaliatory, that is, a second, nuclear strike would completely devastate either of them.

V. *Verification*

No international control procedures have been provided for in the agreements. To assure compliance with the obligations assumed, the USA and the USSR will rely on their own "national technical means" of verification—chiefly reconnaissance satellites. The parties undertake not to interfere with these means and not to use deliberate concealment impeding verification, for example, by roofing over installations such as submarine pens. Intelligence gathering, hitherto considered taboo, has been elevated to the rank of an internationally recognized and mutually useful activity;

the principle of "open skies", which the USA had been advocating for years, seems now to have been accepted by the Soviet Union, at least as far as satellite altitudes are concerned. This fact, and official US admission that modern means of verification, at the disposal of the great powers, are much superior to and more reliable than on-site inspection to monitor quantitative limitations of arms, carry importance as a precedent for other arms-control measures.

Unilateral off-site control will probably suffice to check the numbers and types of ABMs, ICBMs and SLBMs deployed, as well as radars. It will not enable the parties to detect possible violations of the provisions prohibiting the development of certain categories of weapons. However, the risks of evasion are not great in view of the fact that, in order to serve a purpose, development must be followed by tests, and these are in many cases observable without requiring access within the borders of the other country.

A standing consultative commission will be established by the parties to promote the objectives and implementation of the ABM Treaty and the Interim Agreement.

The principal function of the commission will be to consider questions of compliance and to clarify ambiguous situations which might generate suspicion regarding compliance. Each party may voluntarily, through the commission, provide information it considers necessary. The commission is charged with the responsibility of examining questions of interference with national technical means of verification. It may consider changes in the general strategic situation which have a bearing on the obligations assumed. Through the commission the parties are to agree on procedures and dates for destruction or dismantling of ABM systems or their components in cases provided for by the treaty. The commission may also consider proposals for amendments (which would have to be ratified to become valid), as well as measures aimed at further limiting strategic arms. The strategic dialogue between the two powers will thus be institutionalized.

VI. *Summary and conclusions*

Generally speaking, quantitative limitations of arms can be achieved either by reducing them to lower levels, by freezing them at the existing levels or by establishing higher ceilings, allowed to be reached but not exceeded. Reduction of strategic arms has not been intended by the USA and the USSR, except as part of a replacement procedure. Of

the remaining two courses, the parties have basically chosen the latter. The ABM Treaty will result in the deployment by both countries of missiles which were not operational at the time the Moscow agreements were concluded. The overall number of submarine-launched missiles will rise. A stop will be put to an excessive proliferation of fixed land-based ICBMs, the importance of which is diminishing as compared with sea-based deterrence, while mobile land-based ICBMs and bombers are not prohibited.

The concrete net gains in the bargain are: cancellation of the US 12-site anti-ballistic missile programme—probably a matter of primary concern to the USSR, because these ABMs could reduce the effectiveness of its offensive missile build-up; and discontinuance of the deployment of Soviet land-based launchers for "heavy" SS-9 missiles—a matter of primary concern to the USA, because these missiles are viewed as part of the Soviet counter-force strategy, that is, as having a potential first-strike capability.

The parties undertake to continue active negotiations for limitations on strategic offensive arms. No such undertaking is explicitly assumed with regard to defensive systems, except for a review of the ABM Treaty to be conducted five years after its entry into force and at five-year intervals thereafter.

Both the USA and the USSR have made it clear that they are going ahead with armament programmes which are beyond the constraints of the agreements. The US leaders have stated their determination to maintain the US technological lead. The Soviet Union has said that it would take all necessary measures in defence of the principle of equal security. The arguments advanced in justification of this course distort the basic purpose of arms-control negotiations. They range from the need to secure the viability of SALT agreements to the need for acquiring "negotiating chips", so that the next round of negotiations could be conducted from a position of strength.

As far as ABMs are concerned, the systems now in existence offer negligible resistance to the penetration of offensive missiles. Their retention, however, though in small numbers, may provide essential operational experience. It can be taken as evidence of a lingering hope that better, more effective systems will eventually be created. The technical details included in the agreements make it improbable that clandestine ABMs would be deployed. But continued development may undermine the agreed limitations and the withdrawal clause could then be invoked by either side with reference to the "supreme interests", as stipulated in the ABM Treaty.

With respect to strategic offensive systems, the situation is even more

precarious. The number of ballistic missile launchers in the possession of the two sides may not increase beyond a fixed limit, but there are no restrictions in the present agreements on the improvement of the quality of these weapons—their survivability, accuracy, penetrability and range. Better weapons are substituted for those which become obsolete. The technological arms race is encouraged and even legitimized. In the absence of mutual restraint it is bound to produce temptations for seeking a decisive advantage. Thus, for example, land-based missiles may be provided with computerized command, so as to be launched automatically, "on warning", as soon as the enemy missiles cross the horizon. The US "Trident" submarines equipped with long-range missile systems will have an increased operating area and greater resistance to anti-submarine means of warfare, while the Soviet undersea fleet is expected to be provided with advanced SLBMs.

The number of nuclear charges carried by each ballistic missile will proliferate, and an open-ended competition in this field is not only likely, but almost certain. Again, instead of nipping the development of new weapons in the bud, an important arms-control measure may be delayed indefinitely, or until parity is achieved, that is, until the USSR catches up with the USA in the deployment, or at least the development, of multiple nuclear warheads. The absence of qualitative limitations on offensive missiles may deprive the quantitative limitations on launchers of any value whatsoever.

In the areas not covered by the agreements, the development of new sophisticated long-range bombers, such as the US bomber B-1, having better survivability against SLBM attack and higher penetrability of air defences than the existing B-52 bomber force, or such as the advanced Soviet supersonic swing/wing bomber; of a submarine-launched cruise missile (SLCM) capable of flying at low altitudes, so as to escape radar detection; as well as of new means of anti-submarine and anti-satellite warfare, will go on.

The freeze on offensive weapons achieved so far is more apparent than real. The nuclear arms race is rapidly moving from a race for quantity to a race for quality. The economic burden will therefore not be relieved. Some savings resulting from the suspension of plans for the construction of a ramified network of ABMs are likely to be offset by expenditure on offensive weapons.

The "secondary" nuclear powers, especially France which, unlike Britain, is not integrated into the NATO military system, and China, will hardly be dissuaded from retaining, increasing and modernizing their nuclear potential. If anything, the limitation of US and Soviet ABM systems may, to

some extent, increase the credibility of their nuclear forces. The Chinese Prime Minister has stated that the SALT agreements have nothing to do with China and that they mark the beginning of a new stage in the arms race; the French reception was also cool. Both may seek a new generation of missiles capable of penetrating the existing defences of the USA and the USSR and may perhaps even try to develop their own ABMs. This would create a new threat to the balance of deterrence.

The obligation of the parties to the Non-Proliferation Treaty to pursue negotiations on measures relating to cessation of the nuclear arms race and to nuclear disarmament is being fulfilled in so far as negotiations are concerned. But the arms race has not ceased, and there is even less indication that nuclear disarmament measures will be agreed upon in the foreseeable future. The SALT agreements will hardly weaken the position of the protagonists of nuclear armaments in the near-nuclear countries.

The outcome of SALT has no bearing on the arms situation in Europe, with the exception of the two powers' non-dissemination commitment—not to deploy ABM systems or their components outside their national territories, and not to transfer them to their allies—a commitment which the USA does not consider as setting a precedent for strategic offensive arms. Nuclear weapons, bombers, medium- and short-range missiles, installed in Europe and targeted on Europe, remain unaffected. Their reduction or limitation may become possible only as part of a European arms settlement. Due to the political climate generated by the Moscow agreements, the talks on mutual and balanced reduction of forces in Europe may start sooner than had been expected. However, in view of the plurality of interests involved, they may prove even more complicated than SALT.

The conclusion is that in terms of disarmament the immediate effects of the first SALT agreements, described by the parties as "historic", are less than impressive. The agreements may, of course, be interpreted as admission on the part of the USA and the USSR of rough parity in the destructive power contained in the opposing arsenals (a precise equality being, in any event, difficult to achieve, if not impossible, given differences in geography, technology and strategic philosophy) as well as adoption of a no-damage limiting posture. If this is so, if mutual deterrence really is the only mission for the great powers' strategic forces, then there should be no need for any ABMs whatsoever, or for developing and deploying nuclear warheads beyond those needed for deterrence.

One justification, if not the most important one, for MIRVs was the appearance of ABMs. MIRVs were designed to provide assured retaliation by penetrating any defence network that might be put in place. Once developed, MIRVs themselves speeded up ABM programmes. At least

in the USA the possibility of the USSR developing MIRVs was used as a rationale for such programmes. ABMs and MIRVs are the most serious threat to the strategic stability and are closely intertwined. A solution therefore should be sought simultaneously on both. Anti-ballistic missile defences should be prohibited altogether, both those now in existence and any possible future defence systems, whatever the components, and whatever the effectiveness. There can be no valid justification for keeping them, even in reduced proportions, if the idea of a first nuclear strike has been really abandoned, and if the great powers have reconciled themselves with the fact that they are both vulnerable to massive retaliation. Already the present limitation of ballistic missile protection removes pretexts for enlarging the offensive forces. Consequently, multiplication of offensive warheads could also be unconditionally banned. The follow-on SALT negotiations to which both parties are committed must, moreover, result in a substantial reduction of offensive strategic missiles, a restriction on anti-submarine and anti-satellite systems, and a ban, or at least limitation, on military research and development relating to the above specified weapon systems. Until this happens, until the driving force of nuclear arms rivalry is neutralized, it will be hard to believe that either of the parties has accepted the concept of sufficiency and has given up claims for superiority.

The competition in arms will be fueled by new technological advances. Limitation may turn into escalation.

Appendix 1A

Treaty between the United States of America and the Union of Soviet Socialist Republics on the limitation of anti-ballistic missile systems

The United States of America and the Union of Soviet Socialist Republics, hereinafter referred to as the Parties,

Proceeding from the premise that nuclear war would have devastating consequences for all mankind,

Considering that effective measures to limit anti-ballistic missile systems would be a substantial factor in curbing the race in strategic offensive arms and would lead to a decrease in the risk of outbreak of war involving nuclear weapons,

Proceeding from the premise that the limitation of anti-ballistic missile systems, as well as certain agreed measures with respect to the limitation of strategic offensive arms, would contribute to the creation of more favorable conditions for further negotiations on limiting strategic arms,

Mindful of their obligations under Article VI of the Treaty on the Non-Proliferation of Nuclear Weapons,

Declaring their intention to achieve at the earliest possible date the cessation of the nuclear arms race and to take effective measures toward reductions in strategic arms, nuclear disarmament, and general and complete disarmament,

Desiring to contribute to the relaxation of international tension and the strengthening of trust between States,

Have agreed as follows:

ARTICLE I

1. Each Party undertakes to limit anti-ballistic missile (ABM) systems and to adopt other measures in accordance with the provisions of this Treaty.

2. Each Party undertakes not to deploy ABM systems for a defense of the territory of its country and not to provide a base for such a defense, and not to deploy ABM systems for defense of an individual region except as provided for in Article III of this Treaty.

ARTICLE II

1. For the purposes of this Treaty an ABM system is a system to counter strategic ballistic missiles or their elements in flight trajectory, currently consisting of:

(*a*) ABM interceptor missiles, which are interceptor missiles constructed and deployed for an ABM role, or of a type tested in an ABM mode;

(*b*) ABM launchers, which are launchers constructed and deployed for launching ABM interceptor missiles; and

(*c*) ABM radars, which are radars constructed and deployed for an ABM role, or of a type tested in an ABM mode.

2. The ABM system components listed in paragraph 1 of this Article include those which are:

(*a*) operational;
(*b*) under construction;
(*c*) undergoing testing;
(*d*) undergoing overhaul, repair or conversion; or
(*e*) mothballed.

ARTICLE III

Each Party undertakes not to deploy ABM systems or their components except that:

(a) Within one ABM system deployment area having a radius of one hundred and fifty kilometers and centered on the Party's national capital, a Party may deploy: (1) no more than one hundred ABM launchers and no more than one hundred ABM interceptor missiles at launch sites, and (2) ABM radars within no more than six ABM radar complexes, the area of each complex being circular and have a diameter of no more than three kilometers; and

(*b*) within one ABM system deployment area having a radius of one hundred and fifty kilometers and containing ICBM silo launchers, a Party may deploy: (1) no more than one hundred ABM launchers and no more than one hundred ABM interceptor missiles at launch sites, (2) two large phased-array ABM radars comparable in potential to corresponding ABM radars operational or under construction on the date of signature of the Treaty in an ABM system deployment area containing ICBM silo launchers, and (3) no more than eighteen ABM radars each having a potential less than the potential of the smaller of the above-mentioned two large phased-array ABM radars.

ARTICLE IV

The limitations provided for in Article III shall not apply to ABM systems or their components used for development or testing, and located within

current or additionally agreed test ranges. Each Party may have no more than a total of fifteen ABM launchers at test ranges.

ARTICLE V

1. Each Party undertakes not to develop, test, or deploy ABM systems or components which are sea-based, air-based, space-based, or mobile land-based.

2. Each Party undertakes not to develop, test, or deploy ABM launchers for launching more than one ABM interceptor missile at a time from each launcher, nor to modify deployed launchers to provide them with such a capability, nor to develop, test, or deploy automatic or semi-automatic or other similar systems for rapid reload of ABM launchers.

ARTICLE VI

To enhance assurance of the effectiveness of the limitations on ABM systems and their components provided by this Treaty, each Party undertakes:

(*a*) not to give missiles, launchers, or radars, other than ABM interceptor missiles, ABM launchers, or ABM radars, capabilities to counter strategic ballistic missiles or their elements in flight trajector, and not to test them in an ABM mode; and

(*b*) not to deploy in the future radars for early warning of strategic ballistic missile attack except at locations along the periphery of its national territory and oriented outward.

ARTICLE VII

Subject to the provisions of this Treaty, modernization and replacement of ABM systems or their components may be carried out.

ARTICLE VIII

ABM systems or their components in excess of the numbers or outside the areas specified in this Treaty, as well as ABM systems or their components prohibited by this Treaty, shall be destroyed or dismantled under agreed procedures within the shortest possible agreed period of time.

ARTICLE IX

To assure the viability and effectiveness of this Treaty, each Party undertakes not to transfer to other States, and not to deploy outside its national territory, ABM systems or their components limited by this Treaty.

ARTICLE X

Each Party undertakes not to assume any international obligations which would conflict with this Treaty.

ARTICLE XI

The Parties undertake to continue active negotiations for limitations on strategic offensive arms.

ARTICLE XII

1. For the purpose of providing assurance of compliance with the provisions of this Treaty, each Party shall use national technical means of verification at its disposal in a manner consistent with generally recognized principles of international law.

2. Each Party undertakes not to interfere with the national technical means of verification of the other Party operating in accordance with paragraph 1 of this Article.

3. Each Party undertakes not to use deliberate concealment measures which impede verification by national technical means of compliance with the provisions of this Treaty. This obligation shall not require changes in current construction, assembly, conversion, or overhaul practices.

ARTICLE XIII

1. To promote the objectives and implementation of the provisions of this Treaty, the Parties shall establish promptly a Standing Consultative Commission, within the framework of which they will:

(*a*) consider questions concerning compliance with the obligations assumed and related situations which may be considered ambiguous;

(*b*) provide on a voluntary basis such information as either Party considers necessary to assure confidence in compliance with the obligations assumed;

(*c*) consider questions involving unintended interference with national technical means of verification;

(*d*) consider possible changes in the strategic situation which have a bearing on the provisions of this Treaty;

(*e*) agree upon procedures and dates for destruction or dismantling of ABM systems or their components in cases provided for by the provisions of this Treaty;

(*f*) consider, as appropriate, possible proposals for further increasing the viability of this Treaty, including proposals for amendments in accordance with the provisions of this Treaty;

(*g*) consider, as appropriate, proposals for further measures aimed at limiting strategic arms.

2. The Parties through consultation shall establish, and may amend as appropriate, Regulations for the Standing Consultative Commission governing procedures, composition and other relevant matters.

ARTICLE XIV

1. Each Party may propose amendments to this Treaty. Agreed amendments shall enter into force in accordance with the procedures governing the entry into force of this Treaty.

2. Five years after entry into force of this Treaty, and at five year intervals thereafter, the Parties shall together conduct a review of this Treaty.

ARTICLE XV

1. This Treaty shall be of unlimited duration.

2. Each Party shall, in exercising its national sovereignty, have the right to withdraw from this Treaty if it decides that extraordinary events related to the subject matter of this Treaty have jeopardized its supreme interests. It shall give notice of its decision to the other Party six months prior to withdrawal from the Treaty. Such notice shall include a statement of the extraordinary events the notifying Party regards as having jeopardized its supreme interests.

ARTICLE XVI

1. This Treaty shall be subject to ratification in accordance with the constitutional procedures of each Party. The Treaty shall enter into force on the day of the exchange of instruments of ratification.

2. This Treaty shall be registered pursuant to Article 102 of the Charter of the United Nations.

Done at Moscow on May 26, 1972, in two copies, each in the English and Russian languages, both texts being equally authentic.

Appendix 1B

Interim Agreement between the United States of America and the Union of Soviet Socialist Republics on certain measures with respect to the limitation of strategic offensive arms

The United States of America and the Union of Soviet Socialist Republics, hereinafter referred to as the Parties,

Convinced that the Treaty on the Limitation of Anti-Ballistic Missile Systems and this Interim Agreement on Certain Measures with Respect to the Limitation of Strategic Offensive Arms will contribute to the creation of more favorable conditions for active negotiations on limiting strategic arms as well as to the relaxation of international tension and the strengthening of trust between States,

Taking into account the relationship between strategic offensive and defensive arms,

Mindful of their obligations under Article VI of the Treaty on the Non-Proliferation of Nuclear Weapons,

Have agreed as follows:

ARTICLE I

The Parties undertake not to start construction of additional fixed land-based intercontinental ballistic missile (ICBM) launchers after July 1, 1972.

ARTICLE II

The Parties undertake not to convert land-based launchers for light ICBMs, or for ICBMs of older types deployed prior to 1964, into land-based launchers for heavy ICBMs of types deployed after that time.

ARTICLE III

The Parties undertake to limit submarine-launched ballistic missile (SLBM) launchers and modern ballistic missile submarines to the numbers operational and under construction on the date of signature of this Interim Agreement, and in addition to launchers and submarines constructed under procedures established by the Parties as replacements for an equal number of ICBM launchers of older types deployed prior to 1964 or for launchers on older submarines.

ARTICLE IV

Subject to the provisions of this Interim Agreement, modernization and replacement of strategic offensive ballistic missiles and launchers covered by this Interim Agreement may be undertaken.

ARTICLE V

1. For the purpose of providing assurance of compliance with the provisions of this Interim Agreement, each Party shall use national technical means of verification at its disposal in a manner consistent with generally recognized principles of international law.

2. Each Party undertakes not to interfere with the national technical means of verification of the other Party operating in accordance with paragraph 1 of this Article.

3. Each Party undertakes not to use deliberate concealment measures which impede verification by national technical means of compliance with the provisions of this Interim Agreement. This obligation shall not require changes in current construction, assembly, conversion, or overhaul practices.

ARTICLE VI

To promote the objectives and implementation of the provisions of this Interim Agreement, the Parties shall use the Standing Consultative Commission established under Article XIII of the Treaty on the Limitation of Anti-Ballistic Missile Systems in accordance with the provisions of that Article.

ARTICLE VII

The Parties undertake to continue active negotiations for limitations on strategic offensive arms. The obligations provided for in this Interim Agreement shall not prejudice the scope or terms of the limitations on strategic offensive arms which may be worked out in the course of further negotiations.

ARTICLE VIII

1. This Interim Agreement shall enter into force upon exchange of written notices of acceptance by each Party, which exchange shall take place simultaneously with the exchange of instruments of ratification of the Treaty on the Limitation of Anti-Ballistic Missile Systems.

2. This Interim Agreement shall remain in force for a period of five years unless replaced earlier by an agreement on more complete measures limiting strategic offensive arms. It is the objective of the Parties to conduct active follow-on negotiations with the aim of concluding such an agreement as soon as possible.

3. Each Party shall, in exercising its national sovereignty, have the right to

withdraw from this Interim Agreement if it decides that extraordinary events related to the subject matter of this Interim Agreement have jeopardized its supreme interests. It shall give notice of its decision to the other Party six months prior to withdrawal from this Interim Agreement. Such notice shall include a statement of the extraordinary events the notifying Party regards as having jeopardized its supreme interests.

Done at Moscow on May 26, 1972, in two copies, each in the English and Russian languages, both texts being equally authentic.

Appendix 1C

Protocol to the Interim Agreement between the United States of America and the Union of Soviet Socialist Republics on certain measures with respect to the limitation of strategic offensive arms

The United States of America and the Union of Soviet Socialist Republics, hereinafter referred to as the Parties,

Having agreed on certain limitations relating to submarine-launched ballistic missile launchers and modern ballistic missile submarines, and to replacement procedures, in the Interim Agreement,

Have agreed as follows:

The Parties understand that, under Article III of the Interim Agreement, for the period during which that Agreement remains in force:

The U.S. may have no more than 710 ballistic missile launchers on submarines (SLBMs) and no more than 44 modern ballistic missile submarines. The Soviet Union may have no more than 950 ballistic missile launchers on submarines and no more than 62 modern ballistic missile submarines.

Additional ballistic missile launchers on submarines up to the above-mentioned levels, in the U.S.—over 656 ballistic missile launchers on nuclear-powered submarines, and in the U.S.S.R.—over 740 ballistic missile launchers on nuclear-powered submarines, operational and under construction, may become operational as replacements for equal numbers of ballistic missile launchers of older types deployed prior to 1964 or of ballistic missile launchers on older submarines.

The deployment of modern SLBMs on any submarine, regardless of type, will be counted against the total level of SLBMs permitted for the U.S. and the U.S.S.R.

This Protocol shall be considered an integral part of the Interim Agreement.

Done at Moscow this 26th day of May, 1972.

Appendix 1D

Agreement on measures to reduce the risk of outbreak of nuclear war between the United States of America and the Union of Soviet Socialist Republics

The United States of America and the Union of Soviet Socialist Republics, hereinafter referred to as the Parties:

Taking into account the devastating consequences that nuclear war would have for all mankind, and recognizing the need to exert every effort to avert the risk of outbreak of such a war, including measures to guard against accidental or unauthorized use of nuclear weapons,

Believing that agreement on measures for reducing the risk of outbreak of nuclear war serves the interests of strengthening international peace and security, and is in no way contrary to the interests of any other country,

Bearing in mind that continued efforts are also needed in the future to seek ways of reducing the risk of outbreak of nuclear war,

Have agreed as follows:

ARTICLE I

Each Party undertakes to maintain and to improve, as it deems necessary, its existing organizational and technical arrangements to guard against the accidental or unauthorized use of nuclear weapons under its control.

ARTICLE II

The Parties undertake to notify each other immediately in the event of an accidental, unauthorized or any other unexplained incident involving a possible detonation of a nuclear weapon which could create a risk of outbreak of nuclear war. In the event of such an incident, the Party whose nuclear weapon is involved will immediately make every effort to take necessary measures to render harmless or destroy such weapon without its causing damage.

ARTICLE III

The Parties undertake to notify each other immediately in the event of detection by missile warning systems of unidentified objects, or in the event of signs of interference with these systems or with related communications facilities,

if such occurrences could create a risk of outbreak of nuclear war between the two countries.

ARTICLE IV

Each Party undertakes to notify the other Party in advance of any planned missile launches if such launches will extend beyond its national territory in the direction of the other Party.

ARTICLE V

Each Party, in other situations involving unexplained nuclear incidents, undertakes to act in such a manner as to reduce the possibility of its actions being misinterpreted by the other Party. In any such situation, each Party may inform the other Party or request information when, in its view, this is warranted by the interests of averting the risk of outbreak of nuclear war.

ARTICLE VI

For transmission of urgent information, notifications and requests for information in situations requiring prompt clarification, the Parties shall make primary use of the Direct Communications Link between the Governments of the United States of America and the Union of Soviet Socialist Republics.

For transmission of other information, notifications and requests for information, the Parties, at their own discretion, may use any communications facilities, including diplomatic channels, depending on the degree of urgency.

ARTICLE VII

The Parties undertake to hold consultations, as mutually agreed, to consider questions relating to implementation of the provisions of this Agreement, as well as to discuss possible amendments thereto aimed at further implementation of the purposes of this Agreement.

ARTICLE VIII

This Agreement shall be of unlimited duration.

ARTICLE IX

This Agreement shall enter into force upon signature.

Done at Washington on September 30, 1971, in two copies, each in the English and Russian languages, both texts being equally authentic.

Appendix 1E

Agreement between the United States of America and the Union of Soviet Socialist Republics on measures to improve the USA-USSR direct communications link with annex, supplementing and modifying the memorandum of understanding with annex, of June 20, 1963

The United States of America and the Union of Soviet Socialist Republics, hereinafter referred to as the Parties,

Noting the positive experience gained in the process of operating the existing Direct Communications Link between the United States of America and the Union of Soviet Socialist Republics, which was established for use in time of emergency pursuant to the Memorandum of Understanding Regarding the Establishment of a Direct Communications Link, signed on June 20, 1963,

Having examined, in a spirit of mutual understanding, matters relating to the improvement and modernization of the Direct Communications Link,

Have agreed as follows:

ARTICLE I

1. For the purpose of increasing the reliability of the Direct Communications Link, there shall be established and put into operation the following:

(*a*) two additional circuits between the United States of America and the Union of Soviet Socialist Republics each using a satellite communications system, with each Party selecting a satellite communications system of its own choice,

(*b*) a system of terminals (more than one) in the territory of each Party for the Direct Communications Link, with the locations and number of terminals in the United States of America to be determined by the United States side, and the locations and number of terminals in the Union of Soviet Socialist Republics to be determined by the Soviet side.

2. Matters relating to the implementation of the aforementioned improvements of the Direct Communications Link are set forth in the Annex which is attached hereto and forms an integral part hereof.

ARTICLE II

Each Party confirms its intention to take all possible measures to assure the continuous and reliable operation of the communications circuits and the system of terminals of the Direct Communications Link for which it is responsible in accordance with this Agreement and the Annex hereto, as well as to communicate to the head of its Government any messages received via the Direct Communications Link from the head of Government of the other Party.

ARTICLE III

The Memorandum of Understanding Between the United States of America and the Union of Soviet Socialist Republics Regarding the Establishment of a Direct Communications Link, signed on June 20, 1963, with the Annex thereto, shall remain in force, except to the extent that its provisions are modified by this Agreement and Annex hereto.

ARTICLE IV

The undertakings of the Parties hereunder shall be carried out in accordance with their respective Constitutional processes.

ARTICLE V

This Agreement, including the Annex hereto, shall enter into force upon signature.

Done at Washington on September 30, 1971, in two copies, each in the English and Russian languages, both texts being equally authentic.

Annex to the agreement between the United States of America and the Union of Soviet Socialist Republics on measures to improve the USA-USSR direct communications link

Improvements to the USA-USSR Direct Communications Link shall be implemented in accordance with the provisions set forth in this Annex.

I. CIRCUITS

(*a*) Each of the original circuits established pursuant to paragraph 1 of the Annex to the Memorandum of Understanding, dated June 20, 1963, shall continue to be maintained and operated as part of the Direct Communications Link until such time, after the satellite communications circuits provided for herein become operational, as the agencies designated pursuant to paragraph III (hereinafter referred to as the "designated agencies") mutually agree that

such original circuit is no longer necessary. The provisions of paragraph 7 of the Annex to the Memorandum of Understanding, dated June 20, 1963, shall continue to govern the allocation of the costs of maintaining and operating such original circuits.

(*b*) Two additional circuits shall be established using two satellite communications systems. Taking into account paragraph I (*e*) below, the United States side shall provide one circuit via the Intelsat system and the Soviet side shall provide one circuit via the Molniya II system. The two circuits shall be duplex telephone band-width circuits conforming to CCITT standards, equipped for secondary telegraphic multiplexing. Transmission and reception of messages over the Direct Communications Link shall be effected in accordance with applicable recommendations of international communications regulations, as well as with mutually agreed instructions.

(*c*) When the reliability of both additional circuits has been established to the mutual satisfaction of the designated agencies, they shall be used as the primary circuits of the Direct Communications Link for transmission and reception of teleprinter messages between the United States and the Soviet Union.

(*d*) Each satellite communications circuit shall utilize an earth station in the territory of the United States, a communications satellite transponder, and an earth station in the territory of the Soviet Union. Each Party shall be responsible for linking the earth stations in its territory to its own terminals of the Direct Communications Link.

(*e*) For the circuits specified in paragraph I (*b*):

—The Soviet side will provide and operate at least one earth station in its territory for the satellite communications circuit in the Intelsat system, and will also arrange for the use of suitable earth station facilities in its territory for the satellite communications circuit in the Molniya II system. The United States side, through a governmental agency or other United States legal entity, will make appropriate arrangements with Intelsat with regard to access for the Soviet Intelsat earth station to the Intelsat space segment, as well as for the use of the applicable portion of the Intelsat space segment.

—The United States side will provide and operate at least one earth station in its territory for the staellite communications circuit in the Molniya II system, and will also arrange for the use of suitable earth station facilities in its territory for the satellite communications circuit in the Intelsat system.

(*f*) Each earth station shall conform to the performance specifications and operating procedures of the corresponding satellite communications system and the ratio of antenna gain to the equivalent noise temperature should be no less than 31 decibels. Any deviation from these specifications and procedures which may be required in any unusual situation shall be worked out and mutu-

ally agreed upon by the designated agencies of both Parties after consultation.

(*g*) The operational commissioning dates for the satellite communications circuits based on the Intelsat and Molniya II systems shall be as agreed upon by the designated agencies of the Parties through consultations.

(*h*) The United States side shall bear the costs of: (1) providing and operating the Molniya II earth station in its territory; (2) the use of the Intelsat earth station in its territory; and (3) the transmission of messages via the Intelsat system. The Soviet side shall bear the costs of: (1) providing and operating the Intelsat earth station in its territory; (2) the use of the Molniya II earth station in its territory; and (3) the transmission of messages via the Molniya II system. Payment of the costs of the satellite communications circuits shall be effected without any transfer of payments between the Parties.

(*i*) Each Party shall be responsible for providing to the other Party notification of any proposed modification or replacement of the communications satellite system containing the circuit provided by it that might require accommodation by earth stations using that system or otherwise affect the maintenance or operation of the Direct Communications Link. Such notification should be given sufficiently in advance to enable the designated agencies to consult and to make, before the modification or replacement is effected, such preparation as may be agreed upon for accommodation by the affected earth stations.

II. TERMINALS

(*a*) Each Party shall establish a system of terminals in its territory for the exchange of messages with the other Party, and shall determine the locations and number of terminals in such a system. Terminals of the Direct Communications Link shall be designated "USA" and "USSR".

(*b*) Each Party shall take necessary measures to provide for rapidly switching circuits among terminal points in such a manner that only one terminal location is connected to the circuits at any one time.

(*c*) Each Party shall use teleprinter equipment from its own sources to equip the additional terminals for the transmission and reception of messages from the United States to the Soviet Union in the English language and from the Soviet Union to the United States in the Russian language.

(*d*) The terminals of the Direct Communications Link shall be provided with encoding equipment. One-time tape encoding equipment shall be used for transmissions via the Direct Communications Link. A mutually agreed quantity of encoding equipment of a modern and reliable type selected by the United States side, with spares, test equipment, technical literature and operating supplies, shall be furnished by the United States side to the Soviet side against payment of the cost thereof by the Soviet side; additional spares for the encoding equipment supplies will be furnished as necessary.

(*e*) Keying tapes shall be supplied in accordance with the provisions set forth in paragraph 4 of the Annex to the Memorandum of Understanding, dated June 20, 1963. Each Party shall be responsible for reproducing and distributing additional keying tapes for its system of terminals and for implementing procedures which ensure that the required synchronization of encoding equipment can be effected from any one terminal at any time.

III. OTHER MATTERS

Each Party shall designate the agencies responsible for arrangements regarding the establishment of the additional circuits and the systems of terminals provided for in this Agreement and Annex, for their operation and for their continuity and reliability. These agencies shall, on the basis of direct contacts:

(*a*) arrange for the exchange of required performance specifications and operating procedures for the earth stations of the communications systems using Intelsat and Molniya II satellites;

(*b*) arrange for testing, acceptance and commissioning of the satellite circuits and for operation of these circuits after commissioning; and,

(*c*) decide matters and develop instructions relating to the operation of the secondary teleprinter multiplex system used on the satellite circuits.

Appendix 1F

Agreement between the government of the United States of America and the government of the Union of Soviet Socialist Republics on the prevention of incidents on and over the high seas

The Government of the United States of America and the Government of the Union of Soviet Socialist Republics,

Desiring to assure the safety of navigation of the ships of their respective armed forces on the high seas and flight of their military aircraft over the high seas, and

Guided by the principles and rules of international law,

Have decided to conclude this Agreement and have agreed as follows:

ARTICLE I

For the purposes of this Agreement, the following definitions shall apply:

1. "Ship" means:

(*a*) A warship belonging to the naval forces of the Parties bearing the external marks distinguishing warships of its nationality, under the command of an officer duly commissioned by the government and whose name appears in the Navy list, and manned by a crew who are under regular naval discipline;

(*b*) Naval auxiliaries of the Parties, which include all naval ships authorized to fly the naval auxiliary flag where such a flag has been established by either Party.

2. "Aircraft" means all military manned heavier-than-air and lighter-than-air craft, excluding space craft.

3. "Formation" means an ordered arrangement of two or more ships proceeding together and normally maneuvered together.

ARTICLE II

The Parties shall take measures to instruct the commanding officers of their respective ships to observe strictly the letter and spirit of the International Regulations for Preventing Collisions at Sea, hereinafter referred to as the Rules of the Road. The Parties recognize that their freedom to conduct

operations on the high seas is based on the principles established under recognized international law and codified in the 1958 Geneva Convention on the High Seas.

ARTICLE III

1. In all cases ships operating in proximity to each other, except when required to maintain course and speed under the Rules of the Road, shall remain well clear to avoid risk of collision.

2. Ships meeting or operating in the vicinity of a formation of the other Party shall, while conforming to the Rules of the Road, avoid maneuvering in a manner which would hinder the evolutions of the formation.

3. Formations shall not conduct maneuvers through areas of heavy traffic where internationally recognized traffic separation schemes are in effect.

4. Ships engaged in surveillance of other ships shall stay at a distance which avoids the risk of collision and also shall avoid executing maneuvers embarrassing or endangering the ships under surveillance. Except when required to maintain course and speed under the Rules of the Road, a surveillant shall take positive early action so as, in the exercise of good seamanship, not to embarrass or endanger ships under surveillance.

5. When ships of both Parties maneuver in sight of one another, such signals (flag, sound, and light) as are prescribed by the Rules of the Road, the International Code of Signals, or other mutually agreed signals, shall be adhered to for signalling operations and intentions.

6. Ships of the Parties shall not simulate attacks by aiming guns, missile launchers, torpedo tubes, and other weapons in the direction of a passing ship of the other Party, not launch any object in the direction of passing ships of the other Party, and not use searchlights or other powerful illumination devices to illuminate the navigation bridges of passing ships of the other Party.

7. When conducting exercises with submerged submarines, exercising ships shall show the appropriate signals presecribed by the International Code of Signals to warn ships of the presence of submarines in the area.

8. Ships of one Party when approaching ships of the other Party conducting operations as set forth in Rule 4 (c) of the Rules of the Road, and particularly ships engaged in launching or landing aircraft as well as ships engaged in replenishment underway, shall take appropriate measures not to hinder maneuvers of such ships and shall remain well clear.

ARTICLE IV

Commanders of aircraft of the Parties shall use the greatest caution and prudence in approaching aircraft and ships of the other Party operating on and over the high seas, in particular, ships engaged in launching or landing aircraft,

and in the interest of mutual safety shall not permit: simulated attacks by the simulated use of weapons against aircraft and ships, or performance of various aerobatics over ships, or dropping various objects near them in such a manner as to be hazardous to ships or to constitute a hazard to navigation.

ARTICLE V

1. Ships of the Parties operating in sight of one another shall raise proper signals concerning their intent to begin launching or landing aircraft.

2. Aircraft of the Parties flying over the high seas in darkness or under instrument conditions shall, whenever feasible, display navigation lights.

ARTICLE VI

Both Parties shall:

1. Provide through the established system of radio broadcasts of information and warning to mariners, not less than 3 to 5 days in advance as a rule, notification of actions on the high seas which represent a danger to navigation or to aircraft in flight.

2. Make increased use of the informative signals contained in the International Code of Signals to signify the intentions of their respective ships when maneuvering in proximity to one another. At night, or in conditions of reduced visibility, or under conditions of lighting and such distances when signal flags are not distinct, flashing light should be used to inform ships of maneuvers which may hinder the movements of others or involve a risk of collision.

3. Utilize on a trial basis signals additional to those in the International Code of Signals, submitting such signals to the Intergovernmental Maritime Consultative Organization for its consideration and for the information of other States.

ARTICLE VII

The Parties shall exchange appropriate information concerning instances of collision, incidents which result in damage, or other incidents at sea between ships and aircraft of the Parties. The United States Navy shall provide such information through the Soviet Naval Attaché in Washington and the Soviet Navy shall provide such information through the United States Naval Attaché in Moscow.

ARTICLE VIII

This Agreement shall enter into force on the date of its signature and shall remain in force for a period of three years. It will thereafter be renewed without further action by the Parties for successive periods of three years each.

This Agreement may be terminated by either Party upon six months written notice to the other Party.

ARTICLE IX

The Parties shall meet within one year after the date of the signing of this Agreement to review the implementation of its terms. Similar consultations shall be held thereafter annually, or more frequently as the Parties may decide.

ARTICLE X

The Parties shall designate members to form a Committee which will consider specific measures in conformity with this Agreement. The Committee will, as a particular part of its work, consider the practical workability of concrete fixed distances to be observed in encounters between ships, aircraft, and ships and aircraft. The Committee will meet within six months of the date of signature of this Agreement and submit its recommendations for decision by the Parties during the consultations prescribed in Article IX.

Done in duplicate on the 25th day of May, 1972 in Moscow in the English and the Russian languages each being equally authentic.

2. The prospects for SALT II

With the conclusion of the first strategic arms limitation agreements, the climate for further development, acquisition and control of strategic arms has changed. Yet there is likely to be substantial continuity in both policies and programmes. Both the continuity and the changes are most easily discussed by beginning with a brief commentary on the forces that have motivated the strategic arms race and the approaches to its limitation during the past few years.

I. *The foundations of strategic arms policies*

US policies

One can identify five lines of thought that have dominated US strategic arms policy during the past few years:

1. Acceptance of the view that it would be an exercise in futility to procure forces, for example, a heavy, nationwide ABM system, to limit the damage that the United States would suffer in the event of a thermonuclear exchange with the Soviet Union. Any defence would probably be offset, at less cost, by improvements in Soviet offensive capabilities.
2. Belief that some "damage-limiting" capabilities are nevertheless desirable as a means of coping with attacks that might be launched by lesser powers or by accident.
3. Concern that the Soviet Union might develop strategic forces that would make a nuclear disarming attack, a "first strike", a realistic Soviet option.
4. Concern that the Soviet Union might obtain a superiority in strategic forces which, even aside from the possibility of a "first strike", would be politically or militarily useful.
5. Desire to be in a favourable bargaining position as regards Soviet-US Strategic Arms Limitation Talks.

Arguments have been adduced with respect to each of these points, particularly in connection with the debate about whether the United States should deploy a limited ABM system and in discussion of the US approach to limiting strategic arms by agreement. Notwithstanding extensive discussion, however, assignment of relative weights to the several desires, concerns and beliefs as

determinants of policy is fraught with uncertainty. Yet, if one is to look to the future, some attempt seems necessary.

The first belief is clearly the least controversial, and can be taken at face value.

The argument for a defence to cope with an accidental or Chinese attack appears to have been used in large measure to justify weapon acquisition decisions made primarily for other reasons. This was true during the Johnson Administration when a decision to proceed with some kind of ABM deployment seemed politically expedient, and when the defence against China and accidents was used as a plausible rationale. It is likely that the present Administration's request for funds for an ABM defence of the Washington area has something of the same character. Although the case for the defence is being made on the desirability of having a capability to cope with a limited attack, the desire to deploy the Washington defence is doubtless based substantially on the belief that it would have been politically undesirable to negotiate a strategic arms agreement that was asymmetric in permitted ABM deployments; and symmetry having been negotiated, the Administration's position would appear inconsistent if it did not advocate going ahead with the defence. The fact is that concern about accidents and attacks by lesser powers, although real, has been so overshadowed by other concerns that it cannot be counted a serious factor in US policy. Thus, the US Joint Chiefs of Staff appeared to support the Johnson Administration's Sentinel decision primarily because it could be regarded as a first step towards a nationwide, heavy ABM deployment rather than because of Secretary of Defense McNamara's stated arguments for it. Spokesmen for the present Administration have stated that they regard the achievement of an ABM Treaty with the Soviet Union of sufficient value to justify foregoing a nationwide defence to cope with light attacks. And the US Congress, in its unwillingness to support the Administration's request for a light defence of Washington, appears to have decided that such a defence is simply not worth its costs.

Concern about Soviet acquisition of a first-strike capability seems to be much greater than that about accidents or attacks by lesser powers, and it has played a much more prominent part in the Safeguard ABM debate, in the rationalization of decisions to develop and acquire new offensive weapon systems and in the US approach to SALT. Yet, in this case too, the argument seems to have been used to justify decisions that have their bases elsewhere. One of the reasons is undoubtedly the fact that a first-strike scenario is easily described and modelled using well-developed analytical techniques. Related is the fact that a "worst-case" analysis of a first strike—one that gives the adversary the benefits of all doubts as to weapons performance and tactics and one's self none—is in a sense the ultimate in conservatism; the force requirements to survive such an attack and to retaliate (or for that matter to respond in any other way) will generally be more demanding than for other conceivable scenarios. Thus, while

few would argue that a first strike is the most likely contingency against which a nation must be prepared, it has nevertheless played a prominent role in the analysis of strategic questions. The analysts can do something with the scenario, and the proponents of new and expanded weapons programmes—often the same people—find it their most persuasive rationale.

If concern about accidents, attacks by lesser powers and a first strike has been less important as an actual determinant of US policy than the rhetoric would suggest, it is in large measure because concern about strategic superiority has probably been more so. The reasons are understandable. It is extremely difficult to describe how strategic force in excess of that sufficient to destroy an adversary's society could be exploited politically or militarily; and yet, after centuries of experience with conventional arms, where marginal differences in the capabilities of opposing powers could be so exploited, both political and military leaders find it difficult to accept the idea of strategic sufficiency.

The difficulty is reinforced by recognition of the fact that the actions of all of the players in the international political arena must be influenced by the beliefs of each about the utility of strategic strength. If the political leaders in either the Soviet Union or the United States, or for that matter in other states, believe, for whatever reasons, that differences in the relative strategic force levels or technologies of the Soviet Union and the United States are significant, and are prepared to condition their actions on that belief, then relative differences *ipso facto* assume importance. One has what engineers refer to as a "positive-feedback" process. One observes the attitudes of others, bases one's own on them, thereby reinforcing the attitudes in others who react similarly, and so on. It is a process that can be broken only if one, or more, of the major actors is prepared to discount heavily the attitudes and actions of the others. It is hardly surprising, then, that proponents of strategic sufficiency have found it difficult to sell as a basis for policy.

Yet, during the late 1960s it appeared that the United States was moving towards just such acceptance with the argument that what was necessary, and sufficient, for US strategic forces was an "assured-destruction" capability—an ability to inflict, with high assurance, unacceptable damage on the Soviet Union in a retaliatory attack.

Early pronouncements by the Nixon Administration also suggested acceptance of the concept of strategic sufficiency. Thus, there appeared in the President's first "state of the world" message, the statement that "Formerly, any additional strength was strategically significant; today, available power threatens to outstrip rational objectives." And much more recently there have been similar statements by Administration spokesmen; for example, Dr Kissinger, in his briefing of the relevant congressional committee members on the strategic arms limitation agreements, stated: "now both we and the Soviet Union have begun

to find that each increment of power does not necessarily represent an increment of usable political strength".

On the other hand, there is a great deal to suggest either that the Administration's views have changed since 1969 or 1970, or that they were misunderstood at that time. Thus, in his second "state of the world" message, President Nixon, perhaps to clarify any misunderstanding, seemed to go out of his way explicitly to reject McNamara's "assured-destruction" criterion as a basis for US strategic weapons policy. At the same time, he also rejected the conventional, or what he called the "military" definition of sufficiency in favour of "political sufficiency" which he characterized as requiring strategic forces which would not only be adequate to inflict a devastating retaliatory blow on the Soviet Union, but which, in addition, would prevent coercion of the United States and its allies, and which would permit a flexible response to a Soviet attack. There are also a number of statements indicating that in the case of strategic nuclear forces, as with conventional ones, somehow "more" makes a difference. Thus, when Senator Pell, in the hearings on the strategic arms limitation agreements, raised a question as to whether the Administration was reversing a previous position on the importance of strategic superiority and the meaning of strategic sufficiency, the Secretary of State replied: "when we use the word sufficiency we mean a strong national defense capability second to none". And when pressed further as to whether the possibility of retaliation "with devastating results on a second round would not be considered sufficiency in itself", he replied, "No".

Finally, there is, in the position taken by Defense Department spokesmen as regards research and development, a still further rejection of sufficiency in favour of superiority, in this case, with respect to the technologies relevant to strategic arms.

Much rhetoric to the contrary notwithstanding, then, it seems clear that the US Administration has unequivocally rejected strategic sufficiency, at least as conventionally defined, as a basis for its policies, believing that Soviet superiority in strategic strength is unacceptable, and that at least as regards the state of technology, US superiority is imperative.

The fifth consideration in US policy, the desire to be in a strong negotiating position as regards arms limitation, is obviously strongly linked to the rejection of sufficiency, for if the latter concept were accepted, bargaining on issues of relative strength would hardly be meaningful. Indeed, the whole approach to SALT I would have been entirely different if strategic sufficiency, conventionally defined, had been accepted by both parties, or even by one, as a basis for policy. The nuclear arms race would have been treated more like the problem of cancer than as a contest in which relative advantage is of importance.

But, of course, the approach to SALT has been very much in the latter vein, and Administration spokesmen have made much of the necessity for a strong

position from which the United States could bargain with respect to both SALT I and SALT II.

Yet, it seems likely that the "bargaining-chip" argument, like the arguments relating to accidents, the China threat and the first strike, has been exaggerated in the interest of securing support for programmes, the major incentives for which really lie elsewhere: in concern about Soviet counterpart weapon systems; in the desire of the military establishment to acquire new weaponry; in pressures from industry; and perhaps above all, in the rather generalized belief that increasing strategic strength is advantageous, regardless of arms-control negotiations. Thus, the "bargaining-chip" argument was used by the Administration, particularly in 1971, to ensure congressional support for an ABM programme after the China, accident and first-strike arguments all proved inadequate. And it has been used again this year, with respect to SALT II, not primarily to build a constituency for the B-1 bomber and the Trident submarine because of negotiating needs, but rather to gain support for the programmes which, like Safeguard, were wanted anyway, but were in jeopardy as regards congressional support.

Soviet policies

Any attempt to analyse Soviet motivations with respect to strategic arms policy must be even more speculative than in the case of the United States. Nevertheless, some very general observations are possible.

Clearly, in Soviet thinking, there has been even less acceptance than in the West of the view that nuclear strength is different, not only in degree but in kind, from that based on conventional arms. Not surprisingly then, the superiority in US strategic strength during the 1950s and 1960s was irksome, and provided a strong motivation to the USSR to catch up. Continuation, at great cost, of the Soviet missile programme long past the point of sufficiency, and indeed, by some measures past the point of parity with the United States, makes it clear that strategic superiority is still viewed as advantageous.

Until the late 1960s, Soviet policy with respect to defence against nuclear attack also appeared to be based on traditional thinking. Thus, air defences had a heavy claim on the Soviet defence budget, and serious efforts were made to develop ballistic-missile defences. However, by about 1967 the Soviet attitude had begun to change. The position taken by the USSR in the Strategic Arms Limitation Talks clearly signaled acceptance of the view that had been prevalent in the United States since the 1950s, that in the context of the Soviet-US arms race, any attempt to build defensive forces would be likely to trigger a build-up in adversary offensive forces that would leave the balance unchanged or worse.

The third prominent factor in Soviet strategic policy has been concern about

encirclement and, specifically as regards strategic arms, about the possibility that the United States and its allies could use bases around the periphery of the USSR, and also aircraft carriers, to attack the Soviet Union with dual-purpose aircraft—those which are normally thought of in the West as components of "tactical" or "general purpose" forces, but which have a capability of reaching the Soviet Union.

Undoubtedly Soviet strategic arms policy has been affected by still other considerations, as has that of the United States: by a concern about a first strike; by a desire to be able to intercept missiles or aircraft launched by accident or by lesser nuclear powers; by a desire to be in a strong bargaining position as regards arms-control talks; and, of course, by the pressures from a military-industrial complex. But there is hardly any basis for commenting on the strength of these factors.

Certainly SALT I was possible, or rather, took the form it did, because of some convergence of Soviet-US positions with respect to some of these major factors related to strategic arms policy.

Thus, the fact that both powers regard relative advantage in force levels and technology as important has probably meant that an agreement on force levels could not have been reached at an earlier time when the US advantage was pronounced. It has meant that the force-level agreements had to be at levels that were approximately equal, or where advantages to one side could arguably offset advantages to the other, and it is at least a plausible explanation of the failure in SALT I to produce agreement to control multiple warhead technology, an area where the United States had a commanding lead.

The ABM Treaty is a reflection of the acceptance by each side of the futility of defence against the other in the foreseeable future and of the fact that, accordingly, the cities and population of each are hostage to the other. It clearly would not have been possible had Soviet views on defensive measures not changed, as mentioned above, in the late 1960s.

Finally, of course, SALT I is a reflection of the coincidence of views in the United States and the USSR that this is an expedient time not only for arms control but for some rapprochement, views that have their bases in a multiplicity of factors: some reduction in each country of concern about the aggressiveness of the other; a mutual sense of futility about the arms race; a mutual desire to allocate resources to non-military purposes; a turning inward and general rejection of things military in the United States in reaction to Viet-Nam; and Soviet concern about China.

II. *The impact of SALT I*

The most simplistic approach to the analysis of the initial strategic arms limitation agreements involves looking only at the *direct* inhibitory effects on the strategic weapons programmes of the Soviet Union and the United States. If one considers the agreements in this light, and treats plans and projections as if they were immutable or nearly certain of realization, rather grand claims can be made. Thus, it has been suggested by US spokesmen that, were it not for the agreements, the United States would go ahead with its full 12-site ABM programme, that Soviet ABM defences would also be greatly expanded, and that Soviet strategic offensive forces might reach 2 000 ICBMs and 1 200 SLBMs by 1977, levels about one-third higher than those permitted by the agreements. Viewed in this light, and disregarding all of their other effects, the initial arms limitation agreements are impressive indeed.

However, from an alternative perspective, SALT I can be seen as, at best, an opportunity for restraint in the acquisition of arms, or, at worst, as a cruel disappointment. Many of SALT's critics would discount heavily the likelihood that the US 12-site ABM programme would be funded by Congress in the absence of the agreements, and also that Soviet ABM and offensive-missile levels would increase as projected by Administration spokesmen. Some would go further and argue that, without SALT, Soviet ABM defences might have been limited to the single site around Moscow instead of the permitted two, and that US ABM defences might have been limited to a single site or none.

More important in the view of the critics, at least those who believe that much of the motivation for the strategic arms race lies in the reaction of each side to moves by the other, is the question of the secondary inhibiting effects of the agreements. The concern is with the reactions of the Soviet Union and the United States as regards weapons development and acquisition *not* specifically proscribed.

In this regard, in one sense, a verdict on the SALT I agreements is premature, and may never be possible. There is presently no way of knowing whether programmes proscribed by the initial agreements would go forward in their absence, nor if there would be an adversary reaction were they to do so, a reaction which it could be claimed the agreements indirectly prevented. To give a specific example, there is no possibility that one could ever establish that the United States would have gone ahead with a heavy, nationwide ABM defence had the treaty not been negotiated, *and* that the Soviet Union would, *in response*, have gone ahead with new strategic offensive programmes not proscribed by the agreement, for example, new bombers, cruise missiles or multiple independently targetable re-entry vehicles (MIRVs). To claim that the treaty prevents the last programmes depends on two assumptions, neither of them provable.

In another sense, however, a verdict can be reached with respect to SALT I more quickly and with little speculation. It is decidedly negative.

A year or so ago it would have seemed reasonable to hope that with the conclusion of the SALT I agreements there would be a diminution of concern about the likelihood that either side would build forces proscribed by them, and that with that diminution, much of the pressure to compensate *in advance* for such possible adversary moves would disappear. Thus, with large-scale ABM systems proscribed, the major rationale for MIRV programmes—that they are needed to facilitate penetration of defences yet to be deployed—would be diminished. The limits placed on the growth of offensive-missile forces, coupled with the proscription on heavy, nationwide ABM systems, would make the scenario of a future first strike much less worrisome, thereby eliminating much of the argument for further expansion, diversification and qualitative improvement of retaliatory forces. Thus, one might have hoped that in recognition of the political commitment to the agreements and the consequent unlikelihood that they would be lightly violated or abrogated, there would have been, beginning with the moment of their negotiation, a dampening effect on a variety of unproscribed programmes. In this vein, witness after witness before US congressional committees argued that the effect of the agreements was to enhance the utility of each US offensive missile, and that, accordingly, the US programmes for MIRVs, for a new bomber and for a new submarine should be curtailed or stopped. It is a view which the US Administration emphatically rejected, demanding instead that all existing offensive-weapons programmes go ahead with undiminished vigour.

One interpretation to be placed on this attitude is that the Administration discounts completely the possibility that the political commitment involved makes the proscribed programmes less likely than in the absence of agreement, and that, accordingly, there can be no reduction in concern about a first strike. In this view, those programmes that were rationalized as a hedge against such an attack before the agreements were negotiated must go forward without abatement. Another, not mutually exclusive, interpretation is that the concern about the stability of the strategic balance, that is, concern about a Soviet first strike, is really a relatively unimportant factor in US policy, and that the desire for superior strategic strength and/or other motivations, some of which are discussed below, have been controlling.

There is no *direct* evidence yet available as to whether Soviet programmes will in any way change in the light of the agreements. However, President Nixon's statement to the effect that General Secretary Brezhnev had informed him that the Soviet Union would go ahead with programmes not proscribed by the agreements would seem to suggest that the Soviet reaction to the agreements is similar to that of the United States.

That the critics of SALT are so vociferous in their condemnation of the continuation of major offensive development and acquisition programmes is hardly surprising, the hopes for SALT having been raised as they were. But in a way, much of the criticism reflects naïveté: a belief that the US government, and possibly that of the Soviet Union as well, had gone as far toward acceptance of the concept of "sufficiency" as some earlier pronouncements had suggested; that the political commitments inherent in the agreements are of great moment; and that the US expressions of concern about stability were to be taken at face value.

Complicating an assessment of the impact of SALT I on strategic arms policies and the prospects for SALT II has been the bargaining process. The argument that weapons programmes should be supported, so that a nation will be in a strong bargaining position in arms-control negotiations regarding those and related weapons, has been severely criticized on the grounds that the accumulation of "bargaining chips" may be less likely to facilitate agreement than to delay and frustrate it while one's adversary attempts to procure similar "chips". The use of the tactic has also produced resentment by those who see the objective of arms control being used to "sell" strategic weapons programmes that might otherwise not be viable. However, notwithstanding these arguments, the "bargaining-chip" tactic seems destined to be a feature of arms-control negotiations as long as they are carried out within a framework where relative advantage is believed to be of great importance, and as long as there appears to be enough hope of eventual agreement so that some of those opposed to the programmes for which support is sought can be swayed by that hope (or by the fear of a charge that they may be instrumental in frustrating agreement). The success achieved by Administration spokesmen in securing support for the Safeguard ABM programme on the grounds that it was needed if the United States was to bargain effectively in SALT I has doubtless been a factor in the use of similar arguments with respect to SALT II, this time in the demands for support for offensive-weapons programmes.

The fact that these new programmes are being supported as strongly as they are by the President and his immediate advisers may be largely because of a belief at that level that they are desirable as "bargaining chips", as hedges against the development by the Soviet Union of first-strike capabilities, SALT I notwithstanding, or, as strongly implied earlier, out of a rather deep-seated belief that the strategic arms race with the Soviet Union should be regarded as a highly competitive endeavour in which superior relative strength is a desirable attribute. However, there is at least the possibility that White House support for these programmes, and possibly support within the Kremlin for their Soviet counterparts, is to a substantial degree a consequence of intragovernmental bargaining.

The major concessions in the case of the United States, if that they be, are those embodied in the "assurances" which the Joint Chiefs of Staff have specified as conditions for their support of the agreements.

The first "assurance", relating to the maintenance of an intelligence-collection capability adequate to verify compliance with the agreements, seems quite reasonable and innocuous. More troublesome from an arms-control perspective are the other two.

The second "assurance", that the United States maximize strategic capabilities within the constraints established by the agreements, would seem to require not only continuation of the major strategic programmes heretofore mentioned—the MIRV programmes, the B-1 bomber and the Trident missile-launching submarine programme—but, if taken literally, considerable additional effort in the strategic arms area since the agreements and US resources would permit much more. Clearly, acceptance of this "assurance" would vitiate all hope that the agreements would result in any restraint by the United States as regards strategic offensive programmes.

The third "assurance", relating to research and development programmes, is at least as troublesome, particularly as regards its adverse effects on the prospects for future strategic arms-control agreements. With limits on strategic force levels having been negotiated in SALT I, and the precedent set for more permanent and encompassing limits in the future, the major additional objectives for SALT II are arms reduction and constraint on weapons development. Failure to achieve the latter could well mean that the arms race will continue with little, if any, abatement, albeit with perhaps greater emphasis on qualitative improvement and the development of new systems and less on expanding force levels. The first part of the third "assurance", which requires the maintenance of US technological superiority, would, if accepted, practically ensure an unending race since there is not the slightest evidence that the Soviet Union would do other than try to catch up as it has in the past. And the second part of the "assurance", which requires continuation of testing to ensure the effectiveness of new and existing nuclear weapons systems, would make questionable the most promising approach to constraining weapons development. This is because, with rare exceptions, there can be little confidence in being able to verify adversary compliance with any agreements to constrain development other than by imposing limits on testing.

In summary, it would appear that the secondary effects of SALT I, far from being inhibitory, are almost certain to prove to have been escalatory. Commitments to proponents of expanded weapons programmes to secure their support for the agreements, and the use of "bargaining-chip" arguments to secure support for programmes which might not otherwise be approved, would appear to lead to larger weapons programmes than might result in the absence of arms-

control negotiations. Moreover, to the extent this happens, the positions of the "weaponeers" in both nations will be strengthened—hardly a favourable development in terms of improving international relations in general or the prospects for arms control in particular.

SALT I, then, has clearly been a disappointment in that any agreement-related alleviation of concern about future adversary programmes seems not to have had the dampening effect on strategic offensive programmes expected by many. And the approach to SALT I and the reactions to it by the governments have made it clear that, rhetoric to the contrary notwithstanding, arms control and disarmament are not to be facilitated in the foreseeable future by the acceptance of the concept of strategic sufficiency as a basis for policy. This last point was made with particular forcefulness in the United States by Senator Jackson's successful effort to have included in the congressional resolution approving of the interim offensive agreements language urging that the intercontinental strategic force levels permitted the United States by a future treaty not be inferior to those of the USSR.

Finally, whatever one's attitude to SALT I, it will be difficult not to be concerned about the likelihood of success in SALT II, considering the problems that will constitute its agenda. They will include all of those that eluded solution in SALT I and perhaps others of comparable difficulty. By comparison, the negotiation of the one definitive agreement that emerged from SALT I, the ABM Treaty, seems like an exercise in "cream skimming": neither side had a significant investment in a deployed system; the one system that had been deployed, that around Moscow, was widely believed to be of negligible military significance; there was no technical basis for hope on either side that a system could be deployed that could not be easily overwhelmed; and compliance with agreed constraints could be verified with high confidence by unilateral means.

But all is not black. The aforementioned enhancement of the role of the "weaponeers" apart, the effects of SALT I on both intragovernmental and intergovernmental processes are almost certainly positive.

On the US side, issues of importance as regards strategic arms policy, but which in the absence of SALT would have commanded limited attention, became matters for consideration at the White House; a much larger than usual fraction of the Congress was exposed to arguments from both sides on a host of strategic-arms and foreign-policy questions; and the military establishment was forced to give serious consideration to arms-control questions.

The impact on the Soviet side was probably at least as great. Undoubtedly, the prospect of SALT was a major factor in forcing a serious consideration of strategic arms policy, and beyond that, of the broader question of the relationship between the Soviet Union and the West, at the 24th Party Congress. And the negotiating process almost necessarily required a degree of lateral com-

munication within the highly compartmentalized Soviet government and Party administration that can only have resulted in a deeper understanding at middle levels of the issues involved.

At the intergovernmental level, it is likely that the negotiations have given each nation a better appreciation of the concerns and motivations of the other. And also, the climate for cooperation in other respects has, at least in the short term, been improved by the conclusion of the agreements.

III. *The problems for SALT II*

The highest priority objective of SALT II, at least from the US perspective, will be the conclusion of a treaty of unlimited duration to replace the Interim Agreement relating to strategic offensive forces. A major, and related, Soviet objective—which however the United States has stated unequivocally is not a subject for SALT II—will be dealing with the forward-based systems (FBS) problem. In addition, the SALT II (or III or IV) agenda could include force reductions, limitations affecting the development of new or improved strategic offensive capabilities, and agreements limiting defensive systems in addition to those to cope with ballistic missiles, specifically anti-submarine warfare (ASW) and air-defence capabilities. In December 1972, Soviet Communist Party General Secretary Brezhnev officially indicated the advisability of gradually reducing strategic armaments and of establishing some kinds of limit to their qualitative development.

As the support for the Jackson amendment demonstrated, the terms of the interim offensive forces agreement are unsatisfactory as a basis for a lasting treaty in the view of an important segment of US opinion. This is because they permit the Soviet Union missile capabilities that would be markedly superior to those permitted the United States by all of the commonly used measures—numbers of missiles, megatonnage, total throw weight and number of warheads. The asymmetries are acceptable in the Interim Agreement, or at least defenders of the agreement have so argued, because it is judged that the Soviet Union could not realize the advantages permitted it within the five-year time span of the agreement and because, in respects not covered by the agreement, the United States has offsetting advantages which are also likely to persist through 1977. These include substantial advantage in intercontinental bombers, both in numbers and performance characteristics, missile-launching submarines which are also believed to be superior in performance to their Soviet counterparts, and which, in addition, can be operated with greater efficiency because of basing near their patrol areas, and bombers, other than those with intercontinental ranges, which can reach the Soviet Union from carriers and bases around the periphery of the USSR.

The Interim Agreement is presumably unsatisfactory to the USSR as a basis for a lasting treaty just because it fails to reduce the last-mentioned US advantages.

Discussion of a broadening of the agreement to impose ceilings on additional delivery systems is facilitated by considering three more or less "pure" approaches (although an actual agreement could well involve a mix): "levelling up"; "levelling down"; and "asymmetric aggregation".

By permitting the Soviet Union and the United States each to build not only the kind of ABM system on which it had begun work but, in addition, the kind on which its adversary was working, the ABM Treaty permits symmetry in ABM capabilities. However, in so doing, it sets a remarkably unfortunate precedent for future strategic arms limitation efforts. The "levelling-up" analogue for a comprehensive offensive force level agreement would involve permitting the United States to increase its ICBM and SLBM force levels to those of the Soviet Union, and to replace some of its ICBMs with larger ones so that the size distribution of the forces would be similar. The Soviet Union would be permitted to build bombers to the US level. Truly symmetric "levelling up" would also presumably involve acquisition by the Soviet Union of attack-aircraft carriers and other forward-based systems and bases from which they could operate. Even aside from the difficulties in reaching any agreement with respect to the last issues, there are powerful arguments against the "levelling-up" approach. With ICBMs increasingly regarded as obsolescent and of secondary importance to SLBMs, particularly in the United States, the idea of building more, including some very large ones, would have very limited appeal. Similarly, it would seem unlikely that a three- or four-fold expansion of the Soviet bomber force could command great support, considering the history of Soviet strategic offensive weapons programmes during the past two decades, the relatively great expense of building and maintaining bombers as compared with ICBMs, and the likelihood that US air defences will not be constrained by agreement while ABM defences are. Unfortunately, if an agreement were reached permitting such "levelling up", there would almost certainly be more pressure to move in these unattractive directions than there would be in the absence of an agreement. All things considered, the "levelling-up" approach seems so senseless as scarcely to merit comment. The one area where "levelling up" would probably have substantial appeal for one of the participants in SALT II would be with respect to SLBM forces. Certainly there would be interest on the part of the US Navy in retaining the entire Polaris-Poseidon fleet as the Trident submarines become operational rather than regarding the newer submarines as replacements for the older ones. A US government negotiating position could well reflect that interest.

For arms-control advocates and those concerned with reducing military

expenditure, "levelling down" would seem much more attractive. As regards bombers, the opposition would probably be minimal and easily dealt with. The US B-52 fleet is ageing and the FB-111 has never commanded great support. It would seem likely that the opportunity to obtain a force of the new B-1 bombers of roughly the size of the Soviet intercontinental bomber force, or perhaps modestly larger, would be attractive enough to the US Air Force and its supporters that the older bombers could be bargained away. On the Soviet side, "levelling down" would probably be more difficult in view of the recent and large expenditure involved in procuring both missile-launching submarines and ICBMs. As regards the latter, the US position, at least initially, would surely require elimination of the SS-9s in view of their great payload capability. This would be particularly so in the absence of limits on the development of multiple warhead technology.

Although symmetry has its attractions as an approach to limiting strategic offensive forces, it is hardly a requirement. The alternative is to permit one side advantage in some areas to be offset by adversary advantage in others. This is, of course, the approach in the Interim Agreement, and it is attractive particularly because of the knotty problems inherent in the forward-based systems issue.

If these problems are not dealt with elsewhere, say, in a European security conference or in a conference on mutual and balanced force reductions, and if the US position that they are not negotiable in SALT is adhered to, a comprehensive offensive forces agreement would have to permit the Soviet Union some compensating advantage, most likely in ICBMs, the Jackson amendment notwithstanding. It should be noted, however, that with time, forward bases will be of diminishing importance as aircraft and SLBM ranges increase. Accordingly, Soviet intransigence with respect to the FBS issue might reasonably be regarded as more of an excuse, if historical factors can be put aside, than a reason for failure to reach an offensive forces agreement. This would be particularly so if the agreement in question involved, at most, modest force-level reductions, for in that case the advantages the United States would have by virtue of its access to forward bases would be relatively small.

But even aside from the FBS question an "aggregated asymmetric" approach has both advantages and disadvantages.

Permitting some flexibility to one or both sides in phasing out systems of one kind in favour of the acquisition of another may be advantageous particularly if consensus can be reached that some kinds of weapons are more destabilizing or otherwise more worrisome than others. The fact that the interim agreements permit the deployment of additional SLBMs if equal numbers of ICBMs are phased out, but not *vice versa*, suggests some acceptance both of the concept of flexibility and of the fact that SLBMs are less worrisome and/or more valuable than ICBMs.

But there will, of course, be problems in any attempt to establish equivalence factors for different systems or aggregated asymmetric ceilings. In this regard questions of relative weight to be given to different motivating factors in strategic arms policy will have to be faced, at least implicitly. Thus, if concern about a first strike is really important, one would approach SALT II with a strong commitment to maintain a "triad" of strategic systems—bombers, ICBMs and SLBMs, but with emphasis on the latter since they are likely to be least vulnerable. If economic considerations are dominant, ICBMs would be favoured, being less costly than the other two components of the "triad". While it is a thesis of this paper that the overriding motivation for both powers is concern about superiority as measured in delivery vehicles, throw weight, megatonnage or otherwise, the weight to be given to other motivations is probably somewhat different in the cases of the two nations. The United States, for example, is probably more concerned about a first strike, and the Soviet Union more concerned about limiting expenditures. If these observations are correct, one would expect the United States to favour an agreement that would permit, if not require, a posture of the first kind mentioned above—a "triad" with great emphasis on SLBMs—and the Soviet Union to have a greater interest in the second.

It is to be expected that any comprehensive offensive forces treaty of unlimited duration would include elements of asymmetry, particularly because of the FBS problem: quite possibly some "levelling up" on the part of the United States with respect to SLBM systems; and hopefully, and almost certainly, some "levelling down".

Regrettably, there can be little basis for optimism about reductions beyond those required as "levelling-down" measures. In present circumstances, it is difficult to imagine reductions in missile-launching submarines below the level of 41 which the United States now has, or in intercontinental bombers below the level of 140, with which the Soviet Union is credited. Certainly, there would be great opposition in the United States to moving to lower levels with respect to these components of the "triad", and reductions in ICBMs below the level of 1 000 or so would meet strong opposition in both countries: in the Soviet Union, because of the large commitment to them, the fact that their costs are relatively low, and the fact that lack of operational experience and qualitative disadvantages as compared with the United States would be less troublesome than with aircraft or submarines; in the United States, because the lower the levels of ICBMs, the more credible is the first-strike scenario against them. (This will be especially true if the ratio of ICBMs to SLBMs becomes small and if the latter are perceived to have a counterforce capability.)

Notwithstanding the fact that some limits have been imposed on offensive force levels by the Interim Agreement and that more comprehensive and endur-

ing limits, if not also some reductions, may be negotiated in SALT II, the strategic arms race is likely to continue with little diminution in intensity unless the development of new weapons and improvements in old ones can somehow be constrained. Unilateral restraint seems unlikely and the experience with SALT I suggests it may be even less likely in an "arms-control" environment than in its absence. Thus, limiting development by agreement becomes a matter of priority for SALT II; to the extent that one is concerned about stability, even a higher priority than limitations on force levels, since it is probable that qualitative changes will be more destabilizing than quantitative ones.

Despite a growing belief, at least throughout the West, that the exploitation of technology must not be allowed to take place without careful considerations, in advance, of the likely consequences for the human condition, the prospects for restraint in those areas relevant to strategic weaponry are, in a general sense, poor. The difficulty is in the absolute irreconcilability of the US and Soviet positions. As remarked earlier, the position of the United States is that it must maintain superiority in technology (one of the major arguments being to compensate for Soviet secrecy), a position the Soviet Union cannot accept.

Yet, there are grounds for optimism in the possibility that constraints can be imposed on technologies in selected limited areas without the United States renouncing its objective of overall technological superiority nor the Soviet Union conceding it. What is required is that in those selected areas there be little difference between the levels of technology in the two countries.

Notwithstanding the fact that some effort was made, but no success achieved, in SALT I to constrain forward movement with MIRVs, such constraint remains possibly the most interesting opportunity for developmental limitation for SALT II. The difficulty in limiting development in the past in this area was that the United States was clearly ahead both in terms of having demonstrated the concept and in the accuracies achievable with its missile warheads, MIRVs or otherwise. Accordingly, any expectation that the Soviet Union would agree to constraints on testing that would seriously impede its catching up were surely not very realistic. However, it is now apparently expected, at least by US intelligence sources, that the Soviet Union will soon demonstrate true MIRVs. Severe limits on numbers of missile tests and on improvements in re-entry vehicles, if imposed after that event, would presumably not preclude MIRV deployment by the USSR, and consequently, an increase in the numbers of warheads deliverable by its missiles to at least the levels planned for US missile forces. However, such limits could prevent the attainment by either side of the high accuracies and reliabilities that would be required to destroy adversary hard targets with high confidence. Thus, concern on both sides about a first strike would be reduced. In addition, such limitations would lead to a general slowing down of the development of new missiles with consequent budgetary savings.

Almost certainly, the possibility will be broached in SALT II, but great optimism about agreement is hardly warranted. There is no evidence that the Soviet Union is greatly concerned about a US first strike, and, as suggested earlier, there is reason to believe that US concerns have been overstated. Moreover, limitations on testing leading to an erosion in confidence in the performance of strategic forces are not likely to be easily accepted by the military establishments on either side. Indeed, they would be directly contrary to the aforementioned third "assurance" specified by the US Joint Chiefs of Staff as a condition for their approval of the SALT I agreements.

Most proponents of arms control by negotiation, particularly in the United States, having argued that a major driving force in the arms race is the action-reaction phenomenon, have been enthusiastic supporters of limitations on defensive systems. Thus, severe limitations on ABM defences were widely supported on the grounds that with such defences proscribed, much of the impetus for development and procurement of new and additional offensive systems, as well as concern about a first strike, would be eliminated. Similar arguments can be made with respect to limiting air defences, civil defences and ASW capabilities. They are being made at least with respect to the latter. Thus, it is claimed that if development and deployment of ASW capabilities could be appropriately limited, there would be greater confidence in the continued invulnerability of missile-launching submarine forces, and that, accordingly, the impetus to improve strategic offensive forces of all kinds to ensure maintenance of an adequate deterrent capability would be reduced.

The argument seemed more persuasive before the conclusion of the SALT I agreements than it does now for, as noted above, there is not the slightest evidence that conclusion of the ABM Treaty has resulted in a diminution of pressures to continue with various strategic offensive programmes, even those (the MIRV programmes) that were specifically rationalized on the grounds of the need to penetrate possible ABM defences.

Notwithstanding this, and the fact that there is no serious threat to submarine-based deterrent forces on the horizon, measures to reduce the likelihood of a future threat will command some attention, particularly as SLBM forces are increasingly viewed as the primary component of deterrence.

In a technical sense the heart of the problem is devising constraints that will reduce the likelihood of an erosion in the viability of SLBM forces without unacceptably reducing capabilities to conduct the kinds of operations that have been traditionally a part of war at sea—destruction of merchant shipping and naval general purpose forces, and the prevention of such destruction through ASW operations. Some approaches can be envisaged that might be reasonably consistent with these somewhat conflicting objectives. A sanctuary agreement is one possibility. If it could be agreed that one of the two great powers would not

conduct naval operations within some reasonably large area of the oceans, a sanctuary would exist within which the SLBM forces of the other could be deployed without fear—so long as the agreement was adhered to—of their all being suddenly destroyed by pre-emptive attack. With increasing SLBM ranges, it is possible that such sanctuaries could be within range of targets in the two countries and yet in areas where there would be little reason for, or likelihood of, naval operations in the event of a conventional war at sea. Thus, the sanctuaries might even be honoured in wartime. But while such an agreement might reduce day-to-day concern, if there were any, about SLBM vulnerability, it would have little, if any, inhibiting effect on a naval arms race because of the belief that one would have to hedge against the possibility of violation or abrogation of the agreement, which could occur in a matter of days or hours. Other proposals, for example prohibitions on the trailing of submarines in peacetime, suffer from the same defect. Most of those that do not, for example constraints on the construction of attack submarines and other naval weapons, will be perceived to be objectionable, particularly in naval circles, because of the overlap problem. While they might make less likely the destruction of SLBM forces, they will result in a diminution of ability to conduct traditional naval operations.

In the case of the ABM analogue, similar overlap problems arose, with respect, for example, to the question of a light defence to cope with attack by accident or by lesser powers. In that case the decision was made to renounce this possibility in the interest of what was perceived to be the more important objective of reducing concerns about the adequacy of deterrent forces. But the precedent is not likely to be followed in the ASW case for two reasons. Firstly, there is a substantial basis for belief that both destruction of surface forces by attack submarines and ASW activity in a protracted war at sea might be quite effective—there was little confidence that ABM defence against accidents or lesser powers would be. And secondly, there have been major ASW programmes for many years not only in the United States but by its allies, and a major attack-submarine programme in the Soviet Union. There are, therefore, large investments, and consequently constituencies that can be expected to resist constraints.

With these factors in mind, and recognizing that, at least in the case of the US Navy, there is substantial confidence in the invulnerability of present SLBM forces and much sentiment to the effect that their improvement is a more promising and attractive way to ensure the continuance of that invulnerability than negotiated constraints on adversary naval activities, one must conclude that the prospects for negotiating such constraints are poor. This must be said of the prospects for limits on air defences as well, the parallel with the ASW case being closer than with the ABM case.

In summary, assuming the FBS problem and those highlighted by the Jackson amendment are not insoluble, there would seem to be a basis for highly qualified optimism that SALT II might produce an agreement of unlimited duration relating to offensive delivery-system levels that would be broader in scope than the Interim Agreement and which would involve some reductions. There is less basis for optimism about substantial reductions, significant limits on strategic weapons development, bringing the ABM down to zero level or limitations on defensive systems other than ABM.

Early negotiation of a treaty of any scope seems unlikely; the problems are too complex and the constituencies for it too weak. By 1975 or 1976 the pressures for agreement will have increased both because of the approaching expiration of the Interim Agreement and the approach of another US election. The aphorism that negotiations will consume the time available, validated by the SALT I experience, strongly suggests that if SALT II is to produce agreements, it will be at that time.

Meanwhile the strategic arms race will go on, fueled by commitments made to secure support for the SALT I agreements and by demands made for "bargaining chips" for SALT II.

If very encompassing agreements are the result of SALT II, perhaps the price will have been worth paying. However, the events of the past several years provide enough basis for pessimism to suggest that the unilateral exercise of restraint, with the hope that there will be some reflection in adversary actions, may be as promising an approach to strategic-arms control and disarmament as continued formal negotiations, the ancillary benefits of the latter notwithstanding. The foregoing analysis is based on the proposition that the strategic arms policies of the Soviet Union and the United States, and their approaches to arms control, will continue to be motivated by the same concerns and desires that appear important now, and that the relative weights given to these factors will not change significantly. Different assumptions are possible, and would lead to dramatically different conclusions. Were, for example, either party, or both, to base its policy on acceptance of strategic sufficiency, conventionally defined, unilateral restraint could be the order of the day, at least for that party. In such a context, if SALT were to have meaning at all, it would be radically changed, from a procedure where competitive bargaining is dominant to one in which the pursuit of relative advantage, or even equal security, would be muted as the strategic arms race became increasingly viewed as a malignancy to be dealt with cooperatively.

Postscript to Chapters 1 and 2

In its critical appraisal of the first SALT agreements, SIPRI has not overlooked their political importance. Neither has it underestimated the positive arms-control aspects of the agreements, such as the ban on nationwide ABM deployment, explicit reliance on national means of verification or restrictions on the size of ICBM launchers.

Some writers have tended to overemphasize these aspects. In the opinion of SIPRI, however, they do not balance the shortcomings so far as disarmament is concerned.

3. Verification using reconnaissance satellites

Square-bracketed references, thus [1], *refer to the list of references on page 74.*

I. *Introduction*

One of the remarkable features about the SALT I agreements is the relative ease with which the problem of verifying the implementation of these agreements was solved. The requirement of on-site inspection, which has been considered by many states as essential in checking compliance with arms-control treaties, has been totally discarded in SALT I. For the first time the United States, the main proponent of on-site inspection, admitted that the modern means of verification at the disposal of the great powers are superior and more reliable than on-site inspection for monitoring the quantitative limitations of arms.

Equally interesting is the fact that the parties to the SALT I agreements have circumvented the institutional and organizational problems of international control. As a matter of fact, the control established under the agreements is not international in the proper sense of the word; under Article XII of the ABM Treaty, each party will use its own "national technical means" of verification to provide assurance of compliance.

The exact nature of the "national technical means" is not discussed in the treaty. However, it is evident from the official statements concerning the SALT I agreements that reconnaissance through satellites will constitute the basic element of the envisaged control system. Thus the Soviet Union, for the first time, accepted the principle of "open skies", proposed by the United States as long ago as July 1955, but only as far as satellite altitudes are concerned. As a matter of fact it is public knowledge that both sides have, for a number of years, been using satellites for the purpose of intelligence gathering, although neither side has officially admitted it. For example, in the period from January 1971 to the end of December 1972, about 31 per cent of all the satellites launched by the United States were photographic reconnaissance satellites. The comparable figure for Soviet satellites is 39 per cent.[1] Thus, what actually happened when the treaty was signed was not the introduction of new procedures, but the legalization of existing practices.

[1] These figures are based on our estimates of the number of photographic reconnaissance satellites, as listed in tables 3A.1 and 3B.1, pp. 76 and 90.

For obvious reasons, a considerable degree of secrecy surrounds the reconnaissance satellite programmes of both the United States and the Soviet Union. However, the launch dates and basic characteristics of all the satellites launched are known (*Table of Earth Satellites*, published by the Royal Aircraft Establishment at Farnborough, England).[2] And the data available is sufficient to identify those satellites which are destined mainly, if not exclusively, for reconnaissance.

The purpose of this chapter is to examine the reconnaissance capabilities of satellites. To this end, the reconnaissance satellite programmes of the United States and the Soviet Union are discussed, and detailed tables of the relevant data for the reconnaissance satellites launched by both countries are presented. The capability and effectiveness of satellites for checking the implementation of arms-control agreements will also be briefly discussed.

II. *US satellite programmes*

The possibility of using artificial Earth satellites as observation platforms was recognized as long ago as 1946 and, in 1954, detailed descriptions of technical requirements were submitted by the United States Air Force (USAF) to various industrial firms, with requests for design proposals. The programme was designated Weapon System 117L (WS-117L) and in October 1956 the development of the Agena rocket, which has since been the basic launch vehicle for reconnaissance satellites, began.

In November 1958 the US Department of Defense officially disclosed that WS-117L consisted mainly of three separate programmes—Discoverer, which was concerned with research and development of, among other things, photographic reconnaissance techniques; Satellite Missile Observation System (SAMOS), a photographic reconnaissance satellite system; and Missile Defense Alarm System (MIDAS). The SAMOS designation was discontinued by the USAF in 1961 and subsequently photographic reconnaissance satellites were not officially identified.

In addition, electronic intelligence satellites were developed using the so-called Elint (electronic intelligence) or ferret satellites. Also, under the so-called Vela programmes, satellites were developed to check any violation of the treaty banning nuclear explosions in the atmosphere and in outer space.

[2] All the satellites launched by the United States and the Soviet Union are registered with the United Nations in conformity with General Assembly resolution 1721 B(XVI) but the information given by these countries is scanty. Important details such as the launch time and site, physical characteristics of satellites, degree of manoeuvrability, satellite lifetime and often the orbital characteristics are not given. Availability of such data and more information is being discussed by the United Nations (UN report A/AC.105/101, 11 May 1972).

Photographic reconnaissance satellites

Photographic reconnaissance satellites were developed under the Discoverer and the SAMOS programmes. Most of these satellites have been launched from Vandenberg Air Force Base at Point Arguello, about 240 km north-west of Los Angeles on the west coast of the United States. The advantages of reconnaissance through satellites, compared with reconnaissance by aircraft such as the U-2, are as follows. A satellite's high speed of almost 30 000 km per hour enables it to survey very large areas in a short time. Because of the high altitude involved—about 200 km—an area of several thousands of square kilometres can be photographed on a single frame of film. A satellite at this altitude can remain in orbit for about eight to 10 days—a period sufficient for reconnaissance functions. In practice, the photographic reconnaissance satellites have a perigee[3] height of between 120 km and 370 km.

These satellites have two basic types of missions, each involving different orbital lives for the satellites. One type of mission requires an area surveillance satellite, its purpose being to search a large area of a particular country for objects of potential interest. The satellite, therefore, carries a wide-angle, low-resolution[4] camera. A satellite of this type usually has an orbital life of three to four weeks. When this satellite is within communication range of one of the Air Force ground stations, the exposed film, already developed aboard the spacecraft, is scanned by electronic devices and the resulting electrical signals are transmitted to Earth by radio. At the end of the mission, the satellite re-enters the Earth's atmosphere and burns up. Such satellites have been launched using Thor/Agena-A boosters, capable of putting a payload of 600–900 kg into orbit. Thor/Agena-B and Thor/Agena-D boosters are able to carry a greater payload—1 000–1 500 kg—and recently improved versions of booster rockets, which include the so-called Thrust-Augmented-Thor (TAT) and the Long-Tank TAT, can carry payloads of between 1 600 and 2 000 kg. [1–2]

The other type of mission uses a "close-look" satellite, which carries a camera with high resolution and relatively narrow field of view. The purpose of this mission is to re-photograph areas of particular interest located by the area surveillance satellites. The close-look satellites are larger than those used for the first type of mission and they remain in a near-polar orbit for about five days before the film itself is recovered. More recent satellites remain in orbit for longer periods—about three weeks. At the end of the mission a

[3] The orbital path of a satellite is generally elliptical. The shortest distance between the Earth and the satellite is called the perigee height, and the longest distance the apogee height.
[4] Resolution here and elsewhere refers to ground resolution broadly defined as the size of the smallest object that can be distinguished on the ground, with good contrast, by an optical system.

capsule containing the film is ejected from the spacecraft and in some cases recovered when it lands at sea within a predetermined area. More often, the capsule is recovered in mid-air; when the capsule reaches an altitude of about 15 km, a parachute, fixed to it, opens and is caught by a trapeze-like cable attached to a C-130 transport aircraft [2]. The aircraft is guided by ground radar and radio-beacon signals from the capsule. The films, thus recovered, are then developed and analysed.

Initially, close-look satellites were launched using Atlas/Agena boosters; from mid-1966, Titan-3B/Agena-D boosters have been used. Although the sizes of both these boosters are the same, the payloads put into orbit differ: 1 500–2 000 kg for Atlas/Agena and about 4 500 kg for the Titan-3B/Agena-D boosters. [1] The increased payload capability enables larger film packs, longer focal-length cameras and a larger number of film-recovery capsules to be used.

The characteristics of the photographic reconnaissance satellites are given in table 3A.1, p. 76.

Electronic reconnaissance

Electronic reconnaissance (ferret) satellites are launched into orbits with perigee heights of about 300–500 km, that is, higher than those used for photographic reconnaissance, and have considerably longer orbital lives—of the order of years rather than days. As the satellite passes over areas of interest, radar signals and other sources of electromagnetic radiation are recorded on tape. The tapes are then played back and the signals are transmitted to ground receiving stations and deciphered. At the end of the mission, the satellites re-enter the Earth's atmosphere and burn up.

As with the photographic reconnaissance satellites, two types of ferret satellites may also be in use: one type would be used for large-area surveillance, for locating the approximate positions of radars and for determining their frequency bands, and the second type, larger and more complex, would then be used to obtain more detailed information on the characteristics of the radars of interest. Often a pair of satellites have been used, one going into a 300–500 km orbit and the second going into a lower orbit with a perigee height of about 200 km. The perigee heights would suggest that the first is a ferret type of satellite and that the second one is a recoverable photographic reconnaissance satellite. [2] The ferret satellites in this group are usually octagonal in shape and weigh about 60 kg.

Until 1967, the electronic reconnaissance satellites were launched using Thor-Agena boosters but since then TAT/Agena boosters have been used. The payloads placed into orbits have been about 1 500 kg.

Electronic reconnaissance satellites are listed in table 3A.2, p. 84.

Missile Defense Alarm System (MIDAS)

The purpose of satellites developed under this programme was to give early warning, using infrared techniques, of the launch of enemy missiles. The satellites used had perigee heights of 3 000 km or more, the only exception being MIDAS 2 which had a perigee height of about 480 km. Payloads of 1 600–2 000 kg were put into orbit by Atlas/Agena-B or Atlas/Agena-D boosters.

A problem with these satellites was that their infrared sensors could not discriminate between the radiation emitted from the rocket engines and radiation from the sun, which reached the sensors after reflection from high clouds. A new generation of satellites (early-warning satellites) was developed, the first of which was launched into a near synchronous equitorial orbit[5] on 6 August 1968. These satellites can probably not only provide early warning of ICBM launches but can also detect nuclear explosions. The satellites may be used for communication purposes also. [1]

The MIDAS satellites as well as the early-warning satellites are listed in table 3A.3, p. 86.

Nuclear-explosion detection

Satellites used for the detection of nuclear explosions in the atmosphere and in space—Vela satellites—employ techniques which include those described above. Detectors sensitive to X-rays are also used to detect nuclear explosions in space. These satellites have been developed under a separate programme. Between 1963 and 1965, Vela satellites were launched using Atlas/Agena-D boosters with payload capacities of 150 kg. During the period 1967 to 1970, the payloads were increased to between 230 and 260 kg and Titan-3C boosters were used. The satellites were oribited at perigee heights of between 100 000 and 111 500 km and therefore have an extremely long orbital life—longer than one million years. They were launched in pairs in near circular orbits, the two satellites occupying virtually the same orbit, but diametrically opposed to each other, so that observation could be made from opposite sides of the Earth simultaneously [2].

In April 1970 the United States announced that Vela-11 and Vela-12 would be the last of the Vela series. However, interest in verifying the observance of the Partial Test Ban Treaty has not diminished, and the sensors for detecting nuclear tests are now probably carried by the new early-warning system satellites. The characteristics of these are also listed in table 3A.3.

US reconnaissance satellites are summarized in tables 3A.4–3A.6, p. 89.

[5] When a satellite orbits the Earth above the equator at the same rate as the Earth spins about its own axis, then the satellite is said to be in a synchronous equatorial orbit.

III. *Soviet satellite programmes*

The Soviet Union's Cosmos satellite programme began on 16 March 1962. The only Cosmos satellites which have been identified with any degree of confidence as having a reconnaissance function are those which have orbital lives of about eight, 12 or 13 days and which probably perform photographic reconnaissance.

It is difficult to identify those Soviet satellites which are equivalent to the US MIDAS, Vela and early-warning satellites, although the Soviet Union has probably developed similar systems. For example, the Cosmos series contains no satellites with orbital characteristics analogous to those of Vela satellites; the Soviet Union may be employing different techniques to obtain information similar to that obtained by the MIDAS, the Vela and the early-warning satellites. One guess is that Cosmos 159, and many satellites in the Electron series, could carry sensors similar to those used in the MIDAS and Vela satellites, and that Molniya satellites, spending a long time over North America while still visible from Soviet ground stations, could be performing military detection missions [3].

Two Soviet satellite programmes will be discussed here—those concerned with photographic reconnaissance and with electronic reconnaissance.

Photographic reconnaissance satellites

A number of characteristics of the Soviet satellites, such as the narrow range of orbital inclinations[6] used and the launch times, make their identification as reconnaissance satellites relatively simple. Moreover, a certain amount of knowledge has been acquired about the nature of the radio signals transmitted by these satellites and this facilitates their identification [4–5].

These satellites are launched either from Tyuratam (45.6° N, 63.4° E) about 160 km east of the Aral Sea or from Plesetsk (62.9° N, 40.1° E) about 1 000 km north of Moscow. Vostok launch vehicles A-1 or A-2 (the latter being a later configuration with an up-rated second stage) have been used to put the Soviet reconnaissance satellites into orbit. The normal payload is about 4 000 kg. Each satellite probably consists of a spherical capsule with its recovery parachute, an instrument package and a location-beacon transmitter. The instrument package is separated from the capsule during the last orbit and burns up in the Earth's atmosphere; the conventional signals cease with the destruction of the instrument package [4]. The location beacon of the

[6] The angle between the orbital plane of the satellite and the equatorial plane of the Earth is called the orbital inclination.

capsule, which continuously transmits in Morse code one of the three pairs of letters, TK, TG or TF, is switched on as the capsule approaches the Earth [6]. The strength of the signals decreases abruptly when the capsule has reached the ground and the signals stop when the recovery is made.

The photographic reconnaissance satellites, launched between March 1962 (when the Cosmos series began) and December 1972, are listed in table 3B.1, p. 90. Until about the end of 1968, most of these satellites had an orbital life of about eight days. A new generation of satellites, beginning with Cosmos 208 which was launched in March 1968, had longer orbital lives—about 12 days. This change to longer duration flights is associated with the improvement in resolution. Better resolution necessitates the use of cameras with longer focal-length lenses which results in a smaller area of the Earth being photographed on each pass. Therefore, shorter orbital periods[7] are necessary if the satellite ground tracks[8] are to be closely spaced, and this can be achieved by reducing the apogee heights. It can be seen from table 3B.1 that these orbital criteria apply to satellites having lives of 12 days. Both the eight- and the 12-day satellites transmit information in pulse duration modulation form [5].

A further development—satellite manoeuvrability—marked the beginning of a yet another type of satellite. First used in Cosmos 251, this facility to change the orbital characteristics increased the ability of the satellite to achieve a precise coverage of specific areas. These satellites usually fly for 13 days and transmit groups of Morse characters [5].

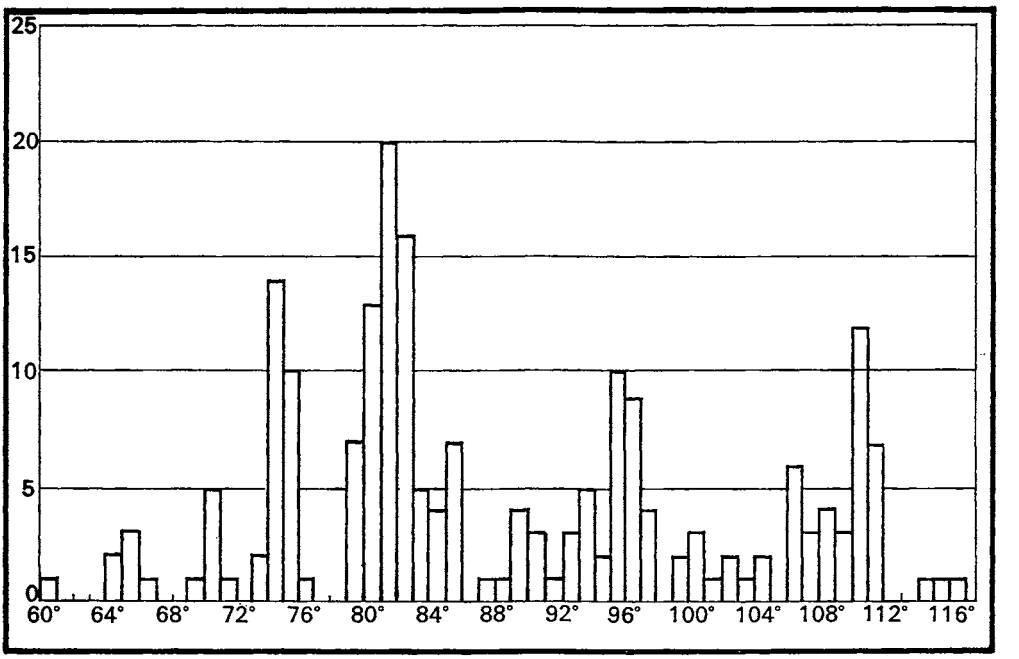
Electronic reconnaissance

It is not certain which of the large number of satellites in the Cosmos series are used for gathering electronic intelligence data. In the *Table of Earth Satellites* published by the Royal Aircraft Establishment, a large number of satellites, ellipsoidal in shape and weighing about 400 kg, are listed. Of these, the ones which are launched from Plesetsk at an orbital inclination of about 71° and with orbital periods of 92 minutes and 95 minutes have perigee heights of about 300 km or more. Their orbital lives are also considerably longer and, therefore, they are possibly electronic reconnaissance satellites. Satellites launched at an inclination of about 74° and with orbital periods of about 95 minutes may also fall into this group [7].

It is possible that some of the photographic reconnaissance satellites may also be performing electronic reconnaissance. Certain photographic reconnaissance satellites exhibit a change in the telemetry. This change is due to

[7] The time required for a satellite to go round the Earth once is called its period.
[8] The ground track is defined as the projected path traced out by a satellite over the surface of the Earth.

Chart 3.1. Number of US photographic reconnaissance satellites: by orbital inclination (deg)



the activation of a UHF/VHF transmitter for the rapid replay of stored data which may consist of information collected by electronic sensors [6].

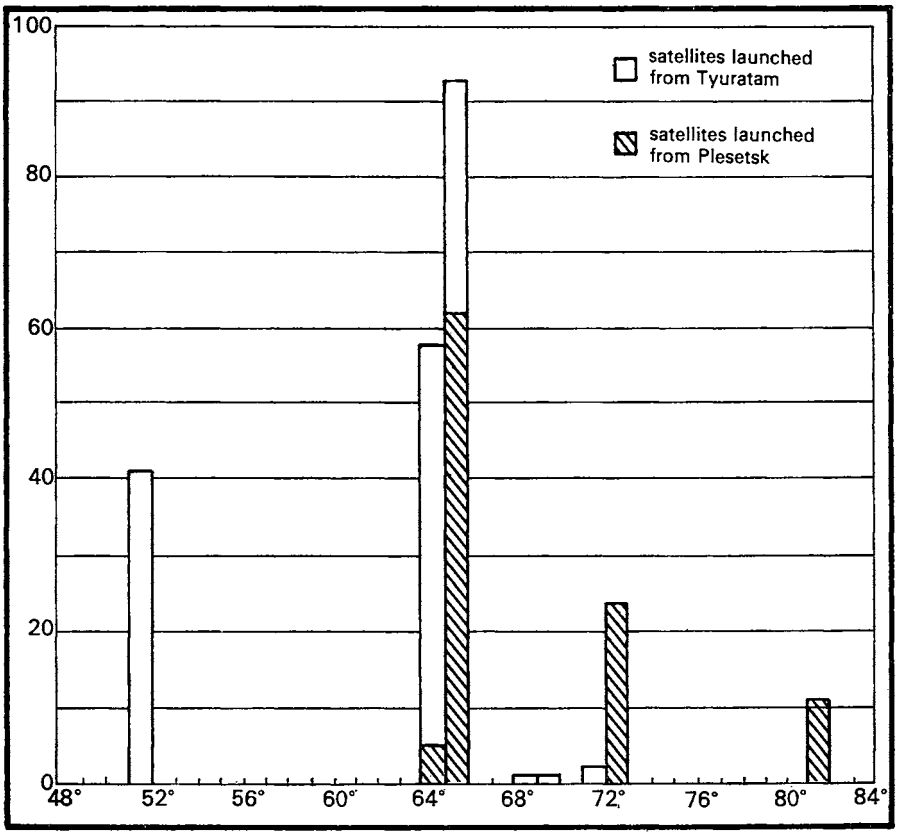
Some possible electronic reconnaissance satellites are listed in table 3B.2, p. 99, and a summary of these and of photographic reconnaissance satellites is given in table 3B.3, p. 101.

IV. *Potential of the reconnaissance satellites*

A close examination of the reconnaissance satellite programmes of both the United States and the Soviet Union gives some idea of the potentials of these satellites. In charts 3.1 and 3.2 the orbital inclinations of the photographic reconnaissance satellites are plotted against the number of satellites launched by the United States and the Soviet Union, respectively. It can be seen that only four orbital inclinations—about 52°, 65°, 72° and 81°—have been used by the Soviet satellites. This is in contrast to the US satellites which have a much wider range of orbital inclinations. Therefore, it is easier to use the Soviet satellite programme to illustrate the possible applications of the satellites.

Most satellites from Tyuratam are launched at an orbital inclination of 65°, but in the summer months an inclination of 52° is frequently used so that two photographic passes per day over a given area can be made [6]. A seasonal

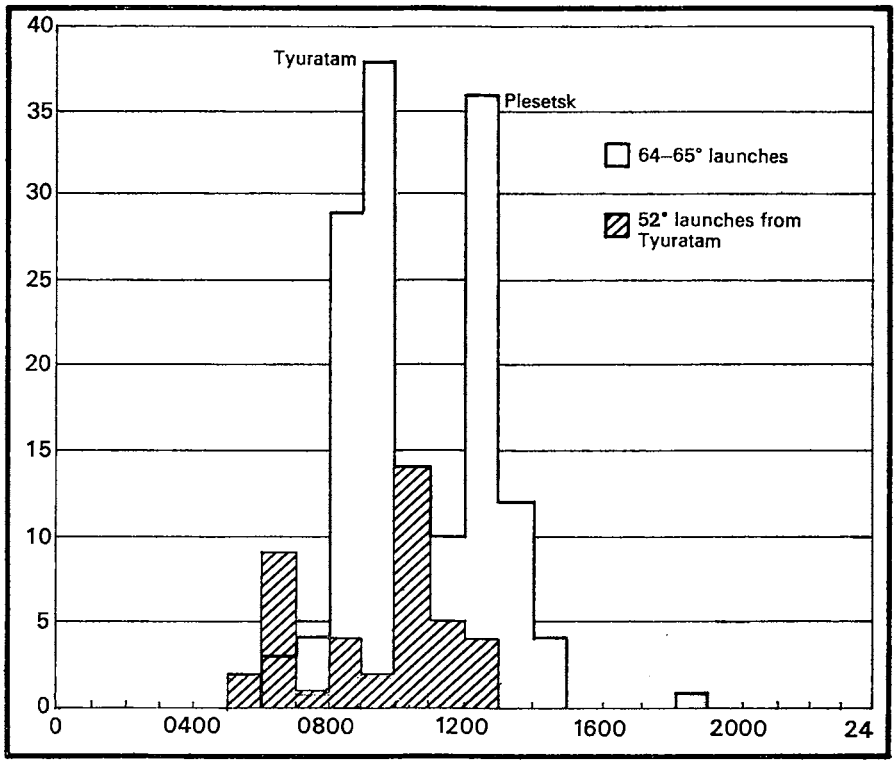
Chart 3.2. Number of Soviet photographic reconnaissance satellites: by orbital inclination (deg)



change in orbital inclination from 65° to 81° also occurs for satellites launched from Plesetsk. Such changes in inclinations are more difficult to detect for the US satellites because of their wide range of orbital inclinations. Most of them, however, have inclinations of around 90°. One explanation for these differences may be that the United States has a very sophisticated and ambitious programme: if a satellite is placed in a polar orbit (that is, with an inclination of 90°), then the entire surface of the Earth between the poles will be seen by the satellite, giving as wide a coverage of the Earth's surface as possible.

A second interesting feature of the satellites listed in tables 3A.1 and 3B.1 is their period. If the period of a satellite is 90 minutes, an exact factor of the Earth's period of rotation (1 440 minutes), the satellite would pass over a particular area on the Earth on every 16th orbit—once each day. However, in practice, satellites do not have periods of exactly 90 minutes and since periods other than this would result in a gradual shift of the ground tracks each day, a complete coverage of an area of interest could be made. Analysis

Chart 3.3. Number of Soviet photographic reconnaissance satellites: by time of launch (GMT)



of the ground tracks of satellites launched at 65° and 72° by the Soviet Union reveals that with orbital periods of approximately 90 minutes a complete coverage of a country, such as the United States, can be obtained in eight days [8]. The orbital inclination of 72° is used for satellites launched from Plesetsk instead of the usual 65° in order to extend the coverage of the United States to include Greenland where the Ballistic Missile Early Warning radar stations are situated.

A third interesting feature is the time at which the satellites are launched. In chart 3.3 the launch times of all the Soviet photographic reconnaissance satellites launched from Tyuratam at orbital inclinations of 52° and 65°, and those launched from Plesetsk at 65°, are plotted against the number of satellites. It can be seen that most satellites with orbital inclinations of 65° are launched at about 0900 hours GMT from Tyuratam and at about 1200 hours GMT from Plesetsk. This means that a satellite in this group would cover most of the United States during the daytime. The satellites with orbital inclinations of 52° are launched earlier from Tyuratam—0600 hours GMT—

so that, during the summer months, two passes could be made over areas of interest.

From the above discussion it can be seen that the orbital inclination, the launch site and the launch time of a satellite may have been chosen so that a particular area of the Earth can be surveyed at a specific time. The perigee height gives an indication of the nature of the reconnaissance. Most photographic reconnaissance satellites have a perigee height of about 200 km, an ideal altitude for short-term missions. The quality of the photographs taken from such an altitude still remains a closely guarded secret, but some clues can be found in a series of articles written in *Astronautics* some 12 years ago [9]. According to the author of these articles, a camera with a lens of focal length of 0.305 m, placed in a satellite at an altitude of about 230 km, would have a ground resolution of about 0.74 m, and camera lenses of at least 0.61 m focal lengths have been developed by the USAF. Using such a camera the ground resolution would improve to better than 0.30 m. The estimation of these figures does not take into account the fact that the resolution would deteriorate to some extent due to the Earth's atmosphere. However, modern improved cameras and films cannot give much worse resolution than those estimates, as exemplified by Lunar photographs and photographs taken by the crews of the Apollo spacecraft. A photograph of the Lunar surface taken by Lunar Orbiter-5 from a height of about 200 km shows a narrow trail, probably one metre wide, made by a small rock rolled down a hill [2]. It seems that it would be possible to obtain clear photographs of, for example, a military airfield or a large radar installation. This is shown by a photograph (plate 1) taken from a height of about 160 km by Gemini-7 astronauts using a nonspecialized camera; the rocket launch pads at Cape Kennedy are clearly seen there. Another photograph (plate 2), taken by the Apollo 9 crews, shows Dallas and Fort Worth in the United States. Even with such a nonspecialized camera and technique, the network of roads within the two cities and those connecting them and their airports are clearly seen. One of the factors contributing to such high resolution is the absence of vibration in the satellites as compared with aircraft.

Further developments have made photography possible under very low light intensity, such as moonlight or even starlight [10]. Illumination of target areas by laser beams has also been developed.

It was mentioned earlier that the United States uses two types of photographic reconnaissance satellites—one to identify potentially interesting areas and the other to make a detailed study of them. Such a system has certain disadvantages because a large number of photographs must be taken by the surveillance satellite, many of which may be of no interest. Moreover, the recovery and the processing of these photographs introduce some delay

NASA 65-HC-2548.

Plate 1. The Kennedy Space Center complex at Cape Kennedy photographed by the Gemini-7 astronauts from an altitude of about 200 km:

(1) The two white circles are the sites of launch pads built for manned flight to the Moon.

(2) A row of pads from where the Gemini spacecrafts were launched.

NASA 71-HC-108.

Plate 2. Dallas (right) and Fort Worth (left) photographed from Apollo-9 spacecraft flying at a height similar to that used for reconnaissance satellites:
(1) Carswell AFB and the General Dynamics plant at Ft. Worth;
(2) Greater Southwest International Airport with Rout 183 connecting the two cities;
(3) Love Field in Dallas; and
(4) Ling-Temco-Vought Aerospace and Hensley Field, the Dallas Naval Air Station.

before a close-look satellite could be launched. Usually a close-look satellite is launched about four to eight weeks after an area surveillance satellite has been launched.

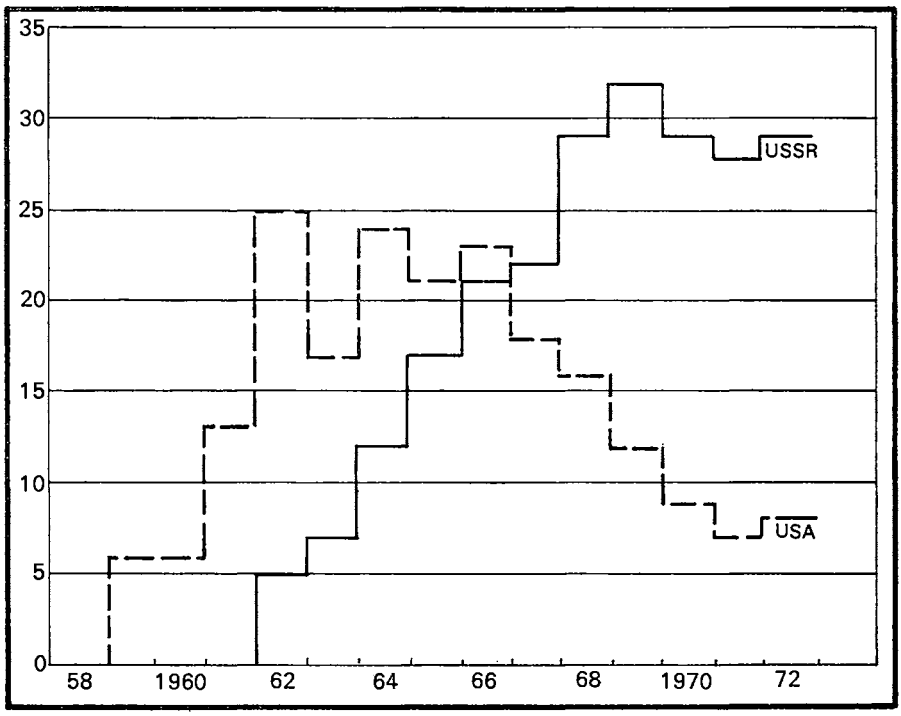
These problems may be overcome by new developments in television cameras, the pictures from which may be transmitted back to Earth in a relatively short time. New types of vidicon tubes[9] for such cameras give resolutions which approach those of the usual photographic cameras [1, 11]. The advances in communications satellites in synchronous orbits which can handle television transmission bandwidths would not only make it possible to relay reconnaissance photographs to the ground stations but would also enable the ground operators to switch to a lens of different focal length on the satellite camera or to insert filters of different colours so as to detect objects under camouflage. In addition to the optical and the television cameras, developments in sensors sensitive to radiation outside the range of the visible spectrum, extend the use of satellites. Further, the use of side-looking radar, giving a useful resolution, allows reconnaissance to be carried out under all weather conditions. A conventional radar can penetrate clouds easily but even with a large three metre diameter antenna, an object of 1.5 km in size could not be resolved easily from an altitude of about 200 km. A side-looking radar can give better resolution using a smaller antenna, provided that the antenna is aimed to the side rather than straight forward, as would be the case with a conventional radar. [2, 10]

From table 3A.4 and chart 3.4, in which the number of photographic reconnaissance satellites launched each year is plotted against time, it can be seen that the US reconnaissance programme probably reached maturity around 1966–67. Between 1962 and 1966 the yearly rate of launch was fairly constant and then it decreased. It can also be seen (table 3A.1) that during 1962–64 two area-surveillance satellites were often in orbit simultaneously, indicating that the second satellite may have been launched in order to ensure reliability. Since 1966 the rate has been decreasing and virtually no overlap between successive satellites has occurred.

This may be due to the improved performance of the satellites and to the development of a large new satellite, known as the "Big Bird", which is designed to perform both the surveillance task and the close-look type of mission [12]. The first was launched on 15 June 1971. With such satellites, surveillance of areas can be carried out by pictures transmitted by radio, after which the areas of potential interest can be photographed by the same

[9] The vidicon tube is a part of the satellite television camera system whose main component is a layer of photoconductive material. The image of an object is formed on this layer, and then converted into electrical signals.

Chart 3.4. US and Soviet photographic reconnaissance satellites: number launched per year



satellite. The close-look photographs thus obtained are returned to Earth in recoverable capsules.

Moreover, it can be seen that the decrease in the yearly launch rate of the Soviet photographic reconnaissance satellites did not take place until 1970; during 1969 more Cosmos recoverable reconnaissance satellites were launched than in previous years. It is interesting to note that the launches of Cosmos 281, 282, 286 and 289 coincided with very tense situations and clashes on the Chinese-Soviet border and that the orbital characteristics of these satellites were such that two photographic coverages of the regions concerned could have been made each day during daytime [2, 6].

Another satellite, Cosmos 344, was launched in 1970 at such an orbital inclination that the French nuclear test being carried out at Mururoa in the Pacific (22° S, 138° W) could be observed. The satellite's nearest position to the test area was 20° S, 141.4° W [6]. The coincidence in timing is particularly noteworthy; the test took place at 1800 hr GMT and the satellite overflew the region at 1842 hr GMT.

Furthermore, in December 1971 two manoeuvrable satellites—Cosmos 463 and 464—were launched. Analysis of their characteristics showed that they

may have been manoeuvred to stabilize their ground tracks over East Pakistan where, at that time, hostilities were taking place [13].

From table 3A.1 it can be seen that the US satellite 1970-54A had an unusually low orbital inclination for satellites launched from Vandenberg. The ground tracks of this satellite covered Syria, Israel, northern Sinai, northern Egypt and the Suez Canal zone. The satellite was launched at such a time that it could fly over the Suez Canal zone at about 1800 hr local time, when the sun casts long shadows, and identification of small objects such as anti-aircraft batteries is easier [2].

V. *Verification by satellites*

The SALT I agreements seem to have accepted that satellites could be used to check compliance of some arms-control agreements. Indeed with as good a resolution as 0.3 m, which is now feasible, there should be no difficulty in observing and identifying such objects as anti-ballistic missile launchers, large radar installations and inter-continental ballistic missiles, as well as surfaced ballistic missile submarines. Also possibly other arms limitations which may result from SALT II, such as restrictions on the number of strategic bombers, could be verified by satellites.

It would be equally easy to use these means for guarding against significant concentrations of armed forces—including tanks, heavy artillery and so on—a point which may be of relevance, for example, in some arms-control settlements in Europe. There is also some indication that satellite reconnaissance might be helpful in identifying underground nuclear explosions and efforts are being made to develop sensors, mounted on satellites, to detect field tests of certain chemical weapons.

An obvious limitation of such control methods is their inability to check qualitative changes in the military arsenal of states, although development of certain new weapons should be detectable at the testing stage. But even for verification of quantitative limitation of arms, an obligation not to use concealment for impeding verification is important. This has been provided for in SALT I agreements, and would also have to be provided for in other arms-control agreements. However, the development of multi-spectral sensors carried by satellites may make it possible, in future, to detect certain objects under camouflage; for example, underground missile silos could be detected using infrared sensors to distinguish the heated silo from the surrounding.

In all such verification operations a prohibition on interference with satellites would be essential. The concept of verification by satellites could be jeopardized by the development of techniques whereby satellites can be intercepted and destroyed by other satellites [14–16].

At present only two powers are capable of inspecting each other, as well as other nations, from space. As long as they maintain this monopoly, the application of reconnaissance satellites for arms-control agreements may be limited to their reciprocal arrangements. To be used in multilateral arms-control treaties, under which each party must obtain assurance of compliance of the treaty obligations by all other parties, reconnaissance through satellites would also have to become a multilateral undertaking.

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VI. *Tables of US and Soviet reconnaissance satellites*

Conventions

A-1	Vostok launch vehicle
A-2	Vostok up-rated second stage
A/A-A	Atlas Agena-A
A/A-B	Atlas Agena-B
A/A-D	Atlas Agena-D
B-1	Modified Sandal intermediate-range missile with an added upper stage
BMEWS	Ballistic missile early-warning system
C-1	Skean intermediate-range missile plus upper stage
Cape Ken	Cape Kennedy
IMEWS	Integrated missile early-warning system
Th/A-A	Thor Agena-A
Th/A-B	Thor Agena-B
Th/A-D	Thor Agena-D
TAT/A-D	Thrust-Augmented-Thor Agena-D
LTTAT/A-D	Long Tank TAT Agena-D
T-3C	Titan-3C
T-3D	Titan-3D
T-3B/A-D	Titan-3B Agena-D
Van	Vandenberg
...	Data not available
—	No reconnaissance satellite

Sources

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Table 3A.1. US photographic reconnaissance satellites

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime (days)	Whether film capsule recovered[b]
		1959						
Discoverer 1[c] (1959 β)	Van Th/A-A	28 Feb 2150	89.7	96.0	163	968	5	No
Discoverer 2 (1959 γ)	Van Th/A-A	13 Apr 2122	89.9	90.4	239	346	12.7	No
Discoverer 5 (1959 ε)	Van Th/A-A	13 Aug 1858	80.0	94.19	217	739	46	No
Discoverer 6 (1959 ζ)	Van Th/A-A	19 Aug 1926	84.00	95.27	212	848	62	No
Discoverer 7 (1959 κ)	Van Th/A-A	7 Nov 2024	81.64	94.70	159	847	19	No
Discoverer 8 (1959 λ)	Van Th/A-A	20 Nov 1926	80.65	103.72	187	1679	108.24	No
		1960						
Discoverer 11 (1960 δ)	Van Th/A-A	15 Apr 2024	80.1	92.16	170	589	10.88	No
Discoverer 13 (1960 θ)	Van Th/A-A	10 Aug 2038	82.85	94.04	258	683	95.97	Yes
Discoverer 14 (1960 κ)	Van Th/A-A	18 Aug 1955	79.65	94.55	186	805	28.19	Yes
Discoverer 15 (1960 μ)	Van Th/A-A	13 Sep 2219	80.90	94.23	199	761	34.2	No
Discoverer 17 (1960 ο)	Van Th/A-B	12 Nov 2238	81.70	96.45	190	984	46.9	Yes
Discoverer 18 (1960 σ)	Van Th/A-B	7 Dec 2024	81.50	93.66	243	661	115.9	Yes
		1961						
SAMOS 2 (1961 α)	Van A/A-A	31 Jan 2024	97.40	94.97	474	557	15 years	—[d]
Discoverer 20 (1961 ε)	Van Th/A-B	17 Feb 2024	80.91	95.41	288	786	526.9	No
Discoverer 23 (1961 λ)	Van Th/A-B	8 Apr 1800	81.94	101.13	200	1422	154	No
Discoverer 25 (1961 ξ)	Van Th/A-B	16 Jun 2302	82.11	90.87	222	409	25	Yes
Discoverer 26 (1961 π)	Van Th/A-B	7 Jul 2331	82.94	95.02	228	808	150.4	Yes
Discoverer 29 (1961 ψ)	Van Th/A-B	30 Aug 1932	82.14	91.51	152	542	10.2	Yes
Discoverer 30 (1961 ω)	Van Th/A-B	12 Sep 1955	82.66	92.40	235	546	90.1	Yes
Discoverer 31 (1961 αβ)	Van Th/A-B	17 Sep 2107	82.70	90.86	235	396	38.27	No
Discoverer 32 (1961 αγ1)	Van Th/A-B	13 Oct 1926	81.69	90.84	234	395	30.6	Yes
Discoverer 34 (1961 αε1)	Van Th/A-B	5 Nov 1955	82.52	97.12	227	1011	396.4	No
Discoverer 35 (1961 αζ1)	Van Th/A-B	15 Nov 2121	81.63	89.7	238	278	17.9	Yes
Discoverer 36 (1961 ακ1)	Van Th/A-B	12 Dec 2238	81.21	91.82	241	484	85.3	Yes
USAF (1961 αλ1)	Van A/A-B	22 Dec 1912	89.6	94.1	244	702	235	—[d]

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime (days)	Whether film capsule recovered[b]
		1962						
Discoverer 38 (1962 ε1)	Van Th/A-B	27 Feb 2150	82.23	90.04	208	341	21	Yes
USAF (1962 η1)	Van A/A-B	7 Mar 1912	90.89	93.90	251	676	457.1	Yes
USAF (1962 λ1)	Van Th/A-B	18 Apr ...	73.48	90.90	200	441	40	Yes
USAF (1962 π)	Van A/A-B	26 Apr 2136	74.1?[b]	90.0?[b]	...	...	2	Yes
USAF (1962 ρ1)	Van Th/A-B	28 Apr 2248	73.11	91.10	180	475	28	Yes
USAF (1962 σ1))	Van Th/A-B	15 May 1938	82.33	94.02	305	634	560	Yes
USAF (1962 φ1)	Van Th/A-B	30 May 0029	74.10	89.70	199	319	12	Yes
USAF (1962 χ1)	Van Th/A-B	2 Jun 0043	74.26	90.50	211	385	26.9	Yes
USAF (1962 ψ)	Van A/A-B	17 Jun ...	...	...	...	...	1	Yes
USAF (1962 αβ)	Van Th/A-B	23 Jun 0029	75.09	89.58	213	293	14.7	Yes
USAF (1962 αγ)	Van Th/A-D	28 Jun 0112	76.04	93.60	211	689	78	Yes
USAF (1962 αζ1)	Van A/A-B	18 Jul 2053	96.12	88.73	184	236	9	Yes
USAF (1962 αη)	Van Th/A-B	21 Jul 0058	70.29	90.42	208	381	24	Yes
USAF (1962 αθ)	Van Th/A-B	28 Jul 0029	71.09	90.64	225	386	27	Yes
USAF (1962 ακ1)	Van Th/A-D	2 Aug 0029	82.25	90.77	204	418	24	Yes
USAF (1962 αλ)	Van A/A-B	5 Aug 1800	96.30	88.62	205	205	1	Yes
USAF (1962 ασ)	Van Th/A-D	29 Aug 0012	65.21	90.38	187	400	12	Yes
USAF (1962 αν1)	Van Th/A-B	1 Sep 2238	82.82	94.42	300	609	785.54	Yes
USAF (1962 αχ)	Van Th/A-B	17 Sep 2346	81.84	93.33	204	668	62.2	Yes
USAF (1962 ββ)	Van Th/A-D	29 Sep 2346	65.40	90.30	203	376	14	Yes
USAF (1962 βε)	Van Th/A-B	9 Oct 1858	81.96	90.96	213	427	37.3	Yes
USAF (1962 βο)	Van Th/A-B	5 Nov 2219	74.98	90.71	208	409	27	Yes
USAF (1962 βπ)	Van A/A-B	11 Nov 2024	96.00	88.65	206	206	1	Yes
USAF (1962 βρ)	Van Th/A-B	24 Nov 2205	65.14	89.92	204	337	18	Yes
USAF (1962 βσ)	Van Th/A-D	4 Dec 2136	65.10	89.16	194	273	3	Yes
USAF (1962 βφ)	Van Th/A-D	14 Dec 2122	70.97	90.46	199	392	25	Yes
		1963						
USAF (1963-02A)	Van Th/A-D	7 Jan 2107	82.23	90.54	205	399	16.3	Yes

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Life-time (days)	Whether film capsule recovered[b]
USAF (1963-07A)	Van Th/A-D	1 Apr 2248	75.40	90.66	201	408	25	Yes
USAF (1963-16A)	Van TAT/A-D	18 May 2234	74.54	91.12	153	497	8	Yes
USAF (1963-19A)	Van TAT/A-D	12 Jun 2400	81.87	90.67	192	419	29.1	Yes
USAF (1963-25A)	Van Th/A-D	27 Jun 0043	81.6	90.5	196	396	29.7	Yes
USAF (1963-28A)	Van A/A-D	12 Jul 2238	95.37	88.20	164	164	5.2	Yes
USAF (1963-29A)	Van Th/A-D	18 Jul 2400	82.86	90.44	194	387	25.8	Yes
USAF (1963-32A)	Van TAT/A-D	30 Jul 2400	74.95	90.40	157	411	12	Yes
USAF (1963-34A)	Van TAT/A-D	25 Aug 0029	75.01	89.40	161	320	18.6	Yes
USAF (1963-35A)	Van Th/A-D	29 Aug 1912	81.89	90.80	292	324	69.7	Yes
USAF (1963-36A)	Van A/A-D	6 Sep 1926	94.37	89.06	169	263	7.05	Yes
USAF (1963-37A)	Van TAT/A-D	23 Sep 2248	74.90	90.63	161	441	18.2	Yes
USAF (1963-41B)	Van A/A-D	25 Oct 1858	99.05	88.85	136	297	3.2	Yes
USAF (1963-42A)	Van TAT/A-D	29 Oct 2107	89.90	90.84	279	345	83.51	Yes
USAF (1963-48A)	Van Th/A-D	27 Nov 2107	69.99	90.20	175	386	17.3	Yes
USAF (1963-51A)	Van A/A-D	18 Dec 2150	97.89	88.48	122	266	1.28	Yes
USAF (1963-55A)	Van TAT/A-D	21 Dec 2150	64.94	89.96	176	355	18	Yes
		1964						
USAF (1964-08A)	Van TAT/A-D	15 Feb 2136	74.95	90.86	179	444	23	Yes[c]
USAF (1964-09A)	Van A/A-D	25 Feb 1858	95.66	88.24	173	190	4	Yes
USAF (1964-12A)	Van A/A-D	11 Mar 2010	95.73	88.20	163	203	4.3	Yes
USAF (1964-20A)	Van A/A-D	23 Apr 1843	103.56	89.40	150	336	5.2	Yes
USAF (1964-22A)	Van TAT/A-D	27 Apr 2331	79.93	90.77	178	446	28.19	Yes[c]
USAF (1964-24A)	Van A/A-D	19 May 1926	101.12	89.69	141	380	3.31	Yes
USAF (1964-27A)	Van TAT/A-D	4 Jun 2324	79.96	90.27	149	429	13.94	Yes[c]
USAF (1964-30A)	Van TAT/A-D	13 Jun 1550	114.98	91.67	350	364	354.21	Yes
USAF (1964-32A)	Van TAT/A-D	19 Jun 2317	85.00	90.95	176	461	26.81	Yes[c]
USAF (1964-36A)	Van A/A-D	6 Jul 2150	92.89	89.20	121	346	2	Yes
USAF (1964-37A)	Van TAT/A-D	10 Jul 2317	84.88	91.00	180	461	26.52	Yes[c]

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime (days)	Whether film capsule recovered[b]
USAF (1964-43A)	Van TAT/A-D	5 Aug 2317	79.96	90.71	182	436	26	Yes[e]
USAF (1964-45A)	Van A/A-D	14 Aug 2248	95.52	89.00	149	307	8.8	Yes
USAF (1964-48A)	Van Th/A-D	21 Aug 1550	115.0	91.6	349	363	221.66	Yes
USAF (1964-56A)	Van TAT/A-D	14 Sep 2248	84.96	90.88	172	466	21.7	Yes[e]
USAF (1964-58A)	Van A/A-D	23 Sep 2010	92.91	89.00	145	303	4.78	Yes
USAF (1964-61A)	Van Th/A-D	5 Oct 2150	79.97	90.75	182	440	20.50	Yes[e]
USAF (1964-67A)	Van TAT/A-D	17 Oct 2248	74.99	90.59	189	416	17.27	Yes[e]
USAF (1964-68A)	Van A/A-D	23 Oct 1829	95.55	88.6	139	271	5.06	Yes
USAF (1964-71A)	Van LTTAT/A-D	2 Nov 2136	79.95	90.70	180	448	25.33	Yes[e]
USAF (1964-75A)	Van TAT/A-D	18 Nov 2038	70.02	89.71	180	339	17.45	Yes[e]
USAF (1964-79A)	Van A/A-D	4 Dec 1858	97.02	89.69	158	357	1.2	Yes
USAF (1964-85A)	Van Th/A-D	19 Dec 2107	74.97	90.46	183	410	26.06	Yes[e]
USAF (1964-87A)	Van Th/A-D	21 Dec 1912	70.08	89.50	238	264	21.64	Yes
		1965						
USAF (1965-02A)	Van TAT/A-D	15 Jan 2107	74.95	90.52	180	420	25	Yes[e]
USAF (1964-05A)	Van A/A-D	23 Jan 2010	102.5	88.85	146	291	5.2	Yes
USAF (1965-13A)	Van TAT/A-D	25 Feb 2150	75.08	90.07	177	377	20.92	Yes[e]
USAF (1965-19A)	Van A/A-D	12 Mar 1926	107.69	88.51	155	247	4.98	Yes
USAF (1965-26A)	Van TAT/A-D	25 Mar 2107	96.08	89.06	186	265	10.1	Yes[e]
USAF (1965-31A)	Van A/A-D	28 Apr 2010	95.60	88.95	180	259	5.14	Yes
USAF (1965-33A)	Van TAT/A-D	29 Apr 2136	85.04	91.05	178	473	26.5	Yes[e]
USAF (1965-37A)	Van TAT/A-D	18 May 1800	75.01	89.71	198	331	28.24	Yes[e]
USAF (1965-41A)	Van A/A-D	27 May 1926	95.78	88.67	149	267	5.11	Yes
USAF (1965-45A)	Van TAT/A-D	9 Jun 2248	75.07	89.84	176	362	12.58	Yes[e]
USAF (1965-50B)	Van A/A-D	25 Jun 1926	107.64	88.78	151	283	4.9	Yes
USAF (1965-57A)	Van TAT/A-D	19 Jul 2248	85.05	91.01	182	464	29.85	Yes[e]
USAF (1965-62A)	Van A/A-D	3 Aug 1912	107.47	89.06	149	307	4.11	Yes
USAF (1965-67A)	Van TAT/A-D	17 Aug 2053	70.04	90.37	180	407	54.40	Yes[e]

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime (days)	Whether film capsule recovered[b]
USAF (1965-74A)	Van TAT/A-D	22 Sep 2122	80.01	90.04	191	364	18	Yes[e]
USAF (1965-76A)	Van A/A-D	30 Sep 1926	95.60	88.77	158	264	4.7	Yes
USAF (1965-79A)	Van TAT/A-D	5 Oct 1746	75.05	89.75	203	323	24.01	Yes
USAF (1965-86A)	Van TAT/A-D	28 Oct 2122	74.97	90.54	176	430	19.81	Yes[e]
USAF (1965-90A)	Van A/A-D	8 Nov 1926	93.88	88.74	145	277	2.92	Yes
USAF (1965-102A)	Van TAT/A-D	9 Dec 2107	80.04	90.72	183	437	16.78	Yes[e]
USAF (1965-110A)	Van TAT/A-D	24 Dec 2107	80.01	90.83	178	446	26.59	Yes[e]
		1966						
USAF (1966-02B)	Van A/A-D	19 Jan 2010	93.86	88.72	150	269	3.88	Yes
USAF (1966-07A)	Van TAT/A-D	2 Feb 2136	75.05	90.64	185	425	24.67	Yes
USAF (1966-12A)	Van A/A-D	15 Feb 2024	96.54	89.00	148	293	7.44	Yes
USAF (1966-18A)	Van TAT/A-D	9 Mar 2217	75.03	90.59	178	432	19.83	Yes
USAF (1966-22B)	Van A/A-D	18 Mar 2024	100.01	88.87	152	284	4.92	Yes
USAF (1966-29A)	Van TAT/A-D	7 Apr 2248	75.06	89.56	193	312	18.43	Yes
USAF (1966-32A)	Van A/A-D	19 Apr 1912	116.95	89.94	145	398	6	Yes
USAF (1966-39A)	Van A/A-D	14 May 1829	110.55	89.40	133	358	6	Yes
USAF (1966-42A)	Van TAT/A-D	24 May 0155	66.04	89.00	179	271	16	Yes
USAF (1966-48A)	Van A/A-D	3 Jun 1926	87.01	88.87	143	288	6.17	Yes
USAF (1966-55A)	Van TAT/A-D	21 Jun 2136	80.10	90.15	194	367	22	Yes
USAF (1966-62A)	Van A/A-D	12 Jul 1800	95.52	88.25	137	236	7	Yes
USAF (1966-69A)	Van T-3B/A-D	29 Jul 1843	94.12	88.58	158	250	7	Yes
USAF (1966-72A)	Van TAT/A-D	8 Aug 2107	100.12	89.35	194	287	32.20	Yes
USAF (1966-74A)	Van A/A-D	16 Aug 1829	93.24	89.58	146	358	7.5	Yes
USAF (1966-83A)	Van A/A-D	16 Sep 1800	93.98	89.37	148	333	6	Yes
USAF (1966-85A)	Van TAT/A-D	20 Sep 2107	85.13	90.87	188	442	21.90	Yes
USAF (1966-86A)	Van T-3B/A-D	28 Sep 1912	93.98	89.01	151	296	9.06	Yes
USAF (1966-90B)	Van A/A-D	12 Oct 1912	90.88	88.99	181	258	8.46	Yes
USAF (1966-98A)	Van A/A-D	2 Nov 2024	90.96	89.20	159	305	7.2	Yes

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital incli-nation (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Life-time (days)	Whether film capsule recov-ered[b]
USAF (1966-102A)	Van TAT/A-D	8 Nov 1955	100.09	89.42	172	318	20.6	Yes
USAF (1966-109A)	Van A/A-D	5 Dec 2107	104.63	89.77	137	388	8.2	Yes
USAF (1966-113A)	Van T-3B/A-D	14 Dec 1814	109.56	89.58	138	368	9	Yes
		1967						
USAF (1967-02A)	Van TAT/A-D	14 Jan 2122	80.07	90.13	180	380	18.7	Yes
USAF (1967-07A)	Van A/A-D	2 Feb 1955	102.96	89.47	136	357	9	Yes
USAF (1967-15A)	Van TAT/A-D	22 Feb 2248	80.03	90.12	180	380	17.02	Yes
USAF (1967-16A)	Van T-3B/A-D	24 Feb 1955	106.98	90.02	135	414	10.15	Yes
USAF (1967-29A)	Van TAT/A-D	30 Mar 1858	85.03	89.45	167	326	17.65	Yes
USAF (1967-43A)	Van LTTAT/A-D	9 May 2150	85.10	94.36	200	777	64.62	Yes
USAF (1967-50A)	Van A/A-D	22 May 1829	91.49	88.42	148	240	8.18	Yes
USAF (1967-55A)	Van A/A-D	4 Jun 1800	104.88	90.57	149	456	8.17	Yes
USAF (1967-62A)	Van LTTAT/A-D	16 Jun 2136	80.02	89.97	181	367	33.16	Yes
USAF (1967-64A)	Van T-3B/A-D	20 Jun 1619	111.40	89.01	127	325	10.22	Yes
USAF (1967-76A)	Van LTTAT/A-D	7 Aug 2136	79.72	89.72	174	346	24.85	Yes
USAF (1967-79A)	Van T-3B/A-D	16 Aug 1702	111.88	90.43	142	449	13	Yes
USAF (1967-87A)	Van LTTAT/A-D	15 Sep 1938	80.07	89.95	150	389	18.69	Yes
USAF (1967-90A)	Van T-3B/A-D	19 Sep 1829	106.10	89.75	122	401	10.23	Yes
USAF (1967-103A)	Van T-3B/A-D	25 Oct 1912	111.57	90.15	136	429	9	Yes
USAF (1967-109A)	Van LTTAT/A-D	2 Nov 2136	81.53	90.47	183	410	29.83	Yes
USAF (1967-121A)	Van T-3B/A-D	5 Dec 1843	109.55	90.16	137	430	11.18	Yes
USAF (1967-122A)	Van LTTAT/A-D	9 Dec 2219	81.65	88.45	158	237	15	Yes
		1968						
USAF (1968-05A)	Van T-3B/A-D	18 Jan 1858	111.52	89.91	138	404	17.13	Yes
USAF (1968-08A)	Van LTTAT/A-D	24 Jan 2219	81.48	90.55	176	430	33.54	Yes
USAF (1968-18A)	Van T-3B/A-D	13 Mar 1955	99.87	89.87	128	407	11	Yes
USAF (1668-20A)	Van LTTAT/A-D	14 Mar 2248	83.01	90.20	178	391	26.22	Yes
USAF (1968-31A)	Van T-3B/A-D	17 Apr 1702	111.51	90.10	134	427	12	Yes

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital incli-nation (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Life-time (days)	Whether film capsule recov-ered[b]
USAF (1968-39A)	Van LTTAT/A-D	1 May 2136	83.05	88.58	164	234	14	Yes
USAF (1968-47A)	Van T-3B/A-D	5 Jun 1731	110.52	90.31	123	456	12.2	Yes
USAF (1968-52A)	Van LTTAT/A-D	20 Jun 2150	84.99	89.75	193	326	25	Yes
USAF (1968-64A)	Van T-3B/A-D	6 Aug 1634	110.00	89.85	142	395	9	Yes
USAF (1968-65A)	Van LTTAT/A-D	7 Aug 2136	82.11	88.60	152	257	19.45	Yes
USAF (1968-74A)	Van T-3B/A-D	Sep 10 1829	106.06	89.82	125	404	15	Yes
USAF (1968-78A)	Van LTTAT/A-D	18 Sep 2136	83.02	90.12	167	393	19.25	Yes
USAF (1968-98A)	Van LTTAT/A-D	3 Nov 2136	82.15	88.90	150	288	19.99	Yes
USAF (1968-99A)	Van T-3B/A-D	6 Nov 1912	106.00	89.73	130	390	14	Yes
USAF (1968-108A)	Van T-3B/A-D	4 Dec 1926	106.24	93.30	136	736	8	Yes
USAF (1968-112A)	Van LTTAT/A-D	12 Dec 2219	81.02	88.67	169	248	15.65	Yes
		1969						
USAF[f] (1969-07A)	Van T-3B/A-D	22 Jan 1912	106.15	97.04	142	1 090	12	Yes
USAF (1969-10A)	Van LTTAT/A-D	5 Feb 2248	81.54	88.70	178	238	18.86	Yes
USAF (1969-19A)	Van T-3B/A-D	4 Mar 1926	92.00	90.50	134	461	14	Yes
USAF (1969-26A)	Van LTTAT/A-D	19 Mar 2136	83.04	88.73	179	241	4.35	Yes
USAF[f] (1969-39A)	Van T-3B/A-D	15 Apr 1731	108.76	89.96	135	410	15	Yes
USAF (1969-41A)	Van LTTAT/A-D	2 May 0155	64.97	89.54	179	326	21.35	Yes
USAF (1969-50A)	Van T-3B/A-D	3 Jun 1648	110.00	90.04	137	414	11.20	Yes
USAF[f] (1969-63A)	Van LTTAT/A-D	24 Jul 0126	74.98	88.49	178	220	30.44	Yes
USAF[f] (1969-74A)	Van T-3B/A-D	22 Aug 1605	108.00	89.51	133	366	16	Yes
USAF (1969-79A)	Van LTTAT/A-D	22 Sep 2107	85.03	88.83	178	253	19.74	Yes
USAF (1969-95A)	Van T-3B/A-D	24 Oct 1814	108.04	93.39	136	740	15	Yes
USAF (1969-105A)	Van LTTAT/A-D	4 Dec 2136	81.48	88.61	159	251	36.26	Yes
		1970						
USAF[f] (1970-02A)	Van T-3B/A-D	14 Jan 1843	109.96	89.69	134	383	18	Yes
USAF (1970-16A)	Van LTTAT/A-D	4 Mar 2219	88.02	88.76	167	257	21.98	Yes
USAF[f] (1970-31A)	Van T-3B/A-D	15 Apr 1550	110.97	89.70	130	388	21	Yes

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime (days)	Whether film capsule recovered[b]
USAF (1970-40A)	Van LTTAT/A-D	20 May 2136	83.00	88.62	162	247	27.53	Yes
USAF[f] (1970-48A)	Van T-3B/A-D	25 Jun 1453	108.87	87.70	129	389	11	Yes
USAF (1970-54A)	Van LTTAT/A-D[g]	23 Jul 0126	60.00	90.04	158	398	26.99	Yes
USAF[f] (1970-61A)	Van T-3B/A-D	18 Aug 1453	110.95	89.67	151	365	16	Yes
USAF (1970-90A)	Van T-3B/A-D	23 Oct 1746	111.06	89.83	135	396	19	Yes
USAF (1970-98A)	Van LTTAT/A-D	18 Nov 2122	82.99	88.70	185	232	22.78	Yes
		1971						
USAF (1971-05A)	Van T-3B/A-D	21 Jan 1829	110.86	90.09	139	418	19	Yes
USAF (1971-22A)	Van LTTAT/A-D	24 Mar 2107	81.52	88.56	157	246	18.81	Yes
USAF (1971-33A)	Van T-3B/A-D	22 Apr 1536	110.93	89.85	132	401	21	Yes
USAF[h] (1971-56A)	Van T-3D	15 Jun 1843	96.41	89.38	184	300	52	Yes
USAF (1971-70A)	Van T-3D/A-D	12 Aug 1410	111.00	90.13	137	424	22	Yes
USAF (1971-76A)	Van LTTAT/A-D	10 Sep 2136	74.95	88.48	156	244	25.02	Yes
USAF (1971-92A)	Van T-3B/A-D	23 Oct 1717	110.94	90.02	134	416	25	Yes
		1972						
USAF[h] (1972-02A)	Van T-3D	20 Jan 1836	97.00	89.41	156	332	40	Yes
USAF (1972-16A)	Van T-3B/A-D	17 Mar 1702	110.98	89.91	130	409	25	Yes
USAF (1972-32A)	Van LTTAT/A-D	19 Apr 2150	81.48	88.85	155	277	23	Yes
USAF (1972-39A)	Van LTTAT/A-D	25 May 1841	96.34	89.17	158	306	10	Yes
USAF[h] (1972-52A)	Van T-3D	7 Jul 1746	96.88	88.77	174	251	49	Yes
USAF (1972-68A)	Van T-3B/A-D	1 Sep 1746	110.50	89.71	140	380	30	Yes
USAF[h] (1972-79A)	Van T-3D	10 Oct 1800	96.47	88.93	160	281	60	Yes
USA[f] (1972-103A)	Van T-3B/A-D	21 Dec 1746	110.45	89.68	139	378	30	?

[a] The designation of each satellite is recognized internationally and is given by the World Warning Agency on behalf of the Committee on Space Research.
[b] Doubts about the data and the recovery of satellites are indicated by question marks.
[c] There is some doubt as to whether this satellite attained the orbit.
[d] Photographs taken by cameras mounted on these satellites are transmitted to Earth by radio signals whereas all other satellites in the table carry recoverable capsules containing films.
[e] These satellites may carry recoverable capsules although they are radio-transmission-type.
[f] Manoeuvrable satellites.
[g] In the UN registrations this was listed as Titan 3B-Agena.
[h] "Big Bird" satellites.

Table 3A.2. US electronic or ferret reconnaissance satellites

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Life-time (years)
		1962					
USAF (1962 δ)	Van Th/A-B	21 Feb ...	81.97	90.00	167	374	16 days
USAF (1962 ω1)	Van Th/A-B	18 Jun 2024	82.14	92.40	370	441	1.4
Star-rad (1962 βκ1)	Van Th/A-D	26 Oct 1619	71.39	147.43	194	5537	4.94
USAF (1962 βτ1)	Van Th/A-D	13 Dec 0405	70.36	116.26	231	2786	4.17
		1963					
USAF (1963-03A)	Van Th/A-D	16 Jan 2248	81.89	94.66	459	533	6
USAF (1963-21E)	Van Th/A-D	15 Jun 1438	69.91	94.45	181	829	42.1 days
USAF (1963-27A)	Van TAT/A-D	29 Jun 2234	82.3	94.84	484	536	6.33
USAF (1963-35B)	Van Th/A-D	29 Aug 1912	81.89	92.07	310	431	29–30 days
USAF (1963-41A)	Van A/A-D	25 Oct 1858	99.05	58.99	144	332	4.0 days
USAF (1963-42B)	Van TAT/A-D	29 Oct 2107	89.99	93.35	285	585	1.57
USAF (1963-55B)	Van TAT/A-D	21 Dec 2150	64.52	91.68	321	388	0.89
		1964					
USAF (1964-01A)	Van TAT/A-D	11 Jan 2010	69.91	103.47	905	934	800
USAF (1964-01E)	Van TAT/A-D	11 Jan 2010	69.90	103.48	905	934	1 000
USAF (1964-11A)	Van LTTAT/A-D	28 Feb 0338	82.03	94.74	479	520	4.98
USAF (1964-35A)	Van LTTAT/A-D	3 Jul 0126	82.09	94.94	501	529	5.11
USAF (PII) (1964-45B)	Van A/A-D	14 Aug 2248	95.67	127.40	275	3748	13
USAF (1964-36B)	Van A/A-D	6 Jul 2150	92.97	91.20	297	377	0.49
USAF (1964-68B)	Van A/A-D	23 Oct 1829	95.50	91.14	323	336	0.34
USAF (1964-72A)	Van LTTAT/A-D	4 Nov 0134	82.00	95.05	512	526	5.02
		1965					
SR6B (1965-16A)	Van Th/A-D	9 Mar 1829	70.09	103.52	910	939	100
USAF (1965-31B)	Van A/A-D	28 Apr 2010	95.26	95.16	490	559	4.51
USAF (1965-50A)	Van A/A-D	25 Jun 1926	107.65	94.68	496	510	3.16
USAF (1965-55A)	Van LTTAT/A-D	17 Jul 0600	70.18	94.46	471	512	3.42
USAF (1965-62B)	Van A/A-D	3 Aug 1912	107.36	94.78	501	515	2.87

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Life-time (years)
		1966					
USAF (1966-02A)	Van A/A-D	19 Jan 2010	93.86	88.72	150	269	6 days
USAF (1966-09A)	Van LTTAT/A-D	9 Feb 2010	82.09	94.83	508	512	3.63
USAF (1966-22A)	Van A/A-D	18 Mar 2024	100.95	89.30	162	308	5 days
USAF (1966-39B)	Van A/A-D	19 Apr 1912	109.94	95.39	517	559	5
USAF (1966-48B)	Van A/A-D	3 Jun 1926	86.97	88.70	136	281	5.43 days
USAF (1966-74B)	Van A/A-D	16 Aug 1929	93.17	94.99	510	524	3.5
USAF (1966-83B)	Van A/A-D	16 Sep 1800	94.06	94.25	460	501	1.65
USAF (1966-98B)	Van A/A-D	2 Nov 2024	91.00	89.86	208	324	13.71 days
USAF (1966-118A)	Van LTTAT/A-D	29 Dec 1200	75.03	94.41	486	496	2.50
		1967					
USAF (1967-43B)	Van TAT/A-D	9 May 2150	85.10	98.38	555	809	50
USAF (1967-50B)	Van A/A-D	22 May 1829	91.49	88.42	148	240	4.9 days
USAF (1967-53E)	Van Th/A-D	31 May 0936	69.91	103.35	916	921	500
USAF (1967-53G)	Van Th/A-D	31 May 0926	69.91	103.40	915	927	500
USAF (1967-53H)	Van Th/A-D	31 May 0936	69.91	103.39	915	926	500
USAF (1967-62B)	Van LTTAT/A-D	16 Jun 2136	80.20	94.51	501	517	1.35
USAF (1967-71A)	Van LTTAT/A-D	25 Jul 0350	75.03	94.30	458	513	1.87
USAF (1967-109B)	Van LTTAT/A-D	2 Nov 2136	81.68	94.41	455	524	1.4
		1968					
USAF (1968-04A)	Van LTTAT/A-D	17 Jan 1005	75.16	94.53	450	546	2.5
USAF (1968-08B)	Van LTTAT/A-D	24 Jan 2219	81.65	94.75	473	542	2.2
USAF (1968-20B)	Van LTTAT/A-D	14 Mar 2245	83.09	94.66	481	522	1.81
USAF (1968-52B)	Van LTTAT/A-D	20 Jun 2150	85.18	94.15	437	519	1.56
USAF (1968-78A)	Van LTTAT/A-D	18 Sep 2136	83.22	94.75	500	514	1.03
USAF (1968-86A)	Van LTTAT/A-D	5 Oct 1117	74.97	94.55	483	511	3
USAF (1968-112B)	Van LTTAT/A-D	12 Dec 2219	80.33	114.45	1 391	1 468	10 000

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime (years)
		1969					
USAF (1969-10B)	Van LTTAT/A-D	5 Feb 2248	80.41	114.22	1 396	1 441	10 000
USAF (1969-26B)	Van LTTAT/A-D	19 Mar 2136	83.08	94.82	504	513	2.72
USAF (1969-41B)	Van LTTAT/A-D	2 May 0155	65.71	93.37	401	473	0.79
USAF (1969-65A)	Van LTTAT/A-D	31 Jul 1005	75.02	94.67	462	541	6
USAF (1969-79B)	Van LTTAT/A-D	22 Sep 2107	85.16	94.51	490	496	1.65
USAF[b] (1969-82A)	Van LTTAT/A-D	30 Sep 1341	69.65	93.91	446	484	1.09
		1970					
USAF (1970-16B)	Van LTTAT/A-D	4 Mar 2219	88.14	94.16	442	514	1.68
USAF (1970-40B)	Van LTTAT/A-D	20 May 2136	83.12	94.59	491	503	4
USAF (1970-66A)	Van LTTAT/A-D	26 Aug 1005	74.99	94.51	484	504	4
USAF (1970-98B)	Van LTTAT/A-D	18 Nov 2122	83.18	94.63	487	511	4
		1971					
USAF (1971-60A)	Van LTTAT/A-D	16 Jul 1048	75.00	94.59	488	508	5
USAF (1971-76B)	Van LTTAT/A-D	10 Sep 2136	75.07	94.60	492	507	3
USAF[b] (1971-110A)	Van LTTAT/A-D	14 Dec 1214	70.00	104.93	983	999	700
		1972					
USAF (1972-02D)	Van T-3D	20 Jan 1836	96.59	94.86	472	549	3
USAF (1972-52C)	Van T-3D	7 Jul 1746	96.15	94.66	497	504	3

[a] See footnote *a* to table 3A.1.
[b] Several other satellites were launched with these; it is possible that the others may also have been electronic reconnaissance satellites.

Table 3A.3. US MIDAS, Vela and early-warning satellites

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime (years)
MIDAS series							
		1960					
MIDAS 2 (1960 ξ1)	Cape Ken A/A-A	24 May 1731	33.0	94.44	484	511	20

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime (years)
Discoverer 19 (1960 τ)	Van Th/A-B	20 Dec 2238	83.40	93.00	209	631	32.2
		1961					
Discoverer 21 (1961 ζ)	Van Th/A-B	18 Feb 2248	80.74	97.85	240	1 069	426
MIDAS 3 (1961 σ1)	Van A/A-B	12 Jul 1619	91.2	161.54	3 358	3 534	100 000
MIDAS 4 (1961 αδ1)	Van A/A-B	12 Oct 1961	95.89	166.01	3 496	3 756	100 000
		1962					
MIDAS 5 (1962 κ1)	Van A/A-B	9 Apr 1550	86.68	153.03	2 814	3 382	100 000
		1963					
MIDAS 6 (1963-14A)	Van A/A-B	9 May 2010	87.42	166.48	3 604	3 680	100 000
MIDAS 7 (1963-30A)	Van A/A-B	19 Jul 0350	88.41	168.00	3 670	3 727	100 000
		1966					
USAF (1966-77A)	Van A/A-D	19 Aug 1926	90.07	167.59	3 680	3 700	100 000
USAF (1966-89A)	Van A/A-D	5 Oct 2248	90.20	167.63	3 682	3 702	100 000
Vela series							
		1963					
Vela 1 (1963-39A)	Cape Ken A/A-D	17 Oct 0224	38.3	6 270	102 098	111 137	$>10^6$
Vela 2 (1963-39C)	Cape Ken A/A-D	17 Oct 0224	37.8	6 370	99 300	115 800	$>10^6$
		1964					
Vela 3 (1964-40A)	Cape Ken A/A-D	17 Jul 0824	39.58	6 022.6	101 959	104 591	$>10^6$
Vela 4 (1964-40B)	Cape Ken A/A-D	17 Jul 0824	40.88	6 007.0	94 436	111 775	$>10^6$
		1965					
Vela 5 (1965-58A)	Cape Ken A/A-D	20 Jul 0824	35.27	5 148.16	88 534	96 238	$>10^6$
Vela 6 (1965-58B)	Cape Ken A/A-D	20 Jul 0824	34.99	6 726.4	101 859	121 453	$>10^6$
		1967					
Vela 7 (1967-40A)	Cape Ken T-3C	28 Apr 1005	30.06	667.8	107 337	114 612	$>10^6$
Vela 8 (1967-40B)	Cape Ken T-3C	28 Apr 1005	30.06	6 671.8	107 337	114 612	$>10^6$

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime (years)
		1969					
Vela 9 (1969-46D)	Cape Ken T-3C	23 May 0755	32.8	6 703	110 900	112 210	$>10^6$
Vela 10 (1969-46E)	Cape Ken T-3C	23 May 0755	32.8	6 709	110 920	112 283	$>10^6$
		1970					
Vela 11 (1970-27A)	Cape Ken T-3C	8 Apr 1104	32.41	6 729	111 210	112 160	$>10^6$
Vela 12 (1970-27B)	Cape Ken T-3C	8 Apr 1104	32.52	6 745	111 500	112 210	$>10^6$
Early warning series							
		1966					
USAF (1966-51A)	Van A/A-D	9 Jun 2010	90.05	124.89	174	3616	176 days
		1968					
USAF (1968-63A)	Cape Ken A/A	6 Aug 1117	9.9	1 436	31 680	39 860	$>10^6$
		1969					
BMEWS 2 (1969-36A)	Cape Ken A/A-D	13 Apr 0224	9.9	1 445	32 670	39 270	$>10^6$
		1970					
BMEWS 3 (1970-46A)	Cape Ken A/A-D	19 Jun 1131	28.21	588.85	178	33 685	3
BMEWS 4 (1970-69A)	Cape Ken A/A-D	1 Sep 0058	9.9	1 436	31 680	39 860	$>10^6$
IMEWS 1 (1970-93A)	Cape Ken T-3C	6 Nov 1083	7.8	1 197.1	26 050	35 886	$>10^6$
		1971					
IMEWS 2 (1971-39A)	Cape Ken T-3C	5 May 0755	0.87	1 434	35 651	35 840	$>10^6$
		1972					
IMEWS 3 (1972-10A)	Cape Ken T-3C	1 Mar 0938	0.87	1 434	35 678	35 871	$>10^6$
USAF (1972-101A)	Cape Ken A/A-D	20 Dec ...	98.0	480.0	14 000	14 000	400 000

[a] See footnote *a* to table 3A.1.

Table 3A.4. US photographic reconnaissance satellites: summary

Orbital inclination:	60°	64–66°	69–71°	73–76°	79–85°	87–90°	91–97°	99–104°	106–112°	114–117°	Total
Year											
1959	—	—	—	—	4	2	—	—	—	—	6
1960	—	—	—	—	6	—	—	—	—	—	6
1961	—	—	—	—	11	1	1	—	—	—	13
1962	—	4	3	8	6	1	3	—	—	—	25
1963	—	1	1	5	5	1	3	1	—	—	17
1964	—	—	2	3	8	—	7	2	—	2	24
1965	—	—	1	6	5	—	5	1	3	—	21
1966	—	1	—	3	2	3	7	4	2	1	23
1967	—	—	—	—	9	—	1	2	6	—	18
1968	—	—	—	—	8	—	—	1	7	—	16
1969	—	1	—	1	4	—	1	—	5	—	12
1970	1	—	—	—	2	1	—	—	5	—	9
1971	—	—	—	1	1	—	1	—	4	—	7
1972	—	—	—	—	1	—	4	—	3	—	8
Total	**1**	**7**	**7**	**27**	**72**	**9**	**33**	**11**	**35**	**3**	**205**

Table 3A.5. US electronic reconnaissance satellites: summary

Orbital inclination:	65°	70°	75°	80–83°	85°	88–90°	91–97°	99–101°	107–110°	Total
Year										
1962	—	2	—	2	—	—	—	—	—	4
1963	1	1	—	3	—	1	—	1	—	7
1964	—	2	—	3	—	—	3	—	—	8
1965	—	2	—	—	—	—	1	—	2	5
1966	—	—	1	1	1	—	4	1	1	9
1967	—	3	1	2	1	—	1	—	—	8
1968	—	—	2	4	1	—	—	—	—	7
1969	1	1	1	2	1	—	—	—	—	6
1970	—	—	1	2	—	1	—	—	—	4
1971	—	1	2	—	—	—	—	—	—	3
1972	—	—	—	—	—	—	2	—	—	2
Total	**2**	**12**	**8**	**19**	**4**	**2**	**11**	**2**	**3**	**63**

Table 3A.6. US MIDAS, Vela and early-warning satellites: summary

	MIDAS					Vela			Early-warning				
Orbital inclination:	33°	81–83°	87–90°	91–96°	Total	30–35°	37–41°	Total	0.87°	7–10°	28°	90–98°	Total
Year													
1960	1	1	—	—	2	—	—	—	—	—	—	—	—
1961	—	1	—	2	3	—	—	—	—	—	—	—	—
1962	—	—	1	—	1	—	—	—	—	—	—	—	—
1963	—	—	2	—	2	—	2	2	—	—	—	—	—
1964	—	—	2	—	2	—	2	2	—	—	—	—	—
1965	—	—	—	—	—	2	—	2	—	—	—	—	—
1966	—	—	—	—	—	—	—	—	—	—	—	1	1
1967	—	—	—	—	—	2	—	2	—	—	—	—	—
1968	—	—	—	—	—	—	—	—	—	1	—	—	1
1969	—	—	—	—	—	2	—	2	—	1	—	—	1
1970	—	—	—	—	—	2	—	2	—	2	1	—	3
1971	—	—	—	—	—	—	—	—	1	—	—	—	1
1972	—	—	—	—	—	—	—	—	1	—	—	1	2
Total	**1**	**2**	**5**	**2**	**10**	**8**	**4**	**12**	**2**	**4**	**1**	**2**	**9**

Table 3B.1. Soviet photographic reconnaissance satellites

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime (days)	Whether recovered[c]
		1962						
Cosmos 4 (1962 ξ 1)	TT A-1	26 Apr 1005	65.0	90.6	282	317	3.0	Yes
Cosmos 7 (1962 $\alpha\iota$ 1)	TT A-1	28 Jul 0922	64.95	90.08	197	356	4.0	?
Cosmos 9 (1962 $\alpha\omega$ 1)	TT A-1	27 Sep 0936	65.0	90.9	292	346	4.0	?
Cosmos 10 (1962 $\beta\zeta$ 1)	TT A-1	17 Oct 0922	65.0	90.2	197	367	4.0	?
Cosmos 12 (1962 $\beta\omega$ 1)	TT A-1	22 Dec 0922	65.00	90.45	198	392	7.9	?
		1963						
Cosmos 13 (1963-06A)	TT A-1	21 Mar 0824	64.97	89.77	192	324	8.0	?
Cosmos 15 (1963-11A)	TT A-1	22 Apr 0824	65.00	89.77	160	358	5.0	?
Cosmos 16 (1963-12A)	TT A-1	28 Apr 0936	65.02	90.4	194	388	9.9	?
Cosmos 18 (1963-18A)	TT A-1	24 May 1048	65.0	89.3	196	288	9.0	?
Cosmos 20 (1963-40B)	TT A-1	18 Oct 0936	64.9	89.6	205	302	10.0	?
Cosmos 22 (1963-45A)	TT A-2	16 Nov 1048	64.93	90.30	192	381	6.0	?
Cosmos 24 (1963-52A)	TT A-1	19 Dec 0922	65.03	90.51	204	391	8.9	?
		1964						
Cosmos 28 (1964-17A)	TT A-1	4 Apr 0936	65.04	90.37	213	373	7.9	?
Cosmos 29 (1964-21A)	TT A-1	25 Apr 1019	65.01	89.50	203	296	7.9	Yes
Cosmos 30 (1964-23A)	TT A-2	18 May 0950	64.87	90.28	206	366	7.9	?
Cosmos 32 (1964-29A)	TT A-1	10 Jun 1048	51.24	89.76	213	319	7.99	Yes
Cosmos 33 (1964-33A)	TT A-1	23 Jun 1019	65.0	89.5	209	293	7.93	?
Cosmos 34 (1964-34A)	TT A-2	1 Jul 1117	64.89	89.98	202	348	7.93	?
Cosmos 35 (1964-39A)	TT A-1	15 Jul 1131	51.24	89.2	218	258	7.92	?
Cosmos 37 (1964-44A)	TT A-1	14 Aug 0936	64.92	89.41	207	287	7.9	?
Cosmos 45 (1964-55A)	TT A-2	13 Sep 0950	64.89	89.68	207	313	4.9	Yes
Cosmos 46 (1964-59A)	TT A-1	24 Sep 1200	51.25	89.22	211	264	8.02	?
Cosmos 48 (1964-66A)	TT A-1	14 Oct 0950	65.08	89.32	204	284	5.96	?
Cosmos 50 (1964-70A)	TT A-1	28 Oct 1048	51.23	88.67	190	230	8.0	No[b]
		1965						
Cosmos 52 (1965-01A)	TT A-1	11 Jan 0936	65.00	89.50	203	298	7.89	?

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime (days)	Whether recovered[e]
Cosmos 59 (1965-15A)	TT A-2	7 Mar 0907	64.97	89.78	217	310	7.92	?
Cosmos 64 (1965-25A)	TT A-1	25 Mar 1005	64.98	89.17	201	267	7.92	Yes
Cosmos 65 (1965-29A)	TT A-2	17 Apr 0950	65.00	89.75	207	319	7.94	Yes
Cosmos 66 (1965-35A)	TT A-1	7 May 0950	65.01	89.33	202	282	7.9	?
Cosmos 67 (1965-40A)	TT A-2	25 May 1048	51.81	89.89	200	346	7.99	Yes
Cosmos 68 (1965-46A)	TT A-1	15 Jun 1005	65.02	89.82	209	315	7.9	?
Cosmos 69 (1965-49A)	TT A-2	25 Jun 0950	64.89	89.65	212	305	7.91	?
Cosmos 77 (1965-61A)	TT A-2	3 Aug 1102	51.79	89.29	201	280	7.93	?
Cosmos 78 (1965-66A)	TT A-1	14 Aug 1117	68.92	89.75	218	298	7.89	?
Cosmos 79 (1965-69A)	TT A-2	25 Aug 1019	64.90	89.94	205	338	7.90	?
Cosmos 85 (1965-71A)	TT A-2	9 Sep 0936	64.90	89.53	204	297	7.89	?
Cosmos 91 (1965-74A)	TT A-2	23 Sep 0907	64.48	89.76	204	324	7.91	Yes
Cosmos 92 (1965-83A)	TT A-2	16 Oct 0810	64.97	89.85	201	334	7.94	Yes
Cosmos 94 (1965-85A)	TT A-2	28 Oct 0824	64.96	89.23	205	271	7.93	?
Cosmos 98 (1965-97A)	TT A-1	27 Nov 0824	65.05	92.07	205	547	8.0	?
Cosmos 99 (1965-103A)	TT A-1	10 Dec 0810	64.99	89.61	203	309	7.90	?
		1966						
Cosmos 104 (1966-01A)	TT A-1	7 Jan 0824	65.00	90.22	193	380	7.90	?
Cosmos 105 (1966-03A)	TT A-1	22 Jan 0838	65.01	89.64	204	310	7.90	?
Cosmos 107 (1966-10A)	TT A-1	10 Feb 0853	64.97	89.64	204	310	7.90	?
Cosmos 109 (1966-14A)	TT A-2	19 Feb 0853	64.94	89.48	202	295	7.91	?
Cosmos 112 (1966-21A)	PL A-1	17 Mar 1033	72.07	92.09	207	545	7.79	?
Cosmos 113 (1966-23A)	TT A-2	21 Mar 0936	64.94	89.71	207	313	7.92	?
Cosmos 114 (1966-28A)	PL A-2	6 Apr 1146	72.94	90.06	210	343	7.81	Yes
Cosmos 115 (1966-33A)	TT A-1	20 Apr 1048	65.00	89.44	201	294	7.93	?
Cosmos 117 (1966-37A)	TT A-1	6 May 1102	64.93	89.55	205	298	7.89	?
Cosmos 120 (1966-50A)	TT A-2	8 Jun 1102	51.80	89.37	205	285	7.94	?
Cosmos 121 (1966-54A)	PL A-2	17 Jun 1102	72.83	89.86	200	333	7.80	?
Cosmos 124 (1966-64A)	TT A-2	14 Jul 1033	51.78	89.41	205	286	7.95	?

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime (days)	Whether recovered[e]
Cosmos 126 (1966-68A)	TT A-2	28 Jul 1048	51.79	89.99	204	350	8.94	Yes
Cosmos 127 (1966-71A)	TT A-2	8 Aug 1117	51.83	89.13	201	267	7.93	Yes
Cosmos 128 (1966-79A)	TT A-2	27 Aug 0950	64.99	89.81	213	319	7.87	?
Cosmos 129 (1966-91A)	PL A-1	14 Oct 1214	64.65	89.45	180	312	6.75	?
Cosmos 130 (1966-93A)	TT A-2	20 Oct 0853	64.95	89.71	208	314	7.91	?
Cosmos 131 (1966-105A)	PL A-2	12 Nov 0950	72.86	89.94	204	337	7.81	?
Cosmos 132 (1966-106A)	TT A-1	19 Nov 0810	65.02	89.37	210	276	8.00	?
Cosmos 134 (1966-108A)	TT A-2	3 Dec 0810	64.98	89.46	201	294	7.90	?
Cosmos 136 (1966-115A)	PL A-1	19 Dec 1200	64.68	89.17	188	280	7.75	?
		1967						
Cosmos 138 (1967-04A)	PL A-1	19 Jan 1243	64.55	89.15	191	273	8.50	?
Cosmos 141 (1967-12A)	PL A-2	8 Feb 1019	72.85	89.74	205	316	7.79	Yes
Cosmos 143 (1967-17A)	TT A-1	27 Feb 0824	64.99	89.53	204	297	7.89	?
Cosmos 147 (1967-22A)	PL A-1	13 Mar 1214	64.57	89.42	195	301	7.76	?
Cosmos 150 (1967-25A)	PL A-2	22 Mar 1243	65.64	90.04	204	350	7.75	Yes
Cosmos 153 (1967-30A)	PL A-1	4 Apr 1355	64.59	89.26	199	279	7.74	?
Cosmos 155 (1967-33A)	TT A-2	12 Apr 1102	51.80	89.11	193	272	7.98	Yes
Cosmos 157 (1967-44A)	TT A-1	12 May 1033	51.26	89.60	249	262	7.93	?
Cosmos 161 (1967-49A)	PL A-2	22 May 1355	65.64	89.71	201	321	7.79	Yes
Cosmos 162 (1967-54A)	TT A-2	1 Jun 1048	51.81	89.19	196	275	7.99	?
Cosmos 164 (1967-57A)	PL A-2	8 Jun 1312	65.59	89.51	185	317	5.76	?
Cosmos 168 (1967-67A)	TT A-2	4 Jul 0600	51.81	89.05	198	264	7.98	?
Cosmos 172 (1967-78A)	TT A-2	9 Aug 0546	51.80	89.40	200	293	7.94	?
Cosmos 175 (1967-85A)	PL A-2	11 Sep 1033	72.93	90.20	211	358	7.82	Yes
Cosmos 177 (1967-88A)	TT A-2	16 Sep 0600	51.84	89.29	200	280	7.99	?
Cosmos 180 (1967-93A)	PL A-2	26 Sep 1019	72.89	90.04	208	341	7.82	?
Cosmos 181 (1967-97A)	PL A-2	11 Oct 1131	65.61	89.72	194	327	7.78	?
Cosmos 182 (1967-98A)	TT A-2	16 Oct 0755	64.99	89.90	210	330	7.93	Yes
Cosmos 190 (1967-110A)	PL A-2	3 Nov 1117	65.73	89.80	191	338	7.80	Yes

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime (days)	Whether recovered[e]
Cosmos 193 (1967-117A)	PL A-2	25 Nov 1131	65.63	89.85	202	335	7.74	?
Cosmos 194 (1967-119A)	PL A-2	3 Dec 1200	65.66	89.55	201	307	7.78	Yes
Cosmos 195 (1967-124A)	PL A-2	16 Dec 1200	65.65	90.10	207	353	7.76	?
		1968						
Cosmos 199 (1968-03A)	PL A-2	16 Jan 1200	65.63	90.15	204	364	16.49	No
Cosmos 201 (1968-09A)	TT A-2	6 Feb 0755	64.91	89.91	204	337	7.93	Yes
Cosmos 205 (1968-16A)	PL A-2	5 Mar 1229	65.66	89.40	199	292	7.76	?
Cosmos 207 (1968-21A)	PL A-2	16 Mar 1229	65.64	89.71	201	321	7.79	?
Cosmos 208 (1968-22A)	TT A-2	21 Mar 0950	64.95	89.35	208	274	11.85	Yes
Cosmos 210 (1968-24A)	PL A-2	3 Apr 1102	81.39	90.27	200	373	7.84	?
Cosmos 214 (1968-32A)	PL A-2	18 Apr 1033	81.40	90.25	200	373	7.96	?
Cosmos 216 (1968-34A)	TT A-2	20 Apr 1033	51.84	89.12	201	267	7.98	?
Cosmos 223 (1968-45A)	PL A-2	1 Jun 1102	72.86	89.85	200	333	7.80	Yes
Cosmos 224 (1968-46A)	TT A-2	4 Jun 0643	51.83	89.05	203	256	7.98	?
Cosmos 227 (1968-51A)	TT A-2	18 Jun 0614	51.81	89.06	190	269	7.99	Yes
Cosmos 228 (1968-53A)	TT A-2	21 Jun 1200	51.62	89.00	199	252	11.92	Yes
Cosmos 229 (1968-54A)	PL A-2	26 Jun 1102	72.87	89.85	207	327	7.79	Yes
Cosmos 231 (1968-58A)	TT A-2	10 Jul 1955	64.98	89.95	199	345	7.91	?
Cosmos 232 (1968-60A)	PL A-2	16 Jul 1312	65.32	89.85	189	348	7.73	Yes
Cosmos 234 (1968-62A)	TT A-2	30 Jul 0658	51.83	89.42	208	288	6.04	Yes
Cosmos 235 (1968-67A)	TT A-2	9 Aug 0658	51.81	89.27	201	281	7.95	?
Cosmos 237 (1968-71A)	PL A-2	27 Aug 1229	65.42	89.70	200	320	7.79	Yes
Cosmos 239 (1968-73A)	TT A-2	5 Sep 0658	51.80	89.17	203	269	7.99	?
Cosmos 240 (1968-75A)	TT A-2	14 Sep 0643	51.83	89.29	202	282	7.01	?
Cosmos 241 (1968-77A)	PL A-2	16 Sep 1229	65.42	89.73	202	322	7.79	Yes
Cosmos 243 (1968-80A)	TT A-2	23 Sep 0741	71.29	89.54	213	293	10.88	?
Cosmos 246 (1968-87A)	PL A-2	7 Oct 1214	65.37	89.18	149	321	4.76	Yes
Cosmos 247 (1968-88A)	PL A-2	11 Oct 1200	65.39	89.94	199	345	7.74	?
Cosmos 251[c] (1968-96A)	TT A-2	31 Oct 0907	64.87	88.99	201	250	18.09	?

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime (days)	Whether recovered[e]
Cosmos 253 (1968-102A)	PL A-2	13 Nov 1200	65.42	89.97	200	333	4.8	?
Cosmos 254 (1968-104A)	PL A-2	21 Nov 1214	65.40	89.85	197	335	7.72	?
Cosmos 255 (1968-105A)	PL A-2	29 Nov 1243	65.42	89.64	197	317	7.77	?
Cosmos 258 (1968-111A)	TT A-2	10 Dec 0824	64.98	89.59	205	298	7.9	?
		1969						
Cosmos 263 (1969-03A)	PL A-2	12 Jan 1214	65.43	89.74	200	325	7.72	?
Cosmos 264[c] (1969-08A)	TT A-2	23 Jan 0922	69.94	89.57	209	295	12.88	?
Cosmos 266 (1969-15A)	PL A-2	25 Feb 1019	72.90	89.90	202	336	7.90	?
Cosmos 267 (1969-17A)	TT A-2	26 Feb 0824	65.04	89.82	205	329	7.93	Yes
Cosmos 270 (1969-22A)	PL A-2	6 Mar 1214	65.43	89.81	200	331	7.74	Yes
Cosmos 271 (1969-23A)	PL A-2	15 Mar 1214	65.40	89.71	196	324	7.78	Yes
Cosmos 273 (1969-27A)	PL A-2	22 Mar 1214	65.43	89.78	198	329	7.73	Yes
Cosmos 274 (1969-28A)	TT A-2	24 Mar 1005	64.98	89.56	206	300	7.90	Yes
Cosmos 276 (1969-32A)	PL A-2	4 Apr 1019	81.36	90.25	200	371	7.90	Yes
Cosmos 278 (1969-34A)	PL A-2	9 Apr 1258	65.42	89.58	198	310	7.78	Yes
Cosmos 279 (1969-38A)	TT A-2	15 Apr 0824	51.74	89.04	192	267	7.98	Yes
Cosmos 280[c] (1969-40A)	TT A-2	23 Apr 1005	51.60	89.20	207	250	12.86	Yes
Cosmos 281 (1969-42A)	PL A-2	13 May 0922	65.42	89.43	191	303	7.74	Yes
Cosmos 282 (1969-44A)	PL A-2	20 May 0838	65.40	89.73	202	321	7.70	Yes
Cosmos 284 (1969-48A)	TT A-2	29 May 0658	51.76	89.45	205	294	7.95	Yes
Cosmos 286 (1969-52A)	PL A-2	15 Jun 0907	65.41	89.78	200	327	7.78	Yes
Cosmos 287 (1969-54A)	TT A-2	24 Jun 0658	51.77	88.95	188	264	7.96	Yes
Cosmos 288 (1969-55A)	TT A-2	27 Jun 0712	51.76	89.17	199	273	7.98	Yes
Cosmos 289 (1969-57A)	PL A-2	10 Jul 0907	65.40	89.64	194	325	4.8	?
Cosmos 290 (1969-60A)	PL A-2	22 Jul 1229	65.40	89.75	194	332	7.79	Yes
Cosmos 293 (1969-71A)	TT A-2	16 Aug 1200	51.77	89.08	208	256	11.93	Yes
Cosmos 294 (1969-72A)	PL A-2	19 Aug 1258	65.40	89.79	200	329	7.79	Yes
Cosmos 296 (1969-75A)	TT A-2	29 Aug 0907	64.95	89.59	207	302	7.90	Yes
Cosmos 297 (1969-76A)	PL A-2	2 Sep 1102	72.89	89.66	205	309	7.84	Yes

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime (days)	Whether recovered[e]
Cosmos 299 (1969-78A)	TT A-2	18 Sep 0838	64.97	89.41	207	284	3.98	Yes
Cosmos 301 (1969-81A)	PL A-2	24 Sep 1214	65.41	89.34	195	289	7.76	?
Cosmos 302 (1969-89A)	PL A-2	17 Oct 1146	65.41	89.69	198	321	7.78	Yes
Cosmos 306 (1969-93A)	TT A-2	24 Oct 0950	64.97	89.64	215	299	11.87	Yes
Cosmos 309 (1969-98A)	PL A-2	12 Nov 1131	65.40	89.99	185	364	7.75	?
Cosmos 310 (1969-100A)	TT A-2	15 Nov 0838	65.00	89.91	204	336	7.92	Yes
Cosmos 313 (1969-104A)	PL A-2	3 Dec 1326	65.40	89.07	198	259	11.73	Yes
Cosmos 317[c] (1969-109A)	PL A-2	23 Dec 1355	65.41	89.34	205	280	12.72	Yes
		1970						
Cosmos 318 (1970-01A)	TT A-2	9 Jan 0922	64.97	89.29	203	277	11.90	Yes
Cosmos 322 (1970-07A)	PL A-2	21 Jan 1200	65.41	89.65	195	319	7.78	Yes
Cosmos 323 (1970-10A)	PL A-2	10 Feb 1200	65.43	89.65	201	314	7.78	Yes
Cosmos 325 (1970-15A)	PL A-2	4 Mar 1214	65.39	89.77	200	327	7.79	Yes
Cosmos 326 (1970-18A)	PL A-2	13 Mar 0810	81.35	90.20	203	363	7.88	?
Cosmos 328[c] (1970-22A)	PL A-2	27 Mar 1146	72.87	89.54	203	299	12.77	Yes
Cosmos 329 (1970-23A)	PL A-2	3 Apr 0838	81.33	88.79	198	228	11.87	Yes
Cosmos 331 (1970-26A)	TT A-2	8 Apr 1019	65.02	89.77	206	320	7.92	Yes
Cosmos 333[c] (1970-30A)	PL A-2	15 Apr 0907	81.34	89.11	219	239	12.85	Yes
Cosmos 344 (1970-38A)	PL A-2	12 May 1019	72.90	89.83	202	329	7.85	Yes
Cosmos 345 (1970-39A)	TT A-2	20 May 0922	51.75	89.06	192	270	7.98	Yes
Cosmos 346 (1970-42A)	TT A-2	10 Jun 0936	51.74	89.16	197	274	7.00	Yes
Cosmos 349 (1970-45A)	PL A-2	17 Jun 1258	65.39	89.81	199	332	7.79	Yes
Cosmos 350 (1970-50A)	TT A-2	26 Jun 1200	51.73	89.04	202	258	11.93	Yes
Cosmos 352 (1910-52A)	TT A-2	7 Jul 1033	51.78	89.46	207	294	7.95	Yes
Cosmos 353 (1970-53A)	PL A-2	9 Jul 1341	65.42	89.38	204	284	11.72	Yes
Cosmos 355 (1970-58A)	PL A-2	7 Aug 0936	65.40	89.71	199	322	7.78	Yes
Cosmos 360[c] (1970-68A)	TT A-2	29 Aug 0838	64.99	89.64	209	305	9.93	?
Cosmos 361[c] (1970-71A)	PL A-2	8 Sep 1033	72.87	89.59	209	298	12.8	?
Cosmos 363 (1970-74A)	TT A-2	17 Sep 0824	65.01	89.53	208	294	11.86	?

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime (days)	Whether recovered[e]
Cosmos 364[c] (1970-75A)	PL A-2	22 Sep 1258	65.41	89.49	202	297	9.76	Yes
Cosmos 366 (1970-78A)	TT A-2	1 Oct 0824	64.96	89.48	204	295	11.90	Yes
Cosmos 368 (1970-80A)	TT A-2	8 Oct 1243	64.99	90.56	204	400	5.98	Yes
Cosmos 370[c] (1970-82A)	TT A-2	9 Oct 1102	64.92	89.40	202	288	12.84	Yes
Cosmos 376[c] (1970-92A)	PL A-2	30 Oct 1326	65.38	89.43	207	286	12.71	Yes
Cosmos 377 (1970-96A)	TT A-2	11 Nov 0922	64.99	89.40	204	286	11.90	?
Cosmos 383[c] (1970-104A)	PL A-2	3 Dec 1355	65.41	89.33	204	279	12.69	Yes
Cosmos 384 (1970-105A)	PL A-2	10 Dec 1117	72.88	89.46	203	292	11.80	Yes
Cosmos 386[c] (1970-110A)	TT A-2	15 Dec 1005	64.99	89.40	215	276	12.90	?
		1971						
Cosmos 390 (1971-01A)	TT A-2	12 Jan 0936	65.01	89.28	204	275	12.83	Yes
Cosmos 392 (1971-04A)	TT A-2	21 Jan 0838	64.99	89.32	204	278	11.83	?
Cosmos 396[c] (1971-14A)	PL A-2	18 Feb 1410	65.42	89.40	205	286	12.70	Yes
Cosmos 399[c] (1971-17A)	TT A-2	3 Mar 0936	65.00	89.34	201	283	13.84	?
Cosmos 401[c] (1971-23A)	PL A-2	27 Mar 1102	72.83	89.26	185	290	12.81	Yes
Cosmos 403 (1971-26A)	PL A-2	2 Apr 0824	81.34	88.96	214	230	11.80	?
Cosmos 406[c] (1971-29A)	PL A-2	14 Apr 0810	81.31	89.16	217	246	9.90	?
Cosmos 410 (1971-40A)	TT A-2	6 May 0629	64.96	89.35	205	280	11.90	?
Cosmos 420[c] (1971-43A)	TT A-2	18 May 0810	51.75	89.00	199	257	10.93	Yes
Cosmos 424 (1971-48A)	PL A-2	28 May 1033	65.40	89.36	204	282	12.71	Yes
Cosmos 427[c] (1971-55A)	PL A-2	11 Jun 1005	72.84	89.74	204	314	11.80	?
Cosmos 428 (1971-57A)	TT A-2	24 Jun 0810	51.76	89.07	206	257	11.93	Yes
Cosmos 429[c] (1971-61A)	TT A-2	20 Jul 1005	51.76	88.98	202	252	12.90	?
Cosmos 430[c] (1971-62A)	PL A-2	23 Jul 1102	65.41	89.54	199	305	12.70	?
Cosmos 431 (1971-65A)	TT A-2	30 Jul 0838	51.77	88.95	194	257	11.91	Yes
Cosmos 432[c] (1971-66A)	TT A-2	5 Aug 1005	51.74	88.97	194	259	12.91	Yes
Cosmos 438[c] (1971-77A)	PL A-2	14 Sep 1258	65.40	89.54	208	296	12.72	?
Cosmos 439 (1971-78A)	PL A-2	21 Sep 1200	65.41	89.28	203	275	6.46	?
Cosmos 441[c] (1971-81A)	TT A-2	28 Sep 0741	65.03	89.02	206	247	15.09	?

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime (days)	Whether recovered[e]
Cosmos 442 (1971-84A)	PL A-2	29 Sep 1131	72.86	89.47	182	313	12.75	?
Cosmos 443 (1971-85A)	PL A-2	7 Oct 1229	65.40	89.55	204	301	11.67	?
Cosmos 452[c] (1971-88A)	TT A-2	14 Oct 0907	64.97	89.07	198	260	12.83	?
Cosmos 454[c] (1971-94A)	PL A-2	2 Nov 1424	65.42	89.14	203	262	13.70	?
Cosmos 456[c] (1971-98A)	PL A-2	19 Nov 1200	72.86	89.34	178	304	12.80	?
Cosmos 463[c] (1971-107A)	TT A-2	6 Dec 0950	64.97	89.24	202	273	4.96	?
Cosmos 464[c] (1971-108A)	PL A-2	10 Dec 1102	72.84	90.34	206	375	5.80	?
Cosmos 466[c] (1971-112A)	TT A-2	16 Dec 0950	65.01	89.39	209	280	10.90	?
Cosmos 470[c] (1971-118A)	PL A-2	27 Dec 1410	65.42	89.03	194	260	9.76	?
		1972						
Cosmos 471[c] (1972-01A)	TT A-2	12 Jan 1005	64.99	89.66	201	317	13	?
Cosmos 473 (1972-06A)	TT A-2	3 Feb 0845	65.01	89.68	205	314	12	Yes
Cosmos 474[c] (1972-08A)	TT A-2	16 Feb 0936	64.97	89.79	214	317	13	?
Cosmos 477 (1972-13A)	PL A-2	4 Mar 1005	72.85	89.60	201	295	12	?
Cosmos 478[c] (1972-15A)	PL A-2	15 Mar 1300	65.39	89.48	205	295	13	?
Cosmos 483[c] (1972-24A)	PL A-2	3 Apr 1020	72.81	89.74	209	314	12	Yes
Cosmos 484 (1972-26A)	PL A-2	6 Apr 0805	81.30	88.73	196	224	12	Yes
Intercosmos 6[d] (1972-27A)	TT A-1	7 Apr 1005	51.78	88.94	203	248	4	Yes
Cosmos 486[c] (1972-30A)	PL A-2	14 Apr 0805	81.33	88.64	179	234	13	?
Cosmos 488[c] (1972-34A)	PL A-2	5 May 1133	65.41	89.50	208	303	13	?
Cosmos 490 (1972-36A)	PL A-2	17 May 1025	65.42	89.39	205	285	12	?
Cosmos 491[c] (1972-38A)	TT A-2	15 May 0640	64.98	88.95	177	269	14	?
Cosmos 492[c] (1972-40A)	TT A-2	9 Jun 0712	65.96	89.77	205	324	13	Yes
Cosmos 493[c] (1972-42A)	TT A-2	21 Jun 0635	65.0	89.25	203	275	12	Yes
Cosmos 495[c] (1972-44A)	PL A-2	23 Jun 1126	65.4	88.3	206	298	13	?
Cosmos 499[c] (1972-51A)	TT A-2	6 Jul 1048	51.77	89.31	204	283	10.8	Yes
Cosmos 502[c] (1972-55A)	PL A-2	13 Jul 1424	65.38	89.06	209	249	14	?
Cosmos 503[c] (1972-56A)	PL A-2	19 Jul 1355	65.43	89.40	202	288	12.70	Yes
Cosmos 512 (1972-59A)	PL A-2	28 Jul 1019	65.39	89.25	203	273	11.7	?

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime (days)	Whether recovered[e]
Cosmos 513[c] (1972-60A)	TT A-2	2 Aug 0824	64.97	89.73	203	320	12.9	Yes
Cosmos 517 (1972-67A)	TT A-2	30 Aug 0824	64.98	89.42	204	288	11.9	Yes
Cosmos 518 (1972-70A)	PL A-2	15 Sep 0936	72.84	89.64	204	307	8.85	Yes
Cosmos 519[c] (1972-71A)	TT A-2	16 Sep 0824	71.33	90.19	207	360	9.90	Yes
Cosmos 522[c] (1972-77A)	PL A-2	4 Oct 1200	72.83	89.74	206	316	12.78	?
Cosmos 525 (1972-83A)	PL A-2	18 Oct 1200	65.39	89.25	207	269	10.71	?
Cosmos 527[c] (1972-86A)	PL A-2	31 Oct 1341	65.37	89.62	207	306	12.7	?
Cosmos 537 (1972-93A)	TT A-2	25 Nov 0907	64.95	89.59	204	305	11.8	?
Cosmos 538[c] (1972-99A)	PL A-2	14 Dec 1355	65.4	89.4	205	283	12.7	?
Cosmos 541 (1972-105A)	PL A-2	27 Dec 1033	81.3	90.2	221	346	11.9	Yes

[a] See footnote *a* to table 3A.1.
[b] According to C. S. Sheldon the satellite was probably recovered, whereas RAE tables suggest that the satellite broke up.
[c] Manoeuvrable satellite.
[d] Included because its orbital characteristics were similar to those of photographic reconnaissance satellites, and its telemetry was in most respects identical to that of satellites which are normally recovered after 12 days but which do not manoeuvre.
[e] See footnote *b* to table 3A.1.

Table 3B.2. Possible Soviet electronic reconnaissance satellites

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime
		1967					
Cosmos 148 (1967-23A)	PL B-1	16 Mar 1746	71.00	91.26	270	404	51.77 days
Cosmos 152 (1967-28A)	PL B-1	25 Mar 0658	70.98	92.13	272	488	132.88 days
Cosmos 173 (1967-81A)	PL B-1	24 Aug 0502	71.03	92.10	277	480	115.53 days
Cosmos 189 (1967-108A)	PL C-1	30 Oct 1800	74.01	95.57	524	565	20 years
Cosmos 191 (1967-115A)	PL B-1	21 Nov 1424	70.96	92.16	267	497	102.37 days
		1968					
Cosmos 200 (1968-06A)	PL C-1	19 Jan 2205	74.03	95.23	523	537	10 years
Cosmos 204 (1968-15A)	PL B-1	5 Mar 1117	70.99	95.81	275	844	362.45 days
Cosmos 222 (1968-44A)	PL B-1	30 May 2024	70.91	92.28	285	488	134 days
Cosmos 242 (1968-79A)	PL B-1	20 Sep 1438	70.97	91.29	272	406	53.69 days
Cosmos 245 (1968-83A)	PL B-1	3 Oct 1258	70.98	92.12	284	473	104.45 days
Cosmos 250 (1968-95A)	PL C-1	31 Oct 2205	74.02	95.30	522	542	40 years
Cosmos 257 (1968-107A)	PL B-1	3 Dec 1453	70.94	91.97	286	462	91.54 days
		1969					
Cosmos 265 (1969-12A)	PL B-1	7 Feb 1410	71.01	91.89	275	458	82.5 days
Cosmos 269 (1969-21A)	PL C-1	5 Mar 1731	74.05	95.34	525	543	10 years
Cosmos 275 (1969-31A)	PL B-1	28 Mar 1605	70.98	95.18	273	780	315.61 days
Cosmos 277 (1969-33A)	PL B-1	4 Apr 1258	70.95	91.90	268	466	92.57 days
Cosmos 285 (1969-49A)	PL B-1	3 Jun 1258	71.03	92.16	267	493	126.09 days
Cosmos 295 (1969-73A)	PL B-1	22 Aug 1424	71.01	91.95	270	469	101.15 days
Cosmos 303 (1969-90A)	PL B-1	18 Oct 1005	70.99	91.91	270	466	97.41 days
Cosmos 308 (1969-96A)	PL B-1	4 Nov 1200	71.02	91.34	271	408	60.99 days
Cosmos 311 (1969-102A)	PL B-1	24 Nov 1102	71.04	91.99	273	469	105.80 days
Cosmos 314 (1969-106A)	PL B-1	11 Dec 1258	71.01	91.93	272	465	100.63 days
Cosmos 315 (1969-107A)	PL C-1	20 Dec 0336	74.04	95.26	518	542	10 years
		1970					
Cosmos 324 (1970-14A)	PL B-1	27 Feb 1731	71.03	91.97	275	466	84.53 days
Cosmos 327 (1970-20A)	PL B-1	19 Mar 1438	70.95	95.65	280	819	306.41 days

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Life-time
Cosmos 330 (1970-24A)	PL C-1	7 Apr 1117	74.06	95.22	514	543	8 years
Cosmos 334 (1970-33A)	PL B-1	23 Apr 1326	70.92	92.10	272	482	108.39 days
Cosmos 351 (1970-51A)	PL B-1	27 Jun 0741	70.99	91.93	270	467	108.15 days
Cosmos 357 (1970-63A)	PL B-1	19 Aug 1507	70.99	92.04	272	476	97.30 days
Cosmos 362 (1970-73A)	PL B-1	16 Sep 1200	70.96	95.65	270	829	392.4 days
Cosmos 369 (1970-81A)	PL B-1	8 Oct 1507	70.93	92.32	269	506	106.2 days
Cosmos 387 (1970-111A)	PL C-1	16 Dec 0434	74.01	95.31	528	538	10 years
Cosmos 388 (1970-112A)	PL B-1	18 Dec 0936	70.95	92.32	271	505	143.40 days
		1971					
Cosmos 391 (1971-02A)	PL B-1	14 Jan 1200	70.91	95.81	267	803	402.57 days
Cosmos 393 (1971-07A)	PL B-1	26 Jan 1243	71.03	92.13	272	485	140.86 days
Cosmos 395 (1971-13A)	PL C-1	18 Feb 2107	74.04	95.41	529	546	7 years
Cosmos 421 (1971-44A)	PL B-1	19 May 1019	70.96	91.99	273	469	172.75 days
Cosmos 423 (1971-47A)	PL B-1	27 May 1200	71.03	92.15	272	487	183.16 days
Cosmos 425 (1971-50A)	PL C-1	29 May 0350	74.03	95.24	506	553	7 years
Cosmos 435 (1971-72A)	PL B-1	27 Aug 1102	70.96	92.09	271	482	153.6 days
Cosmos 436 (1971-74A)	PL C-1	7 Sep 0126	74.04	95.18	509	545	6 years
Cosmos 437 (1971-75A)	PL C-1	10 Sep 0350	74.05	95.31	519	548	7 years
Cosmos 440 (1971-79A)	PL B-1	24 Sep 1034	71.00	95.21	272	785	1 year
Cosmos 453 (1971-90A)	PL B-1	19 Oct 1243	71.00	92.19	271	493	151.55 days
Cosmos 455 (1971-97A)	PL B-1	17 Nov 1117	71.00	92.19	272	491	143.55 days
Cosmos 458 (1971-101A)	PL B-1	29 Nov 1019	70.96	92.25	272	497	142.90 days
Cosmos 460 (1971-103A)	PL C-1	30 Nov 1648	74.01	95.25	528	532	8 years
Cosmos 467 (1971-113A)	PL B-1	17 Dec 1048	71.00	91.95	267	472	122.80 days
		1972					
Cosmos 479 (1972-17A)	PL C-1	22 Mar 2035	74.06	95.20	514	543	7 years
Cosmos 498 (1972-50A)	PL B-1	5 Jul 0936	70.95	92.12	267	490	5 months
Cosmos 500 (1972-53A)	PL C-1	10 Jul 1619	74.07	95.18	505	549	7 years
Cosmos 523 (1972-78A)	PL B-1	5 Oct 1131	71.03	92.09	272	481	4 months

Satellite name and designation[a]	Launch site and vehicle	Launch date and time (GMT)	Orbital inclination (deg)	Period (min)	Perigee height (km)	Apogee height (km)	Lifetime
Cosmos 524 (1972-80A)	PL B-1	11 Oct 1326	70.99	92.33	267	512	5 months
Cosmos 526 (1972-84A)	PL B-1	25 Oct 1048	70.96	92.15	273	486	7 months
Cosmos 536 (1972-88A)	PL C-1	3 Nov 0141	74.02	95.27	518	544	8 years

[a] See footnote *a* to table 3A.1.

Table 3B.3. Soviet reconnaissance satellites: summary

	Photographic								*Electronic*		
Launch site:	Tyuratam				Plesetsk				Plesetsk		
Orbital inclination:	52°	65°	70°	Total	65°	72°	81°	Total	71°	74°	Total
Year											
1962	—	5	—	*5*	—	—	—	—	—	—	—
1963	—	7	—	*7*	—	—	—	—	—	—	—
1964	4	8	—	*12*	—	—	—	—	—	—	—
1965	2	14	1	*17*	—	—	—	—	—	—	—
1966	4	11	—	*15*	2	4	—	*6*	—	—	—
1967	6	2	—	*8*	11	3	—	*14*	4	1	*5*
1968	8	5	1	*14*	11	2	2	*15*	5	2	*7*
1969	6	6	1	*13*	16	2	1	*19*	9	2	*11*
1970	4	9	—	*13*	9	4	3	*16*	8	2	*10*
1971	5	8	—	*13*	8	5	2	*15*	10	5	*15*
1972	2	9	1	*12*	10	4	3	*17*	4	3	*7*
Total	**41**	**84**	**4**	**129**	**67**	**24**	**11**	**102**	**40**	**15**	**55**

Part II. Special topics

4. Security in Europe through disarmament and related measures

Square-bracketed references, thus [1], *refer to the list of references on page 130.*

I. *Introduction*

After a long period of uncertainty and hesitation, the question of security in Europe has finally been taken up officially at two different parleys—one in Helsinki and one in Vienna. The Helsinki meeting, which began on 22 November 1972 with 32 European states,[1] the United States and Canada participating, has been primarily concerned with political, economic and cultural issues and their implications for security in Europe. It is usually referred to as multilateral consultations on the question of the conference on security and cooperation in Europe. The Vienna meeting, which opened on 31 January 1973 with a more limited number of participants, only NATO and Warsaw Treaty countries, has been dealing with just one particular issue relevant to security in Europe—the reduction of forces. Although the two parleys are concerned with rather different issues they have a common aim: to discover whether the positions of the countries concerned, particularly the USA and the USSR, are close enough to permit full-scale negotiations on these issues to begin.

These two exploratory meetings represent an important break in the deadlock which has existed for a long time in discussions on security in Europe. The problem has been a difference in approach to the whole issue by the two military alliances; in their considerations of the question of security in Europe NATO countries, with the exception of France, have generally given priority to the problem of reduction of forces; Warsaw Treaty countries have more strongly emphasized the need for discussing political and economic issues.

The NATO position dates from about the mid-1960s. Until then, Western efforts had been largely directed towards solving various political issues, in particular the German problem, which the Western allies considered one of the primary causes of tension in Europe, while arms-regulation and disarmament measures were rather subordinated to this major goal. When, in their opinion, it became obvious in the early 1960s that the reunification of the two

[1] All European governments, with the exception of Albania have taken part in the meeting.

German states was unlikely to be achieved in the foreseeable future, Western countries gradually shifted their attention to those arms-regulation and disarmament measures which they considered could be agreed upon independently of parallel progress in solving outstanding political problems in Europe. It was, however, believed that eventual agreements on military matters would subsequently facilitate negotiations on political issues. Reduction of forces was one of the measures in which NATO allies have expressed the most pronounced interest.

The position of Warsaw Treaty countries was somewhat different. They had for many years considered disarmament problems independently of political issues, paying special attention to disarmament of the German states. However, since the mid-1960s Warsaw Treaty countries have been expressing the view that security in Europe can best be achieved through solving pending political problems, including, in the first place, recognition of the *status quo* in Europe, and by strengthening economic, cultural and other ties between European countries. This would then ultimately create adequate mutual confidence, relax the tension and consequently provide grounds for substantial disarmament measures. In view of this Warsaw Treaty countries have been pressing for the convening of a conference which would primarily deal with political, economic and cultural issues and their possible contribution to strengthening various aspects of security in Europe.

President Nixon's visit to the Soviet Union in May 1972 marked a turning point in the struggle to reconcile the two positions. The process of détente in Europe, which had been furthered by improvements in relations between the Federal Republic of Germany and Warsaw Treaty countries, was so advanced that both sides felt stimulated to take advantage of the situation and meet each other half way. The joint communiqué on the visit included two important paragraphs; in one the United States expressed a willingness to enter into multilateral consultations as preparation for a conference on security and cooperation in Europe, and in the other, the Soviet Union confirmed its readiness to discuss a reciprocal reduction of armed forces and armaments in a special forum. These statements were understood to correspond with the views held by the respective allies of the two countries. However, Western willingness to start preliminary exchanges of views on the conference on security and cooperation was conditional upon significant progress being made in negotiations among the four powers on the Berlin question.[2]

After the signing on 3 June 1972 of the Final Quadripartite Protocol of the Agreement of 3 September 1971 by the four powers, the USA, USSR, the United

[2] This was not a new element but merely the repetition of a previously expressed position of the West. However, it is important that the wording of the communiqué clearly confirmed Soviet acceptance of the position.

Kingdom and France, which basically reconfirmed their rights and responsibilities in Germany and provided the ground for making progress in inter-German negotiations on Berlin, Western allies felt that favourable conditions at last existed for initiating preliminary exchanges of views on a broad range of issues, including those favoured by the Warsaw Treaty. After further discussions within as well as between the two alliances, and the visit of President Nixon's adviser, Henry Kissinger, to the Soviet Union in September 1972, NATO countries officially accepted on 23 October an invitation to begin multilateral consultations in Helsinki on security and cooperation. The Warsaw Treaty reply to an official NATO invitation of 16 November to open exploratory talks on the question of reductions of forces was handed over on 18 January 1973. While accepting 31 January as the starting date, the Warsaw Treaty proposed that the talks should be open to all interested countries in Europe and also expressed preference for Vienna as the site of the talks instead of Geneva, suggested by the NATO countries. After intensive consultations, agreement was reached between the two sides to open the talks in Vienna, as scheduled before, with only the NATO and Warsaw Treaty countries participating. It was also agreed that the final status of countries without troops or territory in Central Europe as well as the question of the participation of non-aligned and neutral countries in any discussion of force reductions should be settled in the course of the Vienna consultations.

When discussing attitudes of the military alliances to the question of security in Europe, it is also important to consider the views of non-aligned and neutral European countries which have expressed considerable interest in the whole problem. Generally speaking these countries attach as much importance to political, economic and cultural issues as to arms-control and disarmament measures and are in favour of convening respective conferences proper, provided they are well prepared. However, these countries are much less positive to those ideas which advocate negotiations on later issues on a bloc-to-bloc basis. They consider that a number of arms-control and disarmament measures are of direct relevance to their own security and they would therefore like to include them in the agenda of a conference of all European states. This applies in the first place to arms-regulation measures of a confidence-building nature. As far as more comprehensive measures, such as reductions of forces, are concerned, for which bloc powers are primarily responsible, non-aligned countries consider that a conference of all European countries should discuss basic principles to be observed in subsequent negotiations between the blocs, which would take into consideration their interest in the problems involved.

II. *Disarmament and related measures*

A brief review of the basic attitudes of the parties concerned to the question of security in Europe clearly shows differences of approach in dealing with the problem. Without underrating in any way the importance of political, economic and cultural issues to security in Europe, only certain measures in the field of disarmament and related areas, which may be taken up in the context of the present discussions of security in Europe, will be considered here.[3]

Generally speaking, it is possible to distinguish two broad areas within which agreements could be reached. They are on the one hand the confidence-building measures and on the other hand arms-regulation and disarmament measures. These measures are not of equivalent political or disarmament importance but if agreed upon they will, to a greater or lesser degree, contribute to strengthening security in Europe. It seems that the actual chances for rapid agreement are in inverse proportion to the political and disarmament significance of the measures: the less comprehensive the solutions sought, the better the prospects for agreement.

Confidence-building measures

Confidence-building measures have, as the name suggests, limited significance for disarmament. They refer to political decisions concerning certain military matters which only marginally affect the military strength of the country concerned but which tend to improve the political atmosphere and confidence in general. Of such measures, the three usually mentioned in a European context are the advance notification of military manoeuvres, the exchange of observers on manoeuvres and the prohibition of military manoeuvres in border areas. In connection with the verification system for some of these measures, notably prohibition of manoeuvres in border areas, references are also made to establishment of control posts. These represent an essential part of one of the old standing proposals for inspection against surprise attack and consequently this measure will also be discussed here.[4]

[3] For a detailed and comprehensive analysis of various past arms-control and disarmament proposals see the chapter "Past proposals for disarmament and arms regulation" in the *SIPRI Yearbook on World Armaments and Disarmament 1969/70*, pp. 388–424 [1].

[4] These are by no means all the confidence-building measures. References are also made to advance notification of mobilization exercises, restrictions on surveillance activities, prohibition of building of large fortifications in border areas, prohibition of flights by foreign planes carrying nuclear weapons and of the entry of foreign submarines and surface ships with nuclear arms on board into the ports of European states, and so on. However, these measures are less likely to be taken up in the negotiations on security in Europe and consequently they are not dealt with here.

The positions of governments, as well as the views of independent analysts, are strongly divided on the question of the actual significance of these measures. The most critical of them regard these measures as unimportant and deny them any real value on the grounds that they only divert attention from the more pressing need for real disarmament. Advocates and supporters of these measures maintain that they represent a useful method of testing the goodwill of the parties concerned and that, in the long run, after sufficient political confidence has been created, they may lead to more comprehensive measures of a disarmament nature.

Advance notification of military manoeuvres

References made by different countries regarding advance notification of military manoeuvres are relatively few and in principle rather general, so that they do not provide answers to various problems arising in connection with this confidence-building measure. One of these problems is the definition of manoeuvres that might be covered by an agreement on the subject. Strictly speaking, manoeuvres are not the only movements which involve military forces and sometimes it is difficult to make a clear distinction between various movements of forces. Perhaps this was one of the reasons why NATO countries, in their declaration of 5 December 1969 referring to this measure, proposed discussion on "advance notification of military movements and manoeuvres". [2] This is a broader approach to the whole problem. It provides for more comprehensive solutions because it covers a much wider range of operations of military forces than one dealing only with manoeuvres. Military manoeuvres represent only one particular sort of movement of forces.

However, to be a really effective confidence-building measure, an agreement on advance notification, regardless of how comprehensive it is, would have to include several more provisions of substantial importance. For example, the notification must be given reasonably in advance and also contain information about the size and composition of forces involved, purpose of the movements of forces as defined by the agreement, duration of the movements as well as the geographical area in which these movements are to take place. In connection with this, a question could also be raised as to what would be the borderline between movements of forces covered by the agreement that would be reported and those that would not with regard to numerical strength of forces involved. For example, a Yugoslavian memorandum from 1970, which dealt with various confidence-building measures at length, suggested that there should be advance notification of all manoeuvres involving forces whose total strength exceeds 50 000 men. The same memorandum also suggested that the minimum notification period should be at least one month. These two questions—the size

of forces and the notification period—seem to reflect the crux of the problem. It is likely that different countries will have different views on them.

It is obvious that it would be rather impractical to notify either manoeuvres or other movements by smaller forces, first because they may not impose a significant threat to other countries, and secondly because it could be difficult to observe instances of violation of the agreement. The question of what is the reasonable minimum size of forces whose operations, defined in one way or another, should be reported, is a different matter. A distinction should be made between operations of individual, especially small, forces of smaller countries and those of military alliances. It may be argued that a movement of forces involving, say, 50 000 men does not represent the same threat to major bloc countries, taking into consideration their overall strength and preparedness, as it does to countries whose armed forces are not that large. One solution to the problem may be to agree on different minimums for different countries. This would depend on whether the agreement on advance notification was so comprehensive as to cover each country in Europe, in which case this approach could be useful, or limited in scope to cover only military alliances. In the latter case the distinction between countries would not be so important since members of alliances often carry out military exercises jointly.

On the other hand, it is clear that notification periods which are not long enough would provide grounds for various abuses of the agreement. Past experience shows that manoeuvres and other movements of forces were in some instances timed so as to coincide with important political events taking place in another country and in that way served as a means of exerting pressure. An agreement on the advance notification, with specific provisions on the minimum notification period, would undoubtedly place some restrictions on the possible use of various movements of forces for political purposes.

Exchange of observers on manoeuvres

As a further step in the confidence-building process, an agreement on the exchange of observers on manoeuvres has been recommended. This measure could be agreed upon either as a separate and independent measure or in conjunction with an agreement on advance notification. In the first case it would comprise some elements of advance notification: in the second it would significantly complement the agreement on notification. But in either case, mutual confidence would be strengthened.

An argument which the opponents of this measure use is that the presence of observers from countries other than allied countries involves a security risk because military manoeuvres can be a source of information about the combat readiness of forces, their weapon systems, strategies and so on. If this is so, the presence of foreign observers could very well be restricted to particular

locations and to such activities of forces as do not unduly effect the security of the host country or countries. The principle of reciprocity must be an essential part of any agreement on the exchange of observers.

Another question is also of vital importance. It is unlikely that the countries concerned will be prepared to go so far as to invite foreign observers to all movements of forces and therefore it will be necessary to draw a borderline between those movements covered by the agreement and those which would remain outside its scope.

It should be noted that the practice of the exchange of observers already exists but is largely confined to intra-bloc relations. Thus NATO manoeuvres are usually open to allied observers and sometimes to journalists, as are Warsaw Treaty manoeuvres to their allies and press. There are also examples where non-aligned countries have invited to their manoeuvres military attachés accredited to their governments. This was the case, for instance, with Yugoslavia during the large-scale manoeuvres known as "Freedom 71", held in autumn 1971. Sweden is also known to invite foreign observers to its manoeuvres.

Prohibition of manoeuvres in border areas

The third possible confidence-building measure dealing with military manoeuvres, namely the prohibition of manoeuvres in border areas, is relatively of much greater importance, since its intention is to restrict certain military activities of the countries concerned. Because of this, it is likely that negotiations on this measure will encounter more difficulties, particularly when the definition of a border area is concerned, taking into consideration obvious differences in the size of territory of various countries.

Broadly speaking, there are two types of military manoeuvres. One type, usually called normal exercises of national armed forces, which each country undertakes from time to time regardless of any particular political considerations, comprises manoeuvres whose main purpose is to test the achieved level of strength of armed forces after regular training periods, their general preparedness, functioning of transportation and communications systems, and so on. The other type of manoeuvre includes those which are generally undertaken with a view to testing the ability of armed forces to undertake defensive or offensive actions, whatever the explanations for offensive actions may be, as well as the corresponding strategies, in regard to particular foreign forces or group of forces. In the latter case it is of considerable importance that the manoeuvres take place in particular border areas, unlike exercises of the first kind which, in principle, may be held in other parts of the country.[5]

[5] It should be noted that manoeuvres in border areas sometimes also perform the same functions as the first type of military exercise.

The manoeuvres in border areas have both military and political functions. From a military point of view it is important to exercise forces in the terrain, with corresponding fortifications, where they will eventually operate in case of armed conflict. In that way soldiers become familiar with the various tasks and conditions under which they would fight. Politically, manoeuvres in border areas may be used as a demonstration of strength with a view to deterring other countries from aggression or as a means of exerting pressure on other countries or they may serve the purpose of strengthening the confidence of the local population.

While no one could reasonably question the legitimate right of countries to hold manoeuvres the question could be raised whether it would not be possible to reach an agreement which would, taking into consideration all aspects of the problem and in particular the security interests of the countries concerned, in some way regulate activities in border areas since they may cause unnecessary tensions between countries. It is believed that the military advantages of exercises in border areas may, to some extent, be compensated for by performing them in similar terrain elsewhere. This solution naturally has various shortcomings from a military point of view and it may also increase the cost of exercises, but it is believed that the overall political effects on the strengthening of mutual confidence of such an agreement make it worthwhile pursuing. On the other hand, the agreement would not be possible outside the general atmosphere of détente, which is already considered to prevail in Europe, and this fact greatly decreases the importance of political aspects of manoeuvres in border areas, and in that way makes such an agreement somewhat easier to reach.

Partial solutions may also be considered, for example, to prohibit manoeuvres only in particularly sensitive areas, such as Central Europe and the Mediterranean, or to place some restrictions on their overall number and frequency. However, the number, size and location of manoeuvres recently held in various parts of Europe suggest that they still play an important military and political role. In the first nine months of 1972, the military alliances held 11 large-scale manoeuvres in various parts of Europe. NATO manoeuvres took place on 8–12 January in Denmark, on 25–29 April in the western Mediterranean, on 2–19 May in the eastern Mediterranean, on 15–18 May in Central Europe, on 26–30 June again in Central Europe, on 16–20 September in Greece, Turkey and the eastern Mediterranean and on 17–28 September in Northern Norway, the North Sea, the English Channel and central and western parts of the northern Atlantic. Warsaw Treaty manoeuvres were held in Bulgaria from 21 February to 8 March, in Poland on 8–11 April, in the Black Sea on 18–23 April, and in Czechoslovakia on 11–15 September. The Warsaw Treaty manoeuvre under the code name "The Shield" (11–15 September) included

forces from all Treaty countries, with the exceptions of Romania and Bulgaria. Likewise, in the NATO manoeuvre "The Strong Express" (17–28 September) the forces of 14 countries took part, including 300 warships, 700 aircraft and over 60 000 soldiers. [3]

An agreement prohibiting military manoeuvres in border areas, regardless of how comprehensive it may be, inevitably raises the important question of verification of compliance with the provisions of the agreement. Technically, this problem is much easier to solve now than it was some 10 years ago. The development of reconnaissance satellites has provided adequate means for aerial verification. Satellite reconnaissance is now carried out irrespective of whether a country subjected to it agrees to it or not. The activities detected in this way undoubtedly include movements and concentrations of forces discussed above. It is therefore reasonable to assume that from a technical point of view satellite reconnaissance alone is adequate for verifying an agreement prohibiting manoeuvres in border areas. Politically it may not be so because satellite technology has so far mainly been confined to the United States and the Soviet Union which means that the verification would be carried out solely by these two countries. Other countries parties to an agreement on military manoeuvres would have to rely on the information released by these two powers. They may object to such a system, unless control through satellites becomes internationalized.

Satellite verification could also be complemented with ground verification, by the establishment of control posts at agreed points such as specified road and railroad junctions, harbours and airports. In fact a suggestion for the establishment of ground posts was made by NATO countries in the Brussels declaration of 5 December 1969. This solution would not only provide for participation of a larger number of countries in the verification system but would also represent an additional impetus to confidence building because satellite reconnaissance combined with ground posts would, in principle, facilitate measures to guard against surprise attack.

Inspection against surprise attack

The first proposal of this kind was the US "open skies" plan, launched in July 1955 at the Geneva Conference of Heads of Governments. It was exclusively directed towards the Soviet Union. It proposed mutual exchange of blueprints of military establishments and verification of these by reciprocal aerial photographic inspection. The purpose of this would be to provide "against the possibility of a great surprise attack", thus relaxing tension. [4]

The Soviet Union was also interested in the prevention of a surprise attack but its proposals were related to disarmament measures, primarily the reduction of conventional armaments and armed forces. [5] Besides, the Soviet Union

favoured the creation of ground control posts to guard against concentrations of conventional forces while the United States advocated a system of aerial inspection.

Later, in 1956, the Soviet Union agreed to include aerial inspection in its proposal for ground control posts, suggesting that the depth of the inspected zone should be 800 kilometres on each side of the demarcation line between the NATO and Warsaw Treaty military forces. Then, in August 1957, the Western powers proposed the establishment of inspection zones in the Northern Hemisphere and in Europe, which were to provide, in addition to aerial inspection, for ground observation posts and mobile inspection teams. The proposal was also advanced within the framework of a wider plan for partial measures of disarmament, which included, in the first place, a proposal for the limitation and reduction of armed forces and armaments, so as to meet the long-standing Soviet objection that the West was advocating control without disarmament. However, the position of the two sides remained far apart on a number of other points, the most important being the probable origin of a surprise attack. The Western countries conceived of a surprise attack via the polar areas by long-range missiles or manned aircraft carrying nuclear weapons—hence their insistence on an aerial inspection zone in the Arctic region. The Soviet Union saw the main danger in the fact that the armed forces of the NATO and Warsaw Treaty countries were concentrated in close proximity to each other and advocated an agreement whereby the relevant regions would be subjected to close observation and inspection. In other words, the Soviet Union was more concerned with the outbreak of a limited war, which could develop into a world war, than with the possibility of a massive nuclear surprise attack which was the United States' primary concern.

It may be assumed that some of the past controversies concerning this measure would come out in discussions even today if the whole question of inspection against surprise attack were raised again. However, in principle the problem has now become less acute. Satellite reconnaissance has provided some means to guard against a massive conventional attack by surprise. More importantly, the second-strike capability which both the United States and the Soviet Union possess has largely decreased the likelihood of a surprise nuclear attack. Of course, these arguments are valid only as regards military alliances in Europe and their mutual relations. For non-aligned countries the whole question of surprise attack has lost neither its military nor political importance.

Arms-regulation and disarmament measures

Unlike confidence-building measures, arms-regulation and disarmament measures deal more directly with forces and armaments and for this reason

they would, if agreed upon, represent a significant factor contributing to security in Europe. The range of possible arms-regulation and disarmament measures that could be applied to Europe is rather large. In the past references were made to such measures as withdrawal of foreign troops and abolition of foreign military bases and alliances, restrictions on military budgets, limitations of forces and armaments, and others. However, only certain of these measures continue to attract wide attention, and these will be considered here. They are three in number: limitations of forces and armaments, restrictions on foreign military bases, and restrictions on military budgets. The question of nuclear-free zones continues to remain an important issue in a European arms settlement. However a serious discussion of this topic, particularly with regard to Central Europe, would have to be preceded by agreements on other less complex matters.

Limitations of forces and armaments

The question of limitations of forces and armaments in Europe was originally entirely linked to the German problem.

After the German states joined the respective military alliances—the Federal Republic of Germany joined NATO in 1955 and the German Democratic Republic the Warsaw Treaty in 1956—the concept of limitations of forces and armaments was substantially changed. It gradually ceased to be considered in the context of the German problem and the search for its solution, but was treated rather as a separate measure of arms regulation and disarmament. This new concept was pursued most actively by the Soviet Union. The West still tended, from time to time, to link the question of limitations of forces and armaments with the solution of the German problem.

The proposals put forward by various countries following this change can be divided into three groups. The first group called for the withdrawal of foreign forces, at first from Germany and the countries adjacent to it, and later from all European countries. The second group of proposals was aimed at creating a zone between East and West where the levels of forces and armaments would be frozen. The third group dealt with the reduction of forces and armaments in the territory of Germany and the neighbouring countries as well as in the territory of other member countries of NATO and the Warsaw Treaty. No progress has been made in either field. The last two ideas have been continually discussed, however, and represent the most topical issues in present considerations of security in Europe.

FREEZING OF THE LEVELS OF FORCES AND ARMAMENTS

The idea of freezing the levels of forces and armaments has been put forward on various occasions in the past both by Western and Eastern countries

although with different emphasis and in different contexts. For example, the Soviet Union, in its draft agreement of March 1956 on the reduction of conventional armaments and armed forces, suggested the creation of a zone for the limitation and inspection of forces and armaments comprising the territory of both parts of Germany and of states adjacent to them, which would provide for ceilings on the size of forces of the USA, USSR, UK and France stationed in the zone, and joint international inspection of the armed forces and armaments of the states, parties to the treaty, stationed in the zone. [6] The proposal was not linked with the solution of the German problem. However, there were other conditions, namely that it should be carried out in conjunction with the prohibition of the stationing of atomic and hydrogen weapons of any kind in the zone (this represented a new element) and that pending conclusion of such an agreement, there should be unilateral reduction of foreign troops in the German territory. This proposal was further elaborated and re-submitted on various occasions during the following years but it was always based on more or less the same principle: that any agreement on freezing and inspection of forces and armaments should be carried out within the context of a more substantial disarmament measure.

Western countries also dealt with this question on several occasions. Of particular interest in this respect is the plan of May 1959 which suggested that "in a zone comprising areas of comparable size and depth and importance on either side of a line to be mutually determined, agreed ceilings for the indigenous and non-indigenous forces could be put into effect". [7] However, practical realization of the plan was strongly linked with the question of German reunification; that is, its entry into force was conditional upon the establishment of an all-German government which should be given the possibility of exercising its right to self-defence including the right to joint existing military alliances. In subsequent years, the interest of the Western countries in this measure has waned. For them the whole issue of the freezing of forces and armaments in Central Europe was inextricably linked with the German question. As long as a satisfactory solution to this problem was lacking, they saw no point in an agreement on the freeze.

It seems that this argument is not valid any longer. The Federal Republic of Germany's rapprochement with the Soviet Union and its allies including the German Democratic Republic, which started in 1969 and reached its height with the conclusion of a general treaty between the two German states on 21 December 1972, has given a completely new dimension to the once acute German question. The Berlin agreement of the four big powers—USA, USSR, UK and France which entered into force in June 1972 has also significantly contributed to creating a favourable political atmosphere for taking up the question of freezing the levels of forces and armaments. On the other side the

negotiations on reductions of forces, when they start, are most likely to have a decisive impact on the consideration of this question as well.

It may be assumed that freezing is the most probable area where an agreement could be reached in the foreseeable future, providing the preliminary exchanges of views on reductions of forces result in full-scale negotiations. An agreement on freezing the levels of forces, pending the outcome of the negotiations on a more comprehensive agreement for force reductions, would in no way jeopardize the security of the countries concerned. Secondly, such an agreement would increase public confidence in the goodwill of the negotiators, as well as contributing to a better political climate in Europe without much cost. Finally, judging by the present state of affairs in Europe and the public statements of various countries, it is unlikely that any of them is seriously contemplating an increase in forces, either indigenous or foreign, in the near future. It is, of course, easier to reach an agreement introducing restrictions on something that no one really wants to do.

However, one essential fact should be borne in mind in connection with this reasoning: the above-mentioned arguments are fully valid only as far as freezing of the levels of forces is concerned. The questions of freezing the levels of armaments, and verification of freezing the levels of armaments and armed forces, seem to impose quite different problems, whose solutions will depend largely on the course which the negotiations on reductions of forces take. For example, the prospects for an agreement on the freezing of armaments will be much greater if reduction is extended to cover both armed forces and armaments. In that case, the above-mentioned factors would be valid for an agreement on freezing the levels of armaments as well. Such a development could be imperilled only by a decision of the two alliances to compensate eventual force reductions by increasing the firepower of the remaining forces, which would most probably result not only in a qualitative but also in a quantitative increase of armaments. There is ground for belief that they are seriously considering this possibility. This would no doubt have a decisive impact on the negotiations on limitations of armaments.

As far as verification, either of freezing the levels of armed forces and/or armaments, is concerned it is a problem apart, since it is much more a political than a technical question. It is also obvious that verification of freezing the levels of armaments requires a more comprehensive system than verification of freezing the levels of armed forces. Some kind of on-site verification might be required in both cases.

One possible approach to the whole problem, which would avoid the sensitive question of verification, could be to pursue the issue of freezing the levels of armaments and armed forces on the basis of unilateral but similtaneously undertaken commitments. In this case all countries concerned, and most

importantly those deploying forces on foreign territories, would issue unilateral declarations providing for agreed ceilings to their forces and armaments in particular zones of Europe reinforced by national legislative measures. These unilateral undertakings could be considered as a temporary measure pending the outcome of negotiations on more comprehensive measures such as reductions of forces. In fact without this link between these two measures, a unilateral and non-verified freeze of forces and armaments would be of only limited value.

REDUCTIONS OF FORCES AND ARMAMENTS

As in the past the question of the reduction of forces and armaments still plays the most important role in discussions on security in Europe. It is, however, interesting to note that in this process the positions of the countries concerned have gradually reversed. In the 1950s and the early 1960s the Soviet Union proposed force reductions on a number of occasions, but the Western powers were not interested. When in about 1965 the Western powers expressed interest in the question of force reductions, the Warsaw Treaty powers responded somewhat tardily.

The restraint was first noticed in the declaration on European security of 6 July 1966 by the Political Consultative Committee of the Warsaw Treaty countries, and again in the statement of 26 April 1967 on European security, issued at the conference of the European communist parties held at Karlovy Vary. Both documents expressed full support for a European security conference and dealt with various arms-regulation and disarmament measures including total withdrawal of foreign forces but avoided such topics as reduction of forces stationed in the German states and other European states. This was also the case with other official documents of Warsaw Treaty countries issued in subsequent years. The Soviet attitude was largely explained by the events in Viet-Nam where the United States was substantially increasing its presence. The numbers of US forces in Viet-Nam reached the figure of over half a million in mid-1968 including some forces taken from Germany.

However, Western countries contined to express interest in the subject. In 1967 NATO foreign ministers approved the so-called Harmel Report which *inter alia* dealt with the problem of the reduction of forces and recommended that it should be given continued consideration. The question was raised again at the foreign ministers' semi-annual meetings in 1968 and 1969 and reached a peak in the Rome declaration of May 1970 which explicitly invited interested states to hold exploratory talks on mutual and balanced reductions of forces and armaments.

The Soviet reaction to this invitation came at a Warsaw Treaty meeting in

Budapest in June 1970 when the member countries stated that they would be willing to discuss the question of force reductions but restricted the whole concept only to "foreign forces on the territory of European States". This position was subsequently broadened. In his speech of 30 March 1971 at the 24th Party Congress General Secretary Brezhnev expressed the readiness of the Soviet Union to discuss the reduction of forces and armaments in Europe only. Further references made by Brezhnev to the question of force reduction in the Tbilisi speech of 14 May 1971 were widely interpreted as showing the Soviet Union's willingness to enter into negotiations on this subject at an early date.

On the basis of this understanding NATO countries, with the exception of France, designated, in October 1971, former NATO Secretary General Manlio Brosio as their joint representative to explore prospects for negotiations on reductions of forces and armaments with Warsaw Treaty countries. However, the Soviet Union did not respond. In the Brussels communiqué of 10 December 1971 NATO countries noted this fact with regret and renewed their invitation for exploratory talks on force reductions and expressed the hope that the Brosio mission would start soon, considering that "prior explorations of this question are essential in preparation for eventual multilateral negotiations". [8] Nevertheless the mission never got started.

The Warsaw Treaty "Declaration on peace, security and cooperation in Europe" of 26 January 1972 acknowledged the interest of the member countries in the question of reductions of forces and armaments, foreign and indigenous, but expressed a reservation to preparations of the negotiations on a bloc-to-bloc basis which was the meaning of the Brosio mission. It was not until President Nixon's visit to the Soviet Union, in May 1972, that progress was made. During this visit a general agreement was reached that discussions on the question of the reductions of forces and armaments should be separated from other issues of security in Europe and carried out in a special forum. After additional uncertainties and clarifications of the positions of the countries concerned, an agreement was reached that the preliminary exchanges of views on reductions of forces start on 31 January in Vienna. The meeting is still in progress.

The question of reductions of forces in Europe is a complex matter. When Western countries first started advocating this measure they were largely motivated to do so because of strong internal pressure mounting in the US Congress on the government unilaterally and substantially to reduce US troops in Europe. Beside the Viet-Nam factor, this was one of the most important factors urging the US government to seek a solution to the problem through redistribution of the burdens within the alliance. Although this pressure has not diminished and still plays an important role in the US govern-

ment's policy considerations, the whole issue of reductions of forces has gradually gained a new dimension. With the growing feeling of détente in Europe the question of reductions of forces became much more an issue of inter-bloc relationship and settlement on that basis than of the problem of intra-NATO redistribution of responsibilities and burden-sharings, though this aspect of the problem also remains important. Thus for Western countries the central question is not only what are the best arrangements within the alliance, but also which policy to pursue in regard to the Warsaw Treaty. This adds to the complexity of the issue and makes it even more vague.

This feeling was well expressed by the former American Deputy Secretary for Defense for Europe and NATO Affairs, Frederick Wyle, who made the following remark in the course of the May 1972 hearing on a conference on European security: "... I don't see that there is much real content to the concept of mutual and balanced force reductions. It is a political development which has gotten started, but I think neither side really knows what to make of it." [10] And this is true in many respects.

First of all the question may be raised whether the concept of reduction of forces should cover only foreign or both foreign and indigenous forces; second, whether it should apply to Europe on the whole or only to certain parts of it, and, finally, whether it should envisage absolute or relative reductions. As far as the first question is concerned, the official statements by the two military alliances have not always been consistent. For example, the NATO "Declaration on mutual and balanced force reduction", attached to the Reykjavik communiqué of 25 June 1968 as well as communiqués of 10 April and December 1969 spoke about reduction of forces in general terms and only emphasized that reduction should be balanced in scope and timing. However, the Rome declaration on mutual and balanced force reduction of 27 May and the Brussels communiqué of 4 December 1970 made explicit references to the reduction of both foreign and indigenous forces. The former stated "Reductions should include stationed and indigenous forces and their weapons systems in the area concerned" [11] and the latter reconfirmed this. "These Ministers renewed their invitation to interested States to hold exploratory talks on the basis of their Rome declaration, ... including the possible mutual and balanced reduction of stationed forces as part of an integral programme for the reduction of both stationed and indigenous forces." [12] The references made to these two documents in the subsequent NATO communiqués following the Ministerial meetings in Lisbon in June and in Brussels in December 1971, as well as in Bonn in May 1973 were largely understood as confirmation of the position formulated in 1969.

However, a certain amount of uncertainty still remains in view of other Western official documents dealing with the same question which obviously

express very different views. This was, for example, the case with the Report of the Special Subcommittee on NATO Commitments, entitled "The American Commitment to NATO", submitted to the Committee on Armed Services of the House of Representatives on 15 August 1972, which included the following statement:

> The Subcommittee was amazed to learn that in discussions of MBFR other NATO nations had proposed various reductions in their own forces and that US representatives had been something less than adamant in opposing such an idea in the initial phase of negotiations. In view of the relatively greater cost of the burden borne by the United States and in view of the more desirable impact of lessening tension, the subcommittee strongly believes that any initial reductions of an MBFR agreement should involve the withdrawal of American and Soviet forces. The tension is hardly going to be lessened for NATO partners by a withdrawal of Rumanian divisions, and likewise the concern of the Soviet Union by the reduction of Danish forces. What would contribute most to the lessening of tension is the reduction of Soviet and US forces. [13]

It is interesting to note that smaller NATO powers have in principle taken a positive approach to a possible reduction of indigenous forces. Some of them, such as Belgium and Denmark, are even contemplating certain measures in this regard independently of the outcome of any talks. For example, the Belgian government introduced in November 1972 new regulations which, by means of rationalizing services, reduced the country's armed forces by several thousands. [14] In addition it prepared a proposal which would reduce compulsory military service by two months, but the proposal has not been officially presented to the Parliament. According to press reports both the United States and Great Britain expressed, at the NATO meeting in December 1972, considerable concern in connection with the tentative plans of certain member countries for unilateral reductions in their armed forces. This in particular applied to Denmark about which it was said: "The projected Danish move is regarded as a weakening of NATO military resources and a potentially dangerous precendent for the alliance." [15] According to the same reports the Danish Defence Minister stated that "domestic financial considerations left Denmark no option" and expressed the belief that "more efficient use of personnel would minimize the effect of the reduction on NATO defences". [15]

The non-aligned countries in Europe also have a positive approach to the idea of the reduction of indigenous forces as a complementary measure to foreign force reductions. Some of them have already made concrete steps in this direction. Sweden has, for example, shortened the period of basic compulsory service in the armed forces and has introduced various other measures aimed at preventing further increases in the military budget. In Yugoslavia

in 1971 compulsory service was, in principle, shortened by six months, from 24 to 18 months for all services, with some specific exceptions.

As far as Warsaw Treaty countries are concerned, in particular the Soviet Union, their position on the question of foreign and indigenous forces has not been consistent either. At first, they made no reference to the issue but later spoke about the reduction of foreign forces (Budapest memorandum of the Warsaw Treaty of June 1970) and then about the reduction of forces in general, without qualification (for example, Brezhnev's speech on 31 March 1971). The meaning of the latter statement was variously interpreted; some analysts considered it as applying both to foreign and indigenous forces, while others understood it in a more restricted way, as referring only to foreign forces. Perhaps this was the reason why General Secretary Brezhnev took up the question again only one and a half months later, in his speech at Tbilisi on 14 May 1971, when he said:

> In connection with the Western reaction to proposals made at the congress I should like to mention one detail. Some of the NATO countries show an apparent interest and even nervousness when it comes to a reduction of armed forces and armaments in Central Europe. A spokesman asked whose armed forces, foreign or national, nuclear or conventional, are to be reduced. They asked whether the Soviet proposals contemplate all this together. ... If anything is still not clear we are prepared to clarify, but you must summon resolve to try the proposal in which you are interested by its taste. Translated into diplomatic parlance this means 'Start negotiating'. [16]

The subsequent Warsaw Treaty documents, notably the Prague "Declaration on peace, security and cooperation in Europe" of 26 January 1972, keep referring to "reduction of forces and armaments in Europe, both foreign and national".

However, it may be assumed that for the Soviet Union itself the question of reduction of indigenous forces is not of such importance as it may be for the United States and its allies. From the Soviet point of view the central issue of the problem is clearly the reduction of foreign forces. In the whole post-war period the Soviet Union has been concerned about the presence of large US forces in Europe and has been advancing various plans, such as the abolition of foreign military bases, withdrawal of foreign forces, demilitarization of certain zones in Europe, and so on, with a view to reducing or completely eliminating this presence, considered by Warsaw Treaty countries as one of the important sources of tension in Europe. When these proposals failed to meet Western response the Soviet Union welcomed suggestions and proposals, voiced by various US congressmen since the mid-1960s, for unilateral reduction of US forces in Europe. The US government's ability to withstand this pressure and delay unilateral actions convinced the Soviet Union that a reduction of

American forces in Europe could be brought about only on a mutual basis and therefore it accepted the invitation to discuss the reduction of forces in Europe.

Western analysts interpret Soviet interest first in withdrawal of US forces and now in reductions of forces as being both politically and militarily motivated. They argue, for example, that substantial withdrawal of US forces even on a mutual basis would make the Soviet Union appear a political and military force in Europe whose power would not be adequately challenged by the West. This view was also expressed by the US Committee on Armed Services:

> It must be conceded that without US forces in Western Europe, any action against the Alliance nations would create enormous pressure to withhold such a response. With US forces of substantial numbers involved in the engagement from the beginning, the assurance of a nuclear response is much less in doubt. In short, US forces in place in Europe are the psychological epoxy of the Alliance, the glue that holds NATO together. [17]

The "China factor" is lately also mentioned relatively often in Western considerations of Soviet interests in reductions of forces particularly as regards reduction of foreign forces. Many observers are inclined to believe that the Chinese reopening to the world and especially its rapprochement with the United States and Japan, as well as the recognition of China's rights in the United Nations, including a seat in the Security Council, represent an important factor stimulating Soviet leaders to seek further normalization of relationships in Europe, including reductions of forces, so as to be able, in the next decade or so, to concentrate more on counter-balancing Chinese influence not only in Asia but in the world as a whole. Reinforcement of Soviet military forces in the border areas with China is usually referred to in the West as evidence of Soviet interest in reduction of its forces in Europe.

It is interesting to note that Western analysts, when discussing the Soviet attitude to foreign force reductions, regularly draw attention to one fact which in their opinion complicates the position of the Soviet Union. It is the declared Soviet commitment to preserving the unity of the socialist camp, based on the principle of socialist internationalism which, generally speaking, compels member countries of the Warsaw Treaty to extend aid to each other, including military aid when necessary in order to defend socialism. Consequently, these analysts consider that for the Soviet Union and its allies one of the problems in eventual negotiations on reductions of forces is likely to be the question of how to reconcile an undertaking providing for the reduction of foreign forces with a possible need to redeploy them whenever they consider it necessary. [18]

The question of which forces, foreign alone, or both foreign and indigenous, will be the subject of the negotiations on reduction of forces in Europe, has wider implications. If the negotiations are limited to foreign forces only,

then the whole issue of force reduction is very likely to be a matter concerning primarily forces of the United States and the Soviet Union. It is true that some other countries maintain forces abroad in Europe, [19] for example Great Britain has about 60 000 troops in the Federal Republic of Germany, but in comparison with the 270 000 US forces in Western Europe and over 350 000 Soviet forces in Eastern Europe, other foreign forces are of less significance to discussions on force reductions. In addition, France, with some 50 000 troops stationed in Germany, has expressed reservations in connection with force reductions. First, it considers that reduction of forces may cause negative political consequences for Western countries, and, secondly, it objects to discussions on force reductions on a bloc-to-bloc basis. In view of this France has not put its signature on those parts of NATO documents which dealt with the question of reductions of forces and armaments and has also decided not to take part in the Vienna meetings. Shortly before the opening of preliminary talks the French Defence Minister Debré restated the French position: "We are not hostile to procedures for a true disarmament, but we are conscious of a serious insufficiency in the preparation and study of eventual talks on force reductions. And we have some anxiety as to their political consequences." [20] If the French government does not change its approach in the course of further developments it is obvious that French forces, both those stationed in Germany and at home, would remain outside the scope of eventual agreement on force reductions in Europe.

Eventual agreement on reductions of foreign forces in Europe would undoubtedly represent a major single achievement, but it would be highly desirable to extend such an agreement so as to include reduction of indigenous forces as well. In that way disarmament aspects of the whole measure would be more pronounced.

Another question arises in connection with the problem of reductions of forces in the area which may be covered by such an agreement. It is possible to contemplate an agreement on force reductions to cover the whole of Europe, both in regard to foreign and indigenous forces. Although this would represent the most comprehensive solution to the problem it is unlikely that the expected negotiations will go that far. It is fairly certain that an agreement, at least to start with, will be sought only in regard to Central Europe.

This approach was first suggested by Western countries. The well-known NATO Rome declaration on mutual and balanced force reductions of May 1970, which invited interested states to hold exploratory talks on this question, emphasized that this should be done "with specific reference to the Central Region". This proposal was reconfirmed in subsequent NATO communiqués and declarations. On the other side Warsaw Treaty countries on the relatively rare occasions when they dealt with this question have mainly referred to

reductions of forces in Europe as a whole. This was also the case in the "Declaration on peace, security and cooperation in Europe" of 26 January 1972. This does not necessarily mean that Warsaw Treaty countries will insist on this approach in negotiations when they start. This is suggested by the language of the joint communiqué of May 1972 on the visit of President Nixon to the Soviet Union in which both sides expressed interest in "a reciprocal reduction of armed forces and armaments, first of all in Central Europe".

The fact that attention in discussions on force reductions has been concentrated largely on Central Europe may suggest several things. First, both sides may consider relaxation of tension in this area so vital for security in Europe that they do not want to introduce possible new elements of disagreement in negotiations by taking other areas into consideration. The forces of both sides are most heavily concentrated just in this region where they most directly confront each other. If an agreement could be reached in regard to this area it might be much easier to extend it later to cover other areas as well. It is also possible, although this would be rather an unfortunate approach, that both sides, by excluding other parts of Europe from consideration, in fact wish to preserve the possibility of redeploying forces elsewhere following an agreement on force reductions in Central Europe,

It is still uncertain whether the concept of force reductions implies absolute reduction of forces in an agreed area, either foreign or indigenous, which would subsequently be demobilized or only relative reduction, in other words reduction of troops in certain areas and their redeployment in other areas. At first it was understood that the former approach was to be pursued, but later, strong doubts have been expressed as to whether this was an adequate interpretation of the intentions of the countries concerned.

It would seem that the US government's position with regard to the absolute reduction of forces in agreed areas and their demobilization is already clear. This is suggested by the report "The American Commitment to NATO" which, in dealing with this question, took the following position:

> In considering our worldwide treaty commitments and in the absence of any marked revision in those treaties, it does not seem to the subcommittee that the facts justify a substantial reduction of the total numer of active-duty Army personnel below what is presently planned for fiscal year 1973. The subcommittee notes that Subcommittee No. 2 of the Committee on Armed Services, after extensive review earlier this year, determined that no reduction should be made beyond the manpower levels requested in the fiscal year 1973 budgets.
>
> It would seem, therefore, that no persuasive arguments can be made for both bringing forces back from Europe and demobilizing them. Such an unwarranted cut would leave the Army unable to carry out its strategic commitments for active forces. [13]

In view of this statement it may be assumed that US forces which may be withdrawn from Europe back to the United States will remain earmarked for NATO.

The Soviet Union and its allies are not known to have made specific public references to the question of absolute or relative reduction of forces so that it is difficult to interpret their position on the whole issue. However, they have expressed strong dissatisfaction in connection with the conclusion in 1972 of an agreement between the United States and Greece providing for a home port for Sixth Fleet warships in the Athens area which they interpreted as further escalation of US presence in Europe.

Analyses made so far discuss some of the basic dilemmas and controversies which are most likely to complicate possible negotiations. However, the most crucial question of all, which will determine the outcome of negotiations, regardless of whether they deal with the reduction of foreign or of both foreign and indigenous forces, reduction on an all-European basis or in certain areas only, absolute or relative reduction and so on, is the problem of the reduction of armaments. It seems that both sides have in principle agreed that the discussions on reductions of forces should also include their armaments.[6] In a statement to the press on 11 January 1973 General Secretary Brezhnev made the following remark concerning the question of armaments: "Personally I think and believe that armaments should be reduced a little, even if only a little." [22] However, negotiations on this particular issue may be very difficult because the two sides have different ideas of the whole concept of the reduction of armaments.

In the opinion of the Soviet Union and its allies a reduction of armaments cannot be contemplated without proper reference to nuclear weapons at the disposal of NATO allies and in particular of US forces deployed in Europe. The reduction of conventional forces and weapons would only partly contribute to the strengthening of security in Europe. The main threat to peace in Europe, according to the Soviet view, is represented by NATO nuclear weapons, so-called tactical weapons, stored in Europe and clearly intended to be used in accordance with the doctrine of flexible response. This was one of the views expressed at a scientific conference convened in Moscow on 24–25 January 1972 by the Soviet Committee for European Security of the USSR Academy of Sciences.

The question of the disposition of tactical nuclear weapons in Europe should be specially considered.

[6] Some authors argue that the word "forces" itself implies not only manpower but also their armaments and that for that reason alone, eventual negotiations on balanced reductions would include both. These authors argue that if this were not the intention of the parties concerned they would probably have used the word "troops" which in no way refers to armaments. [21]

According to foreign sources the USA has today accumulated on the territory of Western Europe a considerable amount of means of delivering the so-called tactical nuclear weapons; the number of nuclear warheads exceeds 7 200. The withdrawal from the territory of European states the means of delivery of tactical atomic weapons and nuclear warheads ... are the main conditions of the easing of military tension, an essential factor which will help Europe acquire a new platform for pursuing a policy based on the principles of collective security in Europe. [23]

This statement may be interpreted as an indication of Soviet intention to link the question of reduction of its forces stationed in Warsaw Treaty countries with the reduction of US tactical nuclear weapons in Europe.

On the other hand it is the firm position of the United States and its allies that, in view of Soviet geographical advantages which provide for easier redeployment of forces within a shorter period of time, continued reliance on nuclear weapons is a guarantee that a reduction of forces would not operate to the military disadvantage of the West. Practically this means that NATO countries are very likely to object strongly to any proposal advocating total elimination of tactical nuclear weapons from the European theatre and to consider reluctantly those calling for their reduction.

Advocates of reduction of nuclear weapons argue that for nuclear weapons to be used in Europe, they do not have to be stationed in Europe. The more radical of them emphasize that the quantities of nuclear weapons on both sides are great; however, "[w]ith nuclear weapons even a decisive superiority of numbers does not ensure victory, as it has with other weapons, but merely mutual destruction—and there are no degrees of importance in the matter suicide." [24] Consequently, according to them, there is no meaningful reason why the existing nuclear arsenal in Europe could not be reduced to a lower level since it would still provide for adequate security of the state but at less cost. Opponents of this measure point out that a distinction should be made between global and local wars. For the former, nuclear armaments in general are relevant and negotiations on their reduction would have to take into consideration a much broader range of questions than is possible within discussions on reductions of forces in Europe. For the latter category of wars, and Europe would be a good example of a potential local area of conflict, tactical nuclear weapons could play a decisive role for the outcome of the conflict especially if the other side has at its disposal larger conventional forces. According to this view, conventional force superiority could best be matched by an adequate supply and use of tactical nuclear weapons. This view is also held by the Special Subcommittee on NATO Commitments which stated in its 1972 report:

It has to be conceded that we have no assurance that conventional forces will hold out indefinitely. It may be that after a period of time in a general attack the

only way to stop advancing Warsaw Pact forces would be with the use of tactical nuclear weapons. [25]

If all these problems are successfully overcome and in particular if the two sides find a common approach to nuclear weapons, there will still remain one problem: the reduction itself or more specifically, the problem of the meaning of the concept "balanced reduction" on which the Western powers insist. Many studies have been made in the West with a view to explaining this concept and more or less all of them reached the same conclusion that the only way to provide that neither side will feel significantly less secure than it does under existing conditions would be to carry out the reduction on an asymmetrical basis. The idea of asymmetrical reductions is based on three premises regarding the two military alliances: first, there is a numerical difference in the strength of the divisions and their equipment; secondly, there is a difference in the firepower and the combat endurance capability of forces as well as in the relative capability of various kinds of weapons systems; and, thirdly the geographical conditions are substantially different. [26]

As to the strength of the divisions, available information puts the number of personnel in a US division at roughly 16 000 whereas a Soviet division consists of only 9 000. For practical purposes this means that reduction on a division-for-division basis may not serve a meaningful purpose. In addition Western countries point out that disproportions exist in other areas of comparison:

In tanks, for example, the Pact has a 3-to-1 advantage, which is only partially offset by superior NATO antitank capability. In numbers of aircraft the advantage is about 3-to-2. In some instances qualitative advantages on the part of NATO forces make up for lack of numbers, but this aspect should not be overstated. In addition, there are also some areas where NATO forces would be at a disadvantage because of the use of older equipment. [27]

It seems, however, that the geographical factor plays by far the most important role in Western considerations of the problem of balanced reductions. Generally speaking Western countries consider that the advantage is clearly on the Soviet side for two basic reasons: first, because the proximity of Soviet territory to the central region makes it much easier for the Soviet Union to reinforce its troops there and to maintain the lines of communication with the rear, and, secondly, because NATO countries lack sufficiently deep territory in Europe to provide for maximum manoeuvrability of forces and adequate defence. This argument will explain Western insistence on an asymmetrical approach particularly as concerns US forces:

For one thing, any reductions on the part of the United States would mean bringing troops back 3 000 miles across the ocean, whereas the Soviets would be withdrawing troops several hundred miles across land (the very line to which the Soviet troops

would withdraw might well be a matter of contention). It would therefore seem that more Soviet forces in numbers would have to get an equivalent reduction. For example, if you moved one Soviet tank back 400 miles and one American tank 3 000 miles back across the ocean, you would be handing the Soviets an advantage. [13]

This is not the only aspect of the problem NATO countries consider they have to deal with. There is also the question of redeployment of forces in case of need which is again especially important for US forces which have to be brought back to Europe the long way from the USA. There may be two difficulties involved, political and technical. Many observers believe that once a substantial number of US forces are returned home it may be very difficult for the US government, in view of congressional pressure, to get an authorization to send them back to Europe unless an extraordinary situation so dictates. And there may be delays in doing this, in the first place because transportation capabilities are too limited to provide for quick and adequate redeployment of forces. In addition Western countries point out that the area of Western Europe where redeployment is to take place is relatively small and densely populated:

West Germany is about the size of Oregon. With France presently not part of the military alliance of NATO, virtually all planning for rapid redeployment, in the central region, must contemplate the use of airfields in West Germany. There are insufficient numbers of airfields, and they are insufficiently dispersed. And because of the intractability of the French, the line of communication (that is, the line of resupply) runs parallel rather than perpendicular to what would be the front lines. [28]

The Soviet Union has not yet made its official position on the meaning of balanced reductions quite clear. Judging by the very few articles published by Soviet authors on this question, the Soviet Union seems to be opposed to any asymmetrical reduction of forces in Europe within the framework of a so-called "balance". [29]

Differences which arise in connection with the definition of balanced reductions are not impossible to solve. The most simple solution would be to circumvent the question of a balance altogether. This could be done in several ways: first, by looking for an agreement on reduction of existing forces and armaments by a certain percentage. An obvious advantage of this approach is that it only requires information on the present level of forces and armaments of the countries concerned, and these facts are by and large already known. The most important disadvantage of this approach is, however, that it does not provide for substantial reductions but only within certain strict percentage limits. If this limit is too low the reductions will be quite insignificant. From a military point of view it should always be possible to make restricted reductions which would not seriously affect the existing balance of forces. However,

larger reductions are impossible to contemplate without bringing into the picture the question of balance. An agreement providing for percentage reductions could serve as a starting point in a search for more comprehensive solutions.

Another possible approach which would also circumvent the question of "balanced" reductions would be to look at forces and armaments from the offensive and defensive points of view, and then to concentrate discussions, in the first stage of negotiations, on their offensive characteristics. This is not at all a simple thing to do. First of all, the objection could be raised that it is difficult, if at all possible, to make clear distinctions between the two because offensive and defensive characteristics are very much determined by the way in which the forces and armaments are deployed and for which purposes. Nevertheless, it may be argued that certain types of weapons are, as a rule, used more often for offensive purposes than others and the same distinction could presumably be made with regard to forces, considering their numbers, composition and ratios. The idea of a gradual phasing out of predominantly offensive types of armaments and the corresponding forces connected with their functioning might offer better prospects for security in Europe than one depending on a prior definition of "balance".

Finally, the most radical approach to the reduction of forces and armaments would be the one looking for the minimum of forces and armaments. This approach completely avoids the question of the existing balance and, instead, tries to determine what is the minimum of forces and armaments, both quantitatively and qualitatively, which could provide adequate security of the countries concerned. When this is agreed then there should not be great difficulty in reducing the remaining forces and armaments. However, this approach is possible only if no restrictions are made concerning the choice of forces and armaments that would compose the required "minimum".[7]

Restrictions on foreign military bases

Another measure of an arms-regulation and disarmament nature, very similar to the idea of the freezing of armed forces and armaments, is the proposal for prohibition of the establishment of new foreign military bases in Europe. A document of the Yugoslav government on regional measures of disarmament in Europe of 1970, submitted to all European governments, suggested that all the countries concerned should (a) pledge themselves neither to request nor to accept requests for the enlargement of the existing foreign military bases in peacetime, and (b) accept a moratorium on the creation of new foreign military bases on their territories. The document pointed out that this proposal

[7] Similar ideas were put forward by Frederick Wyle in the hearings on a Conference on European Security. [10]

should be considered in conjunction with other arms-control and disarmament measures and in the first place with reductions of forces. This link is important to observe because an agreement on foreign bases with this content would sufficiently provide against any loopholes in a reduction-of-forces agreement such as, for example, attempts to redeploy forces in some other parts of Europe.

The measure concerning foreign bases could be pursued either independently or in connection with an agreement on the freezing of forces and armaments. In fact it seems natural that these two agreements should go together because they complement each other. In the case of this measure too, partial solutions are also possible. It would be a step forward if the countries concerned could agree, at least, on a moratorium on the creating of new foreign bases, leaving aside the question of the enlargement of existing bases.

Restrictions on military budgets

Of other arms-regulation measures which are occasionally mentioned in connection with discussions on security in Europe one more is, perhaps, worth mentioning. It is a proposal for the reduction or freezing of military budgets. This is not a new proposal; it has been advocated for many years especially by the Soviet Union. The reduction suggested, officially or unofficially, ranged somewhere between 10 and 30 per cent. However, the chances for an agreement on a reduction or freezing of military budgets under the circumstances presently prevailing in Europe are rather small. For example, some NATO countries are contemplating increases in military budgets, with a view to strengthening the alliance, so as to compensate the possible disadvantages of an agreement on the reductions of forces. At the regular NATO meeting in Brussels in December 1972 the ten nations making up the "Eurogroup" within the alliance agreed to an overall increase of their defence budgets by $1.5 billion for 1973 in current prices. This was the third consecutive year that the "Eurogroup" increased military expenditure. A similar process is taking place within the Warsaw Treaty countries. According to the latest estimates military expenditures of these countries rose by 1 per cent in current prices (see p. 207).

It seems that an agreement on restrictions of military budgets, as an independent arms-control measure, is unlikely to obtain sufficient support from the major military powers in Europe, including the United States. It may be assumed that opportunities for an agreement on military budgets exist only in connection with some other substantial measure of disarmament. For example, a successful outcome of SALT could probably facilitate negotiations on a budget freeze since a SALT agreement might somewhat slow down the nuclear arms race which is responsible for a large share in the military expenditure of nuclear powers. Such an agreement could also facilitate negotia-

tions on the budget question in regard to nuclear and non-nuclear members of alliances not taking part in SALT, and this may itself stimulate non-aligned and neutral countries to endorse this measure and undertake the same commitment themselves.

However, if and when the question of budget restrictions is taken up one of the central issues will be the problem of the different military budget structures which exist in countries with different political and economic systems and which make comparisons between them very difficult. A percentage cut in the military budgets of the countries concerned may help to circumvent the problems of comparison. A shortcoming of this approach, however, is that there are substantial differences between the actual total military expenditures and the military allocations included in the state budgets.

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28. *Ibid.*, p. 14965.
29. Kostko, Ju. "Voennaja konfrontacija i problema bezopasnosti v Evrope", *Mirovoja ekonomika i mezdunarodnye otnosenija*, No. 9, September 1972, pp. 17–25.

5. The prohibition of inhumane and indiscriminate weapons

Square-bracketed references, thus [1], *refer to the list of references on page 151.*

I. *Introduction*

A fundamental principle of the laws of war is that the choice of means of injuring an enemy is not unlimited. The means of combat are restricted in two ways: weapons should not cause 'superfluous injuries', and they should not be employed indiscriminately against non-combatants and combatants.

There is increasing concern that these provisions are being undermined by current means of warfare. Modern technology has given rise to a great range of weapons, some of which apparently inflict wounds similar to those caused by weapons which are already prohibited, but whose mode of action is not specifically covered by the formulations of the existing international law. It is necessary to define these weapons and effectively ban their use. As one delegate to the United Nations has said, it is necessary to define "the dum-dum bullets of today".[1]

Moreover, the massive firepower of modern weapon systems and the use of chemical sprays, area weapons, delayed-action fuses and a variety of means of environmental destruction tend to undermine those regulations intended to offer civilian populations some measure of protection from the exigencies of armed conflict.[2] It is imperative that these regulations be reaffirmed and developed.

Among the so-called conventional weapons being given serious consideration at the United Nations and in the International Committee of the Red

[1] "Dum-dum" bullets, named after the arsenal in India where they were produced for the use of British colonial forces against local resistance, were prohibited by a declaration of the Hague Conference in 1899. The United Kingdom, the United States and Portugal did not sign this declaration. However, the United Kingdom acceded to the declaration on 30 August 1907 and Portugal acceded to it on 29 August 1907. [1] For a discussion of the charges and counter-charges made by the parties to World War I regarding the use of dum-dum bullets, see reference [2].

[2] Though statistics are scarce and unreliable, some published figures give an indication of the problem. Of the war-disabled officially registered in Saigon in September 1971, 132 000 were civilian and 53 000 were military, a ratio of more than 7: 3. At the same time, approximately 390 doctors were available to treat the entire civilian population while 1 130 were available for the military. [3]

Cross (ICRC) for possible prohibitive measures are napalm, white phosphorus and other incendiary weapons, hypervelocity rifles and anti-personnel bombs. Napalm and other incendiary weapons may well be the first candidates for prohibition.

II. *Napalm and other incendiary weapons*

The period after World War II was most noteworthy for the formulation of the four Geneva Conventions of 12 August 1949:

I. The Geneva Convention for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field
II. The Geneva Convention for the Amelioration of the Condition of the Wounded, Sick and Shipwrecked Members of Armed Forces at Sea
III. The Geneva Convention relative to the Treatment of Prisoners of War
IV. The Geneva Convention relative to the Protection of Civilian Persons in Time of War.

However, these attempts at codifying the field of humanitarian law of armed conflict, while of great importance, did not claim to cover all aspects of human rights in armed conflicts. A number of steps have been taken since that time to extend the provisions of the original Geneva Conventions.

In the first version of the *Draft Rules for the Protection of the Civilian Population from the Dangers of Indiscriminate Warfare*, which the International Committee of the Red Cross (ICRC) published in 1955 as a first step on the road towards a new, adequate codification of those fields of the humanitarian law of armed conflict which had not been covered by the Geneva Conventions of 1949, the Articles on prohibited weapons did not mention incendiary weapons (Part I, General Principle No. II; Part II, Articles 10–11). As the ICRC later explained, such reference had been omitted because the premise had been "that the terrible damage to the civilian population by incendiary bombs was mainly due to their indiscriminate use", a use of weapons which was dealt with in another part of the Draft Rules. [4]

In drawing up the second version, which was published in 1956 under the title *Draft Rules for the Limitation of the Dangers Incurred by the Civilian Population in Time of War*, the ICRC thought better of it, and it proposed in Article 14 a prohibition against the use of:

> weapons whose harmful effects—resulting in particular from the dissemination of incendiary, chemical, bacteriological, radioactive or other agents—could spread to an unforeseen degree or escape, either in space or in time, from the control of those who employ them, thus endangering the civilian population.

As the ICRC explained in the commentary accompanying Article 14, while the protection of the civilian population had been the main motive and, indeed, the determining consideration for the proposed prohibitions, these prohibitions were meant to be total and, hence, to apply as between the armed forces as well. [5]

On the other hand, only the use of those weapons would be prohibited which would meet all the conditions enumerated in the text. It appears, therefore, that not all incendiary weapons were covered by the proposed prohibition. In effect, the commentary makes specific reference to this aspect of the matter, pointing out that incendiary weapons "are sometimes limited in their effects e.g. the flamethrower or napalm when used against a tank, but sometimes have uncontrollable consequences as in the case of certain bombs scattering inflammable material over a considerable distance". [6] As it was the use, not of categories of weapons (such as "incendiary weapons"), but of specific weapons producing certain effects which the ICRC wanted to see prohibited, the conclusion seems to be that incendiary weapons with limited effects, such as the flamethrower and (as it was then thought) napalm, would have stayed outside the proposed prohibition.

As is well-known, the result of the Draft Rules was minimal. The only time they were the object of serious discussion was in the XIXth International Conference of the Red Cross, held at New Delhi in 1957. With that, matters came to a standstill. In particular the discussion on Article 14 in New Delhi was entirely concentrated on one aspect only, namely, the use of nuclear weapons. Neither incendiary weapons, nor napalm in particular, were so much as mentioned in the debate.

Things were different when the discussion on the "reaffirmation and development of international humanitarian law applicable in armed conflicts" (to borrow the phrase currently used by the ICRC) was reopened, after successive adoption of Resolution XXVIII of the XXth International Conference of the Red Cross (Vienna, 1965), Resolution XXIII of the International Conference on Human Rights (Teheran, May 1968) and Resolution 2444 (XXIII) of the United Nations General Assembly (December 1968). In February 1969, the question of napalm was among the issues put before a group of experts convened by the ICRC. The discussion was not conclusive, some experts holding that napalm and other incendiary weapons cause a sort of asphyxia and therefore come under the Geneva Protocol of 1925,[3] and others considering

[3] The experts pointed not only to the League disarmament discussions, but also to preambular paragraph 4 of the Teheran Resolution, where mention is made of "the use of chemical and biological means of warfare, including napalm bombing". It is to be noted, however, that the Group of Experts consulted by the Secretary-General of the United Nations on the subject of chemical and bacteriological (biological) weapons and the effects of their possible use, did not include napalm in their study, on the ground that this means of warfare had better be treated in one category with explosives. [7]

their assimilation to chemical and bacteriological weapons difficult. According to the latter experts, who pointed to the effectiveness of napalm and other incendiary weapons in certain situations, the important thing to do was to place restrictions on their use. The ICRC concluded in its report that for the time being, and without prejudice to a total prohibition, the only practicable course open to the Red Cross was the one indicated by the last-mentioned experts. [8]

The Secretary-General of the United Nations, in November 1969, endorsed this conclusion. He wrote:

> Reminders to parties to conflicts that in any event the employment of incendiary weapons, such as napalm, should be accompanied by special precautions to prevent them from unduly affecting members of the civilian population or disabled members of the armed forces, or causing unnecessary suffering to combatants would therefore appear to be desirable. Moreover, in view of the reference to napalm in the Teheran Conference resolution, the legality or otherwise of the use of napalm would seem to be a question which would call for study and might be eventually resolved in an international document which would clarify the situation. [9]

In his second report on the same subject, of September 1970, the Secretary-General elaborated the idea of a further study of the effects of napalm on human beings and the living environment, and he suggested that the General Assembly might consider requesting him to prepare, with the aid of qualified consultant experts, a report on the matter. [10] This idea was taken up by the General Assembly only at its 26th session, in December 1971, whilst the scope of the study and report requested was extended to cover "other incendiary weapons" besides napalm. [11]

The latter extension was in line with the suggestion contained in the document on *Protection of the Civilian Population against Dangers of Hostilities*, submitted by the ICRC as one of the preparatory documents to the Conference of Government Experts on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflicts, held in Geneva from 24 May to 12 June 1971. [12]

This conference did not itself go into the question of napalm and other incendiary weapons in any detail. It was suggested, however, that something ought to be done about the problem of weapons, especially those which were not the subject of discussion in the United Nations, the Conference of the Committee on Disarmament, or any other competent body. [13]

In the text of the Draft Additional Protocol to the Four Conventions of Geneva of 12 August 1949, which the ICRC submitted to the second session of the Conference of Government Experts, held in Geneva from 3 May to 3 June 1972, the question of weapons was not dealt with under the heading of protection of the civilian population but of belligerents (or, as they are indi-

cated in the Draft Protocol, combatants). In the relevant article, Article 30, no specific prohibitions were proposed against any particular weapons. The draft article was confined to reaffirming the basic principles that belligerents do not have an unlimited choice of means of combat and that the use is prohibited of means of warfare calculated to cause unnecessary suffering (to which was added "or which are particularly cruel"); and the final paragraph contained a modified version of the famous Martens clause in the preamble to the Hague Convention of 1899 respecting the Law and Usages of War on Land, laying down that pending the adoption of more complete regulations, in cases not provided for in the Protocol, the principles of humanity and the dictates of the public conscience would continue to safeguard populations and belligerents. In the commentary to the Draft Protocol, no explanation was offered for this marked reticence with respect to the issue of possible prohibitions against (use of) specific weapons.

In the conference, these explanations were given by a representative of the ICRC in the commission which discussed the parts of the Draft Protocol in which Article 30 was found. Other bodies, he said, dealt with the question of the prohibition of nuclear, bacteriological and chemical weapons, and it might be preferable if those bodies would also deal with those "conventional" weapons which public opinion was deeply concerned about. In this context, he expressed his appreciation of the fact that the Secretary-General of the United Nations had been requested to prepare a special study on the subject of napalm and incendiary weapons. Prohibitions of specific weapons so far had not been included in the Geneva Conventions; understandably so, he said, because "the rules included in the Conventions are of an absolute nature, whereas the prohibitions of weapons are subject to reprisals or even to reciprocity".[4] The effect of the Geneva Conventions and of the proposed Protocol, on the other hand, was "indirectly to limit or prohibit the use of arms by imposing greater respect for certain categories of persons and objects". For all these reasons, no prohibition of specific weapons had been proposed in Article 30, and if any such prohibition should appear to be necessary, it might be preferable to embody these in a separate instrument.

In the discussion, the most diverse ideas were put forward, and numerous amendments were submitted. Some were in favour of maintaining the gist of Article 30 as drafted by the ICRC; others aimed at introducing certain more

[4] This statement cannot be denied a certain veracity, although it disregards the earnest attempts of the League Disarmament Conference to arrive at absolute prohibitions on chemical, incendiary and bacteriological weapons. In any event the prohibition on bacteriological warfare has assumed an absolute character with the adoption of the Convention on the prohibition of the development, production and stockpiling of bacteriological (biological) and toxin weapons and on their destruction, signed on 10 April 1972 in Washington, Moscow and London.

or less specified prohibitions: of weapons having indiscriminate effect, or of nuclear, bacteriological and chemical weapons in particular; of weapons destroying the environment; and of specific types of conventional weapons likely to cause unnecessary suffering to civilians and belligerents alike. Obviously, it is in the last-mentioned category that propositions relating to incendiary weapons could be expected.

Only very few amendments to Article 30 made express reference to incendiary weapons. One, introduced by the experts of Egypt, Finland, Mexico, Norway, Sweden, Switzerland and Yugoslavia, proposed to prohibit any use, *inter alia*, of a specific category of incendiary weapons, namely, those containing napalm or phosphorus. Another amendment, submitted by the experts of the Netherlands, aimed at prohibiting certain weapons "for use in circumstances where they may affect the civilian population", and among the weapons enumerated were "napalm bombs and incendiary weapons" (a description which was not meant to be technically precise, as it was left to experts to give such a more precise definition).

From the discussions on prohibition of these and other "conventional" weapons, so much had in any event become clear that further study was required. This realization led to the suggestion that the ICRC arrange a meeting of legal, military and medical experts to examine the problems involved.

Legal restraints on methods of warfare may take one of four forms, generally speaking: (1) abstract norms (for example, weapons should not be calculated to cause superfluous injury or be "blind" or indiscriminate); (2) prohibitions of classes of weapons (for example, chemical and biological weapons); (3) prohibitions of specific weapons (for example, exploding or dum-dum bullets); or (4) prohibitions of certain uses of weapons.

The abstract norms underly the conventional treaty prohibitions of classes of weapons and specific weapons. In addition they remain binding in customary law.

A review of the legal status of incendiary weapons must conclude that there is no present conventional law which prohibits their use as a class. Nevertheless, there are a number of precedents for such a prohibition.

The Declaration of St. Petersburg prohibited the use of exploding and incendiary projectiles below 400 grammes. The use of such projectiles in anti-aircraft guns was recognized in both the Hague Draft Air War Rules of 1923 and the Draft Disarmament Convention of 1933. The latter convention emphasised that such projectiles were not prohibited *provided that they are used exclusively for that purpose* (defence against aircraft), thereby demonstrating a general understanding that the provisions of St. Petersburg were still in force with regard to their use against personnel on the battlefield.

The Geneva Protocol of 1925 does not appear to have been intended to

prohibit weapons whose effects were due to heat and flame. It does apply to weapons whose effects are due to poisonous or asphyxiating gases or materials.

The Geneva Disarmament Conference of 1932–33 gave considerable attention to the question of incendiary weapons, and determined that they should be included with chemical and bacteriological weapons in qualitative disarmament. The Draft Disarmament Convention presented at the end of the conference with no opposition would have explicitly forbidden the use of *projectiles specifically intended to cause fires*, and *appliances designed to attack persons by fire*. The formulation would appear to include incendiary bombs, shells, bullets, grenades, and so on, as well as flamethrowers and "firebombs" (napalm bombs). It may possibly not include certain fixed defensive fire emplacements of the fougasse type as long as they function by acting as a barrier rather than attacking personnel.

Cognizant of the fact that there is no binding conventional legal prohibition of the use of incendiary weapons at present, the laws of land warfare of several of the major powers nevertheless emphasise that the use of incendiary weapons in such a way that they cause unnecessary suffering is forbidden. A note in the UK manual states:

> The use of flame-throwers and napalm bombs when directed against military targets is lawful. However, their use against personnel is contrary to the law of war in so far as it is calculated to cause unnecessary suffering.

The US Army Manual on *The Law of Land Warfare* provides:

> The use of weapons which employ fire, such as tracer ammunition, flame throwers, or napalm, and other incendiary agents, against targets requiring their use is not violative of international law. They should not, however, be employed in such a way as to cause unnecessary suffering to individuals.

The prohibition of unnecessary suffering, though difficult in application, remains as a fundamental control.

Customary international law also maintains a distinction between combatants and non-combatants. Though this discrimination is difficult to maintain in certain conditions, the principle is clear and remains a part of modern law. In a number of resolutions the United Nations General Assembly has insisted on its importance. Thus in Resolution 2675 (XXV), of 9 December 1970, the General Assembly adopted certain "Basic principles for the protection of civilian populations in armed conflicts". This resolution was adopted by 109 votes, none against, with eight absentions. It is not legislative in effect but provides significant evidence of the views of states on the issues to which it relates. Among the basic principles are the following:

2. In the conduct of military operations during armed conflicts, a distinction must be made at all times between persons actively taking part in the hostilities and civilian populations.
4. Civilian populations as such should not be the object of military operations.

III. *The UN report on incendiary weapons*

In October 1972 the Secretary-General's report on *Napalm and other incendiary weapons and all aspects of their possible use* was published [48].

The Secretary-General's report consists of five chapters. The first chapter describes incendiary agents and weapons. Incendiary agents are defined as substances which affect their targets primarily through the action of heat and flame derived from self-propagating exothermic chemical reactions, particularly combustion reactions. Examples are petroleum-based incendiaries such as napalm compositions; metal incendiaries, such as magnesium; pyrotechnic incendiaries, which contain an oxidizing agent; and pyrophoric incendiaries, such as white phosphorus and certain organometallic compounds, which ignite spontaneously in air.

Incendiary weapons include bombs, rockets, shells, grenades, bullets, flamethrowers, land-mines, igniters, and so on. That is, incendiary agents are found throughout the entire range of conventional weaponry, and are frequently used together with, or interchangeably with, other agents (such as chemical, biological, fragmentation or high-explosive agents) projected by the same delivery system (cannon, artillery, aircraft, and so on).

Chapter 2 of the Secretary-General's report describes the action of incendiary weapons in urban and rural areas and on matériel. The chapter concludes that in certain circumstances incendiary weapons when used in large quantities are capable of causing massive destruction to both the rural and urban environment. Such destruction is often unavoidably and even deliberately indiscriminate, and may be particularly to the detriment of the civilian rather than the military component of a society.

Chapter 3 describes the medical aspects of incendiary warfare and concludes that it is particularly cruel in its effects, notably because of the long period of recovery required for survivors and the high probability of permanent deformity with consequent emotional disorders.

The fourth chapter describes the uses of incendiary weapons against battlefield targets and population centres. When used in large quantities against urban areas, incendiary weapons have proved to be among the most powerful means of destruction known. Against battlefield targets, the military attraction, particularly of napalm, is their effect on certain kinds of matériel and their casualty effects on personnel, particularly where the precise location of the

target is unknown. The chapter concludes by drawing attention to the social and economic consequences of incendiary warfare. There is a marked disparity between the abilities of the developed and the developing countries both to inflict and to repair the economic damage that may result from incendiary attack.

In the fifth and concluding chapter, the Secretary-General's report points out that development continues towards producing incendiary weapons of still greater destructiveness and there may also follow a proliferation of these weapons throughout an increasing number of states.

> The situation is therefore gradually deteriorating and this underlines the urgent need for international consideration of effective measures of disarmament concerning incendiary weapons [49].

The report indicates that the effects of incendiary weapons may conflict with customary norms as embodied in international law. The massive spread of fire, as well as certain tactical uses of incendiaries, may have consequences that are essentially indiscriminate.

> When there is a difference between the susceptibility to fire of military and civilian targets, it is commonly to the detriment of the latter [50].

Burn injures are not only intensely painful but require exceptional resources for their medical treatment.

> When judged against what is required to put a soldier out of military action, much of the injury caused by indendiary weapons is therefore likely to be superfluous. In terms of damage to the civilian population, incendiaries are particularly cruel in their effects [51].

Further, incendiary weapons may have a variety of toxic and asphyxiating effects through the action of carbon monoxide, white phosphorus, the depletion of oxygen, and so on. Alarm is also expressed at the potential gravity of damage to the rural environment through the massive deployment of incendiaries against forests and crops.

The report suggests that the use of incendiary weapons may be part of a more general problem—the increasing mobilization of science and technology for war purposes.

> New weapons of increased destructiveness are emerging from the research and development programmed at an increasing rate, alongside which the long upheld principle of the immunity of the non-combatant appears to be receding from the military consciousness. These trends have very grave implications for the world community. It is therefore essential that the principle of restraint in the conduct of military operations, and in the selection and use of weapons, be researched with vigour. Clear lines must be drawn between what is permissible in time of war and what is not permissible [52].

Following the publication of the Secretary-General's report, the General Assembly, in a resolution of 29 November 1972, deplored the use of napalm and other incendiary weapons in armed conflicts and requested the Secretary-General to publish the report for wide circulation. The Secretary-General was further requested to report on the comments of governments to the 28th session of the General Assembly.

The resolution was passed by 99 votes in favour and none against, with 15 nations abstaining.

IV. *Incendiary weapons as "weapons of mass destruction"*[5]

The most indiscriminate use of incendiary weapons is as "weapons of mass destruction". This term is usually reserved for nuclear weapons (as well as lethal chemical and biological weapons).[6] Yet it is estimated that the effect of the Hiroshima bomb could have been achieved by placing approximately 975 tons of incendiary bombs and 325 tons of high-explosive bombs in the target area.[7] A total 1 667 tons of incendiary bombs were dropped on Tokyo, causing a greater number of casualties but over a larger area (table 5.1).

One official history describes the Tokyo raid on 9–10 March 1945 as follows:

> The area attacked was a rectangle measuring approximately four by three miles. It was densely populated, with an average of 103 000 inhabitants to the square mile (one ward, the Asakusa, averaged 135 000) and a "built-upness", or ratio of roof space to total area, of 40 to 50 percent, as compared to a normal American residential average of about 10 percent. The zone bordered the most important industrial section of Tokyo and included a few individually designated strategic targets. Its main importance lay in its home industries and feeder plants; being closely spaced and predominantly of wood-bamboo-plaster construction, these buildings easily kindled and the flames spread with the rapidity of a brush fire in a drought, damaging the fire-resistive factories...
>
> Police records show that 267 171 buildings were destroyed—about one fourth of the total in Tokyo—and that 1 008 005 persons were rendered homeless. The official roll of casualties listed 83 793 dead and 40 918 wounded. It was twentyfive days before all the dead were removed from the ruins... [16]

[5] Abstracted from *Napalm and Incendiary Weapons* [53].

[6] On 12 August 1948 the UN Commission for Conventional Armaments approved the US definition that weapons of mass destruction included "atomic explosive weapons, radioactive material weapons, lethal chemical and biological weapons, and any weapons developed in the future which have characteristics comparable in destructive effect to those of the atomic bomb or other weapons mentioned above". [14]

[7] To ensure this tonnage in the target area, it is estimated that a total of 1 600 tons would have to have been dropped. To these bomb loads, about 500 tons of fragmentation bombs would be required to inflict a comparable number of casualties. [15]

Table 5.1. Comparison of atomic and incendiary attacks on Japanese cities, 1945

	Hiroshima	Nagasaki	Tokyo	Average of 93 urban attacks
Planes	1	1	279	173
Bomb load	1 atomic	1 atomic	1 667 tons	1 129 tons
Population density per square mile	35 000	65 000	130 000	Unknown
Square miles destroyed	4.7	1.8	15.8	1.8
Killed and missing	70–80 000	35–40 000	83 600	1 850
Injured	70 000	40 000	102 000	1 830
Mortality rate per square mile destroyed	15 000	20 000	5 300	1 000
Casualty rate per square mile	32 000	43 000	11 800	2 000

Source: "US Strategic Bombing Survey: The Effects of Atomic Bombs on Hiroshima and Nagasaki", in Bond, H., ed., *Fire and the Air War* (Boston, National Fire Protection Association, 1946).

In the European theatre it is more difficult to separate the effects of incendiary and high-explosive bombs, since they were deliberately mixed.

On average, it appears that approximately 50 per cent of the bomb tonnage dropped on the German cities was incendiary, whereas in Japan the incendiary tonnage made up about 99 per cent. [17]

The high explosives were dispatched in Germany to perform the multiple duties of breaking water mains, blocking streets, keeping the fire guards under cover, inflicting civilian casualties, lowering morale, puncturing occasional reinforced concrete buildings and harassing fire-fighters with delayed action explosives after the attack. It was thought that the greatly increased havoc and confusion caused by the fires in Japan would counteract the lack of high explosive bombs. [18]

The effectiveness of incendiary area bombing depends on the construction of the buildings and the density of housing.

... good incendiary targets were such things as lumber yards, woodworks, and warehouses and dwellings ... airframe assembly and airplane engine plants, electrical appliance manufacturing, machineshops, synthetic rubber and synthetic oil plants, plants manufacturing airplane and submarine components, power houses and like occupancies ... were unpromising as incendiary targets because of the relatively low order of occupancy combustibility, unless the roof structure was combustible. [19]

The Germans began incendiary bombing British cities with their two kilogram magnesium and elektron incendiary bombs (table 5.2) and the British replied in kind, bombing over 100 cities, in 43 of which more than 50 per cent of the built-up area was destroyed. [20]

In the German raids on Britain some 60 595 persons lost their lives and 86 182 were wounded. [21]

Table 5.2. German bombing raids on British cities, 1940–41

City	Date	Bomb tonnage	
		Incendiary	Explosive
London	15–16 October 1940	70	386
Coventry	14–15 November 1940	30	500
London	10–11 May 1941	98	400
London	6–19 September 1941	690	5 817
Total	8 August 1940–31 December 1941	**1 600**	**43 000**

Source: Rumpf, H., *Das war den Bombenkrieg* (Oldenburg, Glätting, 1961). According to Rumpf, the raids on the London Docks and markets (7 September 1940), the City (29 December 1940), and military staging areas, railway stations and so on (10 May 1941), were entirely high-explosive bombs, even though sizeable conflagrations occurred.

Table 5.3. US Strategic Bombing Survey estimates of loss of production attributable to strategic bombing as a percentage of total German production, 1942–45

Year	Percentage loss
1942	*2.5*
1943	*9.0*
1944	*17.0*
1945	*6.5* (January to April)

Source: US Strategic Bombing Survey, *Area Studies Division Report*, No. 31, p. 18, cited in Frankland, N. and Webster, C., *The Strategic Air Offensive against Germany, 1939–1945*, Vol. IV (London, HMSO, 1961).

In the British (and US)[8] raids on Germany, estimates of the number of deaths range from 300 000 to 500–800 000.[9]

While there is no doubt as to the extent of the destruction of the German cities, there is considerable doubt as to the effect on the course of the war. The British and US strategic bombing surveys were made on the basis of different sets of assumptions and different sources of material and methods of analysis. They came to somewhat different conclusions. Table 5.3 shows the US estimates of the loss of production attributable to area bombing as a percentage

[8] Of a total of 2 690 000 tons of bombs dropped by the Western Allies in the European theatre, 1 350 000 (50.5 per cent) were dropped on Germany. Of this the RAF dropped 430 747 tons on the cities, including 190 335 tons of incendiaries (44 per cent), and the US AAF 80 000 tons. [22–23]

[9] Bond writes: "A *New York Times* dispatch from Dresden in January, 1946, reports 300 000 deaths... These must be added to an estimated total deaths due to air attack on Germany of 500 000 already established with reasonable certainty... The lower loss figure of 305 000... has been revised by the US Strategic Bombing Survey. The study has carefully compiled and analysed loss of life data from a great variety of source material." [24] Irving cites estimates of deaths in Dresden ranging from 35 000 to 200 000 and himself chooses 135 000, the figure supplied to him by a Dresden official. [25]

Table 5.4. British estimates of loss of production attributable to strategic bombing as a percentage of total German production, 1942–45

Year	Percentage loss	
	War production	All production
1942 Jan–Dec	*0.25*	*0.56*
1943 Jan–June	*1.8*	*2.7*
June–Dec	*3.8*	*8.2*
1944 Jan–June	*1.0*	*4.4*
June–Dec	*0.9*	*7.2*
1945 Jan–June	*1.2*	*9.7*

Source: British Bombing Survey Unit, *Effects of Strategic Air Attacks on German Towns*, p. 30, cited in Frankland, N. and Webster, C., *The Strategic Air Offensive against Germany, 1939–1945*, Vol. IV (London, HMSO, 1961).

of total annual German production. Table 5.4 gives the equivalent British estimates.

The British Bombing Survey Unit concluded that

... area attacks against German cities could not have been responsible for more than a very small part of the fall which actually had occurred in German production by the spring of 1945, and ... in terms of bombing effort, they were also a very costly way of achieving the results which they did achieve.[10] [27]

The incendiary raids on Japan were preceded by an attack on Hankow, China, on 18 December 1944.[11] This raid was noteworthy in that it consisted *only* of incendiary bombs. [29] Also of note is the fact that an *occupied* rather than an enemy town was chosen for the experiment.[12] Forty to 50 per cent of the target area was destroyed though "some (planes) dropped in areas inhabited by Chinese civilians". [31]

Incendiary bombs were also used in Korea:

Sixty-three B-29's on 3 January and 60 B-29's on 5 January [1951] strewed incendiary bombs over the North Korean capital city. Snow-covered roofs checked the spread of the conflagration, and only 35 percent of the city's built up area was destroyed, but

[10] US Strategic Bombing Survey reported regarding the Hiroshima bomb: "The bulk of the city's output came from large plants located on the outskirts of the city; one-half of the industrial production came from only five firms. Of these larger companies, only one suffered more than superficial damage. Of their working force, 94 per cent were uninjured. Since electric power was available, and materials and working force were not destroyed, plants ordinarily responsible for three-fourths of Hiroshima's industrial production could have resumed normal operation within 30 days of the attack had the war continued." [26]

[11] A small night incendiary raid against Nagasaki was carried out the previous August. [28]

[12] Before moving on to the Japanese home islands, the US bombers also bombed in Burma, Southern China and the Indo-China peninsula. Amongst other projects they bombed and mined the ports and rivers of Viet-Nam and bombed the dikes in an attempt to flood Gia Lam airfield at Hanoi: "Although the dikes were hit, the water level was too low to flood the field...". [30] No mention is made of results when the waters subsequently rose.

the Red radio at Pyongyang bitterly reported that "the entire city burned like a furnace for two whole days." [32]

Later, in July 1952, there were further raids:

Over 1 400 tons of bombs were dropped on Pyongyang (the North Korean capital) in these raids ... At night the North Korean capital was again heavily bombed by 65 US Superforts, which dropped 540 tons of bombs ... [33]

According to plan, the Fifth Air Force light-bomber wings commenced their night attacks against Communist communication centres on 20 July. Employing M-20 incendiary clusters and M-76 fire-bombs, [the planes] arrived at heights of about 4 000 feet, at five-minute intervals to bomb targets marked for them by the incendiary bombs carried by pathfinder lead crew. Once the fire got going, each bomber added to the conflagration... From their beginning the light bomber fire raids were marked with success. [34]

... the Fifth Air Force directed heavy attacks at Communist troop concentrations and industrial remnants. Agent reports and aerial photographs indicated that the General Headquarters of the North Korean People's Army was located in a built-up area about four miles outside Pyongyang City... the Fifth Air Force sent 273 sorties there in two strikes on 4 August. [35]

On August 4 an important Communist military headquarters near Pyongyang was wiped out by waves of UN fighter-bombers, 286 tons of bombs being dropped and 8 000 gallons of napalm (jellied petrol) and the entire area being raked by rockets and machine-gun fire. [36]

V. *Incendiary weapons as tactical area weapons*

Incendiary weapons, particularly napalm and phosphorus bombs, have seen widespread application as tactical area weapons. In this case, their use is not necessarily *deliberately* "indiscriminate", in the way that the area bombing of cities may be. In practice, just as the attempt to destroy factories by incinerating them along with the workers who operated them meant the indiscriminate bombing of combatant and non-combatant alike, so has the tactical use of incendiary bombs for close air support and interdiction of troops, supplies and equipment, resulted in the indiscriminate killing of excessive numbers of civilians.

As with strategic incendiary bombing, it is this indiscriminate use which is the most controversial aspect of the use of these weapons.

The following are listed as "suitable" targets for napalm-bomb attacks:

(1) Concentrations of troops in the open, stationary, or on the march.
(2) Vehicles, including armour.
(3) Gun and weapon positions, including missile launching sites.

(4) Supply and equipment concentrations.
(5) Command posts.
(6) Closely defended roadblocks.
(7) Fortifications or strong points.
(8) Air warning and radar installations.
(9) Airfields and aircraft.
(10) Bridges and tunnels occupied by personnel. [37]

Having listed these targets, US Field Manual 20–33 then describes the effects:

b. Effects. Although fire bombs do not have the great explosive and fragmentation effects of HE bombs, they do have these effects to some degree. When a fire bomb hits the target, it is traveling at approximately 450 meters per second and creates modified explosive and fragmentation effects. These shattered tank particles may cause injury to personnel at distances greater than pattern lengths, but these incidental injuries should not be considered normal fire bomb dividends.

(1) *Personnel.* Enemy personnel in the open are excellent targets. Those in shelter may escape due to the limited penetration ability of the fire bomb. However, such personnel will be driven from the firing ports and may suffer from the heat and/or the hot gases created. The psychological effect of the attack may demoralise the enemy and reduce his willingness to defend his positions unless he is well-trained in fire bomb defense.

(2) *Vehicles and weapons.* The fire bomb is excellent against enemy armour, other vehicles, and weapons. The thickened fuel sticks to the vehicle, weapon, or exposed personnel to create burn damage. It may burn out vital engine parts or antennas. It may be drawn into or leak into the vehicle to cause casualties or to set fire to spilled oil or ammunition, resulting in damage or loss of the vehicle. Gun tubes or other metal parts may be damaged so as to be unfit for use. The effective burning time of the thickened fuel will prevent the vehicle or weapon from accomplishing its mission during this time.

(3) *Structures.* Firebombs are effective against many kinds of buildings. They are not effective against reinforced concrete buildings. They are limited in effect on tunnels, most bridges, and fortified positions, although they can effectively neutralise personnel occupying these positions. Lightly built dwellings and factories such as are found in the Orient make excellent fire bomb targets. Most of these buildings are made of wood, plaster, and straw, and they burn easily. Brick and masonry constructed homes and factories such as found in Europe cannot be penetrated easily and are not very suitable as targets.

(4) *Aircraft and air installations.* Fire bombs will set fire to combustible parts, oil supplies, and material in air installations. Radar and radio equipment can be burned and damaged by the heat.

(5) *Noncombustibles.* Machinery and tools that are not combustible will be twisted out of shape by the heat or have their temper destroyed.

(6) *Asphalt, plastics, and other composition materials.* Fire bombs will set fire to asphalt, some plastics, nylon, rayon and similar materials. [38]

Table 5.5. Ordnance consumption by United Nations Air Forces in Korea, 1950–53

Ordnance	FEAF	US Marine Corps	US Navy	Other
Bombs (tons)	386 037	—	—	—
Napalm (tons)	32 357	—	—	—
Rockets (no.)	313 600	—	—	—
Smoke rockets (no.)	55 797	—	—	—
Machine-gun (rounds)	166 853 100	—	—	—
Total (tons)	**476 000**	**82 000**	**120 000**	**20 000**

Source: Futrell, R. F., *The United States Air Force in Korea, 1950–1953* (New York, Duell, Sloan and Pearce, 1961); no breakdown given for US Marine Corps, US Navy and "Other" consumption.

The objectives of tactical napalm bombing are specified as follows:

a. The basic objective of fire bomb missions is to kill, injure, neutralise, and demoralise. A secondary but vitally important objective is to destroy or damage vehicles, equipment, material, and structure or installations. [39]

By contrast, the objectives of a tactical use of other incendiary bombs are more directed towards matériel and structures:

b. The objectives of incendiary bombing in tactial operations is [*sic*] to damage material and facilities, to inflict casualties, and to destroy or weaken the ability to support operations against friendly ground forces. [40]

During World War II, the US Army Air Force dropped over 14 000 tons of napalm, more than two-thirds of it on Japanese targets throughout the Pacific. This experience is summed up by the official historians as follows:

In the war against Japan, the fire bomb saw use from the mainland of Asia to the very small islands of the Pacific. As in Europe, the munition gave best results when used to produce casualities. Some observers in the Pacific went so far as to say that matériel destruction should be but a secondary mission for the fire bomb and then only if the target were highly combustible. Apart from its casualty potential the fire-bomb had a definite psychological effect on enemy troops; ground commanders agreed that enemy morale suffered an obvious decrease after a fire bomb attack... But whether used against troops or other targets, fire bombs to be effective had to be dropped in adequate numbers. Prisoners of war stated that widely dispersed fire bomb hits had little or no effect on the morale of the unit. [41]

US Far East Air Forces (FEAF) in Korea used a total of 32 357 tons of napalm. [42] The figure does not include use by the US Marines, the US Navy and by other air forces under UN command in Korea. Napalm made up some 6.8 per cent of the FEAF total tonnage of ordnance delivered (table 5.5).

During the Korean War, the use of napalm bombs against Soviet-designed T-34 tanks was demonstrated:

In the early days at Taegu the Mustangs used light-case 500-pound bombs filled with thermite and napalm with great success against both tanks and troops. The Russian-built tanks had a good bit of rubber in their treads and even a near miss with flaming napalm would usually ignite and destroy the armoured tank. [43]

Because of the particular configuration of the Soviet-built T-34 tanks, napalm incendiary mixture had been the most effective destroyer of Red armour. [44]

This success of napalm against T-34 tanks in 1950 has contributed one of the major "military necessity" arguments in favour of napalm. The argument is weakened by two factors; first, once certain weaknesses in the construction of a tank have been shown (rubber components, radiator, air intake, aluminium cylinder block and so on) countermeasures can be built into subsequent designs (replacement of rubber components, ability to close air intake, or reverse direction of fan and so on). Secondly, there has been a considerable development since the Korean War of other means of combatting tanks.

In spite of the effectiveness of incendiary weapons against tanks in the Korean War, it is probable that the major use of incendiary bombs was against personnel.

The firebombs were peculiarly demoralizing to North Korean foot soldiers. "The enemy didn't seem to mind being blown up or shot", said Major Hess. "However, as soon as we would start dropping thermite or napalm in their vicinity they would immediately scatter and break any forward movement." [45]

... Fifth Air Force crews and Eighth Army ground troops had also come to believe that napalm was a most effective weapon for employment against hostile personnel. [46]

Since few of the United Nations troops experienced the effects of the weapon they were using, the following letter by a British major who fought in Korea is of interest:

Sir, in 1951 and 1952 I became accustomed to the daily use of napalm on Chinese positions. It wasn't until an "accidental drop" occurred on my own company position that I realized what a nauseating and utterly terrifying weapon it is. To my mind it is a completely uncivilized method of warfare and it would be no more uncivilized to tie our prisoners of war to a post, throw petrol over them and set them alight. It is as horrible as that. The photograph you printed on June 9 must have made all your readers aware that here is a weapon which must be banned.[13] [47]

From the incomplete data available, the tonnage of napalm used by US forces in Indo-China is estimated in table 5.6.

[13] The photograph, which appeared throughout the world press, was of Phan Thi Kim-Phuc, a little girl struck by napalm, thereby personifying the particular cruelty and the indiscriminate effects of napalm, and the problems of accurate delivery in the close air support role in a "hostile" environment.

Table 5.6. Estimated use of napalm in Indo-China by US and allied forces, 1963–71

Year	Total air munitions (tons)	Fighter-bomber (FB) munitions (tons)	Napalm (tons)	Napalm as percent of FB tonnage
1963			2 181	
1964			1 777	
1965	315 000	289 000	17 659	*6.1*
1966	512 000	408 000	54 620	*13.4*
1967	932 763	700 000	(58 000)	(*8.2*)
1968	1 431 654	859 000	(68 000)	(*8.0*)
1969	1 387 237	810 000	(63 750)	(*7.8*)
1970	977 446	497 000	(46 250)	(*9.3*)
1971	764 095	349 000	(26 000)	(*7.4*)
1972	1 084 359	(403 000)	(34 300)	(*8.5*)
Total	**7 404 554**	**4 315 000**	**(372 537)**	**(8.5)**

Sources: Total air munitions and fighter-bomber munitions from Littauer, R. and Uphoff, N. eds., *The Air War in Indochina*, revd. ed. (Boston, Beacon Press, 1972); napalm figures for 1963–1966 plus estimate of "total now exceeds 100 000 tons" in early 1968 from *San Francisco Chronicle*, 19 March 1968; estimate of approximately 125 000 tons of napalm employed by US forces during the period January 1969 through June 1971, provided by the Office of the Assistant Secretary of Defense, Public Affairs, to Professor J. B. Neilands, University of California, by letter, 18 August 1971. The estimates in parentheses are computed on the basis of these figures in proportion to the total fighter-bomber tonnages.

These figures include the munitions expenditure by the Viet-Nam Air Force (VNAF), which has increased from 40 000 tons in 1968 to 63 000 tons in 1971. The VNAF tonnage of napalm is unknown.

VI. *Summary*

Examination of the current status of incendiary weapons in international law shows that they are not unequivocably prohibited under the terms of existing conventional law. Nevertheless, conventional international law contains a number of important precedents with relation to incendiary weapons. The St. Petersburg Declaration of 1868 specifically forbad the use of incendiary projectiles under 400 grammes. Projectiles such as 20 mm high-explosive incendiary shells are widely used today against personnel on the ground.

The Geneva Protocol of 1925 prohibited "the use in war of asphyxiating, poisonous or other gases, and of all analogous liquids, materials or devices...". As the UN Secretary-General's report points out, while not specifically covered by the Protocol, some incendiary agents may kill or incapacitate by their asphyxiating or toxic effects in certain circumstances.

The Draft Disarmament Convention put forward by the British delegation to the Geneva Disarmament Conference of 1932–33 expressly forbad both "the use of projectiles specifically intended to cause fires", and "the use of

appliances designed to attack persons by fire, such as flamethrowers". There was no opposition to this proposed prohibition.

The humanitarian considerations which inspired these legal formulations retain their force today. But international law has not developed at the same rate as military practice.

In modern war there are two overwhelming military demands with regard to the choice of weapons for battlefield use.

The first is for weapons which *permanently incapacitate even when only non-vital areas of the body are hit.* That is to say, even if the person is not killed outright, he will either die subsequently, or be permanently disabled. From the inadequate data available it appears that, apart from those incinerated in the immediate fireball resulting from a napalm attack, about 20–30 per cent of those hit by burning drops of napalm die within half an hour. Depending on the hospital facilities available, as many as 50 per cent may die a slow and painful death over the course of four to six weeks. Only 15–25 per cent recover and many of those will be permanently deformed or disfigured.

Napalm is thus highly effective in incapacitating personnel. But there is little doubt that as far as the survivors of the immediate attack are concerned the wounds are particularly cruel, both in the short term and in the long term and considerably in excess of the requirements for preventing a soldier carrying out his mission.

The second military demand is for *weapons which cover an area which may include the target, rather than hitting the target directly.* There are several reasons for this demand. The first is that it may be difficult to distinguish a target from its surroundings, particularly if it is camouflaged.

The second reason is that it may be difficult to hit a taget, even if it can be seen. The faster a plane flies over, the less time the pilot has to aim his weapons and the greater the chance of missing due to the higher speed of delivery. The more effective the anti-aircraft fire, the greater the demand for shorter time over the target and greater "stand-off capability" (ability to deliver the weapons to the target from longer range). The shorter the time over the target and the greater the distance from it, the less the chance of hitting it. Hence the demand for weapons which increase the probability of having some effect on the target even without a direct hit by increasing the area which they cover.

Napalm bombs combine area characteristics with high incapacitating power. In recent years a wide variety of other weapons with similar characteristics have been developed and utilised: fragmentation bombs and rockets, cluster bombs, fuel-air explosives, gunships which fire 18 000 rounds a minute, use of strategic bombers in tactical support, and so on.

It may be true to say, therefore, that napalm as such is becoming less pre-

dominant as it is replaced by a range of alternative weapon systems with similar area and incapacitating characteristics.

The question then arises as to whether it is not the contemporary military demands for (1) incapacitating and (2) area weapons which deserve legal consideration rather than particular weapons, such as incendiaries. The first demand is directly contrary to the customary principle that weapons should not be calculated to cause unnecessary suffering. The second demand is directly opposed to the principle that weapons should not be indiscriminate in their effects.

There is an urgent need to reassert the primacy of humanitarian considerations over the demands of military convenience.

It would, however, seem practical and appropriate, as a first step towards limiting the modern armoury, to undertake to prohibit the use of incendiary weapons which evoke widespread feelings of horror and disgust frequently associated in the popular mind with chemical weapons.

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Appendix 5A

Chronology of events related to the prohibition of inhumane and indiscriminate weapons, April 1968–March 1973

22 April–13 May 1968

The International Conference on Human Rights at Teheran in its resolution XXIII calls upon the Secretary-General of the United Nations, in consultation with the International Committee of the Red Cross (ICRC) and other appropriate international organizations, to study:

(a) Steps which could be taken to secure the better application of existing humanitarian international conventions and rules in all armed conflicts;

(b) The need for additional humanitarian conventions or for other appropriate legal instruments to ensure the better protection of civilians, prisoners and combatants in all armed conflicts and the prohibition and limitation of the use of certain methods and means of warfare.

19 December 1968

The UN General Assembly adopts resolution 2444 (XXIII) authorizing the Secretary-General to undertake the studies recommended by the Teheran Conference (above).

September 1969

The XXIst International Conference of the Red Cross held at Istanbul urges the International Committee of the Red Cross to draw up concrete rules to supplement the international humanitarian law of armed conflicts now in force and to hold consultations with government experts on those proposals.

20 November 1969

The first report of the United Nations Secretary-General on Human Rights in Armed Conflicts (Document A/7720) is published.

16 December 1969

The UN General Assembly adopts resolution 2597 (XXIV) in which the Secretary-General is requested:

To continue the study initiated under General Assembly resolution 2444 (XXIII), giving special attention to the need for protection of the rights of civilians and combatants in conflicts which arise from the struggles of peoples under colonial and foreign rule for liberation and self-determination and the better application of existing humanitarian conventions and rules to such conflicts.

Further, the Secretary-General is requested to submit a second report on respect for human rights in armed conflicts.

18 September 1970

The second report of the UN Secretary-General on human rights in armed conflicts (A/8052) recommends, *inter alia*, that he be authorized to commission a report on napalm and other incendiary weapons.

28 December 1970–4 January 1971

The UN General Assembly adopts five resolutions (2673 (XXV)–2677 (XXV)) on human rights in armed conflicts. Resolution 2677 (XXV), reaffirming previous resolutions, welcomes the decision of the ICRC to convene at Geneva in 1971, a conference of government experts on the reaffirmation and development of the international humanitarian law of armed conflicts. The resolution expresses the belief that one or more plenipotentiary diplomatic conferences of states parties to the four Geneva Conventions of 1949 and other interested states might be convened at an appropriate time, after due preparation, in order to adopt international legal instruments for the reaffirmation and development of international humanitarian law applicable to armed conflicts. The resolution also expresses the hope that the ICRC conference would consider specific recommendations in this respect.

24 May–12 June 1971

The First Conference of Government Experts on the Reaffirmation and Development of the International Humanitarian Law Applicable to Armed Conflicts is held in Geneva under the auspices of the ICRC.

2 September 1971

The UN Secretary-General submits a report on the Conference of Government Experts and some other recent developments to the General Assembly (A/8370 and Add. 1).

20 December 1971

The UN General Assembly adopts resolution 2852 (XXVI) in which the decision of the ICRC to hold a second conference of government experts in 1972 is welcomed. The ICRC is invited to continue its work and to devote special

attention to measures designed to ensure the better application of existing rules, measures to improve the protection of the civilian population, and the protection of persons struggling under foreign or colonial occupation or racist régimes, the protection and humane treatment of combatants in international and non-international armed conflicts and questions of guerilla warfare, and additional rules for the protection of the wounded and sick. Further, the Secretary-General is requested to submit two reports, one on the second conference of government experts, and one on napalm and incendiary weapons and all aspects of their possible use, with the aid of qualified governmental consultant experts.

In resolution 2853 (XXVI), also on 20 December 1971, the General Assembly expresses the hope that the second conference of government experts would make recommendations for the further development of the international humanitarian law applicable in armed conflicts, including, as appropriate, draft protocols to the Geneva Conventions of 1949, for subsequent consideration at one or more plenipotentiary diplomatic conferences. The Secretary-General is requested to report to the 27th session of the General Assembly on the progress made.

3 May–3 June 1972

The Second Conference of Government Experts on the Reaffirmation and Development of International Law Applicable in Armed Conflicts is held in Geneva under the auspices of the ICRC.

20 September 1972

The UN Secretary-General submits a report on the second conference of government experts (A/8781 and Corr. 1).

9 October 1972

The UN Secretary-General submits a report on *Napalm and other incendiary weapons and all aspects of their possible use*, prepared by a group of qualified governmental consultant experts (A/8803).

29 November 1972

The UN General Assembly, in resolution 2932 (XXVII), "deplores the use of napalm and other incendiary weapons in all armed conflicts", and calls upon the Secretary-General to publish the report on napalm for wide circulation and to report on the comments of governments at its 28th session.

18 December 1972

The UN General Assembly adopts resolution 3032 (XXVII) urging all governments to seek consultations in order that the forthcoming (1974) diplomatic conference on international humanitarian law applicable to armed conflicts would adopt rules which would "contribute significantly in the alleviation of suffering" brought about by modern armed conflicts. Further, the General Assembly requests the Secretary-General to prepare as soon as possible a survey of existing rules of international law concerning the prohibition or restriction of the use of specific weapons.

26 February–3 March 1973

A meeting of military, medical and legal experts on the use of such conventional weapons as may cause unnecessary suffering or have indiscriminate effects is held in Geneva under the auspices of the ICRC.

Scheduled to take place 17 February–14 March 1974

The plenipotentiary diplomatic conference on the reaffirmation and development of international humanitarian law applicable in armed conflicts is to be held in Geneva at the invitation of the Swiss Federal Council, to consider additional protocols to the four Geneva Conventions of 1949.

Appendix 5B

Amendments submitted by government experts to the ICRC Conference, 3 May–3 June 1972

Note: At the 1972 Conference of Government Experts held in Geneva, the ICRC submitted two Draft Additional Protocols to the four Geneva Conventions of 1949. The first applies to international conflicts, the second to non-international conflicts. Article 30 of the former and Article 18 of the latter were entitled Means of Combat and had identical wording. The ICRC draft of these articles and the amendments submitted by the government experts are reproduced below.

ICRC Draft

1. Combatants' choice of means of combat is not unlimited.

2. It is forbidden to use weapons, projectiles or substances calculated to cause unnecessary suffering, or particularly cruel methods and means.

3. In cases for which no provision is made in the present Protocol, the principle of humanity and the dictates of the public conscience shall continue to safeguard populations and combatants pending the adoption of fuller regulations.

C2. Proposal submitted by the experts of Poland

2. It is forbidden to use the following methods and means:
   (a) methods and means which allow no distinction between military objectives on one hand and the civilian population and civilian objects on the other hand;
   (b) methods and means which cause unnecessary suffering or are particularly cruel;
   (c) methods and means which destroy natural human environment.

C3. Proposal submitted by the experts of the Federal Republic of Germany

1. The right of the Parties to the conflict to adopt means of injuring the enemy is not unlimited.

2. It is forbidden to use any means of combat against civilian targets. Furthermore, it is forbidden to use any means of combat against other targets if the military advantage pursued is out of proportion to the suffering caused among the civilian population. Those who use or give orders for the use of means of combat are bound to weigh the military advantage offered by the destruction of a military target against the suffering caused thereby to the civilian population.

3. It is forbidden to use means of combat in a way calculated to cause unnecessary suffering. This prohibition covers the use of means of combat which offer no greater military advantage than other available means of combat, while causing substantially greater suffering. Those who use or give orders for the use of means of combat are bound to weigh concrete military advantages pursued against the suffering caused thereby to the adversary.

4. It is forbidden to use means of combat in a perfidious way.

(Identical title and wording for Article 18 of Draft Protocol II.)
(Replaced by C56 and C59.)

C5. Proposal submitted by the experts of the Federal Republic of Germany

General rule

Pending the acceptance of more complete rules, the High Contracting Parties reaffirm that in cases not covered by humanitarian conventions the civilian population and the combatants shall continue to be safeguarded by the principles of the laws of nations as they result from the usages established from the laws of humanity and the dictates of the public conscience.

(The purpose of this proposal, which applies also to Article 18 in Draft Protocol II, is to reaffirm the Martens clause. In Draft Protocol I, it could be placed either in Part I or in Part V, and, Draft Protocol II, either in Chapter I or in Chapter IX.)

C6. Proposal submitted by the experts of Czechoslovakia, the German Democratic Republic and Hungary

1. The choice of means of combat by the Parties to the conflict and by the combatants is not unlimited.

2. It is forbidden to use weapons, projectiles or substances calculated to cause unnecessary suffering or other particularly cruel methods and means.

3. It is forbidden to use weapons, projectiles or other means and methods which because of their uncontrollable effects in terms of time and space affect military objectives and protected persons or other protected objects indiscriminately.

4. It is forbidden to use weapons, projectiles or other means and methods which upset the balance of the natural living and environmental conditions.

5. In cases for which no provision is made in the present Protocol, the principle of humanity, the rules and principles of international law and the dictates of the public conscience shall continue to safeguard populations and combatants pending the adoption of fuller regulations.

(Paragraph 5 may also be part of the Preamble or figure as a separate article.)

C13. Proposal submitted by the experts of the United States of America

1. The right of combatants to adopt means of injuring the enemy is not unlimited.

2. It is forbidden to use weapons, projectiles, substances, methods and means calculated to cause unnecessary suffering.

3. In cases for which no provision is made in the present Protocol, civilians and combatants remain under the protection and the rule of customary international law and the principle of humanity.

C14. Proposal submitted by the experts of Brazil

1. (No change)

2. Delete the adverb "particularly".

3. Delete the phrase "and the dictates of the public conscience", and insert this paragraph as paragraph 3 of Article 1 of the Protocol:

3. Pending the adoption of fuller regulations, the principles of humanity shall continue to safeguard populations and combatants in cases for which no provision is made in the present Protocol.

C17. Proposal submitted by the experts of Romania

2. Add the following sentence: "It is forbidden to employ weapons of mass destruction, in particular nuclear and thermo-nuclear arms, and any other weapon whereof the nature is such that its destructive effects are not limited to the annihilation of combatants and military objectives but also endanger the civilian population, non-military objects and the environment."

3. Insert, after the words "public conscience" in paragraph 3, the phrase "and the principles stated in United Nations General Assembly resolution 1653 (XVI) entitled Declaration concerning the prohibition of the use of nuclear and thermo-nuclear weapons".

C22. Proposal submitted by the experts of the United Kingdom

1. Combatants' choice of means of combat is not unlimited.

2. It is forbidden to use weapons, projectiles or substances calculated to cause unnecessary suffering.

3. Delete.

New Paragraph in the Preamble to Protocol I
incorporating the Martens clause in an updated form, as follows:

Reaffirming that, until a more complete code of the laws of war has been issued, in cases not included in the present Protocol, civilians and combatants remain under the protection and the rule of the principles of customary international law as they result from established international usages, the principles of humanity and the dictates of the public conscience.

C27. Proposal submitted by the experts of France

1. The choice of means of combat by parties to an armed conflict is not unlimited.

C33. Proposal submitted by the experts of Egypt, Finland, Mexico, Norway, Sweden, Switzerland and Yugoslavia

3. It is forbidden to use weapons and methods of warfare which are likely to affect combatants and civilians indiscriminately.

4. Delayed-action weapons, the dangerous and perfidious effects of which are likely to be indiscriminate and to cause suffering to the civilian population, are prohibited.

5. Incendiary weapons, containing napalm or phosphorus, shall be prohibited.

6. Bombs which for their effect depend upon fragmentation into great numbers of small calibred pieces or the release of great numbers of small calibred pellets shall be prohibited.

7. The constant development of new weapons and methods of warfare places an obligation upon States to determine individually—wherever they do not attain international agreements—whether the use of particular new weapons or methods of warfare is compatible with the principles contained in this article.

8. The prohibitions contained in this article are without prejudice to any prohibitions of weapons and methods of warfare which are found in other articles of the present Protocol or in other instruments.

(For the title of Part III, replace the word "Combatants" by the words "Means

and methods of combat"; the present text, containing the Martens clause, is placed elsewhere in Draft Protocol I.)

(This proposal was also endorsed by the experts of Algeria, Austria, Kuwait, Libya, Mali, Saudi Arabia and Syria.)

C44. Proposal submitted by the experts of Jordan

1. (No change)

2. In particular it is forbidden to use

(a) weapons and means of warfare which endanger the civil population and are indiscriminate in their effects on combatants and civilian alike,

(b) weapons and means of warfare which are calculated to cause unnecessary suffering.

3. Without prejudice to the generality and comprehensiveness of the above two principles, the following weapons or means of destruction of human beings should never be used:

nuclear, biological, bacteriological, and chemical weapons.

4. Steps should be taken to outlaw the above-mentioned weapons and means of warfare and embody same in international treaties.

C56. Proposal submitted by the experts of Australia, Belgium, Canada, the Federal Republic of Germany, the United Kingdom and the United States of America

1. The right of the Parties to the conflict to adopt means of injuring the enemy is not unlimited.

2. It is forbidden to use weapons, projectiles, substances, or methods calculated to cause unnecessary suffering.

3. In the development of new weapons or methods of warfare States have an obligation to determine whether the use of a particular new weapon or method of warfare will be compatible with the principle that methods and means of armed conflict shall not be employed in a manner calculated to cause unnecessary suffering.

(This proposal replaces the amendments contained in documents CE/COM III/C 3, C 13, C 18, C 22 and C 27. The co-sponsors will propose a separate article embodying existing Article 30 (3) of the ICRC draft.)

C57. Proposal submitted by the experts of Spain

1. The choice of means and methods of combat by the Parties to the conflict is not unlimited.

2. Means and methods of combat which are prohibited are those which:

(a) have uncontrollable effects, or harm without distinction combatants and the civilian population, or military objectives and non-military objects; or

(b) cause unnecessary suffering.

3. It is prohibited to use delayed-action weapons, incendiary weapons containing napalm or phosphorus, fragmentation bombs and other weapons, projectiles or substances that have the effects or cause the suffering referred to in the preceding paragraph;

4. Weapons of mass destruction, blind, poisonous or cruel weapons, and weapons with indiscriminate effects are contrary to the dictates of humanity. Members of the international community must renounce such weapons absolutely.

5. The prohibitions provided for in this article shall not affect any other prohibitions on methods and means of combat laid down by international treaty or customary law.

(The experts of Spain consider that the clause known as the "Martens clause" should not be included in this article, but, given its general scope, should be included in the Preamble or in Part I (General Provisions) of the Draft Protocol).

C58. Proposal submitted by the experts of Australia, Belgium, Canada, the Federal Republic of Germany, the United Kingdom and the United States of America

Delete Article 30 (3) and insert the following as a separate article:

In cases not included in the present Protocol or other applicable conventions, civilians and combatants remain under the protection and the rule of the principles of international law, as they result from the principles of humanity and the dictates of the public conscience.

C59. Proposal submitted by the experts of Australia, Belgium, Canda, the Federal Republic of Germany, the United Kingdom and the United States of America

1. The right of the Parties to the conflict to adopt means of injuring the enemy is not unlimited.

2. It is forbidden to use weapons, projectiles, substances, or methods calculated to cause unnecessary suffering.

3. In the development of new weapons or methods of warfare States have an obligation to determine whether the use of a particular new weapon or method of warfare will be compatible with the principle that methods and means

of armed conflict shall not be employed in a manner calculated to cause unncecessary suffering.

(This proposal replaces the amendments contained in documents CE/COM III/C 3, C 13, C 18, and C 22. The co-sponsors will propose a separate article embodying existing Article 30 (3) of the ICRC draft.)

C68–69. Proposal submitted by the experts of Bulgaria, Czechoslovakia, the German Democratic Republic, Hungary and Poland

1. The choice of means and methods of combat by the Parties to the conflict and by the combatants is not unlimited.

2. It is forbidden to use means and methods which cause unnecesary suffering or other particularly cruel means and methods.

3. It is forbidden to use means and methods which affect military objectives and protected persons or civilian objects indiscriminately.

4. It is forbidden to use means and methods which destroy the natural human environmental conditions.

5. In cases for which no provision is made in the present Protocol, the principle of humanity, the rules and principles of international law and the dictates of the public conscience shall continue to safeguard populations and combatants pending the adoption of fuller regulations.

(Paragraph 5 should be a separate article. This proposal replaces documents CE/COM/C2 and 6.)

C26. Proposal submitted by the experts of the Netherlands

Note. Rather than amend Article 30, the Netherlands delegation made the following proposal with regard to Article 39.

Without prejudice to the generality of the provisions of Articles 30, 40 and 45, the following weapons shall be prohibited for use in circumstances where they may affect the civilian population:

1. ... [delayed action weapons, the dangerous and perfidious effect of which are likely to be indiscriminate and to cause suffering to the civilian population];
2. ... [napalm bombs and other incendiary weapons];
3. ... [bombs which for their effect depend upon fragmentation into great numbers of small calibre pieces or the release of great numbers of small calibre pieces or the release of great numbers of small calibre pellets].

The words within the square brackets are meant to convey a *general* description of the weapons involved. The *precise* description of those weapons should be undertaken by experts in this field.

6. UN peacekeeping forces

Square-bracketed references, thus [1], *refer to the list of references on page 200.*

I. *Introduction*

The international security system provided for in the Charter of the United Nations (Chapter VII) is based on the principle of collective security, largely implying that the big powers together should police the world, when necessary using their ordinary military establishments. This system, designed in the spirit of the World War II cooperation, suggests that the big powers have a conforming pattern of interest. But during the 'cold war' period, because of the international situation in general and the composition of the United Nations, a UN collective security power, based on big-power consensus, proved unworkable. As a substitute, multinational bodies have been formed in various ways under the auspices of the UN. As such methods were not anticipated when the Charter was negotiated, the existing articles had to be reinterpreted with a view to providing a constitutional basis for those actions. Given big-power disagreement on the political goals, the different solutions applied have also given rise to formal controversy. Quite naturally, the positions taken have primarily reflected respective states' national interests in the disputes and the areas concerned.

Political disagreement has also made it difficult to formulate generally accepted definitions of terms such as "peacekeeping" or "peace observation", which are commonly used to denote the UN's activities involving military personnel. However, these expressions are usually adopted to indicate UN political and military attempts to control conflicts, as far as possible by impartial, essentially non-coercive methods,[1] and such a definition, though limited in scope, seems sufficient for the purposes of this presentation; it rules out pure enforcement actions as envisaged in the UN Charter, adding a new dimension to the UN's security-building measures. Further, the concept of "peacekeeping" forces will be used here to include those UN operations where military armed units are employed, as opposed to "peace observation" operations which involve organized bodies of unarmed military observers.

In the 1960s the political situation within the UN changed along with the

[1] This definition is rather close to one adopted by L. L. Fabian [1]. There is an abundance of other suggested definitions which will not be discussed here.

entry of the many new member states. Almost simultaneously the experience gained from the UN peacekeeping and peace-observation activities performed so far was assessed and strong criticism drew attention to some failures of the operations. Moreover, the sudden withdrawal of the United Nations Emergency Force (UNEF) from the Middle East in 1967 caused some doubt as to the viability of peacekeeping in the future. Therefore, a need was felt for improving the UN's means and methods of cooling off trouble-spots and containing open violence, and so on 18 February 1965, the UN Special Committee of Peacekeeping Operations (the "Committee of 33") was formed to deal with these problems mainly from their political, legal, constitutional and financial aspects. [2] So far, the results of this Committee have been very restricted, but there seems to be some prospect of reconsideration on the part of the big powers. The positions of the USA and the USSR have recently been summarized and submitted to the Secretary-General. [3–4] Even if their standpoints are still far from compatible, it is interesting to note that the USSR, which previously strictly adhered to the explicit provisions of the UN Charter, has now elaborated its views on "United Nations peacekeeping operations including United Nations observer missions".

It is only natural that peacekeeping and peace-observation activities should, in the first instance, be politically controlled; military and technical issues within this field must always be secondary to political considerations. But on the other hand, military and technical issues play an important role in the execution of the operations, and so it is very important that the military consequences of a political decision are known to the decision-makers. This presentation, then, aims at promoting a general understanding of the essential military and technical problems in peacekeeping from the performer's point of view,[2] and the political problems will not be dealt with more than is necessary to indicate the political framework in which UN peacekeeping operations have to take place. No attempt will be made here to deal with the problems of distributing power and authority within the UN headquarters, nor with the financing problem from the UN point of view.

The discussion will be focused on the force-level peacekeeping operations, and will consider the experience gained on organizational, administrative and logistical problems, from the United Nations Emergency Force—Middle East (UNEF), Opération des Nations Unies au Congo or the United Nations Congo Operation (ONUC) and the United Nations Force in Cyprus (UNFICYP). Because the UN force in Cyprus has been able to benefit from the successes and failures of the previous peacekeeping forces, and is the only UN force still in existence, this force will be used as the main example. There will also be some discussion on preparedness and training, with particular reference to the ex-

[2] Those interested in further studies are advised to refer to the bibliographies, [5–9].

Table 6.1. UN peace-observation missions and peacekeeping forces

Area	Mission	Duration	Aim	Approximate peak strength (men)[a]	Number of participating states[b]
Greece	UN Special Committee on the Balkans (UNSCOB)	1947–52	Observation, mediation	35	7
Indonesia	Consular Commission Good Offices Committee UN Commission for Indonesia (UNCI)	1947–51 1947–49 1949–51	Observation, mediation, conciliation, interposition, cease-fire supervision	65	6
Palestine	UN Truce Supervision Organization (UNTSO)	1949–	Observation, cease-fire supervision	300	17
Kashmir	UN Commission for India and Pakistan (UNCIP) UN Military Observer Group in India and Pakistan (UNMOGIP)	1948– 1949–	Observation, mediation Observation, cease-fire supervision	— 100	— 14
Egypt	UN Emergency Force (UNEF)	1956–67	Observation, interposition, cease-fire supervision	6 600	10
Lebanon	UN Observation Group in Lebanon (UNOGIL)	1958	Observation	600	21
The Congo	Opération des Nations-Unies au Congo (ONUC)	1960–64	Maintenance of law and order	20 000	34
West Irian	UN Temporary Executive Authority (UNTEA) UN Security Force (UNSF)	1962–63	Temporary administration of the area	1 600	9
Yemen	UN Yemen Observation Mission (UNYOM)	1963–64	Observation, cease-fire supervision	200	13
Cyprus	UN Force in Cyprus (UNFICYP)	1964–	Maintenance of law and order	6 400	10
India and Pakistan	UN India and Pakistan Observation Mission (UNIPOM)	1965–66	Observation, cease-fire supervision	100	20

[a] Strength figures concern military personnel only.
[b] Refers to states having participated with military personnel during all or part of the operation: all may not have been permanently present.

Sources: Wainhouse, D. W., and others, *International Peace Observation* (Baltimore, John Hopkins Press, 1966).
Legault, A., *The Authorization of Peace-Keeping Operations in Terms of the Nature of the Conflict* (Paris, International Information Center on Peace-Keeping Operations, 1968).
National Support of International Peacekeeping and Peace Observation Missions, Volume III (Washington, Washington Center of Foreign Policy Research, 1970).

perience gained by the Nordic countries (Denmark, Finland, Norway and Sweden) from participation in UN peacekeeping forces. In addition, a special section on joint Nordic UN officers' training will be included.

A complete list of all the peacekeeping and peace observation missions is given in table 6.1.

II. *Creation of a UN Force*

Mandate and authorization

The formulation of the mandate of the UN peacekeeping force is very important; it sets out the force's task, which in turn influences its organization, equipment requirements and operational principles. The form of the mandate is determined by political considerations. "[W]henever an operation is politically feasible it has also become constitutionally possible." [10] While a clear mandate is advantageous to the force, political discord in the UN may complicate the drawing up of resolutions, and it is then easier to have a short and vague wording adopted than a more comprehensive and precise one. Further, as developments in the area concerned can seldom be foreseen, it may be favourable to start an operation with a rather open-ended formulation, allowing for some freedom as regards the ways and means of carrying out the task, provided continuing complementary directions and guidelines can be expected from the UN. This means relying on long-distance communications in critical situations. If the communications break down, as happened in the Congo, it may also imply leaving the UN officials in the field to take political decisions, the consequences of which can cause world-wide dispute.

Typical tasks allotted to UN peacekeeping forces are guard duties, observation and patrol, enforcement of cease-fires and truces and internal policing and order-keeping [11]. A comparison of the mandates of UNEF,[3] ONUC[4] and

[3] The UNEF mandate, given in five resolutions in 1956 [12–16], contained essentially the following tasks:

(1) to secure the cessation of hostilities and supervise the cease-fire;
(2) to ensure the orderly withdrawal of British, French and Israeli forces;
(3) to patrol the border area between Egypt and Israel; and
(4) to oversee the observance of the Egypt-Israel Armistice provisions.

[4] The ONUC mandate [17–22] was evolving and especially complicated but can, very shortly, be said to have contained the following tasks:

(1) to maintain the territorial integrity and the political independence of the Republic of the Congo;
(2) to assist the central government of the Congo in the restoration and maintenance of law and order;
(3) to prevent the occurrence of civil war in the Congo; and
(4) to secure the immediate withdrawal and evacuation from the Congo of all foreign military, para-military and advisory personnel, not under the United Nations Command, and all mercenaries.

UNFICYP[5] shows some clear distinctions. UNEF, which after its initial operations was stationed along the Egyptian-Israeli border, could be characterized as a 'barrier force', observering and supervising a cease-fire. ONUC and UNFICYP, on the other hand, have been deployed throughout the territory concerned, attempting to restore order and promote a return to normal conditions. They can best be described as 'law and order forces'. The functions of these different types of UN forces are very dissimilar. "[T]he problems encountered by a United Nations force operating within and throughout a country torn by civil war are much greater, thus requiring a higher degree of competence and exposing the force, and the United Nations to greater hazards." [24]

The terms of reference under which the UN force must perform its operations have to be negotiated with the host state which, according to established practice, must give its consent to the stationing of a force on its territory. This can be settled in various agreements, the most important one being the "Status of Forces Agreement". It regulates, *inter alia*, two conditions most essential to the carrying out of the mandate, namely the use of force and the freedom of movement. These two issues deserve some particular comments. A summary of the contents of a Status of Forces Agreement is given in appendix 6A.

The right to carry weapons is granted in the agreement. With an armed military unit, the right to use force is a matter of primary concern, but peacekeeping should be "essentially non-coercive". As a UN operation is intended to prevent bloodshed, or at least to save as many lives as possible, it would be contrary to its aim to use violent means unless this is unavoidable. It can be argued that the killing of one man on a certain occasion may save the lives of thousands. But to decide to whom, where and when this should be done is of course an extremely difficult and sensitive question. And how can it be proved afterwards that it really was necessary?

Not only the peaceful aim of a UN operation *per se* points towards strong restrictions on the use of force. Some UN officers claim that the limitations on the use of force are too great, and that they should be allowed a fuller range of options to be used at their discretion, but in general, the self-defence rule seems to be a good one. Many others are convinced that greater coercion is not only usually unnecessary but in fact may often decrease the UN's real leverage. [25] A Canadian company commander in Cyprus is quoted as saying: "If you go and ask somebody to stop firing they usually will, for a while at least. But how will I be able to talk to Greeks and Turks if I've been pumping bullets at them?"

[5] "The Security Council ... recommends that the function of the force should be, in the interest of preserving international peace and security, to use its best efforts to prevent a recurrence of fighting and, as necessary, to contribute to the maintenance and restoration of law and order and a return to normal conditions." [23]

[26]. After all, despite occasional shows of force, UNFICYP claims not to have killed anybody so far.

There is a general understanding that the authority to use force should be restricted to situations of self-defence. How this affects, *inter alia*, the size of the force and how it is interpreted with a view to facilitating the operations will be dealt with below (see pp. 175 and 184). The awareness that UN soldiers are able to use their weapons if attacked imposes restraints on anyone calculating an assault, as would the awareness of the impact on world opinion resulting from a charge on UN troops. UN arms, even if not employed, help to grant all other authorization needed for the performance of the mission, including freedom of movement. In the Congo the UN troops were sometimes denied the necessary freedom of movement, so the UN gradually added to their authority. On 21 February 1961, the Security Council urged that the UN "take immediately all appropriate measures to prevent the occurrence of civil war in the Congo, including the use of force, if necessary, in the last resort" [27]. At that stage, the Congo operation developed into an enforcement action, as this was probably the only way in which a complete failure of the ONUC could be avoided. This is why the word "essentially" has to be used to qualify "non-coercive" in the definition of peacekeeping given above. But it was only after all peaceful efforts had failed to resolve the problem of Katanga's secession that the ONUC, as a last resort, used force to establish freedom of movement [28].

Because it had a different type of mandate, UNEF never encountered this sort of problem in Egypt.

The UNFICYP Status of Forces Agreement grants the force freedom of movement throughout Cyprus, explicitly including its members together with its service vehicles, vessels, aircraft and equipment. This sounds simple enough, but this authority was challenged in the very first months of operation, when the Cypriot government argued that "freedom of movement" did not include "entry by UNFICYP into ... Government premises" and insisted that "where requirements of absolute secrecy on matter [*sic*] of state defense and security are involved, it is not possible to permit entry of UNFICYP patrols" [29]. This restrictive interpretation seriously hampered the UN force in carrying out its tasks and gave rise to protracted discussions between the Secretary-General and the government of Cyprus. The Secretary-General strongly insisted that the force could not discharge its functions unless it had complete freedom of movement in Cyprus, which could only mean such unrestricted freedom of movement as may be considered essential by the force commander. Finally an agreement was reached which closed about 60 square miles (1.65 per cent of the total area of the country) to UNFICYP patrols. However, passage through these restricted areas along recognized public roads is permitted, and some of the areas "may be visited by the force commander and others by UNFICYP zone

or district commanders if prior notice of intention to do so is given. Since this compromise was worked out, the force has encountered only occasional interference with its freedom of movement from the government authorities." [30]

It is essential that the freedom of movement needed for the operation and the right to use weapons, though restricted to self-defence, is explicitly granted. Even so, it can prove necessary to negotiate the interpretation of the privileges of the agreement during the course of the operation. Although the agreement may appear balanced in print, it invariably favours the host. In practice the peacekeepers must continually try to protect both the peace and their own prerogatives [31].

General organizational principles

Two main principles can be applied when forming a UN military force—the creation of a more or less permanent UN force, drafted, organized, equipped, trained and maintained by the UN itself without significant national involvement, or a jointly organized body of national contingents offered by contributing states at the request of the UN.[6] For political reasons a permanent UN force has not been acceptable to the majority of UN member states [32–33]. Hence the only practical system presently envisaged is the use of national contingents, generally organized in multinational bodies at the disposal of the UN and remaining under its control.

Such a force inevitably suffers from many of the drawbacks that would have been avoided with a permanent UN force. This latter force could be appropriately organized, equipped and trained exclusively for peacekeeping purposes. Thus there could be less improvization when launching an operation and the prospects of efficient application of available resources ought to be fairly good. Until now, the multinational forces have consisted of units with different military organizations, equipment, training and operational procedures and this will probably, more or less, continue. Furthermore, once the political decisions are taken, a permanent force could be deployed accordingly, whereas the contributions from supplying states have to be negotiated, which of course is more time-consuming the greater the number of nations involved. A contributing state may, under certain circumstances, withdraw its contingent, which would not happen in the case of a permanent force. More continuity and less rotation could be expected from the permanent force which also, being non-national, could be more easily accepted by host countries.

On the other hand a permanently organized force would certainly never exactly fit the needs—qualitative or quantitative—of a new operation. The re-

[6] Hybrid organizations can also be thought of as a small internationalized nucleus that could be supplemented by national contingents of the Article 43 type [34].

quirements would be better satisfied by requesting an appropriate number of *ad hoc* designed national units from possible contributors. There are also other practical problems connected with the creation of a non-national force; for example, how to determine proportions when recruiting a commander, officers and other ranks from different peoples, political camps, regions or continents. The financing of a permanent force would also be a heavy burden as it would have to be paid for even when it was not in action.

As pointed out above, political considerations have priority over military judgement to a greater extent than is common in ordinary military practice. This state of affairs often imposes restrictions which result in decreased efficiency on the part of the military forces employed. However, when the military consequences have been properly examined, governments contributing military contingents will probably accept a political necessity, even though it causes some military disadvantages. But where information on the practical consequences is lacking or ignored by the decision-makers within the UN, the decision may expose deployed military contingents to unnecessary danger. And this will certainly not increase the willingness of member states to contribute military peacekeeping units to the UN.

Choice of nationalities

The choice of contributors to a peacekeeping force may be a rather sensitive political question. It depends largely on the attitudes of host countries and possible contributing states.

In the late 1950s, Secretary-General Hammarskjöld put forward some basic outlines for peacekeeping operations which have since become guidelines for all such activities [35]. The primary rule was the disqualification of the big powers —the five permanent members of the Security Council—as contributors of military peacekeeping units; non-participation of their military contingents and non-involvement of their nationals in top political or military positions at field headquarters are intended to ensure impartiality [36]. This is also intended to decrease mutual distrust between big powers as to the others' objectives in the area concerned.

Consequently the medium and small powers are the only possible contributors of peacekeeping forces implying, of course, a further restriction to those having a military establishment sophisticated enough to be able to provide useful military units. But of these states, one more category is excluded, namely all states having an interest in the dispute and the area concerned. The ambition is to create a force which is as impartial as possible, and it has been argued that "impartiality in this context means non-alignment with either side in a dispute, ideally to the extent of total detachment from the controversial issues at stake"

[37]. This is only theoretical; there cannot be absolute impartiality or non-alignment on the part of the participants of a peacekeeping operation, nor can the UN principle of noninterference in a state's internal affairs be completely adhered to when an international UN force is deployed on the country's territory. Whatever the peacekeepers are doing, acting on the Secretary-General's directives usually supports the views of one side and opposes the views of some other. But there should at least be an endeavour not to act on behalf of the national interest of foreign states. 'Impartiality' will be used here in this restricted sense.

Impartiality may be promoted by arranging a national, geographical, political or other distribution of the states invited to participate in the operation. But still more important is the consent of the host state. If the host state does not accept a military contingent from a particular country, this in practice is equivalent to a veto. This safeguard on the part of the host state is a quite natural provision but it can of course also be used to justify excessive claims. Candidates have been turned down on reasonable grounds as well as on many capricious ones—a hostile vote in the UN, a prime minister's unsympathetic remarks, an old policy viewed unfavourably, and the like. A host country "should not be permitted to carry its objection to this or that country's participation beyond a reasonable or justifiable point—otherwise the problems of the Congo, where at one moment the UN Secretariat was literally scraping the barrel to find contingents that were acceptable, will be repeated" [38].

But even the contributing state must be willing to place the units requested at the UN's disposal. Reluctance to contribute to an operation of which the country disapproves is understandable. The purpose of the intended mission, its terms of reference, estimated duration and so on, have in practice to be examined and approved by the contributing state. This examination may result in a refusal to make the contribution requested. Sometimes an affirmative response is not given without further clarification. Sweden, for instance, did not want to take part in UNFICYP until it was made clear that it would not be the only neutral nation contributing a contingent.

All these restrictions reveal that the list of possible contributors varies from area to area and possibly also from time to time. Judgements about impartiality, or about its lack, continue to affect personnel and composition policies even after operations are established. On at least one occasion, a state has been removed when its impartiality was seriously challenged by the host, and conversely, new participants have been added when it has been necessary to broaden the membership base to assure greater impartiality [39]. It is easy to conceive that such changes may create serious problems for the force commander.

Canada, Ireland, the Nordic countries and India are the states which, to date, have most often been engaged in peacekeeping operations.

Contributors to UNFICYP have been almost completely restricted to NATO countries and neutral European countries. This limited choice, which complies with a principle of primarily recruiting forces from the region in question, may have been affected by the fact that consent had to be granted by not less than four states—Turkey, Greece, the United Kingdom and Cyprus—all having been involved in the treaties providing for the establishment of the Republic of Cyprus.

However, a notable exception from the general principle is also made in the UNFICYP case; a substantial part of the force has been made up by British troops. This was mainly due to practical reasons—the British troops were already carrying out peacekeeping activities in Cyprus before the UN troops were dispatched to the island. There was some concern about this as the UK, apart from being one of the Big Five in the Security Council, could hardly be considered as being disinterested in the area. However, the British contingent, though remaining the largest part of the force, was very much reduced as soon as the influx of other national contingents began. Among the parts remaining were support facilities that could offer UNFICYP well-established communications, offices, logistics and transportation arrangements. The outcome was that UNFICYP became the first UN peacekeeping force where these functions have been working smoothly; both UNEF and ONUC suffered heavily from bad communications and inadequate supplies, particularly in the early stages of their operations. The success of the British in this case was due not only to the time they had had to accustom themselves to the conditions but also to the fact that the whole support system was formed by men from one nation alone who were properly trained and coordinated.

Integration of a multinational force

The problem of unifying and commanding a multinational body increases in proportion to the number of different national units involved. Some of these issues have been indicated above when dealing with the general organizational principles. It is self-evident that bringing together people with different languages, education, traditions, religions, standards of living and ways of life will create particular problems that will add to the difficulties of giving adequate orders to ensure complete coordination for full effect at all levels, of arranging communications, of providing logistical support, of accustoming the different units to the prevailing conditions (for example, climate and food) and of maintaining morale.

One way of mitigating these disadvantages would be to involve as few nationalities as possible in a particular operation. But this will seldom be feasible, mainly for political reasons. The only instance where this has happened so far—

in the UN Security Force to West Irian (UNSF) in 1962–1963, which was set up almost entirely by Pakistani troops—was possible only because of the comparatively small size of the force [40]. It is obvious that the size of the force required affects the number of nations necessary to form it.

UNFICYP has been made up of military contingents from seven countries,[7] and another three have contributed non-military contingents. European state dominance of the force must certainly have facilitated the integration within UNFICYP.

Ten nations contributed military contingents to UNEF during its first years; the number then dropped to seven. ONUC received military units from no less than 25 countries and the nationalities represented within its staff numbered 34. Among the civilian elements, still more nations were represented in these missions.

Naturally it takes some time to weld together such heterogeneous bodies of personnel, particularly under such difficult conditions as those which existed in the first phase of the Congo operation. In force headquarters, it is necessary to employ representatives of all nations contributing military contingents. But while the qualifications demanded of the officers designed for force staff positions should enable them to overcome these difficulties rather soon, the problems may be greater where the national contingents are concerned.

The number of nationalities involved depends not only on the size of the force, but also on the maximum contribution possible from each contributing state. No fixed limits can be set for the size of such a contribution, as this depends very much on that country's size and the nature of its military establishment, quite apart from its willingness to participate.

Experience from previous UN operations shows that the battalion is the most useful unit from an operational point of view [42]. There also seems to be rather widespread agreement that, at the battalion level, most UN units ought to be nationally homogeneous [43]. This not only reduces the nationality problem, at least as far as the lower levels are concerned, but also simplifies logistics and administrative procedures. As a rule, the major contributors have participated with battalion-size units (a typical size for an infantry-type battalion is about 500–1 000 men). But many countries have provided smaller, particularly specialized units.

It is possible that the approximate number of contributing states required for forming a future UN military force can be obtained by dividing the calculated force strength by a figure somewhere between 500 and 1 000. Although one has

[7] Austria's original contribution was 54 medical personnel and 45 civilian policemen. In April 1972 Austria sent a military unit of 274 men consisting of two rifle companies, headquarters, communications and engineering units to UNFICYP [41].

to be aware of the unreliability of such a rule-of-thumb, it is certainly advisable to encourage contributors to provide, if possible, battalion-size contingents.

Internal organization

The size of a UN force must be determined by its task and this always varies during different stages of an operation. The peak strengths of UNEF and UNFICYP were similar, around 6 000 men each, but they were both gradually reduced to little more than half, mainly for financial reasons. ONUC on the other hand numbered, at its peak, about 20 000 men—still a rather low figure for carrying out peacekeeping functions in a country as vast as the Congo.

It is reasonable to assume that most UN commanders will complain of a shortage of personnel. There was some argument in the first phase of the Cyprus operation that the UN force should have enforcement and disarmament functions on the island and so be much stronger, but the Cyprus government would never have consented to this [44]. That UNFICYP never even achieved its planned size of 7 000 men was mainly due to pressure from Archbishop Makarios for a reduction to something like 4 000–5 000 men. "[D]uring UNFICYP's first tense year there were over 40 000 other well-led and fairly well-trained armed men on the island ... UNFICYP was outmanned by each side; simple statistics militated against the Force's taking any rash punitive actions." [45] So the size of the force alone confines its operations mainly to peaceful action. One of the force's acting commanders has expressed the view that although UNFICYP was, from the start, properly manned for its task,

> it should have been reduced rather quickly after the stabilizing effect of its introduction. This would appear to be a principle which at least ought to be addressed in any peacekeeping operation ... Progressive reductions in the size of a peacekeeping force, after a short initial period produces good results, should be a definite policy goal. Not only a reduction in costs and an improvement in effectiveness are to be gained, but increased emphasis on peacemaking. [46]

The very different tasks allotted to a peacekeeping force, compared with a national defence force, are clearly indicated by the considerations mentioned. The size of a national defence force is usually determined in relation to the strength of a potential enemy; in a peacekeeping situation, although there should be no enemy, there are usually three or more parties, including the peacekeepers themselves.

The troops needed for peacekeeping purposes are primarily infantry-type units. (An example of an infantry-type UN battalion is given in table 6.2.) To support their operations, headquarters, communications, transportation, logistics and maintenance elements have to be added. In addition, specific tasks may require other kinds of personnel, for example, police and engineers.

Table 6.2. Organization of a typical infantry-type UN battalion[a]

	HQ and HQ company	Rifle company[b]	Two rifle companies	Support company	Battalion total
Men (equipped with small arms)	150	150	300	90	690
Light machine-guns	—	6	12	—	18
AA machine-guns (double)	—	—	—	10	10
Bazookas	—	6	12	—	18
Minibuses	2	—	—	—	2
Volvo jeeps	3	3	6	4	16
Wheeled APCs	—	—	—	10	10
Lorries, 5 tons[c]	7	7	14	21	49
Tractors[d]	—	—	—	8	8
Motorcycles	3	2	4	1	10
Radio communications sets	15	25	50	4	94

[a] This example shows the organization of a Swedish UN "Stand-by" Rifle Battalion. When the battalion is not in service, all the equipment is stored together in an easily accessible way.
[b] The rifle company consists of chief, deputy chief, headquarters section, three rifle platoons and one support platoon.
[c] Procured by the UN. Some of them have trailers attached.
[d] With trailers for 3 tons of cargo.

It is important that the force has its own facilities in all essential respects and relies as little as possible on the parties to the conflict.

As the units are contributed from various countries with different defence organizations, there are also differences involved in recruiting them. Some countries provide professional units, taken from their national defence forces, and these are usually well trained and welded together. Other countries may contribute *ad hoc* units specially made up of non-professionals, mainly conscripts. And sometimes mixtures of both categories are employed.

The non-professional, such as the volunteer reservist or conscript, can in his own way be every bit as good as the professional peacekeeper. There are valid reasons for believing this. First, the man is a volunteer, which gives him a genuine *raison d'être* for being there. Second, he may have served previous engagements in the service of the United Nations. Third, the non-professionals come from every walk of life—the schoolroom, the farm, the work bench, the garage or the grocery store—and so have a common bond with those of the community they have come to serve. In this field of human relations, so vital to the work and achievements of a peace force, this built-in source of mutual understanding can often overcome otherwise insurmountable obstacles and can encourage, in the minds of the community itself, a more positive and helpful attitude towards the peacekeepers. The professional soldier has much to offer but not everything. The knowledge and experience he can bring to the art of peacekeeping is immense, but a process of adaptation is necessary if it is to be successfully applied. The amateur can make a different contribution, but one which is equally valuable. [47]

Most non-professional units are made up of volunteers. Some countries, such as Denmark, have made special provisions enabling them to order conscripts into UN service, although this possibility will probably only be used when the number of volunteers available is too small to form the unit needed. It is obvious that most regular units are simply ordered to this service. Even here, however, the voluntary principle has often been adopted. Thus Ireland has been able to recruit regulars for their UN units on a voluntary basis, even though, under Irish law, all armed service personnel are liable for UN peacekeeping tours whether they want to go abroad or not [48]. Several countries, such as Denmark, Ireland, Finland and, recently, Austria, have had to make changes in their legislation in order to contribute forces to the UN, because their constitutions prohibited their military units from serving outside their own borders.

It is only natural that contributors of troops wish to exert some influence on the conduct of the peacekeeping operation. One way of satisfying this wish has been to offer each national contingent staff positions in proportion to the size of its contingent,[8] so long as it can provide personnel with adequate ability. This method, however, concerns only the staff officers; experience from UNFICYP shows that, as far as assistant personnel such as clerks, signallers, drivers and logistic personnel are concerned, recruiting from one nationality alone can have distinct advantages.

Even the UN has to be represented, being responsible *inter alia* for administrative and financial matters. A civilian staff, including for example personnel for procurement, finance, communications, transport, public information, welfare and special services, is always part of the peacekeeping force's headquarters, and is headed by a UN official, the Chief Administrative Officer (CAO). In addition, special civilian advisers have been placed by the UN at the force commander's disposal, mainly for use in legal and political matters.

There have been some proposals for a standard organization of different kinds of UN military units. While this would have many advantages, it would hardly be possible under the present organizational system and does not seem really necessary provided that the principle that battalion-level units will include personnel from only one nation is retained.

The choice of a force's equipment has always to be related to its task and to the prevailing conditions. As long as an operation remains non-coercive and force is resorted to only as a means of self-defence, small arms and light support weapons such as light machine-guns and bazooka-type anti-tank weapons are usually sufficient. Were a UN force to be deployed in a buffer zone, however, it might be necessary—in order to protect that zone from major infiltration by

[8] This has not always been adhered to. In the ONUC Headquarters there was no direct relation between national distribution of staff positions and the size of the national contingents. [49]

either contestant in the dispute—for the force to be equipped, for self-defence purposes, with a full range of weaponry.

It is interesting to note, in this context, a Soviet point of view, recently put forward, that "the [UN] land forces should be motorized and armed with all types of weapons, including artillery of every calibre. They should have tank units, airborne troops, a diversified air force, and comprehensive naval forces in support." The force could then "operate successfully against an aggressor". [50] This suggestion is on a par with that of General Burns, the first commander of UNEF, who, giving his views on the composition of the force, said that it should be "so strong that it would be in no danger of being thrust aside ..." It ought to be about the size of a division, equipped with tanks and attached reconnaissance and fighter-aircraft units. [51] This would have given the force clear enforcement capabilities. But UNEF was never made that strong an instrument; for guarding and supervising this was not necessary. In the Congo, it was not until enforcement actually became an authorized element of the operation that ONUC was reinforced with mortars and jet fighters.[9] In non-coercive operations, armoured personnel carriers, mainly defensive and offering protection against small-arms fire and fragments, should be used rather than battle tanks which are essentially offensive weapons.

A standardization of equipment would greatly facilitate logistics. As weapons and ammunition are seldom used by a UN force, these do not usually create problems, but standardization of other equipment, such as communications sets and vehicles, would be very advantageous [53]. It should be kept in mind, however, that even rather sophisticated military alliances have not been able to attain the high levels of equipment standardization desirable [54]. Smaller nations and particularly those with a strained economy often have to resort to the "use-whatever-available" military-procurement policy which, unavoidably, will also influence their possible organization of units for UN purposes. Furnishing such units with new kinds of equipment may necessitate more or less complicated additional training. A centralized UN procurement in the area concerned, however, certainly has advantages over long distance national transportation of, for example, heavy lorries. What the UN procures and gives to the contingents has usually, as far as possible, been standardized and this seems to be a good working principle.

There have been suggestions for adoption of new technologies, such as surveillance and monitoring devices, in the service of UN peacekeeping objectives. This is urged by the Soviet Union, which suggests that the latest types of weapons (excluding nuclear weapons) and the latest technical means are necessary [55]. In the United States there has been a recommendation that "research and

[9] By late October 1961, the ONUC had a complement of five jet fighters from Ethiopia, five from Sweden, and five Canberras from India [52].

development on peacekeeping equipment" be undertaken. "As a minimum measure ... appropriate items such as those relating to border surveillance ... should be considered ... Appropriate fields for possible further study include surveillance techniques, communications systems, computerization, contract support 'packages', command and control arrangements and nonlethal means of force." [56] Surveillance techniques may, under certain circumstances, even imply the use of reconnaissance satellites. The use of new technologies may decrease the need for manpower in the future and add to the effectiveness of a UN force; however, this must be examined from an economic point of view.

Finally, as peacekeeping operations could be launched almost anywhere in the world, equipment for many different climatic conditions must be procured and available at the right moment. This is a field where peacekeeping needs coincide, to a significant extent, with some corresponding requirements of the big powers (but in general not with those of medium and small powers). This offers an opportunity for big-power contributions to peacekeeping activities.

For obvious reasons, many difficulties arise when trying to weld a force together into a smoothly cooperating unit. One obstacle often referred to is divergence in economic matters. Recruiting appropriate volunteers calls for varying levels of salary, because of different conditions in the various contributing countries. Therefore it has been argued that countries with low salary and allowance accounts should be invited to contribute those units having the greatest number of personnel. However, this would impose excessive limitations on the possible choice of nationalities when creating a force. The developed countries could bear parts of their personnel costs so as to achieve more parity in UN cost per soldier, regardless of nationality. Actually, some countries do not request full reimbursement at present. Countries willing to contribute forces for peacekeeping might include such increased expenses in their foreign aid accounts.

The disparity in pay has also been referred to as causing controversy between contingents within the force and also between the force and the local population [57]. One way of mitigating this would be to grant the "rich" soldiers a larger bonus upon returning home and to decrease their allowances when in the field. However, this must be first of all solved on a national level and should not be a UN problem.

Command structures

It is an ancient military necessity that orders must be absolutely clear and the command structure as simple as possible, particularly in rapidly developing operations. A commander should have the exclusive right of commanding his forces and, in turn, should be subordinate to only one superior. Orders, direc-

tions and guidance from the higher command level have to be coordinated and in principle issued on behalf of the superior commander. This is the ideal state, and deviations are likely to result in reduced military efficiency.

It has already been explained that political decisions must have priority over purely military judgements when it comes to peacekeeping actions. This must apply not only to mandate and continuing operational directions but also to the command structure.

As far as UNFICYP is concerned, the command structure is probably as close to military demands as has been possible under the circumstances prevailing. For the commander's authority over his force it was established that "The executive control of all units of the Force is at all times exercised by the Commander of the Force ... The contingents comprising the Force are integral parts of it and take their orders exclusively from the Commander of the Force." [58] This implies that the force commander does not have to try merely to coordinate independent contingent commanders into some kind of joint operation. He must be directly in command of all the units, including the civilian police units, and the contingent commanders must consider themselves subordinate to the UNFICYP commander and are not to receive instructions from home. This may seem rather obvious, but such a structure has not applied in all cases. In some of the earlier observation missions various contingents were directly subordinate to their own governments.[10] The control was gradually shifted towards the UN, coinciding with the UN's progressively increasing responsibility for the coordination and management of field operations. This is a sensitive question, as national contingents still have to refer to their home authorities on particular matters, such as jurisdiction, personnel, some special equipment and so on.[11] Usually it is not too difficult to keep these ambiguous command lines apart but it requires an absolute loyalty to the UN on the part of the subcommanders of the force.

As regards relations with the UN, it was clearly stated in the initial Security Council resolution on the creation of UNFICYP that "the commander of the force shall be appointed by the Secretary-General and report to him" [61]. It was later explicitly clarified that the commander should receive "directives from the Secretary-General on exercise of his command" [62].

Apart from the force commander, there were two other officials on Cyprus reporting directly to the Secretary-General—a Special Representative of the Secretary-General and a Mediator. The latter was appointed under the provi-

[10] The early observers were either instructed—that is, openly received orders from their governments and presumably reported to them—or the formal lines of their responsibility were ambiguous [59].

[11] As a rule the UN requires that national contingents be placed under the force commander for: (i) Operations, (ii) Logistics and (iii) General demeanour. They remain under their own national command for descriptive and other personnel and administrative matters [60].

sions in the above-mentioned resolution on UNFICYP, but by 1965 the position had already been discontinued. The force commander, the Special Representative and their immediate senior staff officers are actually working closely together as a team, thereby effectively coordinating the combined military-civilian efforts that will be further described below.

As the UN has taken up responsibility for procurement, transportation, communications, security and other technical matters for the peacekeeping operations, there is also a cadre of specialists to handle this. The top civilian administrator at mission headquarters is always the Chief Administrative Officer. Technically, in the chain of military command, he is directly accountable to the UN General Services in New York, "a bisection of authority that has caused its share of difficulties" [63]. These difficulties have sometimes been referred to as strong tensions between the military and civilian portions of the operations but are more likely to be a matter of personalities. While it is true that it is easier for two men with a similar military educational background to understand each other's problems, it has to be borne in mind that even two military staff officers, given the task of making provisions for different and partly competitive fields of responsibility, will have to disagree, merely because of the natures of their diverging duties. But a prerequisite for smooth handling and appropriate compromises is full coordination of the directions coming from the UN level. This in turn calls for appropriate military expertise at the UN Headquarters in New York.

Although UNEF, in the Middle East, had no Mediator, nor any Special Representative of the Secretary-General, its task required close coordination and cooperation with the United Nations Truce Supervision Organization (UNTSO) with its headquarters in Jerusalem. *Inter alia*, the Egypt-Israel Mixed Armistice Commission, a part of UNTSO, was placed under the operational control of UNEF's commander but at the same time the legal status of both organs remained unchanged [64]. "UNEF was a totally separate operation, though it did lean heavily at first on the existing organization of UNTSO and later was bound up with it in the general problem of the Middle East." [65]

The chains of command in the extremely vast territory of the Congo were more complicated. The force commander was subordinate to the Secretary-General but not directly so; a Special Representative of the Secretary-General, later to be called the Officer in Charge, was responsible for all UN military and civilian activities in the country and the force commander was to receive his orders through him. But simultaneously, for political reasons, the Secretary-General had to maintain direct control of the UN activities in Katanga. So there was a UN political officer, reporting directly to the Secretary-General, and receiving guidance directly from him but being required to keep the Officer in Charge in Leopoldville informed in order to ensure coordination. The com-

plex situation in the Congo called for day-to-day guidance from the UN which was sometimes hampered through breakdowns in communications.

The Secretary-General had a special Military Adviser for the Congo effort (and a Civilian Assistant to the Congo as well). The military adviser had to act in the field on behalf of the Secretary-General, which was sometimes necessary in order clearly to define the Secretary-General's intentions during the evolving operations. Finally, there was also a Chief Administrative Officer with his usual channels of directions.

There has been some criticism of the command structure of ONUC. To some extent this seems to refer to cases when commanders, staff members or other officials allegedly exceeded their terms of reference or transmitted their messages through "unorthodox" channels [66]. This is to disregard an obvious characteristic of modern command procedure: the flow of information cannot be confined to the straight lines of command within the formal hierarchy and there must be an authorization to establish informal contact patterns between various staff members at different command levels. They have to act on behalf of their commander and in his spirit, particularly in a theatre of operations distinguished by long distances, poor communications and rapidly changing situations. This concerns the staff work within a force headquarters as well as the command and contact of the entire force, and must involve consultations with the non-military authorities concerned. However, this policy requires a certain skill and experience on the part of the staff members which reportedly were not always immediately to be found in the heterogeneous body, built up piecemeal to serve the force commander and his subcommanders in the Congo [67].

But these problems largely remain matters of personalities. The availability of properly qualified and acceptable "peacekeeping professionals" is an indispensable prerequisite for a prosperous operation.

III. *Operations*

Launching

The creation, dispatch and deployment of a force requires time. In an atmosphere of political tension a resolution has to be adopted, host-state consent and terms of reference must be negotiated and donor states must be invited to contribute troops, which must then be organized, transferred and committed. However, it has in the past been possible to do this within a remarkably short time. In Egypt in 1956, as well as in the Congo in 1960, a rapid intervention was an urgent necessity; any delay would have exacerbated the situation. The resolution on UNEF was adopted on 4 November 1956 and the first UN forces were

airlifted to Egypt on 15 November [68]. The Security Council adopted its Congo resolution on 14 July 1960, and within 24 hours the first troops for the UN force arrived in the Congo. A month later the force totalled more than 14 000 men, from 24 states. [69]

In contrast to this rapid action, it has been said that the UN force in Cyprus "crawled into action" [70]. Although the authorizing resolution was adopted on 4 March 1964, the force was not declared operational until 27 March, and the majority of the UN troops did not arrive until April. This delay was made possible by the presence on the island of British troops, who were trying to keep the peace pending the arrival of the UNFICYP. The reasons for the delay were difficulties in composing the force: possible participants were either reluctant to contribute or were not acceptable to the host state or the other governments involved. The advantage, however, was that the launching could be properly prepared.

Military operations

Normal military operational principles cannot be adhered to in peacekeeping. The peacekeeping force is not one of two adversaries; as a rule it is the third party in an area. Instead of fighting it must try to stop or prevent violence by peaceful means. The principal method is to try to keep the two adversaries apart simply by interposition of peacekeeping units in areas of confrontation. A unit interposed does run the risk of being shot at from two sides, but firing on UN troops is likely to decrease international goodwill. Sometimes the interposition of peacekeeping units gives the parties an excuse to agree to a cease-fire, which they would not have been likely to do, for political and prestige reasons, without the presence of UN troops.

In Cyprus, UNFICYP units have been interposed between the Greek and Turkish Cypriots on narrow strips of no-man's land. By strategically locating their posts, by constant vigilance, by mobile patrolling and by prompt investigations of all shooting incidents, UNFICYP has usually been successful in preventing Greek and Turkish Cypriots from shooting at each other. It was also decided that it would be useful to clarify exactly where arranged cease-fire lines are located by having UNFICYP troops in some areas actually mark the lines with white paint.

It is important to try to nip incidents in the bud. Quick reaction on the part of a UN force may often prevent the outbreak of open hostilities, but this requires good information, ideally even concerning the planned activities of the parties. The aim is to locate the UN on the spot before anything serious happens. If the mere presence of the UN units is not enough, then as the next step, peaceful tactics must be tried, such as persuasion, negotiation and mediation.

Future clashes may be avoided by persuading the parties to agree on redeployments, mutual withdrawals from sensitive points and the removal of road barriers, fortifications and so on.

If this is not successful, UN troops must be redeployed so as to extend the interpositioning to the sensitive areas. Formally, such a deployment requires the consent of the host state (the parties), so some diplomacy may still be necessary to obtain this. But once the UN unit is deployed it has the right to defend its own positions.

In the Congo it proved necessary to establish certain positions essential to the functions of the UN force, though the freedom of movement did not give the ONUC the right to do this by the initiation of military action. Under the circumstances, with general disorder and the incapacity of the local authorities to control the situation, the UN, under the law-and-order mandate, felt compelled to establish roadblocks, checkpoints and other positions. When these positions were attacked with the intention of dislodging the UN force, it had a legal right to fight back in self-defence. Freedom of movement, so defined, was essential to the UN force precisely because it lacked the authority to initiate the use of military force [71].

Parts of the Congo operations developed into virtual combat activities with infantry attacks supported by mortars and fighter aircraft. UNFICYP never had to go that far. But when the non-forceful techniques broke down completely, it had to try something else; it began to employ, occasionally, actual force, when quieter and less spectacular means had failed [72]. *Inter alia*, this has been done in order to protect Cypriot citizens (for example, harvesters) under attack.

In the Congo, some phases of the action called for rapid redeployment, so the units had to have great mobility. Even in Cyprus there must always be quick reaction units available. In 1964, UNFICYP put together a multinational mobile force comprising Danish, Canadian and Finnish troops, utilizing the best talents of each contingent. It took rapid and quite vigorous action, ripping down gun emplacements and fortifications in "a major show of United Nations determination" [73]. Similar actions have been taken several times since, for example at Melousha in 1966. Show of force (which may, for example, mean firing explosive anti-tank shells at targets at safe distance from the troops concerned) sometimes proves an efficient measure provided it is used with discretion and with consideration of the relative weakness of the peacekeeping force. It can be tolerated by the parties as it may offer the above-mentioned excuse to agree on a cease-fire.

The use of threat or the virtual application of force is a sensitive question, even considering the demand for UN impartiality. A coercive action can always be interpreted as favouring one of the parties. Naturally enough, UNFICYP has been subjected to abusive charges of bias from each side; any action, even

inaction, is labelled a "biased stand" [74]. Each side wants to engage the UN for its own purposes. It is therefore still more evident that decisions involving the use of force must be handled with utmost discretion.

Non-military operations

UNFICYP has not been restricted to the military field only. Many non-military tension-reducing services are also carried out with a view to promoting a return to normal conditions.

One such activity is the use of UN civilian police. In the Congo this was done freely and the UN police had to be given wide responsibilities, as adequate domestic means of maintaining law and order were lacking. In Cyprus the conditions, and consequently the UN police activities, were different. The UN Civilian Police in Cyprus (UNCIVPOL) forms the military peacekeepers' means of liaison with the local police from both Cypriot communities. The advantage is that local policemen are more inclined to accept cooperation with other policemen than to approve of military intermediaries. Its members carry out investigations, reporting, observation, negotiations and inter-community police liaison duties. Although they lack some traditional police powers, such as arrest and interrogation, they have proved able to make a considerable contribution towards reduction of tension by persuading their local counterparts to act with restraint. On many occasions it was the efforts of the UNCIVPOL rather than those of the military that prevented minor incidents from escalating into something much more threatening and dangerous.

But UNFICYP has tried other measures to prevent the rise of tension. Not only has it taken on diplomatic responsibilities as a communications link between the two communities,[12] but it has also played an active role in maintaining many public services, the abolition of which might easily have led to the outbreak of open hostilities. Thus UNFICYP has managed to restore telephone, postal and electric services to isolated communities, and to ensure the water supply to such places. It has made arrangements to re-open closed schools, to re-establish a normal judicial system, to assist in relief operations, to combat forest fires, to locate missing persons, to release hostages, to store and distribute clothes and foodstuffs, to assist in the medical field, to restore normal traffic patterns, to open up shops and markets and to promote agriculture. This shows that the UN in Cyprus has performed a wide variety of activities far beyond those previously conceived as military peacekeeping tasks. The effects have been considerable; yet definite success cannot be achieved without the real determination of the two communities to solve the dispute. [75–76]

[12] This is a function similar to the one carried out by the Neutral Nations Supervisory Committee (NNSC) in Korea.

Support activities

Among the various support activities needed to keep an operation going, intelligence, transportation and logistics deserve some comment. Good intelligence and communications are essential components in any military command and control system. Intelligence provides information about the operational environment and about the movements and activities of hostile or potentially hostile forces. Since the UN force is not operating in a traditional military manner, it has sometimes been presumed that it has no need for any special intelligence activities. Apart from its own surveillance and manning of checkpoints, forming integral parts of its normal operations, it could, it is suggested, rely on information duly requested and obtained from the parties to the conflict. Besides, the concept of 'intelligence' is in many people's minds associated with spies and is thus considered an improper activity, from which the UN should refrain. Cognizant of these circumstances, the UN forces have preferred to refer to their intelligence branches as "Military Information". Sometimes these branches have suffered from lack of resources. As an example, although ONUC had aerial-reconnaissance capability it lacked sufficient equipment for aerial photography and did not have adequate means for monitoring radio broadcasts [77].

Perhaps the discussions on the verification problems in connection with disarmament measures and demilitarization treaties on high political levels will demonstrate that just establishing direct contact with the parties concerned will not necessarily grant the amount of reliable information needed to take sensitive political decisions on behalf of the UN. Information given by parties to a conflict is most likely to be biased. Closing certain areas to UN patrols, as has been done in Cyprus, is another measure likely to restrict the UN's ability to obtain objective information. Therefore the UN force must have proper intelligence means to check facts and situations in a way which is as impartial, but at the same time as efficient, as possible. It needs to be emphasized, however, that this must be confined to means generally accepted by the parties as it would otherwise hamper the cooperation which is indispensible for carrying out the task of the force.

Without appropriate transportation and logistics, no force can be actually operational. Thus these activities have required considerable efforts for the UN peacekeeping operations. This is where the big powers can make their contributions towards peacekeeping. Disqualified as donors of manpower, but with large transportation capability and huge resources, they can play an important role as supporters of the operations. The bulk of this has so far been provided by the United States, although the United Kingdom assumes a major part of the UNFICYP support.

Particularly in the initial phases of an operation, a large airlift capacity is

needed. In Cyprus this was supplied by several nations but for the two previous missions the USA has provided the main part. During the entire Congo operation approximately 93 000 men served in the ONUC, giving a round-trip airlift requirement of 186 000 men. Of this, the USA provided air transport for about 74 000 and sea transport for another 44 000—altogether transport for 64 per cent of the total. At the same time the United States transported more than 22 000 tons of cargo—14 000 tons by air. In the initial period of five and a half months, the USA provided 81.5 per cent of the total airlifts and 100 per cent of the sealifts. [78] This is a substantial contribution. Even if the UNFICYP operation has shown that the US Air Force assistance is not indispensable for the launching of a peacekeeping operation, the transportation capacity of one or more big powers will be most useful, particularly in the first stages when a rapid deployment is necessary [79].

A considerable proportion of the logistical support can also be provided by the big powers. Thus the USA has delivered large quantities of equipment to the different missions—vehicles, aircraft, radio units and various other items including clothing, field cooking ranges, tents, blankets, mine probes, ice cream machines and refrigerated trucks [80].

Logistical services that must be continuously available are food and fuel supply, medical services, postal exchange and facilities for storage, repair and laundry. The problem of food supply is difficult because of dietary preferences and religious restrictions on the part of the various nationalities. For UNEF and ONUC, the USA played an important role as a provider of supplies. In the first year of UNEF the USA furnished some 55–60 per cent of all supplies, rations and equipment not brought in by the national contingents themselves. The dependence of the ONUC operation on US support can be described as practically total during the launching phase and very high throughout the operation's four-year life. [81]

In Cyprus, the main logistical burden has been allotted to the UK. Notwithstanding some minor frictions, this has proved a very good solution, and the logistical support of UNFICYP has been handled with great efficiency, in contrast with the confusion and inadequate supplies in the previous operations. At the same time this system has relieved the USA of its traditional task as the main provider. The Chief Administrative Officer, too, has had an easier task than his counterparts in UNEF and ONUC, as large parts of the administrative responsibilities have been assumed by the British. It is possible, if not likely, that logistic tasks for the next United Nations force will again be entrusted to one of the dozen or so more technically and militarily advanced nations. If not, it will probably be necessary to rely again on the big powers. Once the political consensus on another mission exists, it is not unlikely that the USSR will also play a much more active supporting role.

Withdrawal

The termination of an operation may also create problems, as the precipitous withdrawal of UNEF from the Middle East has shown; this event undoubtedly decreased international confidence in UN peacekeeping abilities. The consent of the host state being discontinued, the Secretary-General's view was that he had no alternative but to order the force out of Egypt. The legal validity of this estimate has been criticized [82]. But even so, the strength, organization and equipment of UNEF were not adequate for tasks other than just guarding the frontier. If it had been given other tasks for which it clearly lacked capacity, such as keeping the two adversaries apart by force, the result could have been disastrous.

ONUC was withdrawn after the Katangan secession was ended and the risk of conflict escalation to an international level was considered small. Political controversies and financial trouble probably accelerated the conclusion of this mission. Internal struggles went on after the force had left.

At times, even national withdrawals from an on-going force have occurred. Various reasons have been given to justify this. The troops can be needed in their home country for defence or internal disturbances, as was the case with the Mali contingent in the Congo in 1960 and with the Indian ONUC brigade in 1963. The troops may be offered for a restricted period only, as with the Finnish contingent to UNEF in 1957. The contributing state may disapprove of the interpretation and execution of the original mandate, as did Guinea, Indonesia, Morocco and the United Arab Republic in the Congo in 1961 (the "Casablanca pullout"). Finally, a formal change in the original mandate may also provide an excuse for withdrawing a contingent, as the contribution to a peacekeeping force in the sense referred to in this presentation is voluntary and usually agreed upon only after examination of the mandate and terms of reference [83].

A sudden withdrawal of national contingents may cause difficulties for the force. It has therefore been suggested that the UN agreements with contributing states include provisions for proper notice periods before the departure of the contingent. This system can also apply advantageously where the consent of host states is concerned, by including such provisions in the Status of Forces Agreement. The notice period should be sufficiently long to allow not only for an orderly withdrawal, but also for the negotiation, recruiting and transportation of appropriate replacement units.

IV. *Preparedness and training*

Planning

As a UN peacekeeping operation is intended to achieve its goal on the basis of non-coerciveness and non-interference in internal political affairs, a UN force has to rely on acceptance, confidence and respect, and not on enforcement of its will by the threat or use of violence. Therefore, the first impression of the force, gained by the parties concerned and the local population, is of utmost importance. Lack of preparation and planning with subsequent disorganized arrival, inadequate deployment, delay, uncertainty and general disorder, is sure to hamper the achievement of the aims of the mission.

Good planning is thus essential. But, at approximately the same time as the political and military technical discussions and negotiations involved in the start of an operation are going on, the recruitment of the military experts needed in the UN Headquarters and the multinational-force staff has to be improvised. More often than not this has been the traditional pattern for the launching of UN operations. "[T]he state of UN preparedness is deficient in all respects. The system moves jerkily from crisis to crisis ... The decentralization, the impermanence, the improvisation, and the unprofessionalism are all singularly ill adapted to the jobs occasionally thrust upon the UN" [84]. Cyprus was a notable exception due to the British efforts to keep peace on the island before the arrival of the UN force. The first commander of the force and several of his staff officers had already spent some considerable time in Cyprus before the UN troops started arriving. But these specific circumstances are unlikely to repeat themselves: next time a UN peacekeeping operation is requested, it is more probable that fast action will be essential, as was the case for UNEF and ONUC.

The tasks to be solved by a UN planning unit have been outlined in various suggestions. The unit could make periodic inventories of possible offers of forces, transport, logistics and other material support; could extract, from previous peacekeeping experience suggestions on organization, equipment, support and administration as well as standing operations procedures; could follow up the situation in probable areas of operation; could make preparations for the launching of operations; could brief force commanders before and during an operation; could form a nucleus for the headquarters of a new mission; and could even train staff officers, or at least give some guidance on national or regional training for UN purposes.

It is astonishing to read the Secretary-General's statement in 1967:

> It is often said, for example, that lack of military staff and lack of planning in the Secretariat are an important source of weakness ... [This is] based on a misleading

equation of United Nations peacekeeping operations—which are only semi-military in their functioning—with normal national military operations ... [it is] hard to see how a United Nations military staff, even if authorized by the competent organs, could justify its existence and actually improve very much the quality either of existing operations or of hypothetical future ones. [85]

This statement must have been made for political reasons only and with very little consideration for military-technical issues.

If peacekeeping operations were very similar to normal national military activities, this would lessen the need for special UN training. The fact that peacekeeping has a semi-military nature strongly emphasizes the urgency for specialized planning and training. Further, it suggests that such operations be an integrated civilian-military effort, the smooth functioning of which cannot be achieved without substantial preparations.

Earmarking

In the 1950s, experience gained from the creation of UNEF led to some steps being taken to facilitate the organization of future missions. For example, it was proposed that participating states should announce a willingness to contribute contingents to the UN; and thus the concept of 'earmarking' developed. In the 1960s, some countries committed themselves to developing rapid-response readiness for emergency call-up, while some others preferred simply to declare a willingness in principle, without earmarking special units. Yet others offered units on a stand-by basis; this category includes Austria, Canada, Denmark, Finland, Iran, Italy, the Netherlands, New Zealand, Norway, Sweden and the UK. For obvious reasons, these offers are dissimilar. They comprise units from all the services as well as police units and technical groups for disaster relief.[13] They come from differently organized military establishments with varying sizes and economic resources. And the 'stand-by' concept is itself differently defined. But despite these and other disparities, this at least represents a first effort to try to solve the preparedness problem on a national level, pending the activation of the UN itself.

A useful approach would be to investigate and list those peacekeeping resources which are available at any one time, and to note what period of notification is required. From such a list, the UN, in case of emergency, could select the components needed for the particular purpose. The current offers will certainly never exactly conform with the need, but experience proves that it is easier to design an *ad hoc* unit when preparations have already been made to

[13] There should be specially trained units in various countries. There should be in addition stand-by police units. Both these would be specially trained to handle the type of situations which the UN frequently faces. [86]

dispatch one other unit, than it is without any preparations having been made at all.

The national efforts could be better coordinated if the UN authorized a list of different kinds and numbers of units, suitable for any kind of stand-by arrangement.

The earmarking may also be applicable to headquarters units. Some of these might undertake some of the planning work, currently missing in the UN itself. There need be no fear that the member states might take over, on a national level, part of the responsibility of the UN, provided that any practical use and deployment of such nationally prepared units is only carried out following exclusive resolutions of the UN, and that the criteria of impartiality and disinterest are maintained.

Training

There are three main requirements involved in the creation of a military unit: personnel, equipment and training to weld the two together.[14] Some of the reasons why special training for UN purposes is required have been given above.

Training concerns both leaders and full units. Almost all training of these two categories has so far been performed at a national level and this practice will probably continue as long as the present system is maintained.

The type and duration of training required for UN peacekeeping activities varies, because there are differences in the capabilities of the units or individuals selected for UN service: they may be professionals or conscripts and they will have reached different levels of school education and military training in their own countries. UN training will probably continue to be given as a supplement to basic military national training, and it is unlikely that the present system will allow for military basic training designed exclusively for UN purposes. Attention has already been drawn to the significant differences between peacekeeping and normal military activities, the conclusion being that whatever military skills already exist, special additional training is imperative for any unit participating in a UN force [87].

Skills that ought to be taught to all types of UN military units include riot control, mob control, patrol duty, investigation of incidents, rescue, assistance for the civil power, hygiene and first-aid medical procedures and observation duties [88]. In addition, it is necessary to brief the personnel on UN rules and procedures, on their authorities and responsibilities as UN employees, on international agreements regarding the humanization of warfare, on behaviour towards the civilian population and so on [89]. This is particularly important,

[14] To put the unit into operation requires, in addition, transport to the area concerned and continuous support activities.

since individual UN soldiers may often find themselves in unexpected situations where they must take action on their own judgement before any superior can give orders or advice. And the responsibility for such actions will be taken by the UN.

Some additional skills should also be mentioned briefly, as experience has shown that they have sometimes been neglected. First, the general standard of mechanical maintenance of vehicles has been poor amongst most contingents, resulting in a high accident rate, and this could be improved by suitable training. Second, language training for the lower ranks has sometimes been inadequate; it is essential that all members of a unit in UN service can communicate, at least on basic subjects, with other elements of the force.

Officers earmarked for service in the different UN staff positions must also, of course, be adequately trained. As the officer training of various national military establishments is more standardized than the ordinary national military-unit training, it might be interesting to look, in more detail, at the special additional training of officers for UN purposes.

First of all, a knowledge of the working language within the mission is indispensable for these officers. (To date, this has always been English.) Since such knowledge cannot be acquired during a relatively short training period, it is necessary to have a body of officers with sufficient language training always available within those national military forces which are possible contributors to UN missions.

Even the training of staff officers has mainly been carried out at a national level. As an exception, the four Nordic countries have created a series of joint courses, which include training for staff officers, military observers, movement control personnel and military-police personnel. Suggestions have been made for creating a UN Military Staff College or for entrusting the United Nations Institute for Training and Research with wider responsibilities in the peacekeeping field [90]. But whether or not this will happen will depend on the outcome of political negotiations.

As a specific example of the specialized training which might be given for UN operations, the Nordic course for UN staff officers and military observers (United Nations Staff Officers' and Military Observers' Course—UNSOMOC) will be dealt with here at some length. This course takes place in Sweden, at an armoured regiment, forming part of the Swedish national military system,[15] and is divided into two classes—one for staff officers and one for military observers. (A similar course, but for military observer training only, takes place also in Niinisalo, Finland. The Swedish course takes place in the spring, the Finnish

[15] The regiment has also assumed responsibility for training and mobilizing Swedish UN battalions.

in the autumn, thus offering two opportunities per year to attend military observers training.)

This joint Nordic course was first offered in 1965, when 36 student officers from the four countries attended three weeks of training as military observers. The need for such a course had been felt rather strongly. In the early 1960s, officers from the Nordic countries had taken part simultaneously in two peacekeeping forces and four peace-observation missions, and experience had confirmed that a new observer had to spend a long time in the field before he became familiar with the conditions and efficient in his work. Moreover, during this familiarization period, he made the same mistakes as his predecessors, all over again. It was felt that this period of weakness could be shortened considerably if some important basic information could be given to the observer before he started his UN service. Several officers with many years of UN experience were available as instructors, and so this first course was conducted "to prepare officers for service as UN Military Observers".[16]

The course was considered successful and in the following year it was expanded to four weeks. Also, a staff officers' training class was added, the purpose of which was "to prepare trained Staff Officers from the Nordic countries for duty assignments as general staff officers in headquarters of UN military peacekeeping forces (missions)".

In the light of experience gained from the course, the syllabus has been continuously revised. The present syllabus of the two classes is given in table 6.3 on p. 194. In addition to approximately 100 hours of formal instruction on the timetable, there is a considerable amount of homework, particularly for the Staff Officers Class, including the study of a great deal of written material and individual language training.

Several of the students, in particular those attending the Military Observers' Class, were already earmarked for a given period of service in a special mission when they applied for the course. Others had already taken part in missions, and expected to serve more periods at other occasions while some had no immediate prospects of UN service. For the four governments concerned, it was equally important to build up a body of officers with a general fitness for UN service, regardless of area, time and mission. Thus the training had to be focused basically on general understanding and all-round principles. On the other hand, it is not sufficient to devote the whole four-week course only to conveying general principles; there must be applicatory instruction and practical training, and for this purpose the most recent information available from the existing missions has been used. In practice, this means that the staff officers are given substantial information derived from the experiences of UNFICYP, whereas

[16] This and the following quotations from the course instructions refer to sources indicated in table 6.3.

Table 6.3. Syllabus of the Nordic United Nations Staff Officers' and Military Observers' Courses

Subject	Staff Officers' class (hours)	Military Observers' class (hours)
General orientation	17	12
The UN; principles for conflict control, international law, survey of operations, stand-by forces	(15)	(10)
Medical problems in foreign countries	(2)	(2)
Staff duties	62	2
Basic instruction (facilities and techniques, planning procedures, staff responsibilities, plans and orders and so on)	(16)	—
Tactical use of UN units	(6)	(2)
Applicatory instruction, planning, procedures	(19)	—
Applicatory instruction, command post exercise	(21)	—
Observer duties	8	49
Basic instruction (reports and forms, organization, general duties of a military observer)	(1)	(15)
Knowledge of weapons, aircraft	—	(5)
Observation post exercises	(4)	(17)
Inquiry procedure	—	(4)
Cease-fire procedure	(3)	(3)
Way of life in the area of operation	—	(3)
Practical medical training	—	(2)
Communications	8	14
Basic instruction	(4)	(4)
Message exercises	(1)	(2)
Field exercises	(3)	(7)
Maintenance	—	(1)
Transport	—	15
Basic instruction	—	(2)
Driving	—	(6)
Trouble shooting, emergency, repairs, towage, recovery	—	(7)
Military English	7	13
Initial and final language tests	(2)	(2)
Military English	(5)	(11)
Reserve, homework and so on	6	4
Total	**108**	**109**

Source: Swedish Army Staff, UN Division, document FN 1433–102, 14 April 1972.

the observers study principles and procedures adopted by the UN Truce Supervision Organization (UNTSO) in the Middle East.[17]

General orientation of the students of both classes aims at giving a general background to the UN, with emphasis on problems related to "international

[17] In the Finnish course at Niinisalo, one group of students is trained for the conditions in Jammu and Kashmir (UNMOGIP).

conflict control" (here used as a synonym to peace observation, peacekeeping and, to some extent, peacemaking), knowledge of the outlines of certain UN peacekeeping operations and of legal and other problems related to UN operations.

None of the Nordic countries has military personnel with substantial experience from service in parts of the world other than Europe, apart from UN duty. Consequently the orientation must include medical advice on how to preserve fitness in different areas and different climates.

For the Staff Officers' Class, the bulk of the time is devoted to providing an introduction to an international staff system—organization, procedures, functions, techniques—as a common basis for the performance of staff duties and for practical training. Applicatory instruction, where students have to act as force commanders, chiefs of staff and officers in key staff positions of a simulated operation, is followed by command post exercises with staff assistants and communications nets available. Planning and conducting operations, negotiation, mediation and conciliation as well as carrying out functions in the civilian field are included in the training. The civilian activities may include aid to civilian authorities or independently discharged civilian functions on the part of the military units.

In a similar way, the Military Observers' Class spends most of its time on observation posts of simulated missions, reporting and filling in forms similar to those of UNTSO. They are taught to carry out enquiries and arrange ceasefires. At the end of the course, they take part in an exercise where they have to stay at their observation posts for the main part of two days, during which time different situations are reproduced, in as natural a way as possible, involving troops, weapons, vehicles and aircraft from two opposing sides. The students have to take appropriate action under the direct supervision of their instructors.

In addition, the two classes come together for certain periods, and take part in each others' activities for mutual information.

The training in communications for staff officers is restricted to radio telephone procedures in English and to teaching them—as general staff officers—to conduct radio conversation under various conditions. While general staff officers usually handle radio sets only under the direct supervision of trained signallers, military observers, as a rule, have to manage the radio set themselves, and consequently they get rather more training. This teaches them to use proper procedures as radio operators, to transmit as well as to receive and to record radio messages even under difficult conditions. Additionally they are also taught to carry out some maintenance and to improvise antennas since equipment often becomes damaged in the field.

Military observers usually have to drive their own trucks: this is almost always the case in UNTSO and may happen in UNMOGIP. Staff officers on the

Table 6.4. Nordic officers trained at the UN Staff Officers' course in Sweden, 1966–72, by nationality and year

Class (year)	Danes	Finns	Norwegians	Swedes	Total
1966	6	4	6	10	26
1967	3	4	6	9	22
1968	1	3	6	12	22
1969	2	7	6	8	23
1970	2	6	6	7	21
1971	6	3	6	6	21
1972	2	4	3	11	20
Total	**22**	**31**	**39**	**63**	**155**[a]

[a] In addition, in the years 1968–1972, three Austrian, four British, one Canadian and two Swiss officers have attended this course, bringing the total number of students to 165.

other hand, usually have drivers available. Therefore, only the Military Observers' Class receives transport training, which includes cross-country driving of wheeled vehicles, even with a trailer attached, making recovery by use of field expedients and making simple trouble-shooting and emergency repairs.

All training is performed in English and the students are encouraged to communicate in English at all times during the course. As the regiment is located in a fairly small city this is feasible even during spare time and provides an excellent opportunity for consistent training. The presence of at least some students without any knowledge of Scandinavian languages has considerably enhanced the 'language morale' so that even students from one and the same Nordic country are heard speaking to each other in English.

The relatively few hours devoted to military English are used mainly for acquainting the student officers with the most common English military terms and phrases that have proved useful in UN service. It is up to each one of the Nordic countries to make sure that its students have enough language knowledge to follow the course. The language tests carried out during the course serve to give the instructors an idea of the average level of the students, enabling them to adjust the instruction accordingly.

It is obvious that four weeks is not sufficient to prepare the students to such a degree that they will be effective on their very first day in a UN mission. But, in addition to the actual training performed, they are also provided with literature to read after the course and with references to other useful publications of different kinds to be studied until the day of departure. It is particularly important that the officers become familiar not only with the purely military aspects but also with the general conditions in the area concerned. Because this can only be included in the syllabus to a very limited degree, the students are advised to undertake studies in history, politics, religion, culture, economics,

Table 6.5. Nordic officers trained at the UN Military Observers' courses in Finland and Sweden, 1965–72, by nationality and year

Class (year)	Finnish course					Swedish course					
	Danes	Finns	Norwegians	Swedes	Total	Danes	Finns	Norwegians	Swedes	Total	Total
1965	—	—	—	—	—	4	5	7	20	36	36
1966	—	—	—	—	—	3	2	6	23	34	34
1967	—	—	—	—	—	5	2	8	23	38[a]	38
1968	3	31	4	16	54	7	9	8	19	43	97
1969	2	27	4	18	51	7	5	8	15	35	86
1970	6	25	4	19	54	4	6	8	15	33	87
1971	6	14	4	15	39	3	4	8	14	29	68
1972	5	17	4	12	38	3	8	12	17	40	78
Total	**22**	**114**	**20**	**80**	**236**	**36**	**41**	**65**	**146**	**288**	**524**

[a] In addition, one Austrian officer attended this class.

social conditions and so on. Serious mistakes in these fields may hamper goodwill.

Sometimes the students want to study the native languages in the area. While such knowledge may be useful, it must come second to a very good knowledge of English, and in any case, the impartial UN officer ought to learn the languages of the two parties—on an equal basis.

The number of officers trained at this course so far is given in tables 6.4 and 6.5. The estimated maximum training capacity, given the present joint Nordic instructor staff of 15 officers, is approximately 25 staff officers and 40 military observers per course. Of the total number of students, most of the military observers have subsequently had at least one term of UN service. The need for staff officers in the field, however, is smaller, as UNFICYP is at present the only mission regularly employing this category of personnel. This means that the Staff Officers' Class mainly adds to the overall UN preparedness of the Nordic countries.

The training is considered very valuable by both instructors and students. Officers in UN service have confirmed that the knowledge acquired during the course has enabled them to contribute to the joint work in the field much sooner than had been deemed possible without advance training. Similar views have been expressed after UN service. Objections and recommendations for changes have in general concerned details and have usually suggested extensions of or additions to presently included items. But of course, the syllabus of the course has to follow the evolving practice in the existing UN missions.

The UN is informed of the activities described but has issued no authorization of this course, nor of any of the other Nordic courses for UN purposes.

Many of the suggestions made in this section on preparedness and training

have clearly indicated the need for UN plans and directions to the benefit of preparedness for peacekeeping. This ought to concern the entire field, from organization, recruitment and equipment to standing operations procedures and training. It would be a great advantage if the UN could, at least, authorize some of the practice developed on a national or regional level. Until these problems are solved, a country-to-country exchange of experience is the only viable way of promoting preparedness for peacekeeping.

V. *Peacekeeping as part of an integrated effort*

There has been a great deal of criticism of peacekeeping, for reasons which have been indicated earlier in this chapter. One cause is probably the lack of a generally accepted definition, enabling many actions not sponsored by the UN to label themselves "peacekeeping". Not all of them deserve this designation according to the definition adopted above, some of them being virtually coercive. The term "peacekeeping" has become somewhat compromised, to the extent that some prefer other expressions, for example, "international control of violence".

One criticism is that peacekeeping may contain wars of liberation and also prevent necessary social change, preserving instead current systems. This is a purely political problem, and as such is not within the scope of this presentation. It is assumed that UN-sponsored operations will be mounted in accordance with the principles of the UN Charter. But it is all too easy for anybody, inclined to resort to violence, to appropriate the term "movement of liberation" for purposes which have nothing to do with the UN Charter.

Another aspect is that UN intervention, though immediately bringing the situation under control and reducing or removing the risk of external-power intervention, tends to preserve the conflict in the long run. Once fighting has ceased, the urgency of stopping bloodshed does not, to the same extent, compel the combatants to settle an agreement. If one party to the conflict feels that it has the weaker position it may try to preserve the current situation in order to prevent or delay an unfavourable final solution. It has even been argued that the influx of foreign currency from UN personnel might be so beneficial to the country's economy that efforts are made to keep the force for an indefinite period.[18]

[18] It must be examined, in each individual case, whether the size of this economic impact may have any significance for the economy as a whole. There is no doubt that the presence of some 50 000 US troops in the Republic of Korea (South) has helped decrease that country's import-export gap by adding to the "invisible trade sector" although this contribution alone probably has no decisive influence. As for Cyprus, UNFICYP may have made up for the loss of tourist revenue in its early period. Now that tourism has expanded again, and the force strength has decreased, Cyprus itself is contributing towards the cost of the force.

This question has concerned several authors. The sense of urgency, which might otherwise have led the parties to a negotiated settlement, may disappear along with the establishment of the UN force.

> There is no doubt that there is an element of truth in this judgment. It represents, however, an oversimplification of the reality. It would be foolhardy to try to re-write history and to foresee what could have happened if no peace-keeping force had been established in a particular area ... The fact is that some conflicts are manageable in the immediate future, and others are not. [91]

The lack of political sense of urgency may even appear within the UN, with the result that insufficient efforts are made to arrive at agreements. For example, no initiatives to reach a political settlement accompanied the containing action of UNEF. Carrying out the peacekeeping mission as a purely military action in a political vacuum will certainly only preserve the *status quo*. 'Peacekeeping' is, as the name indicates, just a way of containing violence, stopping killing and preventing further outbreak of hostilities. It does not remove the tensions. It has to be complemented by what are now generally known as "peacemaking" and "peacebuilding", namely activities which aim at removing the sources of tension causing the current conflict and trying to take measures with a view to preventing the rise of further such tensions in the future. This inevitably spans all important spheres of activities within a community and thus lies mainly within the civilian field.

It is, however, not correct to contend that no coordination between military and civilian activities has been achieved in UN peacekeeping so far. The 'semi-military' character of peacekeeping has already been emphasized. There was an extensive UN civilian relief programme in the Congo during and after the military operations. And the many UNFICYP activities which aimed at normalizing the conditions in the Republic of Cyprus have been referred to. There has been, and still is, a joint military-civilian action. But it can be maintained that the degree of coordination achieved so far has not been enough, and that more people and notably more categories of people have to be involved. It concerns:

> not only ... diplomats, soldiers and the civil servants of the secretariat, but also ... the other professionals and specialists that are needed for the reconstruction of community life, the doctors, engineers, technicians of all kinds and the voluntary services. All agencies have a place, and what past experience has established is the need for an integrated effort involving the soldier peacekeeper, the diplomat peacemaker, the civil servant administrator and, by no means least, the professionals of reconstruction, both social and structural. [92]

All the different branches of the UN should be coordinated in a combined and well coordinated effort in the area of conflict. Even some slight complica-

tion of the military command structure may be tolerated if this can be achieved. It is quite clear that unless something is done to remove the real sources of a conflict, peacekeeping alone can be carried out indefinitely without any perceivable progress. But the blame cannot be put on peacekeeping, being just one tool among others. A carpenter going to work needs a set of tools, a saw, a hammer, nails, pincers and other things. Give him just the saw, and he will be unable to do more than part of the work.

One argument often encountered is that peacekeeping has, in general, been unsuccessful. This is not true. It is not easy to imagine how things may have developed without the launch of any peacekeeping operation, but certainly the number of lives lost could have been higher, living conditions could have been worse, and the risk of external, probably big-power intervention could have been greater. It has to be recognized that peacekeeping operations are not always feasible. For example, they would be hardly applicable to a big power, permanent member of the Security Council which decides about such operations. Whatever their limitations, however, the fact is that peacekeeping actions undertaken hitherto have, on the whole, improved the situation in the countries concerned. Criticism must be constructive and must focus on possible future progress. There is so much useful experience gathered by now, in situations where the need for wider military-civilian cooperation is an essential part, that peacekeeping can be made a much more efficient instrument for future needs, provided there is a political will to do so. It would probably be unwise to relinquish the possibilities to use peacekeeping as one of several agencies for peace.

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Appendix 6A

Summary of a "Status of Forces Agreement"

There have been a number of similarities among the "Status of Forces Agreements" of the three UN peacekeeping forces.[1] Reference here will be made only to the agreement for UNFICYP.

The agreement settles two fundamental principles: the independence of the UN forces *versus* the governmental authorities of the host country and the freedom of movement [96]. Members of the force, guaranteed an international status similar to that of other UN servants, are exempt from all kinds of local jurisdiction (criminal and civil) as far as their service is concerned, and also enjoy considerable personal protection when off duty. But they "shall respect the laws and regulations" of the host country, "refrain from any activity of a political character" within that country, and are subject to the laws of their national governments and regulations established within the force. It is up to the force commander to "take all appropriate measures to ensure the observance of these obligations". Further, some regulations are made with a view to protecting the interest of the host country and its citizens.

Other paragraphs of the agreement deal with the authority over UN premises, displaying of the UN flag, wearing of arms and uniforms, operation, marking and so on of UN vehicles, vessels and aircraft, economic relations between the force (including individual members) and the host country and its citizens, the free and unrestricted use and establishment of communications and postal service and the use of roads, waterways, port facilities and airfields, water, electricity and other public utilities. It also provides for cooperation between the UN and local police, for governmental support in providing the force with supplies and services, employment of locally recruited personnel, settlement of disputes or claims, and liaison.

[1] The Status of Forces Agreement for UNEF was signed on 8 February 1957 [93], for ONUC on 27 November 1961 [94] and for UNFICYP on 31 March 1964 [95].

Part III. The development and spread of arms races

Chapter 7. World military expenditure in 1972

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7. World military expenditure in 1972

Unless otherwise stated, the trends and changes discussed in the following chapter are in real terms—that is, price corrections have been made to remove the price increases caused by inflation. Square-bracketed references, thus [1], *refer to the list of references on page 224.*

I. *Introduction*

World military spending has abated somewhat after very rapid increases from 1965 to 1968 (see chart 7.1). In 1970 and 1971, the total fell slightly and there is evidence from the budget figures that expenditure will remain at about the 1971 level during 1972 and 1973. This pattern of rapid increases in military expenditure followed by levelling-off periods has been demonstrated before, during and after periods of crisis or war, for instance in 1954–60, when expenditure levelled off without returning to the lower pre-Korean War figures. This seems to be happening again now. It should be stressed, however, that a decrease of this kind does not indicate the end of the arms race by any means. In previous post-war periods, the technological arms race went rapidly ahead despite a levelling-off in military spending. This is also happening now. The trend in the figures for military research and development expenditure in recent years shows clearly that the arms race is developing with even greater energy than hitherto. (See pp. 292–295.)

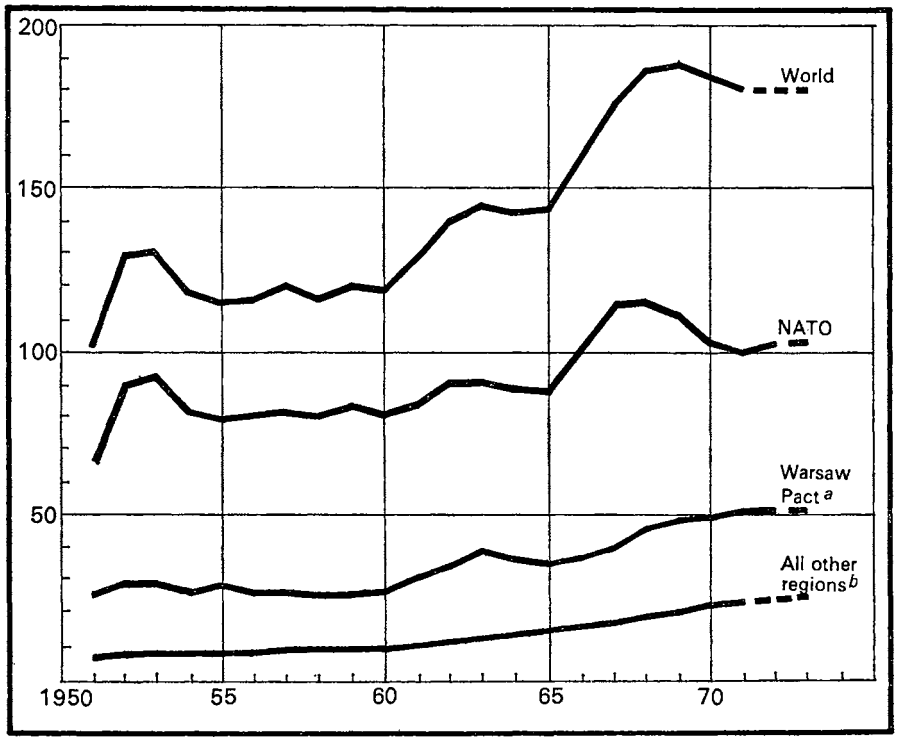
The international agreements that have recently been concluded in the disarmament field have not yet had any visible impact on military expenditure although they may have forestalled an increase. This was one of the conclusions of a UN report published in December 1972:

> In the post-war period, and particularly in recent years, as a result of negotiations within the framework of the United Nations, in the Committee on Disarmament and also between Governments, certain treaties and agreements for the limitation of the arms race, the reduction of international tension and the improvement of the political climate have been concluded and brought into effect. However, disarmament agreements have not yet led to any reduction in military expenditure. [1]

The SIPRI estimate of the total world military expenditure in 1971 is $190 billion in current prices. The proportion of world resources devoted to military expenditure is estimated at more than 6 per cent, of which the developed

Chart 7.1. World military expenditure, 1951–1973

US $ bn, at constant (1970) prices and 1970 exchange rates



[a] At current prices and Benoit-Lubell exchange rates.
[b] Excluding China.

countries are responsible for a relatively higher proportion than the underdeveloped.

NATO and Warsaw Pact countries account for more than 80 per cent of total world military spending, and naturally dominate its trend. NATO itself accounts for more than half of this total and has a somewhat different pattern from that of the Warsaw Pact. Both rose 30 per cent between 1965 and 1968; the former has since then decreased and the latter is levelling off.

The USA, which accounts for about 70 per cent of NATO expenditure, made a sharp 40 per cent increase from 1965 to 1968 because of the Viet-Nam War; this has since then gone down 20 per cent.[1] Spending in the USSR, which is more than four-fifths of the Warsaw Pact total, has been at a more or less constant level since 1969, and the estimate for 1973 again shows no change.

Similarly, the expenditure of the other NATO countries has not changed

[1] The military spending series in tables 7A.1 and 7A.2 differs from that in table 7.2 because of different definitions. The former is based on the NATO definition, which includes war pensions, retired pay and the military portion of joint civil/military activities.

Table 7.1. Long- and short-term trends in the volume of world military expenditure

Based on constant price figures

	Average per cent change per year						*Size of military expenditure in 1971, US $ bn, current prices and exchange rates*
	Long-term trend 1951–71	Year-to-year changes				Budgeted change in 1972	
		1967–68	1968–69	1969–70	1970–71		
USA	+ 1.9	+ 2.7	− 4.2	− 9.8	− 7.8	+ 3.0	*74.9*
Other NATO	+ 2.6	− 2.9	− 0.2	+ 1.3	+ 4.9	+ 3.0	*31.7*
Total NATO	**+ 2.1**	**+ 1.4**	**− 3.3**	**− 7.1**	**− 4.5**	**+ 3.0**	*106.6*
USSR[a]	+ 3.1	+15.5	+ 5.9	+ 1.1	± 0	± 0	*42.6*
Other Warsaw Pact[a]	+ 5.9	+18.4	+12.3	+ 7.4	+ 5.6	(+ 5.4)	*7.9*
Total Warsaw Pact[a]	**+ 3.5**	**+15.9**	**+ 6.8**	**+ 2.0**	**+ 0.8**	**(+ 0.8)**	*50.5*
Other Europe	+ 4.7	+ 3.1	+ 3.6	+ 3.0	− 1.1	+ 6.6	*3.6*
Middle East	+13.2	+24.2	+18.5	+15.5	+11.3	···	*4.7*
South Asia	+ 5.5	+ 3.8	+ 6.7	+ 4.1	+11.1	···	*2.6*
Far East (excl. China)	+ 6.2	+12.4	+12.4	+11.0	+ 7.2	···	*6.3*
Oceania	+ 3.6	+ 6.1	+ 0.5	+ 0.8	− 3.0	+ 5.3	*1.5*
Africa[b]	+14.2	+ 7.4	+22.3	− 2.5	− 5.2	···	*1.6*
Central America	+ 3.9	+10.7	− 5.4	+10.2	+ 1.8	···	*0.6*
South America	+ 3.6	− 4.7	+ 7.2	+ 3.5	+10.0	···	*2.4*
World[c]	**+ 2.9**	**+ 5.5**	**+ 1.1**	**− 2.7**	**− 1.4**	···	*189.3*

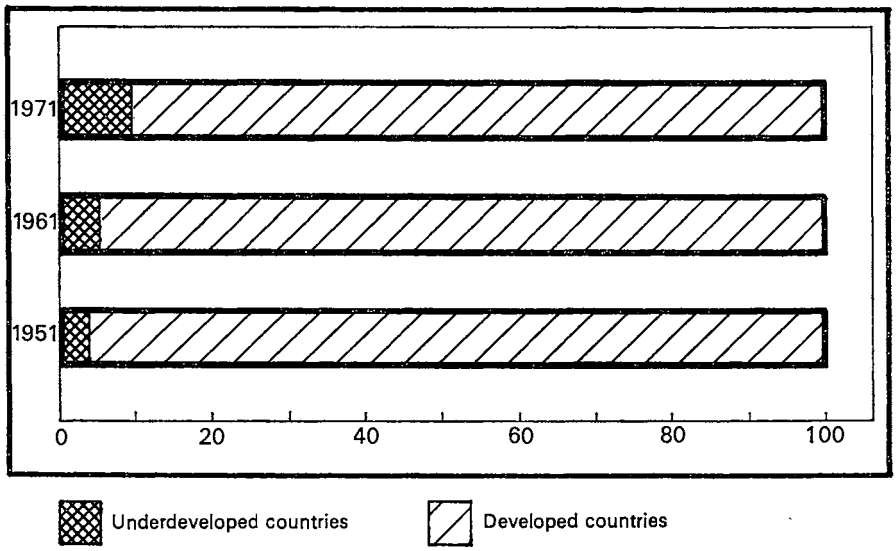
[a] At current prices and Benoit–Lubell exchange rates.
[b] 1960–1971.
[c] Including an estimate for China of US $9.0 billion in 1971.

much, but has shown an upward trend since 1969. The USA has been putting pressure on these countries to pay more for their own defence and also to make a larger contribution to their joint military spending. How much these increases will be depends on the extent to which the European nations are prepared to raise their budgets. The other Warsaw Pact countries have increased their spending by an average of 10 per cent per year, for the past four years, but since it has been impossible to make any price corrections, the rise may be somewhat exaggerated.

While military spending in the developed countries has, with a few exceptions, levelled off, in the underdeveloped countries it has increased sharply. However, it is very important to bear in mind that many of these underdeveloped countries started at a very low level. In Africa, for instance, many new nations have been building up their own armed forces since independence. Regions that have had the sharpest increases in absolute terms are the Far East and the Middle East. These regions also devote relatively the highest proportion of their GDP to military purposes.

Chart 7.2. Military expenditure in developed and underdeveloped countries as a percentage of total military expenditure[a]

Per cent



[a] Excluding China.

However, although military spending in the underdeveloped countries has increased rapidly, their share of total military spending is still very minor. In 1951 the military outlays of the underdeveloped countries (excluding China) made up 4 per cent of the world total; this had increased to only 9 per cent by 1971 (see chart 7.2).

The economic burden of military expenditure, as illustrated by the percentage these expenditures form of Gross Domestic Product (Net Material Product for the Socialist countries), has shown a long-term tendency to fall in most countries. In other words, the value of world output has, on the average, been rising faster than world military expenditure. This tendency is particularly noticeable in the five major industrialized countries (USA, USSR, FR Germany, UK and France) which account for about 75 per cent of total world military expenditure. The most striking contrast to this general trend is in the Middle East (see table 7A.9), where the proportion of GDP absorbed by military expenditure for the two major spenders—Egypt and Israel—more than doubled between 1960 and 1969.

This general tendency for the economic burden of military expenditure to fall should not, of course, be interpreted as a reduction in the level of military activity. A more appropriate indicator, in this case, is the absolute level of world military expenditure in real terms, and this has not shown any significant tendency to fall.

Table 7.2. US military expenditure in the Viet-Nam War,[a] compared with total US military expenditure[b]

US $ bn, fiscal years, ending in June of the year given

	1965	1966	1967	1968	1969	1970	1971	1972	1973
Constant 1973 prices									
Viet-Nam full costs	0.1	8.1	26.7	34.2	35.5	27.2	16.5	9.7	7.1
Other military expenditure	70.8	71.2	68.3	70.2	64.8	64.4	66.4	66.8	65.7
Total military expenditure[c]	**70.9**	**79.3**	**95.0**	**104.4**	**100.3**	**91.6**	**82.9**	**76.5**	**72.8**
Viet-Nam incremental costs	0.1	8.1	24.6	26.2	27.0	20.8	13.0	7.7	5.8
Base-line force	70.8	71.2	70.4	78.2	73.3	70.8	69.9	68.8	67.0
Total military expenditure[c]	**70.9**	**79.3**	**95.0**	**104.4**	**100.3**	**91.6**	**82.9**	**76.5**	**72.8**
Current prices									
Viet-Nam full costs	0.1	5.8	20.1	26.5	28.8	23.1	14.7	9.3	7.1
Other military expenditure	45.6	47.8	46.4	49.4	47.4	51.9	57.5	62.6	65.7
Military retired pay	1.4	1.6	1.8	2.1	2.5	2.9	3.3	3.9	4.9
Total military expenditure[d]	**47.1**	**55.2**	**68.3**	**78.0**	**78.7**	**77.9**	**75.5**	**75.8**	**77.7**
Viet-Nam incremental costs	0.1	5.8	18.4	20.0	21.5	17.4	11.5	7.3	5.8
Base-line force	45.6	47.8	48.1	55.9	54.7	57.6	60.7	64.6	67.0
Total military expenditure[c]	**45.7**	**53.6**	**66.5**	**75.9**	**76.2**	**75.0**	**72.2**	**71.9**	**72.8**

[a] Includes "special expenditure" in other South-East Asian countries.
[b] These are actual or estimated expenditure figures, not appropriations or obligational authority. The figures include expenditure incurred by the Department of Defense only; they exclude military expenditures by the Atomic Energy Commission, and certain other defence-related activities, which are included in the general reference tables (pp. 234–237). The inclusion of these would not alter the general relationship of spending in Viet-Nam to other spending.
[c] Exclusive retired pay.
[d] Inclusive military retired pay.

Source: The Economics of Defense Spending. A Look at the Realities, July 1972. Department of Defense (comptroller) p. 149.

II. *Military expenditure, by region*

The United States

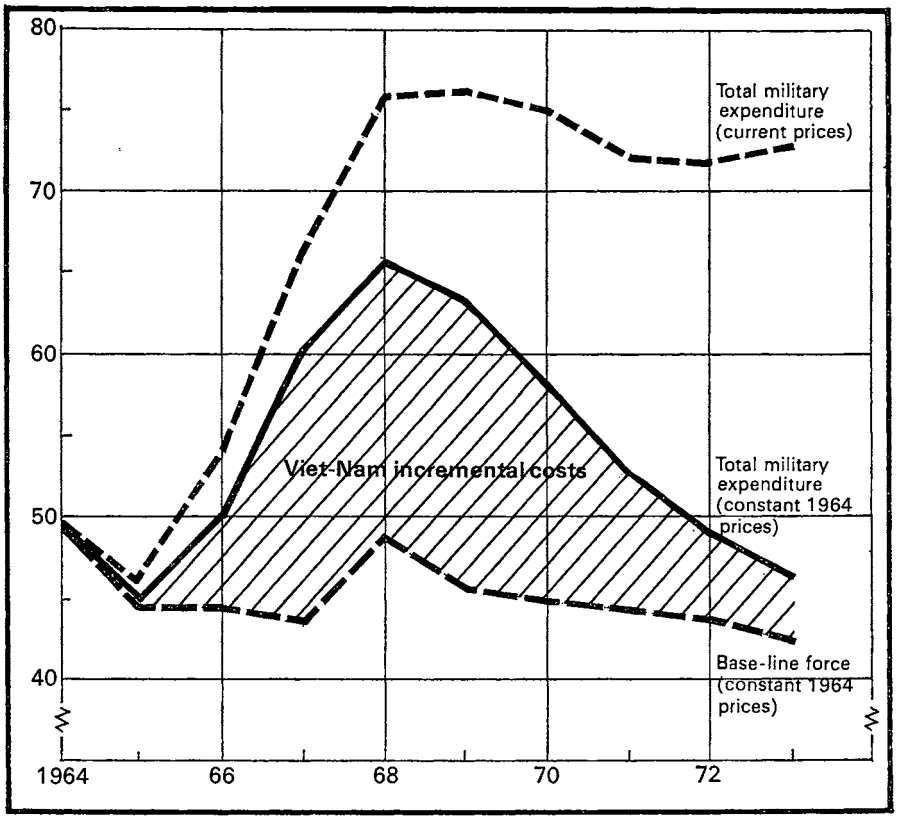
The first point of interest in the United States military outlays is the extent to which the Viet-Nam War has influenced the spending and the question of what has happened to the "peace dividend".[2]

Two definitions have been given for the cost of the war—the Viet-Nam 'full cost' which covers all operating costs in the theatre, and the Viet-Nam 'incremental cost' which is the additional cost of the war above what would be spent in peacetime for the base-line force. The "peace dividend" can only be released from the incremental cost. In 1968 and 1969, when the war was at its peak,

[2] The "peace dividend" would be the extra funds released when the war has ended.

Chart 7.3. US military expenditure in the Viet-Nam War,[a] compared with total military expenditure[b]

US $ bn, fiscal years, ending in June of the year given



[a] See footnote *a* to table 7.2. on p. 209.
[b] See footnote *b* to table 7.2. on p. 209.

the "dividend" would have been the release of more than $20 billion from the defence budget. (See table 7.2.)

Looking at the historical pattern, the prospect for such a dividend is not encouraging. After both World War II and the Korean War, military spending in the United States remained appreciably above the respective pre-war levels. Moreover, because in the later 1960s a number of major new weapon systems were either under development or awaiting the procurement decision, it seemed distinctly possible that the "savings" resulting from the withdrawal of US forces from Viet-Nam would be absorbed elsewhere in the military budget. So far, however, this has not happened. And with incremental war cost representing 8 per cent of the revised fiscal year 1973 military budget there is little further scope for such a transfer to take place.

According to the official US statements about military outlays in real prices, the increase in fiscal year 1973 above the 1965 level was only 3 per cent.

Table 7.3. Trends in the volume of US Department of Defense Total Obligational Authority (TOA)

Fiscal years,[a] index number 1968 = 100, *current prices*

	1968	1970	1971	1972	1973	1974	*Value of TOA in 1974, current $ mn*
Military personnel	100	115	113	116	119	124	24 680
Operation and maintenance	100	103	98	102	107	111	23 098
Procurement	100	88	79	83	83	83	18 806
Research, development, testing and evaluation	100	102	99	104	110	119	8 658
All other[b]	100	101	142	142	164	198	9 783
Total (TOA)	**100**	**101**	**99**	**103**	**107**	**113**	**85 025**

Source: Statement of Secretary of Defense Melvin R. Laird before the Senate Armed Services Committee on the FY 1973 Defense Budget and 1973–1977 Program, 15 February 1972, p. 189. *FY 1974 Department of Defense Budget*, Press Release No. 44–73 (Washington, Office of Assistant Secretary of Defense, 29 January 1973).

[a] Fiscal years ending in June of the year given.

[b] Retired Pay, Special Foreign Currency Program, Military Construction, Family Housing, Civil Defense, Military Assistance Program.

If one disregards the incremental cost of the war, which accounts for 8 per cent of total military expenditure in fiscal year 1973, the official data for expenditure on the base-line force is actually 5 per cent below fiscal year 1965.[3] (See chart 7.3.) This trend contrasts with the tables 7A.1 and 7A.2 in which the level of total expenditure in calendar year 1972 is 16 per cent above that for calendar year 1965. This results from the fact that

a) the definition of military expenditure employed by the official data is less comprehensive than that employed by NATO (see footnote 1, p. 206);

b) the official figures are deflated by the military price index,[4] which rises faster than the consumer price index used in tables 7A.1 and 7A.2.

The military price index used to deflate expenditure on the base-line force showed an increase of 31.4 per cent from 1968 to 1972 compared with a 22 per cent increase in the consumer price index during the same period.

According to the budget proposal for fiscal year 1974, the present adminis-

[3] It is possible that base-line expenditures have fallen even more substantially than indicated here. The official method of calculating the incremental cost of the war is to subtract the estimated cost of maintaining the size and efficiency of the base-line forces from total expenditures. It has been suggested that some of the "required" capital expenditures on the base-line forces has been deferred and the funds consumed in Viet-Nam. If this backlog of deferred investment actually exists and is to be made up, the Department of Defense will either have to admit to miscalculating war costs or justify an expansion in real base-line expenditure on some other grounds. [2] In Department of Defense briefings on the FY 1974 budget officials have indeed referred to a backlog of deferred investment.

[4] The military price index regards nearly all wage and salary increases purely as price increases; even the capital equipment figures are more deflated than their counterparts in the civil sector.

tration appears to be determined to avoid further cuts in military expenditure. The estimated expenditure is $81.1 billion, or 6 per cent above the fiscal year 1973 level in current prices. The budget is intended to provide for a "strong defense posture essential to the security of the United States, the safety of our people and the support of negotiations". It allows for "further modernization of our ... [baseline forces] consistent with the principles of the Nixon Doctrine, as we maintain a smaller but ready military force to implement our National Security Strategy of Realistic Deterrence and our total force concept." [3] In constant prices the total in the budget will remain almost the same but the composition will change somewhat. (See table 7.3.) Roughly 56 per cent of the budget goes to personnel and related costs as against 43 per cent in fiscal year 1964. It is expected that the proportion of the budget being devoted to these costs will now stabilize with the attainment of an all-volunteer force. The intention is now to preserve the balance between personnel, modernization and technology.

Other NATO countries

Military spending in European NATO countries depends on their willingness to bear a larger share of European defence. The US Congress claims that the United States bears a disproportionate share of NATO defence costs and that the European members are not doing enough on their own behalf. At the Brussels meetings on 5–8 December 1972, 10 defence ministers of the Eurogroup[5] announced that their combined defence budgets will increase in 1973 by at least $1.5 billion in current prices. This is the third year running that the defence ministers have agreed on planned defence increases.

Taking into account the rate of inflation, the planned increase of $1.5 billion in 1973, and even $1.3 billion last year,[6] will probably raise their military spending in real terms. The estimated figures since 1970 have also shown a slow upward trend.

The Eurogroup members are apparently anxious to enhance the quality and improve the effectiveness of the collective defence spending in Europe in order to strengthen the security of the Alliance. This is being done as a counterpart to the undiminished presence of US and Canadian forces in Europe. The future development of NATO military spending depends very much on the East-West negotiations on mutual and balanced force reductions.

The 10 defence ministers at the Brussels meetings also emphasized the im-

[5] An informal grouping within NATO, consisting at present of Belgium, Denmark, the Federal Republic of Germany, Greece, Italy, Luxembourg, the Netherlands, Norway, Turkey and the United Kingdom.

[6] An increase of $1 billion was announced at the Brussels meeting in December 1971, but this has since become $1.3 billion.

Table 7.4. NATO: long- and short-term trends in the volume of military expenditure

Based on constant price figures

	Average per cent change per year							*Size of military expenditure in 1971, US $ bn, current prices and exchange rates*
	Long-term trend 1951–71	Year-to-year changes				Budgeted change in 1972	Budgeted change in 1973	
		1967–68	1968–69	1969–70	1970–71			
Belgium	+3.2	+ 4.6	± 0	+6.5	+ 1.3	+ 8.0	+ 5.6	*0.9*
Canada	+0.7	− 5.9	− 5.5	+4.9	+ 0.5	− 3.2	...	*2.1*
Denmark	+5.4	+ 6.4	− 1.6	−1.9	+ 9.5	− 5.0	...	*0.5*
France	+2.8	− 0.1	− 1.3	−0.5	− 0.1	− 0.1	+ 5.8	*6.7*
FR Germany	+4.3	−11.3	+ 8.9	+0.8	+ 7.3	+ 8.8	+ 1.5	*7.8*
Greece	+5.6	+16.9	+13.1	+8.0	+ 5.9	+ 3.8	+ 0.8	*0.5*
Italy	+3.9	+ 1.9	− 1.9	+5.4	+13.2	+ 0.1	+23.7	*3.1*
Luxembourg	+1.3	−11.0	± 0	±0	+12.5	+11.1	...	*0.01*
Netherlands	+3.9	− 1.3	+ 4.6	+3.1	+ 4.6	+ 3.1	+ 0.3	*1.4*
Norway	+3.6	+10.7	+ 1.0	+0.5	+ 2.3	+ 3.3	...	*0.5*
Portugal	+8.3	+ 5.1	− 7.2	+9.3	+ 4.6	+ 3.1	...	*0.5*
Turkey	+4.6	+ 5.7	− 0.3	+7.2	+17.1	+ 5.1	+ 1.6	*0.6*
United Kingdom	+0.5	− 2.3	− 6.2	−0.2	+ 5.0	+ 2.6	+ 4.6	7.2
United States	+1.9	+ 2.7	− 4.2	−9.8	− 7.8	+ 3.0	− 4.0	*74.9*

portance of collaboration and more cooperation in equipment procurement in the 1980s. The agreed list of project areas includes a future main battle tank, field howitzers, aircraft identification equipment and approach and landing systems, interceptor aircraft, air-to-air and surface-to-surface missiles, and tactical communications systems [4].

The main points of interest in the individual countries are as follows. (See table 7.4.) The United Kingdom has shown an upward trend since 1971 and the budget forecast for 1973 shows a rise of nearly 5 per cent in real terms. This rise will cover a number of the already existing arms projects as well as on-going research and current requirements. The re-equipment programme includes Chieftain tanks, the new Anglo-French strike fighters, low level surface-to-air missiles and nuclear-powered submarines. The budget estimate for FR Germany shows substantial increases for 1971 and 1972. French military expenditure has slowly decreased from 1967, but the budget estimate for 1973 shows an increase. Italy made a big increase in its military spending in 1971 and has budgeted an even greater increase for 1973.

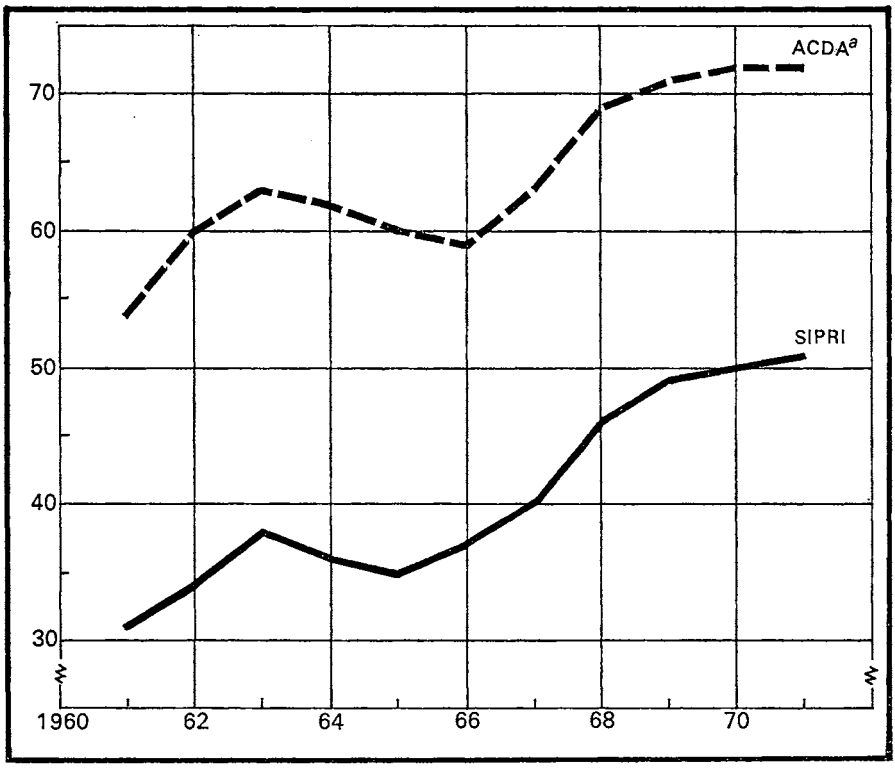
Among the smaller spenders, Greece and Turkey have continued upward trends. In contrast, the estimated expenditure in 1972 for Canada and Denmark shows a fall.

Warsaw Pact countries

There are considerable problems involved in making estimates for Warsaw Pact countries, especially the Soviet Union, that are comparable with those for other countries.

Chart 7.4. Alternative estimates of Warsaw Pact military expenditure figures, 1961-1971

US $ bn



[a] *World Military Expenditure 1971* (Washington, United States Arms Control and Disarmament Agency, 1972).

Two different estimates, from SIPRI and the US Arms Control and Disarmament Agency (ACDA) [5], respectively, are shown in chart 7.4. The ACDA figures are much higher than the SIPRI estimates but indicate a much lower rate of rise—30 per cent in the 10 years from 1961 to 1971, as compared with the SIPRI figure of 60 per cent.

Several factors account for this. There is some evidence that the defence budgets of Warsaw Pact countries do not provide a comprehensive picture of military expenditure. In the case of the Soviet Union it appears that, among other things, expenditures for R&D and nuclear activities are omitted from the defence budget. To account for these omissions, ACDA adds one half of the reported rouble outlays on science to the official Soviet defence budget. While some upward adjustment of the Soviet figure seems appropriate there is no firm basis on which to judge the size of this adjustment (see p. 227). SIPRI has therefore preferred to let the Soviet figures stand. Neither ACDA nor SIPRI make adjustments to the budget figures for other Warsaw Pact countries.

Table 7.5. Warsaw Pact: long- and short-term trends in the volume of military expenditure

Based on current price figures

	Average per cent change per year							*Size of military expenditure in 1971, US $ bn, Benoit–Lubell exchange rates*
	Long-term trend 1951–71	Year-to-year changes				Budgeted change in 1972	Budgeted change in 1973	
		1967–68	1968–69	1969–70	1970–71			
Bulgaria	+ 4.4[a]	± 0	+14.5	+ 6.9	+13.3	...	...	*0.3*
Czechoslovakia	+ 1.8	+ 4.8	+ 6.9	+ 6.5	+ 1.6	+5.9	...	*1.8*
German DR	+12.0[b]	+61.1	+ 9.5	+ 6.3	+ 6.7	+5.9	+8.8	*2.1*
Hungary	+12.1[c]	+18.5	+23.5	+12.0	+ 6.0	+2.9	+1.3	*0.5*
Poland	+12.3	+10.3	+13.4	+ 7.3	+ 6.5	+5.7	+3.0	*2.4*
Romania	+ 4.9[c]	+ 3.8	+23.5	+10.2	+ 6.3	+4.7	+1.0	*0.8*
USSR	+ 3.1	+15.5	+ 5.9	+ 1.1	± 0	±0	±0	*42.6*

[a] 1952–1971.
[b] 1958–1971.
[c] 1957–1971.

Both SIPRI and ACDA use estimated purchasing-power-parity rates rather than official exchange rates for conversion into dollars. For the Soviet Union, ACDA appears to use a rate of roughly 0.37 roubles per dollar. This is lower than the Benoit-Lubell rate of 0.42 roubles per dollar used by SIPRI.

Finally SIPRI makes no price correction to the Warsaw Pact figures. Consumer price indices—the deflator SIPRI uses for all countries—show virtually no change in these countries over long periods. ACDA, on the other hand, applies the US GNP deflator. This implies that the rate of inflation in these countries has been comparable to that in the United States—a rather bold assumption which runs counter to most of the information on price movements published in these countries. [6]

The recent figures for Soviet military expenditure have been constant since 1969 and again there is no change in the 1973 budget. In contrast, all the other Warsaw Pact countries have had rapid increases especially in 1968–1969, but these have recently been levelling off. There still does not exist any satisfactory explanation, though there is some evidence that the German Democratic Republic, for instance, has expanded its armed forces. Czechoslovakia, on the other hand, has reduced its armed forces [5, 7]. One possible explanation is that the USSR is putting pressure on its allies, in the same way as the USA, to take a larger share of the costs of financing weapon procurement, infrastructure and operations. The German Democratic Republic, for instance, has hardly any weapon production of its own except potentially in ship-building and electronics and is therefore dependent upon the Soviet Union for its arms, equipment and spares. Another possibility is that there may be some connection with the price reforms in the Warsaw Pact countries, where the prices of military goods may have been brought more into relation with their costs.

Table 7.6. Other Europe: long- and short-term trends in the volume of military expenditure

Based on constant price figures

	Average per cent change per year							*Size of military expenditure in 1971, US $ mn, current prices and exchange rates*
	Long-term trend 1951–71	Year-to-year changes				Budgeted change in 1972	Budgeted change in 1973	
		1967–68	1968–69	1969–70	1970–71			
Albania[a]	+8.8[b]	+11.6	+37.7	+12.3	+7.6	+10.2	...	*128*
Austria	+6.3	± 0	+ 3.2	− 1.2	−4.4	+ 2.6	...	*175*
Finland	+3.0	+14.8	− 8.8	+ 6.0	+4.9	+10.7	+7.9	*163*
Ireland	+3.3	+ 2.4	+ 4.7	+15.6	+9.6	+12.3	...	*66*
Spain	+4.6	− 0.8	+ 3.1	+ 4.2	+0.7	+13.6	+1.6	*681*
Sweden	+3.6	+ 0.4	+ 4.9	+ 1.1	−1.9	+ 1.5	+1.2	*1 312*
Switzerland	+3.5	− 1.3	+ 3.0	+ 7.5	−3.9	+ 4.9	−1.0	*526*
Yugoslavia	+8.2	+13.3	+ 0.8	+ 0.2	−2.2	+ 9.3	+1.5	*520*

[a] At current prices and Benoit–Lubell exchange rates.
[b] 1964–1971.

Other developed countries

Europe

Total military expenditure in "Other Europe" has shown a slow growth rate from 1967 to 1970, with an annual average of about 3 per cent. A slight fall in 1971 has been followed by a budgeted increase of 6 per cent for 1972. The main countries responsible for the rise in 1972 are Spain and Yugoslavia. Other countries that showed substantial increases in their military spending from 1967 to 1971 were Albania, more than 80 per cent (no price corrections have been made), and Ireland, more than 30 per cent; both countries have budgeted a rise of 10–15 per cent for 1972. (See table 7.6.)

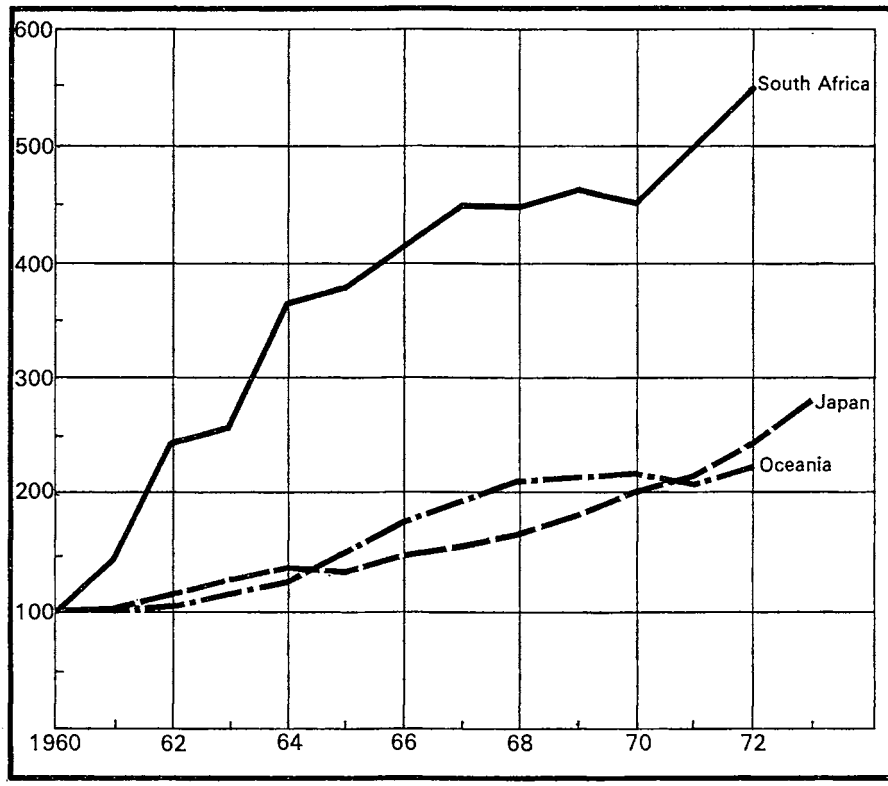
Sweden, on the other hand, which accounts for about one-third of the total military expenditure in "Other Europe", has had hardly any increase in real terms and has maintained about the same level since 1969. Moreover, Sweden's five-year plan does not indicate further increases, rather decreases. The rolling five-year plan calls for reorganization of the military establishment; conscript service has been shortened, and there are plans for future reductions in civil employees in the military sector.

Outside Europe

Oceania (see chart 7.5) has maintained about the same level since 1967, but Australia has budgeted an increase of 6 per cent for 1972. Australia also foresees a reorganization of its defence according to the next five-year plan. The plan stresses the importance of renewed capital equipment as the proportion spent on capital investments had been showing a downward trend in recent

Chart 7.5. The growth of military expenditure in Japan, Oceania and South Africa, 1960–1973

Index numbers 1960 = 100



years. The main fields of change are expansion and re-equipment in the navy as well as the air defence. The planners have projected an annual increase of 4.7 per cent per year up to 1976–77 in real terms. New Zealand has shown a reduction in its military expenditure after 1979.

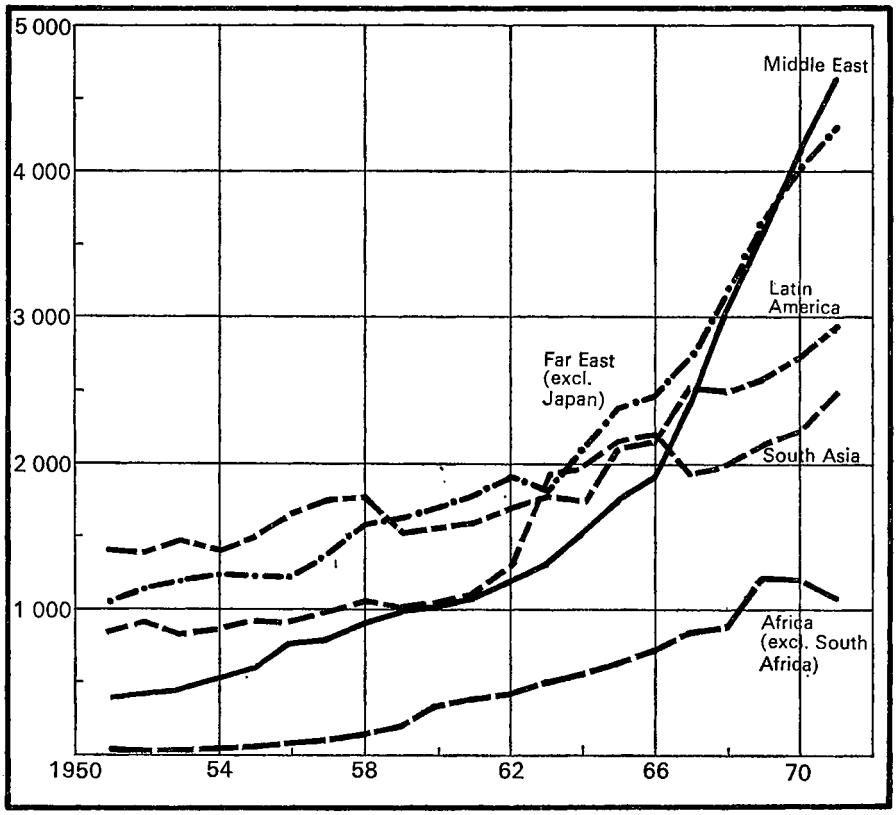
Japanese military expenditure has shown an upward trend since 1961 (see chart 7.5); an even sharper increase is budgeted for 1973. The fourth defence build-up plan has been accepted by the cabinet although reductions have been made from the original one. The intention is to double military expenditure compared with the previous five-year plan, but spending will amount to no more than 1 per cent of GNP and that is much lower than the world average. Prime Minister Tanaka has stated that the build-up is purely defensive and that Japan will have continued dependence on the US nuclear umbrella. The main item in the budget is a sharp increase in aircraft procurement.

The military expenditure of South Africa showed a significant increase from 1960 to 1970 with an average of 16 per cent per year. South Africa even

Chart 7.6. Military expenditure in the underdeveloped regions

Chart 7.6A. Relative size, 1951–1971

US $ mn, at constant (1970) prices and 1970 exchange rates



budgeted for an increase of 10 per cent in 1972 and Defence Minister Botha says that the country cannot be isolated by arms boycotts any longer and is absolutely self-sufficient with regard to its internal needs. (See chart 7.5.)

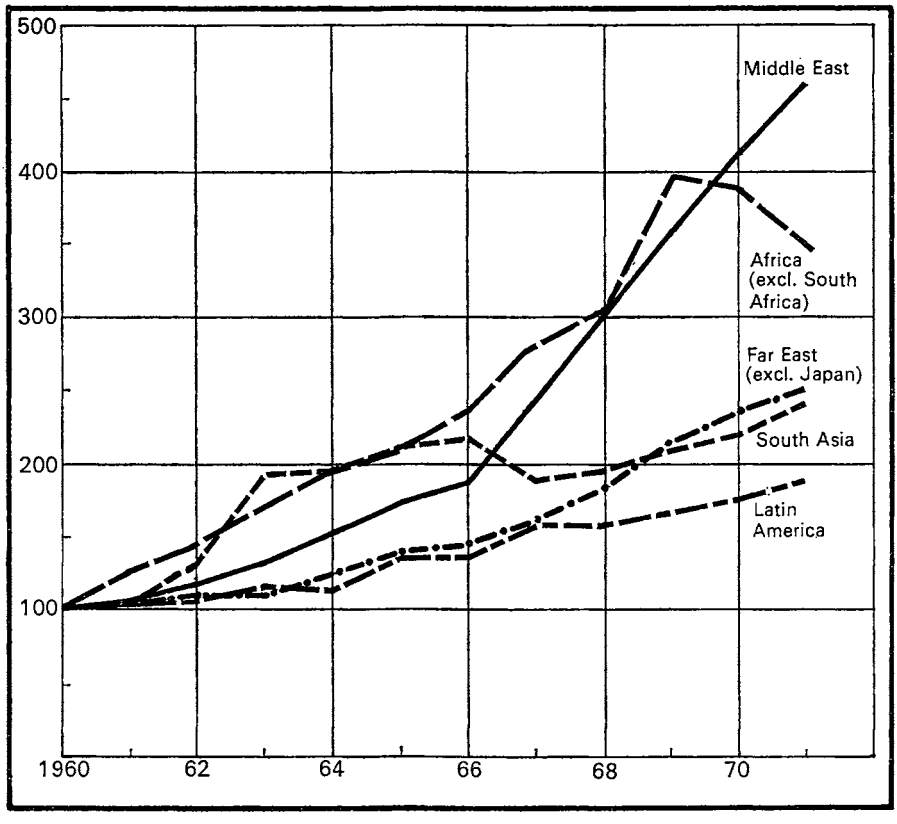
Underdeveloped countries

The greatest increases in military expenditure in absolute terms in the underdeveloped regions have occurred in the Middle East and Far East. (See chart 7.6A.) These two areas have dominated the upward trends in the underdeveloped regions and account for more than half of the spending in the third world.

A comparison of the rate of rise since 1960 (see chart 7.6B) shows that the Middle East still has the fastest increase and that Africa comes in second place. Military spending in Africa, starting at a very low level, reached a peak in 1969 during the Nigerian Civil War and has since had a downward trend.

Chart 7.6B. Growth rate, 1960–1971

Index numbers 1960 = 100



South Asia and Latin America have not shown such rapid increases in recent years. There was, however, a sharp increase of 10–11 per cent in both South Asia and South America in 1971.

Middle East

Egypt and Israel account for half of the military expenditure in the Middle East and dominate the pattern of the rise. The spending grew significantly up to 1971 (see chart 7.7) but since then there has been a slowdown. Countries that still have extremely rapid rates of growth are Iran and Saudi Arabia. (See table 7.7.) Iran has increased its spending almost threefold since 1967 and its intention is to continue its military re-equipment programme at the highest priority. The USA apparently agrees with Iran's future plans and is selling the country further aircraft. Britain has also shown interest in supplying Iran with a weapon arsenal.

Saudi Arabia has budgeted for increases of more than 30 per cent per year in 1972 and 1973.

Chart 7.7. The growth of military expenditure in Egypt and Israel, 1960–1972

Index numbers 1960 = 100

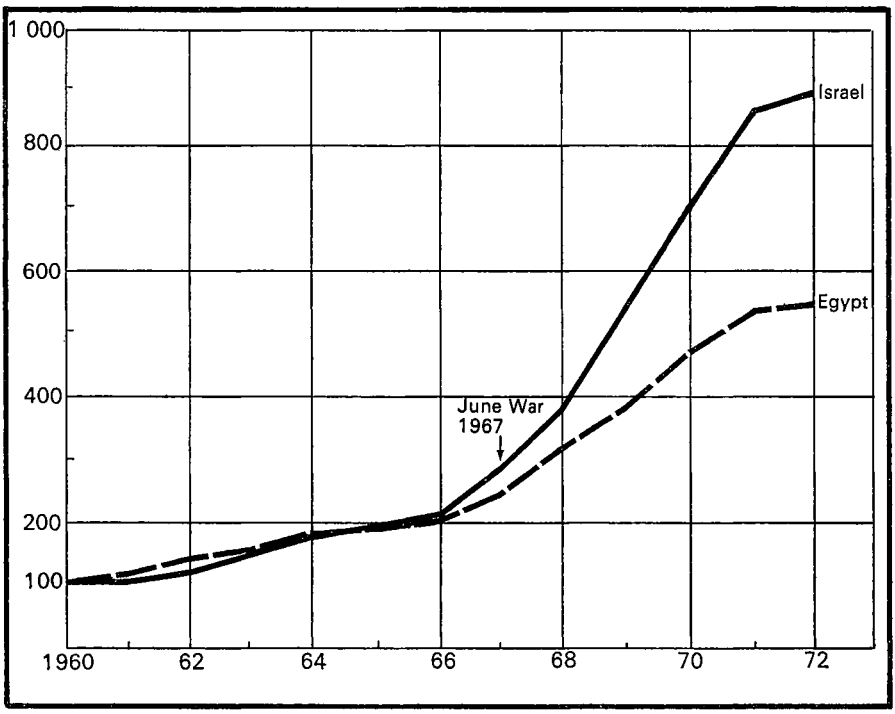


Table 7.7. Middle East: long- and short-term trends in the volume of military expenditure[a]

Based on constant price figures

	Average per cent change per year							*Size of military expenditure in 1971, US $ mn, current prices and exchange rates*
	Long-term trend 1951–71	Year-to-year changes				Budgeted change in 1972	Budgeted change in 1973	
		1967–68	1968–69	1969–70	1970–71			
Egypt	+13.7	+26.9	+25.9	+19.3	+11.1	+ 0.9	...	*1 385*
Iran	+13.4	+27.1	+15.5	+23.2	+19.2	+16.0	...	*976*
Iraq	+12.7	+15.5	+ 9.3	−13.9	− 2.2	+ 3.2	...	*344*
Israel	+15.5	+35.5	+39.7	+30.2	+23.0	+ 1.5	+ 3.8	*1 151*
Jordan	+ 4.5	+19.7	− 1.6	−12.8	−26.9	+16.2	...	*90*
Kuwait[b]	+16.4[d]	+16.6	+11.8	+ 2.8	+11.5	+ 6.3	...	*88*
Lebanon	+10.1	+ 6.6	− 2.1	+23.6	− 4.9	+21.7	+ 5.1	*53*
Saudi Arabia[c]	+16.9[e]	+ 7.2	+ 2.4	+ 9.4	− 3.0	+37.4	+34.2	*449*
Syria	+ 9.8	+57.7	+ 1.3	− 1.3	−3.4	+ 7.9	+ 8.2	*164*

[a] Figures are given for those countries whose military expenditure in 1971 exceeded US $15 million (at current prices and exchange rates).
[b] At current prices.
[c] At current prices, fiscal years.
[d] 1964–1971.
[e] 1961–1971.

Table 7.8. South Asia, the Far East and Oceania: long- and short-term trends in the volume of military expenditure[a]

Based on constant price figures

	Average per cent per year							*Size of military expenditure in 1971, US $ mn, current prices and exchange rates*
	Long-term trend 1951–71	Year-to-year changes				Budgeted change in 1972	Budgeted change in 1973	
		1967–68	1968–69	1969–70	1970–71			
South Asia								
Afghanistan	+ 1.2[c]	+17.9	+13.3	+ 4.0	+12.2	...	...	*36*
India	+ 6.1	+ 4.0	+ 5.8	+ 2.2	+12.8	− 2.3	...	*1 860*
Pakistan	+ 3.8	+ 2.9	+ 8.7	+ 9.1	+ 6.0	+10.3	...	*693*
Far East								
Burma[b]	+ 7.0	+ 2.5	+ 9.1	+ 5.8	+ 3.7	...	...	*111*
Indonesia	+ 1.6	+29.7	+19.7	+13.7	+11.9	...	...	*318*
Japan	+ 4.3	+ 6.6	+ 8.4	+ 9.9	+ 8.2	+12.4	+15.0	*2 081*
Khmer Rep.	+16.7[d]	+ 4.4	+ 5.9	(+149.6)	+56.8	...	...	*144*
Korea, South	+10.9[e]	+18.0	+15.5	+ 2.9	+11.1	+26.6	...	*347*
Laos	− 5.3[f]	− 3.3	+ 1.3	+ 3.1	± 0	...	...	*16*[i]
Malaysia	+11.3	+ 3.3	+48.7	+38.6	+ 2.2	+ 2.3	...	*280*
Philippines	+ 5.7	+18.0	+19.0	+18.9	− 0.2	−20.9	...	*129*
Singapore	+50.2[g]	+26.7	+196.9	−17.2	+76.5	+43.1	...	*154*
Taiwan	+10.8[h]	+ 7.6	+10.4	+ 6.9	− 6.7	...	...	*611*
Thailand	+10.0	+19.9	+17.0	+17.7	+19.6	7.8	...	*259*
Viet-Nam, South	+11.9[c]	+ 7.5	+ 4.7	+ 2.1	+ 2.1	− 0.2	...	*378*
Oceania								
Australia	+ 3.8	+ 6.3	+ 0.3	− 0.2	− 2.6	+ 6.1	...	*1 314*
New Zealand	+ 2.7	+ 4.5	+ 3.4	+10.0	− 6.8	− 2.4	...	*145*

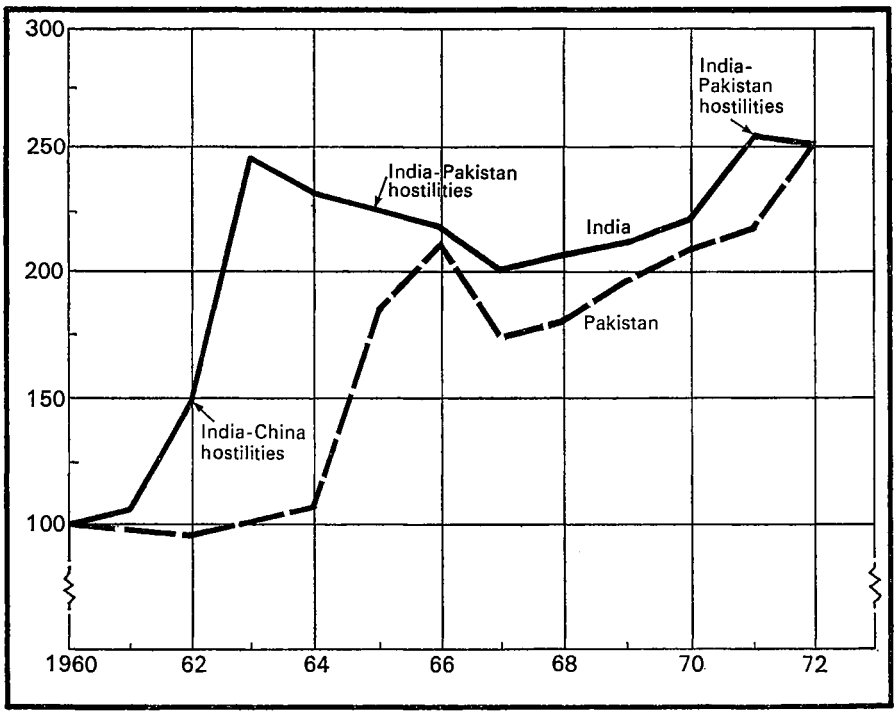
[a] Figures are given for those countries whose military expenditure in 1971 exceeded US $30 million (at current prices and exchange rates). North Korea and North Viet-Nam are not included because reliable figures are not available for most of the period.
[b] At current prices.
[c] 1960–1971.
[d] 1961–1971.
[e] 1952–1971.
[f] 1962–1971.
[g] 1967–1971.
[h] 1953–1971.
[i] Laos devalued in December 1971 from 240 to 600 kips / US $.

Far East

Some countries in the Far East such as Indonesia, South Korea, Khmer Republic, Thailand and Singapore have shown very rapid increases in recent years (see table 7.8). The rest of the countries in that area have slowed down their rate of rise to a greater or lesser degree. The figures for North Korea, North Viet-Nam and China are highly speculative because these countries do not publish defence budgets. Estimates for China are based on both eastern and western sources and range from $8 to $15 billion. What one does know is

Chart 7.8. The growth of military expenditure in India and Pakistan, 1960–1972

Index numbers 1960 = 100



that it has improved its weapon arsenal substantially in recent years (see p. 345). It is estimated that 70 per cent of the costs are accounted for by personnel.

South Asia

India and Pakistan had a parallel growth rate from 1967 to 1971 with an average rise of 6–7 per cent per year (see chart 7.8). In 1972 Pakistan budgeted a sharp increase of more than 10 per cent in real terms, despite the fact that the government had to defend both East and West in 1971.

The Indian military budget for 1971 was substantially revised because the cost of the war was underestimated. The revision of the 1971 budget has caused a reduction in the expenditure originally estimated for 1972.

Africa and Latin America

In North Africa, Libya has shown a sharp upward trend in military spending and even Tunisia has budgeted a sharp increase for 1972. The countries with major rises in military spending in Sub-Saharan Africa—excluding South Africa—are Sudan, Kenya and Tanzania. Nigeria had a peak in 1969 during

Table 7.9. Africa: long- and short-term trends in the volume of military expenditure[a]

Based on constant price figures

	Average per cent change per year						*Size of military expenditure in 1971, US $ mn, constant prices and exchange rates*
	Long-term trend 1960–70	Year-to-year changes 1967–68	1968–69	1969–70	1970–71	Budgeted change in 1972	
North Africa							
Algeria[b]	+ 2.8[c]	...	...	...	± 0	...	*108*
Libya	+28.9	+ 2.0	+ 8.5	+67.4	+15.8	+25.5	*91*
Morocco	+ 6.4	+17.2	+ 7.5	+ 4.2	− 3.8	+ 0.2	*105*
Tunisia	+ 2.0	+22.1	− 3.8	+11.4	−16.0	+28.6	*22*
Sub-Saharan Africa							
Cameroon	+ 5.9	+ 2.7	+ 4.7	± 0	+ 1.0	...	*23*
Ethiopia	+ 4.9	− 4.0	− 8.8	−12.1	+ 0.6	+ 1.4	*40*
Ghana	+ 3.6	+10.0	− 9.1	− 7.2	− 7.1	...	*23*
Guinea[b]	+15.1[d]	+ 0.7	+ 0.7	...	...	...	*16[i]*
Ivory Coast	+12.8[e]	+ 5.2	+ 3.1	− 1.2	...	...	*17[j]*
Kenya	+18.5	± 0	− 3.0	+ 4.9	+27.6	...	*22*
Malagasy Rep.	+20.5	+ 6.0	+ 1.6	− 3.2	...	...	*12[j]*
Nigeria	+32.1	+32.5	+111.9	−18.0	−34.0	...	*338*
Rhodesia	+ 7.0[f]	+ 3.3	+ 5.5	+ 5.2	+ 6.2	...	*25*
Senegal	+ 8.1[c]	± 0	+18.3	± 0	+ 2.4	...	*19*
Somalia	+ 9.9[g]	+ 6.0	+ 1.1	+24.4	+ 0.9	...	*12*
South Africa	+16.2	− 0.4	+ 3.3	− 3.2	+10.5	+10.0	*394*
Sudan	+14.4	+22.8	+ 9.4	+31.0	+ 6.3	...	*101*
Tanzania	+35.4[h]	+10.0	+11.2	+20.1	...	...	*19[j]*
Uganda	+29.3	+22.6	− 0.8	− 7.9	...	...	*22[j]*
Zaïre	+12.8[c]	−22.8	− 3.1	+21.2	+10.3	...	*69*
Zambia	+ 7.0	+ 9.4	−25.6	+ 4.2	...	...	*20[j]*

[a] Figures are given for those countries whose military expenditure in 1971 exceeded US $10 million (at current prices and exchange rates).
[b] At current prices. [c] 1963–1971. [d] 1961–1969. [e] 1961–1970. [f] 1964–1971.
[g] 1961–1971. [h] 1962–1970. [i] 1969. [j] 1970.

Table 7.10. Latin America: long- and short-term trends in the volume of military expenditure[a]

Based on constant price figures

	Average per cent change per year						*Size of military expenditure in 1971, US $ mn, current prices and exchange rates*
	Long-term trend 1951–71	Year-to-year changes 1967–68	1968–69	1969–70	1970–71	Budgeted change in 1972	
South America							
Argentina	+2.0	−23.4	+17.4	+ 3.6	+ 7.6	−10.4	*522*
Brazil	+4.4	+ 0.1	+10.1	− 7.1	+16.4	...	*967*
Chile	+6.3	+ 4.4	+ 5.1	+24.6	+28.3	+18.0	*195*
Colombia	+0.5	+31.5	− 6.9	+20.7	−13.7	+ 6.1	*168*
Peru	+6.1	− 9.1	− 3.5	+22.3	+ 7.7	+11.3	*222*
Venezuela	+3.2	− 0.4	− 5.4	+ 0.3	+ 6.3	23.2	*221*
Central America							
Mexico	+6.4	+ 4.2	+ 8.3	+ 1.7	+ 4.0	...	*234*

[a] Figures are given for those countries whose military expenditure in 1971 exceeded US $100 million (at current prices and exchange rates). Cuba is not included because reliable figures are not available for most of the period.

the Civil War but has since then reduced its military spending, though not to its pre-war level. (See table 7.9.)

Chile and Peru have shown substantial increases over the past three years (see table 7.10).

References

1. *Disarmament and Development* (UN document ST/ECA/174, December 1972).
2. *Department of Defense Appropriations for 1972*, Hearings before a subcommittee of the Committee on Appropriations, US House of Representatives, 92nd Congress, 1st Session (Washington, 1971) Part 1, pp. 1140–41, 1164–65.
3. *FY 1974 Department of Defense Budget*, Press Release No. 44–73 (Washington, Office of Assistant Secretary of Defense, 29 January 1973).
4. *NATO Review*, Nov/Dec 1972, p. 10.
5. *World Military Expenditures* (Washington, United States Arms Control and Disarmament Agency, annual).
6. *World Armaments and Disarmament. SIPRI Yearbook 1972* (Stockholm, Almqvist & Wiksell, 1972, Stockholm International Peace Research Institute) table 4.5, p. 62.
7. *The Military Balance* (London, International Institute for Strategic Studies, annual).

Appendix 7A

Sources and methods

The main reason for collecting and presenting military expenditure material is to show long- and short-term trends in military expenditure, in individual countries and regions, and in the world as a whole. Because of differences in coverage, and the difficulty of finding appropriate exchange rates, expenditure figures are often unsuitable for comparisons between countries, that is, for comparing the military efforts of two countries at a particular point in time. The expenditure figures of, for example, the USA and the USSR do not provide a good basis for comparing the military efforts of the two countries. They do, however, provide a basis for commenting on the rate at which military expenditure is moving.

The purpose of publishing the ratio between military expenditure and gross domestic product (GDP) or net material product (NMP) is, first, to give an indication of the trend, over a period, of military expenditure as a burden on the economies of individual countries, second, to show the world-wide variations between years of greater and lesser international tension, and third, to provide a rough yardstick of comparison between the burden in different countries.

I. *Definitions*

Our aim is to present series of expenditure figures which show the amount of money actually spent (or likely to be spent, for 1973) for military purposes. In many countries there are other series—such as those for obligations or appropriations in the USA—which may be at a different level and may show trends different from those shown by the expenditure series. For most defence procurement, there is usually a long lag between the decision to spend the money and the actual use of resources for purchasing the items. It is the actual use of resources which we are attempting to measure.

Even in countries with highly developed accounting systems, the expenditure figures for any particular year are likely to have a margin of error of 1–2 per cent: when a major procurement contract has been spread over a number of years, the accounting authority may well find it difficult to state precisely the

value of work done in any particular year. Small movements in the figures from one year to the next are not usually significant.

Expenditure is defined to include resources devoted to research and development, to include military aid in the budget of the donor country and to exclude it from the budget of the recipient country, and to exclude war pensions.

Adjustments were made for NATO country figures according to NATO definitions: these include, for example, allied services. For most other countries, however, it was not possible to obtain specific definitions of military expenditure, and consequently no adjustments were made.

The figures are presented on a calendar-year basis. Conversion to calendar years is made on the assumption of an even rate of expenditure throughout the fiscal year. Figures for 1972 and 1973 were based on budget estimates. When the latest figures differed from the previous series chosen, the percentage change from the latest source was applied to the existing series, in order to make the trends as correct as possible.

The figures for the individual countries in each region covered by the world summary table are shown in the subsequent tables.[1]

For ex-colonial countries, no figures are shown before the date of independence except when it is known that the colony financed some military expenditure from its own budget.

Wherever possible, military expenditure series in constant price figures are shown from 1951. The current price military expenditure series in local currency, on the other hand, are expressed as five-year averages up to 1960, so as to allow space for additional information on the relationship between military expenditure and GDP or NMP. Information on individual military expenditure figures in local currency and current prices, for individual years prior to 1961, is contained in the *SIPRI Yearbook 1968/69* which carries some series back to 1948. The figures are constantly revised as new information becomes available.

For calculating the ratio between military expenditure and GDP or NMP, SIPRI military expenditure figures have been used.

Gross domestic product (GDP) is at purchasers' values. It is defined as "the final expenditure on goods and services, in purchasers' values, less the c.i.f. [cost, insurance, freight] value of imports of goods and services".[2] In other words, it is the final prices that consumers pay for goods and services, including the value of exports, but excluding the value of imports.

[1] Albania is included in "Other Europe": it announced its formal withdrawal from the Warsaw Pact in a unilateral declaration on 12 December 1968, having not participated in Warsaw Pact activities since 1960.

[2] See source 2, 1970 edition, introduction, p. XIX.

Net material product (NMP) is defined as "the net (of depreciation) total amount of goods and productive services produced in a year expressed at realized prices".[3] Generally speaking, it differs from GDP in excluding services which, under the socialist classification, are termed "unproductive".[4, 5]

The percentages are presented on a calendar-year basis.

II. *Methods*

Selection of sources and coverage

Two worksheets have been prepared for each country. On the first sheet, all available figures were entered. A single continuous series was then prepared for as long a period as possible on the second worksheet.

For NATO countries, the series used were those corresponding to NATO definitions.[6] For Warsaw Pact countries, official national series were used.

The Warsaw Pact countries publish a single figure for military expenditure, with no functional or service breakdown, and no subsequent comparison of actual with estimated expenditure. The main problem arises when trying to compare the Soviet figure with the military expenditure figures for NATO countries. US analysts have generally come to the conclusion that there are important items included in NATO figures which are excluded from the Soviet figures.[7] In particular, they are fairly confident that a good deal of research and development expenditure is excluded from the Soviet military budget and included in the science budget.[8] Other items which are probably omitted from the Soviet figures are military aid, military stockpiling, military nuclear activities and possibly also some investment in arms production

[3] Wilczynski, J., *The Economics of Socialism* in Carter, C., ed., *Studies in Economics*, number 2 (London, George, Allen and Unwin, 1970).

[4] Wilczynski, J., *op. cit.*, p. 61.

[5] Referred to—in source 2, 1970 edition, introduction, p. LVIII—as the non-material sphere; divided into the following branches: housing, communal services and public utilities (including laundries), education, culture and art, health services, social security and sports, science and scientific services, finance, credit and insurance, general government, other branches of the non-material sphere. See also Wilczynski, J., *op. cit.*, p. 61.

[6] See, for example, sources 9 and 10.

[7] Godaire, J. G., "The Claims of the Soviet Military Establishment", in *Dimensions of Soviet Economic Power* (Washington, US Congress, Joint Economic Committee, 1962).

Sosnovy, T., "The Soviet Military Budget", *Foreign Affairs* 42 (3): 487–94, April 1964.

Lee, W. T. and Anderson, S. A., *Probable Trend and Magnitude of Soviet Expenditures for National Security Purposes* (Menlo Park, California: Stanford Research Institute, Strategic Studies Center, 1969), Research Memorandum SSC-Rm 5205–54, (Prepared for Office of Chief of Research and Development, US Army).

Becker, A. S., *Soviet Military Outlays Since 1955* (Santa Monica, California, 1964), Rand Memorandum RM-3886-PR (Prepared for US Air Force).

[8] See the *SIPRI Yearbook 1969/70*, pp. 288–306, for a discussion of US estimates of Soviet expenditure for military research.

industries. However, the evidence showing that particular activities are financed outside the defence budget is not conclusive, and the upward adjustments made for these alleged omissions are highly speculative. In general, the new estimates made tend to follow the trend of the official Soviet estimates but at a higher level. The figures in tables 7A.1, 7A.4 and 7A.5 have not been adjusted upwards for coverage: although the evidence that the coverage of the Soviet figures is less extensive is reasonably convincing, there is a great deal of uncertainty as to the degree of upward adjustment which would be required to compensate for this, and we felt that it was better to allow the official figures to stand. The evidence on which an adjustment to the official exchange rate was based seemed rather more abundant.

For countries outside NATO and the Warsaw Pact, the source usually preferred, when figures were available, was the United Nations' *Statistical Yearbook*. The military expenditure series of the African countries have mainly been compiled by the United Nations Economic Commission for Africa. For a number of other countries, only rough estimates are available: thus, no official figures have been published for China, North Korea and North Viet-Nam.[9] Another source of figures for third world countries is the publications of the US Agency for International Development (AID). The latest figures in the series have mainly been taken from journals and newspaper articles giving the most recent budget estimates.

The data on GDP and NMP are taken primarily from the UN *Yearbook of National Accounts Statistics* (YONAS), which covers 140 countries and territories and in which "the data are presented ... as far as possible, under uniform table headings and classifications". This data is updated in the UN *Monthly Bulletin of Statistics*.

Where local currency figures are not available in YONAS, estimates are based on data in the International Monetary Fund's *International Financial Statistics*, or on dollar estimates from YONAS or the UN *Statistical Yearbook*. In these cases, the resulting percentages are shown in parentheses, thus (*6.5*).

A complete list of sources is given on pages 230–233.

Comparability between countries: the exchange rate problem

If we wish to make any statements about world or regional trends in military expenditure, the series for individual countries have to be summed, and consequently, converted into a common currency. The exact exchange rate chosen is important if the object is to compare the military efforts of two countries. It is

[9] The estimated figures are mostly based on figures from the US Arms Control and Disarmament Agency *World Military Expenditures* (source 13), the IISS *Military Balance* (source 18), and several current journals.

Table A. Official and Benoit–Lubell exchange rates for Warsaw Pact countries

		Value of US $ in national currency	
	Currency	Official basic rate, 1970	Benoit-Lubell exchange rate
Albania[a]	*leks*	5.0	39.67
Bulgaria	*leva*	1.17	1.16
Czechoslovakia	*korunas*	7.20	8.50
German DR	*marks*	2.22	3.39
Hungary	*forints*	11.74	17.36
Poland	*zlotys*	4.00	15.92
Romania	*lei*	6.00	9.43
USSR	*roubles*	0.90	0.42

[a] In the military expenditure tables, Albania is included under Other Europe.

less crucial, however, if the need is simply for a weighting system to add together figures for the various countries in a region. Small changes in the weighting are not likely to lead to significant differences in the overall trends in total military expenditure for a region.[10] The official exchange rates for 1970 —the base year used for the consumer price indices—were therefore generally used.

As noted earlier, the conversion of Warsaw Pact countries' local currencies to dollars poses a special problem. The use of the official exchange rates not only produces figures for the USSR which are too low as compared with the USA, but also distorts the relationship between the expenditure figures for the countries of the Warsaw Pact. Thus, for instance, using the official exchange rates shown in table A would show the USSR's military expenditure as being one-third of that of the USA in 1970, while Poland's military expenditure would be 45 per cent of Soviet expenditure in the same year. This does not seem to agree with other information on the relative quantity of resources devoted to military purposes by the countries concerned.

An alternative series is therefore presented in table 7A.4 using exchange rates estimated by E. Benoit and H. Lubell, who attempted to calculate defence-purchasing-power-parity exchange rates for these countries. The differences between these exchange rates and the basic official rates are shown in table A. The Benoit-Lubell exchange rate for the Soviet Union, for example, allows for the very different cost-per-head of the average soldier in the United States and the Soviet Union. In 1964 and 1965, the average cost-per-head for military manpower in the United States was roughly $5 000. In the Soviet

[10] An experiment was made using estimated defence-purchasing-power-parity exchange rates for European NATO countries. These rates were derived from data in source 28. The series derived for total European NATO from using these exchange rates was not significantly different from the series derived from the use of official exchange rates.

Union, for 1959–1964, it was estimated to be roughly 1 000 roubles, or $1 100 at the official exchange rate.[11] These figures suggest that 4.5:1 is a more accurate dollar-rouble exchange rate for military manpower. An adjustment similar in direction but smaller in degree was estimated for the other categories of military expenditure. The average for military expenditure as a whole produced a dollar-rouble exchange rate lying between 2:1 and 2.5:1.

Price corrections

The first step in preparing the military expenditure series was to choose one continuous series for each country. The next step was to find an appropriate exchange rate for converting local currency to dollars. The third and final step was to make price corrections, that is, to remove the price increases caused by inflation, since the main purpose of the series is to show whether the real quantity of resources absorbed by military expenditure—the "real cost" of this expenditure—is rising or falling.

There is no price index or deflator which can apply equally well in all cases. Some countries have a defence price index: but the use of this index leads to an understatement of the rise of the real cost of defence.[12] Instead we have used a consumer price index. For a fairly large number of countries this is the only price index available. If we had used a GNP deflator or a general price index, instead, for those countries which possess one—that is, a price index for the output of all goods and services, not just consumer goods and services—the general trends shown by the constant price figures here would not have been significantly different.

All consumer price indices were rebased on the year 1970.

III. *Sources*

The following list of sources includes books and journals used for more than one country and newspapers and periodicals which are regularly examined for military expenditure information.

[11] The US figures are derived simply by dividing military personnel expenditure net of retired pay by the size of the armed forces. The Soviet figure is an approximation arrived at by a number of Western analysts. See Godaire, J. G. and Becker, A. S. quoted in *Soviet Interest in Arms Control and Disarmament, the Decade under Khrushchev, 1954–64* (Cambridge, Mass: Center for International Studies, Massachusetts Institute of Technology, 1965) p. 179 and also source 28.

[12] For a discussion of the considerations relevant to the choice of a price index, see the *SIPRI Yearbook 1972*, pp. 78–79.

Books and journals

1. *Statistical Yearbook* (New York, United Nations, annual).
2. *Yearbook of National Accounts Statistics* (New York, United Nations, annual).
3. *Monthly Bulletin of Statistics* (New York, United Nations, monthly).
4. *Economic and Social Consequences of Disarmament: Replies of Governments and Communications from International Organizations* (UN document E/3593/Rev. 1, 1962).
5. *Economic and Social Consequences of the Armaments Race and Its Extremely Harmful Effects on World Peace and Security* (UN document A/8469, 22 October 1971).
6. *Economic and Social Consequences of the Armaments Race and Its Extremely Harmful Effects on World Peace and Security* (UN document A/8469/Add. 1, 12 November 1971).
7. *International Financial Statistics* (Washington, International Monetary Fund, monthly).
8. *National Accounts of OECD Countries 1950–1968* (Paris, Organization for Economic Cooperation and Development, 1970).
9. *NATO Letter* (Brussels, NATO, monthly) until 1970.
10. *NATO Review* (Brussels, NATO, bimonthly) from 1971.
11. *Worldwide Defense Expenditures and Selected Economic Data, Calendar Year 1964* (Washington, United States Arms Control and Disarmament Agency, 1966) Research Report 66–1.
12. *Worldwide Defense Expenditures and Selected Economic Data, Calendar Year 1965* (Washington, United States Arms Control and Disarmament Agency, 1967).
13. *World Military Expenditures* (Washington, United States Arms Control and Disarmament Agency, annual).
14. *AID Economic Data Book: Africa* (Washington, United States Agency for International Development, annual).
15. *AID Economic Data Book: Far East* (Washington, United States Agency for International Development, annual).
16. *AID Economic Data Book: Latin America* (Washington, United States Agency for International Development, annual).
17. *AID Economic Data Book: Near East and South Asia* (Washington, United States Agency for International Development, annual).
18. *The Military Balance* (London, International Institute for Strategic Studies, annual).
19. Brown, N. and Gutteridge, W. F., *The African Military Balance* (London, International Institute for Strategic Studies, 1964) Adelphi Paper No. 12.

20. Wood, D., *The Middle East and the Arab World: the Military Context* (London, International Institute for Strategic Studies, 1965) Adelphi Paper No. 20.
21. Wood, D., *The Armed Forces of the African States* (London, International Institute for Strategic Studies, 1966) Adelphi Paper No. 27.
22. Wood, D., *Armed Forces in Central and South America* (London, International Institute for Strategic Studies, 1967) Adelphi Paper No. 34.
23. Booth, R. and Gutteridge, W. F., *The Armed Forces of African States* (London, International Institute for Strategic Studies, 1970) Adelphi Paper No. 67.
24. *The Statesman's Year-Book* (London, Macmillan, annual).
25. *International Air Forces and Military Aircraft Directory* (Stapleford, England, Aviation Advisory Services Ltd., annual) until 1971.
26. *Milavnews* (Stapleford, England, Aviation Advisory Services Ltd., annual) from 1972.
27. *Far Eastern Economic Review Yearbook* (Hong Kong, Far Eastern Economic Review, annual).
28. Benoit, E. and Lubell, H., "The World Burden of National Defence", in E. Benoit, ed., *Disarmament and World Economic Interdependence* (Oslo, Universitetsförlaget, 1967).
29. Coward, H. R., *Military Technology in Developing Countries* (Cambridge, Mass: Center for International Studies, MIT, 1964).
30. Heare, J. E., *Trends in Latin American Military Expenditures, 1940–1970* (Washington, US Government Printing Office, 1971) US Department of State publication No. 8618.
31. Loftus, J. E., *Latin American Defense Expenditures*, 1930–1965 (Santa Monica, The Rand Corporation, 1968) RM 5310-PR/15A.

Current periodicals

Africa Diary (New Delhi)
Arab Report and Record (London)
Asian Recorder (New Delhi)
Aviation Week and Space Technology (New York)
Government Business Worldwide (Washington)
Hsinhua News (Stockholm)
Interavia Airletter (Geneva)
International Affairs (London)
Jeune Afrique (Paris)
News Review on China, Mongolia and the Koreas (New Delhi)
Österreichische Militärische Zeitschrift (Vienna)

Osteuropa (Munich)
Survival (London)
Wehrkunde (Munich)
Wehr und Wirtschaft (Stuttgart)

Newspapers

Aftonbladet (Stockholm)
The Australian (Canberra)
Christian Science Monitor (Boston)
Dagens Nyheter (Stockholm)
Daily Telegraph (London)
Financial Times (London)
Hindustan Times (New Delhi)
International Herald Tribune (Paris)
Japan Times (Tokyo)
Krasnaja Zvezda (Moscow)
Le Monde (Paris)
Neue Zürcher Zeitung (Zurich)
New York Times (New York)
Pravda (Moscow)
The Press (Christchurch)
Standard Tanzania (Dar-es-Salaam)
Sydney Morning Herald (Sydney)
The Times (London)

IV. *Conventions*

[ ] = Rough estimates
( ) = For military expenditure: estimates based on budget figures or using an estimated consumer price index, or both
For GDP, NMP data: where other sources than *National Account Statistics* are used
▌ = Year of independence or independence in the five-year period
... = Figures not available
* = Average based on figures from one or two years
— = No military expenditure

Table 7A.1. World summary: constant price figures[a]

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
USA	49 552	69 552	71 397	61 563	58 299	59 421	61 446	60 914	61 740	59 554	62 008
Other NATO	16 749	20 784	21 198	19 825	19 574	20 645	20 965	19 314	20 776	21 740	22 431
Total NATO	**66 301**	**90 336**	**92 595**	**81 388**	**77 873**	**80 066**	**82 411**	**80 228**	**82 516**	**81 294**	**84 439**
USSR	22 948	25 952	25 666	23 881	25 476	23 167	23 029	22 286	22 310	22 143	27 619
Other Warsaw Pact	[2 500]	[2 500]	[2 500]	[2 500]	[2 500]	[2 750]	2 860	2 893	3 073	3 430	3 723
Total Warsaw Pact	**25 448**	**28 452**	**28 166**	**26 381**	**27 976**	**25 917**	**25 890**	**25 179**	**25 383**	**25 573**	**31 342**
Other Europe[b]	1 326	2 076	2 033	2 025	2 006	2 015	2 152	2 190	2 240	2 319	2 475
Middle East	385	375	420	475	600	760	780	910	990	1 005	1 065
South Asia	850	925	845	855	920	915	990	1 005	995	1 016	1 065
Far East (excl. China)	1 790	1 890	2 065	2 075	2 020	2 010	2 160	2 380	2 430	2 500	2 640
China	[3 500]	[3 000]	[2 500]	[2 500]	[2 500]	[2 500]	[2 750]	[2 500]	[2 800]	[2 800]	[3 300]
Oceania	626	751	749	674	688	673	625	615	627	624	625
Africa	115	120	110	110	125	160	180	210	250	390	500
Central America	290	290	300	280	290	300	320	320	335	365	375
South America	1 130	1 100	1 180	1 130	1 200	1 340	1 405	1 430	1 205	1 190	1 195
World total	**101 761**	**129 315**	**130 963**	**117 893**	**116 198**	**116 656**	**119 663**	**116 967**	**119 771**	**119 076**	**129 024**

[a] All Warsaw Pact countries are at current prices and Benoit–Lubell exchange rates.
[b] Albania is included in Other Europe.
[c] US Arms Control and Disarmament Agency, *World Military Expenditure 1971*, suggests another estimate for Warsaw Pact countries, a figure of US $76 000 mn, which would make a world total of US $215 000 mn; see further discussion on page 227.

Table 7A.2. NATO: constant price figures

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
North America:												
USA	49 552	69 552	71 397	61 563	58 299	59 421	61 446	60 914	61 740	59 554	62 008	67 155
Canada	1 787	2 667	2 826	2 515	2 582	2 651	2 490	2 299	2 147	2 140	2 204	2 294
Europe:												
Belgium	406	599	594	585	507	491	512	506	511	518	525	558
Denmark	140	193	254	250	246	237	249	229	236	264	268	328
France	3 493	4 478	5 004	4 226	3 930	5 108	5 312	4 905	5 004	5 158	5 316	5 513
FR Germany	2 840	3 097	2 479	2 516	2 891	2 765	3 365	2 522	4 041	4 370	4 636	5 861
Greece	169	162	155	166	169	219	193	191	198	210	203	206
Italy	1 331	1 457	1 314	1 438	1 426	1 467	1 518	1 559	1 607	1 678	1 732	1 903
Luxembourg	7	12	14	16	17	11	12	11	11	7	8	9
Netherlands	541	633	672	764	802	866	809	712	634	720	839	894
Norway	166	221	278	284	237	230	245	227	241	230	250	276
Portugal	93	101	117	125	132	133	137	139	156	263	261	296
Turkey	198	206	228	234	246	232	227	235	271	287	312	326
UK	5 578	6 958	7 263	6 706	6 389	6 235	5 896	5 779	5 719	5 895	5 877	5 989
Total NATO	**66 301**	**90 336**	**92 595**	**81 388**	**77 873**	**80 066**	**82 411**	**80 228**	**82 516**	**81 294**	**84 439**	**91 608**
Total NATO (excl. USA)	**16 749**	**20 784**	**21 198**	**19 825**	**19 574**	**20 645**	**20 965**	**19 314**	**20 776**	**21 740**	**22 431**	**24 453**
Total NATO Europe	**14 962**	**18 117**	**18 372**	**17 310**	**16 992**	**17 994**	**18 475**	**17 015**	**18 629**	**19 600**	**20 227**	**22 159**

US $ mn, at 1970 prices and 1970 exchange rates (Final column, X, at current prices and exchange rates)

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	*1971X*
67 155	66 280	64 096	63 826	76 043	87 730	90 103	86 274	77 827	71 776	(73 911)	*74 862*
24 453	25 272	25 716	25 597	25 825	26 985	26 205	26 142	26 547	27 850	(28 677)	*31 729*
91 608	**91 552**	**89 812**	**89 423**	**101 868**	**114 715**	**116 308**	**112 416**	**104 374**	**99 626**	**(102 588)**	*106 591*
30 238	33 095	31 667	30 476	31 905	34 450	39 780	42 143	42 619	42 619	42 619	*42 619*
4 177	4 461	4 479	4 484	4 847	5 250	6 217	6 979	7 495	7 915	[8 341]	*7 915*
34 415	**37 556**	**36 146**	**34 960**	**36 752**	**39 700**	**45 997**	**49 122**	**50 114**	**50 534**	**(50 960)**	*50 534[c]*
2 697	2 730	2 904	2 919	3 071	3 046	3 141	3 253	3 351	3 314	(3 532)	*3 571*
1 190	1 316	1 539	1 748	1 906	2 434	3 023	3 582	4 137	4 605	...	*4 720*
1 326	1 983	1 987	2 149	2 191	1 923	1 997	2 130	2 217	2 463	...	*2 619*
2 820	2 820	3 160	3 480	3 615	3 995	4 490	5 045	5 600	6 005	...	*6 230*
[3 800]	[4 300]	[4 800]	[5 500]	[6 000]	[6 500]	[7 000]	[8 000]	[8 500]	[9 000]	...	*[9 000]*
646	679	765	932	1 108	1 229	1 304	1 311	1 321	1 281	(1 349)	*1 459*
640	715	855	945	1 050	1 210	1 300	1 590	1 550	1 470	...	*1 565*
415	425	445	460	483	532	589	557	614	625	...	*633*
1 265	1 365	1 310	1 664	1 655	1 978	1 886	2 021	2 091	2 300	...	*2 405*
140 822	**145 441**	**143 723**	**144 180**	**159 699**	**177 262**	**187 035**	**189 027**	**183 869**	**181 223**	...	*189 327[c]*

US $ mn, at 1970 prices and 1970 exchange rates (Final column, X, at current prices and exchange rates)

1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	*1971X*
66 280	64 096	63 826	76 043	87 730	90 103	86 274	77 827	71 776	(73 911)	(70 950)	*74 862*
2 132	2 219	1 981	2 033	2 185	2 057	1 944	2 040	2 050	(1 985)	...	*2 126*
610	651	635	646	678	709	709	755	765	(826)	(872)	*886*
332	342	360	356	358	381	375	368	403	(383)	...	*452*
5 418	5 568	5 658	5 821	6 133	6 127	6 045	6 014	6 010	(6 006)	(6 355)	*6 700*
6 572	6 313	6 218	6 101	6 358	5 637	6 136	6 188	6 638	(7 224)	(7 335)	*7 788*
211	220	238	258	332	388	439	474	502	(521)	(525)	*516*
2 121	2 172	2 251	2 436	2 378	2 423	2 378	2 506	2 836	(2 840)	(3 514)	*3 118*
9	11	11	11	9	8	8	8	9	(10)	...	*10*
905	984	959	935	1 037	1 023	1 070	1 103	1 154	(1 190)	(1 193)	*1 372*
288	292	338	336	346	383	387	389	398	(411)	...	*450*
290	316	316	333	409	430	399	436	456	(470)	...	*533*
327	354	376	365	368	389	388	416	487	(512)	(520)	*606*
6 057	6 274	6 256	6 194	6 394	6 250	5 864	5 850	6 142	(6 299)	(6 586)	*7 172*
91 552	**89 812**	**89 423**	**101 868**	**114 715**	**116 308**	**112 416**	**104 374**	**99 626**	**(102 588)**	...	*106 591*
25 272	**25 716**	**25 597**	**25 825**	**26 985**	**26 205**	**26 142**	**26 547**	**27 850**	**(28 677)**	...	*31 729*
23 140	**23 497**	**23 616**	**23 792**	**24 800**	**24 148**	**24 198**	**24 507**	**25 800**	**(26 692)**	...	*29 603*

Table 7A.3. NATO: current price figures

	Currency	1951–55 annual average	1956–60 annual average	1961	1962	1963	1964	1965	1966	1967
North America:										
USA	*mn. dollars*	42 835	44 764	47 808	52 381	52 295	51 213	51 827	63 572	75 448
Canada	*mn. dollars*	1 731	1 751	1 716	1 810	1 712	1 813	1 659	1 766	1 965
Europe:										
Belgium	*mn. francs*	18 032	18 316	19 561	21 111	23 596	26 241	26 606	28 169	30 396
Denmark	*mn. kroner*	769	997	1 180	1 551	1 651	1 764	1 974	2 080	2 249
France	*mn. francs*	11 587	16 789	20 395	22 184	22 849	24 280	25 300	26 732	28 912
FR Germany	*mn. marks*	6 972	9 246	13 175	17 233	19 924	19 553	19 915	20 254	21 408
Greece	*mn. drachmas*	3 031	4 746	5 034	5 102	5 385	5 647	6 290	7 168	9 390
Italy	*bn. lire*	510	644	749	861	1 031	1 118	1 212	1 342	1 359
Luxembourg	*mn. francs*	474	386	290	355	348	462	477	497	413
Netherlands	*mn. guilders*	1 385	1 718	2 013	2 186	2 307	2 661	2 714	2 790	3 200
Norway	*mn. kroner*	913	1 041	1 179	1 371	1 465	1 570	1 897	1 947	2 097
Portugal	*mn. escudos*	1 909	2 603	4 922	5 744	5 724	6 451	6 680	7 393	9 575
Turkey	*mn. lire*	843	1 691	2 718	2 940	3 157	3 443	3 821	3 996	4 596
UK	*mn. pounds*	1 505	1 605	1 709	1 814	1 870	2 000	2 091	2 153	2 276

Table 7A.4. Warsaw Pact: current price figures[a]

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
Bulgaria	...	139	...	...	...	...	133	149	141	154	187
Czecho-slovakia	1 236	...	988	918	...	1 071	1 094	1 047	1 035	1 035	1 118
German DR	...	...	...	...	...	...	...	487	...	[750]	[750]
Hungary	...	...	...	...	...	...	110	...	144	[175]	205
Poland	232	415	647	666	792	754	634	704	898	936	1 068
Romania	...	...	...	...	...	...	405	381	365	[380]	[395]
USSR	22 948	25 952	25 666	23 881	25 476	23 167	23 029	22 286	22 310	22 143	27 619
Total Warsaw Pact	**25 448**	**28 452**	**28 166**	**26 381**	**27 976**	**25 917**	**25 890**	**25 179**	**25 383**	**25 573**	**31 342**
Total Warsaw Pact (excl. USSR)	**[2 500]**	**[2 500]**	**[2 500]**	**[2 500]**	**[2 500]**	**[2 750]**	**2 860**	**2 893**	**3 073**	**3 430**	**3 723**

[a] Albania is included in Other Europe tables.

Table 7A.5. Warsaw Pact: current price figures[a]

	Currency	1951–55 annual average[b]	1956–60 annual average[b]	1961	1962	1963	1964	1965	1966	1967
Bulgaria	*mn. new leva*	* 161	167	217	258	270	260	231	240	264
Czechoslovakia	*mn. korunas*	8 902	8 980	9 500	10 900	11 300	10 900	10 300	10 900	12 400
German DR	*mn. marks*	...	*1 650	...	2 764	2 764	2 764	2 800	3 300	3 600
Hungary	*mn. forints*	...	*2 206	3 563	4 998	6 050	6 005	4 926	5 064	5 437
Poland	*mn. zlotys*	6 240	12 500	17 000	18 400	20 700	21 900	23 600	25 200	26 400
Romania	*mn. lei*	...	3 620	...	3 900	4 100	4 110	4 540	4 800	5 000
USSR	*mn. roubles*	10 410	9 486	11 600	12 700	13 900	13 300	12 800	13 400	14 500

[a] Albania is included in Other Europe tables.
[b] Average for those years for which figures are available.

Local currency, current prices — *As a percentage of GDP*

1968	1969	1970	1971	1972	1973	1952	1956	1960	1963	1966	1969
80 732	81 443	77 827	74 862	79 528	78 755	*13.7*	*9.9*	*8.9*	*8.8*	*8.4*	*8.7*
1 927	1 899	2 061	2 131	2 146	...	*7.7*	*6.1*	*4.3*	*3.7*	*2.8*	*2.4*
32 676	33 892	37 502	39 670	44 750	49 409	*(4.9)*	*3.5*	*3.4*	*3.4*	*3.1*	*3.0*
2 591	2 640	2 757	3 195	3 210	...	*2.7*	*3.0*	*2.7*	*3.0*	*2.7*	*2.5*
30 200	31 700	33 200	35 000	36 800	41 040	*8.6*	*7.7*	*6.4*	*5.6*	*5.0*	*4.3*
19 310	21 577	22 573	25 450	28 987	30 770	*5.8*	*3.6*	*4.2*	*5.4*	*4.3*	*3.7*
11 003	12 762	14 208	15 480	16 715	17 366	*6.5*	*6.0*	*4.9*	*3.9*	*3.7*	*5.0*
1 403	1 412	1 562	1 852	1 947	2 540	*4.5*	*3.6*	*3.3*	*3.3*	*3.4*	*2.7*
374	391	416	442	519	...	*2.4*	*1.9*	*1.1*	*1.3*	*1.4*	*0.9*
3 280	3 682	3 968	4 466	4 922	5 190	*5.6*	*5.7*	*4.1*	*4.4*	*3.7*	*3.6*
2 399	2 502	2 774	3 022	3 318	...	*4.0*	*3.5*	*3.2*	*3.5*	*3.5*	*3.5*
10 692	10 779	12 538	14 699	16 559	...	*4.0*[a]	*4.0*	*4.2*	*6.5*	*6.3*	*6.6*
5 159	5 395	6 237	8 487	9 669	10 604	*5.1*	*4.7*	*4.7*	*4.6*	*4.3*	*4.2*
2 332	2 303	2 444	2 810	3 079	3 362	*10.0*	*7.8*	*6.5*	*6.2*	*5.7*	*5.1*

[a] 1953.

US $ mn, at Benoit–Lubell exchange rates

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
222	233	224	199	207	228	228	261	279	316	[323]	...
1 282	1 329	1 282	1 212	1 282	1 459	1 529	1 635	(1 741)	1 768	1 873	...
815	815	815	826	974	1 062	1 711	1 873	1 990	2 124	2 249	2 448
288	349	346	284	292	313	371	458	513	544	560	567
1 156	1 300	1 376	1 482	1 583	1 658	1 828	2 073	2 224	2 368	2 504	2 580
414	435	436	481	509	530	550	679	748	795	832	840
30 238	33 095	31 667	30 476	31 905	34 450	39 780	42 143	42 619	42 619	42 619	42 619
34 415	**37 556**	**36 146**	**34 960**	**36 752**	**39 700**	**45 997**	**49 122**	**50 114**	**50 534**	**(50 960)**	...
4 177	**4 461**	**4 479**	**4 484**	**4 847**	**5 250**	**6 217**	**6 979**	**7 495**	**7 915**	**[8 341]**	...

Local currency, current prices — *As a percentage of NMP*

1968	1969	1970	1971	1972	1973	1952	1956	1960	1963	1966	1969
264	303	324	366		...	*6.2*	*4.8*[c]	*4.0*	*4.8*	*3.3*	*3.2*
13 000	13 900	(14 800)	15 030	15 920	...	*6.5*[d]	*6.8*	*5.4*	*6.6*	*5.6*	*4.8*
5 800	6 350	6 747	7 200	7 625	8 300	...	...	...	*(3.6)*	*(3.7)*	*(6.1)*
6 439	7 952	8 900	9 440	9 715	9 850	...	*1.8*[c]	*2.4*[e]	*3.7*	*2.7*	*3.1*
29 100	33 000	35 400	37 700	39 861	41 066	*3.2*	*4.8*	*4.0*	*4.5*	*4.4*	*4.7*
5 187	6 400	7 052	7 495	7 845	7 922	...	...	...	...	...	...
16 700	17 700	17 900	17 900	17 900	17 900	*13.4*	*9.1*	*6.4*	*8.2*	*6.5*	*6.8*

[c] 1957. [d] 1953. [e] 1961.

Table 7A.6. Other Europe: constant price figures

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
Albania[a]	...	...	...	...	...	...	...	...	...	[70]	[70]	[70]
Austria	45	30	29	3	12	60	98	113	112	104	100	106
Finland	83	57	63	64	86	82	79	83	97	103	118	166
Ireland	30	35	40	37	35	33	32	31	33	35	37	37
Spain	243	307	297	323	309	330	351	314	294	353	348	421
Sweden	563	649	728	763	786	793	813	818	844	834	875	942
Switzerland	236	304	270	238	256	231	308	328	319	297	346	382
Yugoslavia	126	694	606	597	522	486	471	503	541	523	581	573
Total Other Europe	**1 326**	**2 076**	**2 033**	**2 025**	**2 006**	**2 015**	**2 152**	**2 190**	**2 240**	**2 319**	**2 475**	**2 697**

[a] Figures for Albania are at current prices and Benoit–Lubell exchange rates.

Table 7A.7. Other Europe: current price figures

	Currency	1951–55 annual average[a]	1956–60 annual average[a]	1961	1962	1963	1964	1965	1966	1967
Albania	*mn. new leks*	...	...	...	...	...	282	288	272	272
Austria	*mn. shillings*	355	1 717	1 890	2 076	2 608	3 408	2 957	3 474	3 661
Finland	*mn. marks*	133	264	314	460	383	417	446	456	471
Ireland	*mn. pounds*	7.5	8.4	9.9	10.5	10.8	12.9	14.0	13.7	14.4
Spain	*mn. pesetas*	7 484	11 198	13 616	17 449	17 839	19 953	22 103	30 807	34 164
Sweden	*mn. kronor*	1 933	2 674	3 107	3 500	3 839	4 173	4 646	4 990	5 072
Switzerland	*mn. francs*	751	903	1 096	1 264	1 316	1 521	1 586	1 746	1 770
Yugoslavia	*mn. new dinars*	1 429	1 797	2 477	2 701	2 862	3 321	4 292	5 070	5 381

[a] Average for those years for which figures are available.

Table 7A.8. Middle East: constant price figures

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
Cyprus	...	...	...	...	...	...	...	...	...	[4.5]	[4.5]	[5.5]
Egypt	102.5	109.8	125.9	165.7	249.8	288.4	257.9	236.0	232.7	256.6	297.3	336.7
Iran	75.2	71.2	67.6	76.8	106.8	125.4	150.9	240.5	269.0	217.2	215.0	213.8
Iraq	27.9	39.5	58.6	65.9	66.3	93.3	102.3	110.0	128.2	147.5	153.4	164.0
Israel	69.2	43.9	35.0	31.7	34.0	68.3	96.5	108.2	122.7	144.1	144.1	162.3
Jordan	35.6	37.3	39.8	40.5	41.1	49.0	50.1	58.5	72.9	68.3	66.6	71.3
Kuwait[a]	...	...	...	...	...	...	...	...	...	[5.0]	[5.0]	[10.0]
Lebanon	7.4	7.3	9.4	10.1	12.2	16.5	15.9	17.7	16.2	17.4	20.6	29.1
Saudi Arabia[b]	...	...	...	...	...	...	...	...	...	[70.0]	84.7	112.6
Syria	21.3	20.0	27.3	25.8	28.1	48.4	40.1	71.9	70.7	70.7	72.2	79.5
Yemen	...	...	...	...	...	...	...	...	...	[5.0]	[5.0]	[5.0]
Total Middle East	**[385.0]**	**[375.0]**	**[420.0]**	**[475.0]**	**[600.0]**	**[760.0]**	**[780.0]**	**[910.0]**	**[990.0]**	**[1005.0]**	**1065.0**	**1190.0**

[a] Figures for Kuwait are at current prices and 1970 exchange rates.
[b] Figures for Saudi Arabia are for fiscal years, and deflated by the wholesale price index.
[c] 1970.

US $ mn, at 1970 prices and 1970 exchange rates (Final column, X, at current prices and exchange rates)

1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	*1971X*
[70]	71	73	69	69	77	106	119	128	141	...	*128*
129	163	135	155	157	157	162	160	153	(157)	...	*175*
132	130	133	131	128	147	134	142	149	(165)	(178)	*163*
38	42	43	41	42	43	45	52	57	(64)	...	*66*
396	414	405	532	554	550	567	591	595	(676)	(687)	*681*
1 003	1 055	1 118	1 129	1 100	1 104	1 158	1 171	1 149	(1 166)	(1 180)	*1 312*
385	432	435	458	446	440	453	487	468	(491)	(486)	*526*
577	597	577	556	550	623	628	629	615	(672)	(682)	*520*
2 730	**2 904**	**2 919**	**3 071**	**3 046**	**3 141**	**3 253**	**3 351**	**3 314**	**(3 532)**	...	*3 571*

Local currency, current prices						*As a percentage of GDP*					
1968	1969	1970	1971	1972	1973	1952	1956	1960	1963	1966	1969
304	420	471	508	558	...	...	...	...	...	...	...
3 775	4 006	4 135	4 144	4 449	...	*0.6*	*0.8*	*1.2*	*1.3*	*1.3*	*1.2*
589	549	597	668	791	899	*1.3*	*1.5*	*1.7*	*1.9*	*1.6*	*1.4*
15.5	17.3	21.6	26.0	30.7	...	*1.7*	*1.5*	*1.4*	*1.3*	*1.3*	*1.2*
35 516	37 362	41 230	44 943	54 172	57 500	*2.4*[b]	*2.2*	*2.2*	*1.9*	*2.1*	*1.8*
5 176	5 596	6 054	6 381	6 844	7 325	*4.4*	*4.7*	*4.3*	*4.4*	*4.3*	*3.7*
1 787	1 889	2 014	2 061	2 295	2 496	*3.9*	*2.4*	*2.5*	*2.6*	*2.7*	*2.4*
6 406	6 980	7 864	8 838	11 180	12 787	*21.3*[c]	*11.0*[c]	*7.7*[c]	*6.2*[c]	*5.1*[c]	*5.3*[c]

[b] 1954. [c] Percentage of NMP.

US $ mn, at 1970 prices and 1970 exchange rates (Final column, X, at current prices and exchange rates)

1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	*1971X*
[6.5]	7.1	8.7	7.4	8.1	6.8	6.4	6.5	...	...	...	*6.5*[c]
367.7	461.3	499.9	515.1	634.5	805.2	1 014.0	1 209.8	1 344.2	(1 356.1)	...	*1 384.5*
217.3	238.9	296.9	339.3	435.0	553.0	638.5	786.8	938.1	(1 088.5)	...	*975.6*
190.7	225.0	271.0	278.0	287.5	332.0	363.0	312.5	(305.7)	(315.6)	...	*343.9*
201.5	250.9	287.3	306.2	407.2	551.7	770.5	1 003.1	1 233.6	1 252.5	1 299.6	*1 151.3*
72.0	70.9	71.2	84.9	114.8	137.4	135.2	117.9	86.2	(100.2)	...	*89.6*
[20.0]	28.0	30.5	35.0	54.3	63.3	70.8	72.8	81.2	86.3	...	*88.2*
24.5	26.7	30.7	37.9	41.0	43.7	42.8	52.9	50.3	(61.2)	(64.3)	*52.6*
123.0	128.5	140.9	207.9	347.5	372.6	381.5	417.3	404.8	(556.3)	(746.6)	*448.8*
83.0	91.3	100.0	81.8	90.6	142.9	144.7	142.8	137.9	(148.8)	(161.0)	*163.6*
[10.0]	[10.0]	[11.0]	[12.0]	[13.0]	[14.0]	[15.0]	[15.0]	[15.0]	...	...	*[15.0]*
1 316.0	**1 539.0**	**1 748.0**	**1 906.0**	**2 434.0**	**3 023.0**	**3 582.0**	**4 137.0**	**[4 605.0]**	...	...	*[4 720.0]*

Table 7A.9. Middle East: current price figures

	Currency	1951–55 annual average[a]	1956–60 annual average[a]	1961	1962	1963	1964	1965	1966	1967
Cyprus	*mn. pounds*	...	...	...	...	...	2.7	3.3	2.8	3.1
Egypt	*mn. pounds*	44	76	91	100	110	143	178	200	248
Iran	*mn. rials*	3 178	11 228	14 137	14 170	14 469	16 523	20 941	23 850	31 075
Iraq	*mn. dinars*	14	33	45	48	58	68	81	84	89
Israel	*mn. pounds*	51	211	313	386	511	670	826	951	1 284
Jordan	*mn. dinars*	9.7	16.3	18.9	20.6	21.1	21.1	21.5	26.0	35.7
Kuwait	*mn. dinars*	...	...	...	...	...	10.0	10.9	12.5	19.4
Lebanon	*mn. pounds*	21	43	56	81	69	77	90	114	128
Saudi Arabia[b]	*mn. rials*	...	...	324	441	490	522	589	886	1 509
Syria	*mn. pounds*	77	205	261	279	297	346	365	316	366

[a] Average for those years for which figures are available.
[b] Figures for Saudi Arabia are for fiscal years.

Table 7A.10. South Asia: constant price figures

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
Afghanistan	...	...	...	...	...	...	...	...	...	30.7	[30.0]
India	527.4	552.3	547.0	585.6	608.7	609.4	725.9	723.2	671.7	676.4	728.0
Nepal	...	...	...	...	...	...	...	...	...	3.3	[4.0]
Pakistan[a]	310.3	347.8	273.8	241.6	282.7	271.8	225.8	234.7	276.1	289.7	287.0
Sri Lanka[b]	2.4	3.1	4.2	7.0	6.3	7.7	10.4	14.7	15.9	16.0	16.2
Total South Asia	**[850.0]**	**[925.0]**	**[845.0]**	**[855.0]**	**[920.0]**	**[915.0]**	**[990.0]**	**[1005.0]**	**[995.0]**	**1016.0**	**1065.0**

[a] From 1971, Bangla Desh seceded from Pakistan.
[b] Formerly Ceylon.

Table 7A.11. South Asia: current price figures

	Currency	1951–55 annual average[a]	1956–60 annual average[a]	1961	1962	1963	1964	1965	1966
Afghanistan	*mn. afghanis*	...	*552	...	...	...	907	1 019	1 087
Bangla Desh	*mn. taka*	—	—	—	—	—	—	—	—
India	*mn. rupees*	1 908	2 611	3 046	4 336	7 306	8 084	8 651	9 279
Nepal	*mn. rupees*	...	*21.4	...	...	35.1	37.7	34.6	35.6
Pakistan	*mn. rupees*	811	828	984	938	1 029	1 208	2 059	2 575
Sri Lanka[b]	*mn. rupees*	20	58	73	68	60	60	62	65

[a] Average for those years for which figures are available.
[b] Formerly Ceylon.
[c] Fiscal year 1972–73.

Local currency, current prices						*As a percentage of GDP*					
1968	1969	1970	1971	1972	1973	1952	1956	1960	1963	1966	1969
2.7	2.6	2.7	...	...	...	...	...	...	*2.4*[c]	*1.9*	*1.3*
327	425	526	602	625	...	...	...	*5.5*	*6.2*	*8.2*	*15.0*
39 750	47 300	59 600	73 900	94 000	...	...	...	*4.3*	*3.7*	*4.5*	*6.3*
104	124	112	(113)	(123)	...	*4.4*[d]	*5.7*	*7.1*	*8.3*	*8.9*	*11.1*
1 776	2 543	3 511	4 836	5 392	5 913	*4.4*	*4.6*	*6.6*	*6.7*	*8.2*	*15.8*
42.6	45.2	42.1	32.0	45.8	...	(*18.9*)	...	*19.5*	*16.3*	*15.2*	*20.8*
22.6	25.3	26.0	29.0	30.8	...	...	...	...	*1.4*[c]	*1.5*	*2.6*
136	139	172	166	213	234	(*1.4*)	(*2.4*)	(*3.0*)[e]	(*2.3*)	*3.0*	*3.0*
1 618	1 686	1 878	1 858	(2 620)	3 696	...	...	...	*6.0*	*8.3*	*11.0*[f]
587	600	617	625	(707)	800	...	(*5.8*)	(*9.2*)	*7.5*	*6.7*	*10.0*

[c] 1964. [d] 1953. [e] 1958. [f] 1968.

US $ mn, at 1970 prices and 1970 exchange rates (Final column, X, at current prices and exchange rates)

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	*1971X*
[30.0]	[30.0]	28.9	29.1	25.7	22.4	26.4	29.9	31.1	34.9	...	*35.6*
1 003.7	1 639.8	1 607.6	1 565.5	1 521.4	1 371.8	1 426.0	1 508.8	1 541.7	1 738.6	(1 698.8)	*1 860.1*
[4.0]	4.7	4.8	4.1	3.7	4.5	4.8	4.9	5.6	(6.3)	...	*6.6*
273.2	295.6	332.9	537.7	627.1	510.5	525.2	571.1	623.0	660.3	(728.4)	*693.2*
14.8	12.7	12.3	12.8	13.5	14.0	14.9	15.1	15.7	22.9	(28.1)	*23.5*
1 326.0	**1 983.0**	**1 987.0**	**2 149.0**	**2 191.0**	**1 923.0**	**1 997.0**	**2 130.0**	**2 217.0**	**2 463.0**	...	*2 619.0*

Local currency, current prices						*As a percentage of GDP*					
1967	1968	1969	1970	1971	1972	1952	1956	1960	1963	1966	1969
1 174	1 223	1 334	1 400	1 600	...	...	...	...	...	...	...
—	—	—	—	—	400[c]	...	...	...	...	...	...
9 535	10 170	10 840	11 623	13 540	14 088	(*1.8*)	(*1.8*)	(*1.9*)	*3.8*	*3.5*	*3.0*
42.1	46.1	49.1	56.5	67.0	...	...	...	...	...	*0.5*	*0.5*
2 240	2 307	2 588	2 975	3 301	3 930	(*4.0*)	(*3.1*)	*2.8*	*2.4*	*4.4*	*3.5*
69	78	85	93	140	183	*0.3*	*0.6*	*1.1*	*0.8*	*0.8*	*0.7*

Table 7A.12. Far East: constant price figures

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962
Burma[a]	32.0	46.6	64.7	77.4	70.8	74.8	79.2	85.1	86.0	89.3	85.4	90.5
Indonesia	242.6	...	260.7	235.3	185.5	184.9	230.0	296.8	296.2	335.9	372.9	252.0
Japan	741.3	772.9	879.7	850.0	801.3	791.8	782.9	790.6	810.0	798.4	828.2	905.8
Khmer Rep.[b]	...	...	...	...	...	...	...	...	...	[40.0]	41.7	43.7
Korea, North	...	...	...	...	...	...	...	...	...	[200.0]	[225.0]	[250.0]
Korea, South	...	50.0	117.0	139.2	114.4	109.1	140.2	165.3	175.8	170.9	177.9	205.3
Laos	...	...	...	...	...	...	...	...	...	[50.0]	[50.0]	64.6
Malaysia	30.7	49.7	67.3	63.1	56.5	51.6	53.9	56.3	49.6	46.2	39.1	39.4
Mongolia	...	...	...	...	...	...	...	...	...	[15.0]	[15.0]	[15.0]
Philippines	36.3	44.2	44.9	42.8	41.9	42.2	43.2	45.2	46.8	46.1	48.0	46.3
Singapore	...	...	...	...	...	...	...	...	...	[8.0]	[10.0]	[10.0]
Taiwan	...	...	92.1	...	153.1	158.0	174.2	286.2	303.0	280.9	295.7	339.2
Thailand	38.1	63.9	65.5	64.3	56.2	50.7	91.1	76.8	81.4	80.1	84.5	88.5
Viet-Nam, North	...	...	...	...	...	...	...	...	...	[200.0]	[225.0]	[250.0]
Viet-Nam, South	...	...	...	...	...	...	...	...	...	138.9	142.6	218.6
Total Far East	**[1790.0]**	**[1890.0]**	**[2065.0]**	**[2075.0]**	**[2020.0]**	**[2010.0]**	**[2160.0]**	**[2380.0]**	**[2430.0]**	**[2500.0]**	**[2640.0]**	**[2820.0]**

[a] Figures for Burma are at current prices and 1970 exchange rates.
[b] Formerly Cambodia.

Table 7A.13. Far East: current price figures

	Currency	1951–55 annual average[a]	1956–60 annual average[a]	1961	1962	1963	1964	1965	1966	1967
Burma	*mn. kyats*	278	396	408	432	478	466	517	502	486
Indonesia	*mn. new rupiahs*	4	12	32	57	91	145	522	3 700	21 600
Japan	*bn. yen*	144	156	178	209	240	273	299	332	376
Khmer Rep.	*mn. riels*	...	...	1 610	1 736	1 764	1 964	1 845	1 893	1 992
Korea, North	*mn. won*	...	...	...	...	...	...	...	...	...
Korea, South	*bn. won*	4	12	17	21	21	25	30	41	50
Laos	*mn. kips*	...	...	...	2 712	3 312	4 935	7 391	8 494	8 627
Malaysia	*mn. dollars*	163	150	111	112	155	217	303	381	367
Mongolia	*mn. tugriks*	...	...	...	...	...	100	100	100	80
Philippines	*mn. pesos*	164	179	202	208	219	227	260	331	391
Singapore	*mn. dollars*	...	...	...	...	...	...	...	...	79
Taiwan	*bn. dollars*	*2.2	5.8	9.2	10.8	11.2	12.0	12.8	15.2	16.8
Thailand	*mn. baht*	812	1 314	1 473	1 580	1 643	1 778	1 964	2 151	2 575
Viet-Nam, South	*bn. piastres*	...	*6	6	10	10	19	29	35	53

[a] Average for those years for which figures are available.

Table 7A.14. Oceania: constant price figures

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
Australia	554	652	638	578	599	583	538	530	539	534	541
New Zealand	72	99	111	96	89	90	87	85	88	90	84
Total Oceania	**626**	**751**	**749**	**674**	**688**	**673**	**625**	**615**	**627**	**624**	**625**

US $ mn, at 1970 prices and 1970 exchange rates (Final column, X, at current prices and exchange rates)

1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	*1971X*
100.0	97.7	108.4	105.2	101.8	104.3	113.8	120.4	124.8	...	...	*111.4*
179.2	141.9	126.9	78.9	170.3	220.9	264.4	300.6	336.5	...	...	*318.2*
969.9	1 061.8	1 091.9	1 151.8	1 254.7	1 338.0	1 450.8	1 594.8	1 726.3	(1 940.6)	(2 232.4)	*2 080.7*
41.9	45.7	41.3	42.7	45.2	47.2	50.0	124.8	195.7	...	...	*143.5*
[275.0]	[300.0]	[350.0]	[400.0]	[450.0]	[600.0]	[700.0]	[750.0]	[800.0]	...	...	*[800.0]*
170.3	159.5	168.7	206.4	228.7	269.8	311.7	320.6	356.1	(450.9)	...	*346.9*
41.2	30.9	41.1	41.5	39.1	37.8	38.3	39.5	39.5	...	...	*16.0*
53.0	74.2	104.7	128.9	119.6	123.5	183.6	254.4	260.1	(266.1)	...	*280.3*
[15.0]	[15.0]	[20.0]	[20.0]	[20.0]	[20.0]	[20.0]	(22.5)	(22.5)	...	...	*(22.5)*
46.5	44.6	48.8	59.6	66.0	77.9	92.7	110.2	110.0	(87.0)	...	*129.1*
[15.0]	[20.0]	[23.0]	[20.0]	25.8	32.7	97.1	80.4	141.9	(203.0)	...	*153.6*
344.4	369.9	394.6	458.9	491.2	528.5	583.4	623.4	(581.8)	...	...	*610.9*
91.3	96.7	105.9	111.9	128.8	154.4	180.7	212.6	254.3	274.1	...	*259.4*
[275.0]	[300.0]	[350.0]	[400.0]	[450.0]	[500.0]	[500.0]	[580.0]	[580.0]	...	...	*[580.0]*
203.2	403.1	508.0	389.1	405.9	436.4	457.0	466.5	476.4	(475.3)	...	*378.0*
[2 820.0]	**[3 160.0]**	**[3 480.0]**	**[3 615.2]**	**[3 995.0]**	**[4 490.0]**	**[5 045.0]**	**[5 600.0]**	**[6 005.0]**	...	...	*[6 230.0]*

Local currency, current prices						*As a percentage of GDP*					
1968	1969	1970	1971	1972	1973	1952	1956	1960	1963	1966	1969
498	543	575	596	...	...	*4.4*	*6.0*	*6.0*	*6.1*	*6.0*	*5.5*[b]
63 100	80 000	102 200	119 000	...	...	...	...	*5.4*	*2.9*	*1.2*	*3.1*
423	483	570	655	770	934	*2.1*	*1.5*	*1.1*	*0.7*	*0.9*	*0.8*
2 204	2 479	6 930	18 650	...	...	...	...	*7.5*[c]	*6.9*	*5.9*	...
1 617	1 798	1 918	2 183	(1 254)	...	...	...	...	...	...	...
65	85	101	129	171	...	*5.7*[d]	*4.7*	*6.0*	*4.2*	*4.0*	*4.2*
8 776	9 177	9 487	9 606	...	...	...	...	...	*(8.4)*	...	...
379	558	784	813	850	...	...	*2.9*	*2.2*	*1.5*	*3.9*	*4.8*
80	80	90	90	...	...	...	...	...	...	...	...
465	571	709	830	(760)	...	*2.3*	*1.6*	*1.4*	*1.2*	*1.3*	*1.8*
101	270	248	446	641	...	...	...	...	...	*2.0*[b]	*5.3*
19.5	22.6	25.0	24.5	...	...	*6.5*[d]	*9.3*	*12.9*	*12.8*	*12.1*	*11.8*
3 152	3 768	4 465	5 448	6 069	...	*2.7*	*2.1*	*2.6*	*2.4*	*2.1*	*2.9*
72	92	128	155	183	...	...	...	*6.6*	*9.4*	*16.0*	*18.8*

[b] 1967. [c] 1962. [d] 1953.

US $ mn, at 1970 prices and 1970 exchange rates (Final column, X, at current prices and exchange rates)

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	*1971X*
564	596	667	823	992	1 118	1 188	1 191	1 189	1 158	(1 229)	*1 314*
82	83	98	109	116	111	116	120	132	123	(120)	*145*
646	**679**	**765**	**932**	**1 108**	**1 229**	**1 304**	**1 311**	**1 321**	**1 281**	**(1 349)**	*1 459*

Table 7A.15. Oceania: current price figures

	Currency	1951–55 annual average	1956–60 annual average	1961	1962	1963	1964	1965	1966
Australia	*mn. dollars*	342	364	391	406	431	494	634	786
New Zealand	*mn. dollars*	46	52	53	53	55	67	77	84

Table 7A.16. Africa: constant price figures

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
Algeria[a]	...	...	...	...	...	...	...	...	...	...	...
Burundi	...	...	...	...	...	...	...	...	...	...	0.3
Cameroon	...	...	...	...	...	...	...	...	...	11.4	14.3
Central African Republic[a]	...	...	...	...	...	...	...	...	...	...	1.0
Chad	...	...	...	...	...	...	...	...	...	...	...
Congo (Brazzaville)	...	...	...	...	...	...	...	...	0.4	0.5	[4.0]
Dahomey[a]	...	...	...	...	...	...	...	...	...	...	2.2
Ethiopia	...	...	...	...	...	...	...	...	16.4	22.5	26.9
Gabon	...	...	...	...	...	...	...	...	...	...	1.2
Ghana	...	...	...	...	8.1	12.0	14.6	15.1	17.5	30.7	42.1
Guinea[a]	...	...	...	...	...	...	...	...	...	...	4.0
Ivory Coast	...	...	...	...	...	...	...	...	...	...	5.6
Kenya	...	...	...	...	...	6.4	6.8	6.0	5.5	3.1	1.1
Liberia	...	...	...	...	...	...	...	...	1.3	[1.5]	[2.0]
Libya	...	...	...	...	...	...	...	...	6.1	5.9	7.3
Malagasy Rep.	...	...	...	...	...	...	...	...	...	1.9	9.6
Malawi[b]	...	...	...	...	...	...	...	...	...	...	...
Mali[b]	...	...	...	...	...	...	...	...	...	...	[4.0]
Mauritania	...	...	...	...	...	...	...	...	...	...	[3.0]
Mauritius	...	...	...	...	...	...	0.5	0.5	0.5	0.4	0.3
Morocco	...	...	...	...	...	...	...	...	...	52.1	59.5
Niger	...	...	...	...	...	...	...	...	...	...	[1.5]
Nigeria	5.0	4.8	7.4	...	7.4	7.3	8.6	20.1	23.9	24.6	33.8
Rhodesia, S.[b]	...	...	...	...	...	...	...	...	...	...	...
Senegal	...	...	...	...	...	...	...	...	...	...	[4.0]
Sierra Leone	...	...	...	...	...	...	...	...	...	2.7	2.2
Somalia	...	...	...	...	...	...	...	...	...	...	4.4
South Africa	98.5	103.6	88.6	83.3	86.6	96.7	100.1	75.5	54.0	80.2	116.6
Sudan	7.2	6.8	7.8	10.2	11.7	12.1	16.2	19.8	21.8	24.2	24.4
Tanzania	...	...	...	...	...	...	...	...	...	...	[1.0]
Togo[a]	...	...	...	...	...	...	...	...	...	...	0.2
Tunisia	...	...	...	...	...	4.7	6.2	10.5	16.2	18.5	20.7
Uganda	...	...	...	...	3.1	3.4	3.3	3.2	3.1	1.7	0.2
Upper Volta[a]	...	...	...	...	...	...	...	...	...	1.1	1.5
Zaïre[c]	...	...	...	...	...	...	...	...	...	...	[15.0]
Zambia[b]	...	...	...	...	...	...	...	7.4	...	10.1	15.2
Total Africa	**[115.0]**	**[120.0]**	**[110.0]**	**[110.0]**	**[125.0]**	**[160.0]**	**[180.0]**	**[210.0]**	**[250.0]**	**[390.0]**	**[500.0]**

[a] At current prices and 1970 exchange rates.
[b] Former Federation of Rhodesia and Nyasaland; dissolution 31 December 1963.
[c] Formerly Congo (Kinshasa).
[d] 1970.
[e] 1969.

Local currency, current prices						*As a percentage of GDP*					
1967	1968	1969	1970	1971	1972	1952	1956	1960	1963	1966	1969
914	998	1 029	1 068	1 103	1 224	*4.6*	*3.4*	*2.6*	*2.5*	*3.6*	*3.6*
85	93	101	118	122	126	*3.1*	*2.4*	*2.1*	*1.7*	*2.1*	*2.1*

US $ mn, at 1970 prices and 1970 exchange rates (Final column, X, at current prices and exchange rates)

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	*1971X*
[70.0]	79.4	99.3	99.3	(99.3)	(99.3)	(99.3)	(99.3)	(99.3)	(99.3)	...	*107.8*
1.2	1.4	1.6	2.4	2.5	2.6	2.7	3.3	3.4	...	...	*3.4*[d]
18.8	17.0	16.1	16.5	17.8	18.8	19.3	20.2	20.2	20.4	...	*23.1*
1.0	1.0	1.8	2.1	2.1	3.4	4.0	5.2	4.9	5.3	...	*5.7*
1.7	1.9	2.1	3.7	6.0	6.1	6.3	7.6	8.0	...	...	*8.0*[d]
5.1	[5.0]	5.2	5.0	7.3	8.2	8.1	8.4	[8.5]	...	...	*8.4*[e]
3.0	3.5	4.1	4.5	4.3	4.5	4.2	4.0	4.3	...	...	*4.3*[d]
28.9	31.3	34.5	42.2	45.7	47.1	45.2	41.2	36.2	36.4	36.9	*39.6*
1.8	2.7	2.1	3.1	3.0	2.9	2.9	3.2	[3.3]	...	...	*3.4*[e]
41.3	36.9	33.4	29.7	28.5	47.0	51.7	47.0	43.6	40.5	...	*23.4*
5.9	6.0	5.0	11.0	13.2	14.0	14.1	14.2	[14.3]	...	...	*15.5*[e]
10.2	9.4	12.9	14.5	14.2	15.5	16.3	16.8	16.6	...	...	*16.6*[d]
0.8	2.1	6.7	10.8	13.6	16.7	16.7	16.2	17.0	21.7	...	*22.1*
[2.5]	3.0	3.3	3.5	3.4	3.8	3.1	3.3	3.8	...	...	*3.8*[d]
16.6	18.1	20.2	25.9	49.2	40.2	41.0	44.5	74.5	86.3	(108.3)	*91.2*
[10.1]	9.6	9.4	10.5	11.0	11.7	12.4	12.6	12.2	...	...	*12.2*[d]
...	...	0.9	1.4	1.4	1.6	1.5	1.6	1.5	...	...	*1.5*[d]
4.1	4.3	4.7	4.9	4.6	4.8	5.2	5.4	[5.5]	...	...	*5.6*[e]
[3.0]	4.7	2.2	2.2	4.2	6.1	7.8	7.6	7.1	...	...	*7.1*[d]
0.3	0.4	0.3	0.3	0.3	0.3	0.3	0.3	[0.3]	...	...	*0.3*[e]
63.1	82.9	74.5	65.1	70.6	73.7	86.4	92.9	96.8	93.1	(93.3)	*105.4*
1.5	2.0	2.1	2.3	2.7	3.0	3.6	3.3	[3.5]	...	...	*3.6*[e]
44.5	59.7	72.9	83.5	75.3	177.9	235.7	499.5	409.7	273.9	...	*337.8*
...	...	16.0	19.3	13.7	21.1	21.8	23.0	24.2	25.7	...	*24.7*
[8.0]	9.2	10.9	14.6	14.1	14.2	14.2	16.8	16.8	17.2	...	*19.1*
2.4	2.6	2.6	2.8	2.3	2.3	2.7	3.0	(3.0)	(3.2)	...	*3.4*
5.2	6.1	6.5	5.5	7.2	8.4	8.9	9.0	11.2	11.3	...	*12.4*
197.3	205.9	291.5	298.9	323.6	360.2	358.8	370.7	358.8	396.5	(436.1)	*394.2*
24.7	27.1	27.3	36.8	52.2	53.0	65.1	71.2	93.3	(99.2)	...	*100.5*
1.7	3.0	5.7	8.3	10.4	13.0	14.3	15.9	(19.1)	...	...	*19.1*[d]
0.5	0.8	2.5	2.4	2.1	2.3	2.4	2.8	3.1	3.2	...	*3.5*
16.5	17.3	20.1	16.2	18.6	17.2	21.0	20.2	22.5	18.9	(24.3)	*21.7*
1.1	4.2	7.7	13.1	17.8	19.9	24.4	24.2	22.3	...	...	*22.3*[d]
4.3	4.7	4.7	3.1	3.5	3.5	4.4	3.6	3.6	...	...	*3.6*[d]
[20.0]	25.2	33.9	55.1	77.1	65.7	51.1	49.5	60.0	66.2	...	*69.4*
16.2	16.7	8.5	22.5	21.4	23.4	25.6	19.1	19.9	...	...	*19.9*[d]
[640.0]	**[715.0]**	**855.0**	**945.0**	**1 050.0**	**1 210.0**	**1 300.0**	**1 590.0**	**[1550.0]**	**[1470.0]**	...	*[1565.0]*

Table 7A.17. Africa: current price figures

	Currency	1951–55 annual[a] average	1956–60 annual[a] average	1961	1962	1963	1964	1965	1966
Algeria	*mn. dinars*	...	...	...	...	392	490	490	(490)
Burundi	*mn. francs*	...	...	...	86	100	119	182	200
Cameroon	*bn. francs*	...	*2.2	2.8	3.8	3.8	3.8	4.0	4.4
Central African Republic	*mn. francs*	...	...	203	247	247	494	571	588
Chad	*mn. francs*	...	...	4	319	367	441	820	1 426
Congo (Brazzaville)	*mn. francs*	...	*84	...	1 070	...	1 235	1 235	1 910
Dahomey	*mn. francs*	...	...	610	829	968	1 145	1 261	1 194
Ethiopia	*mn. dollars*	...	*32	45	49	54	61	84	101
Gabon	*mn. francs*	...	...	...	371	618	494	741	741
Ghana	*mn. cedis*	* 3.6	8.6	21.9	23.5	21.9	22.2	25.4	25.5
Guinea	*mn. francs*	...	...	...	1 457	1 482	1 235	2 717	3 250
Ivory Coast	*mn. francs*	...	...	...	2 148	1 976	2 742	3 162	3 260
Kenya	*mn. pounds*	...	1.6	0.3	0.2	0.7	2.1	3.5	4.7
Liberia	*mn. dollars*	...	*1.0	...	...	2.4	2.6	2.8	2.8
Libya	*mn. dinars*	...	*1.4	1.8	4.2	4.7	5.4	7.3	15.0
Malagasy Rep.	*bn. francs*	...	*0.1	0.2	...	1.2	2.2	2.6	2.8
Malawi	*mn. kwachas*	...	...	...	...	...	0.7	1.0	1.0
Mali	*mn. francs*	...	...	...	2 270	2 393	2 621	2 697	2 553
Mauritania	*mn. francs*	...	...	...	...	988	494	494	988
Mauritius	*mn. rupees*	...	1.9	1.2	1.4	1.5	1.5	1.5	1.5
Morocco	*mn. dirhams*	...	*211	244	273	379	354	320	344
Niger	*mn. francs*	...	...	...	302	430	463	541	687
Nigeria	*mn. pounds*	1.1	3.7	8.3	11.4	15.2	19.0	22.7	22.2
Rhodesia, S.	*mn. dollars*	...	...	...	...	...	10.2	12.6	12.6
Senegal	*mn. francs*	...	...	...	...	2 223	2 717	3 705	3 705
Sierra Leone	*mn. leones*	...	*1.5	1.3	1.4	1.5	1.7	1.9	1.6
Somalia	*mn. shillings*	...	...	22.6	26.4	32.0	38.6	36.9	46.4
South Africa	*mn. rands*	42	43	65	112	118	171	182	204
Sudan	*mn. pounds*	2.0	4.6	6.7	6.9	7.9	8.3	10.9	15.7
Tanzania	*mn. shillings*	...	...	...	10	17	33	51	68
Togo	*mn. francs*	...	...	66	144	229	682	678	584
Tunisia	*mn. dinars*	...	4.5	8.6	6.6	7.1	8.6	7.4	8.8
Uganda	*mn. shillings*	*13	13	1	5	20	39	78	102
Upper Volta	*mn. francs*	...	*311	403	1 201	1 294	1 313	860	960
Zaïre	*mn. zaïres*	...	...	...	...	3.3	6.1	9.7	15.7
Zambia	*mn. kwachas*	...	*4.1	7.2	7.8	8.0	4.2	12.0	12.6

[a] Average for those years for which figures are available.

Local currency, current prices						*As a percentage of GDP*					
1967	1968	1969	1970	1971	1972	1952	1956	1960	1963	1966	1969
(490)	(490)	(490)	(490)	(490)	...	...	...	...	*(3.1)*	*3.2*	*2.5*
208	227	292	300	...	...	...	...	...	*(1.4)*	...	...
4.8	5.0	5.3	5.6	5.9	...	...	...	...	*2.5*	*2.4*	*2.0*
946	1 109	1 451	1 351	1 468	...	...	...	*0.6*[b]	*0.7*	*1.3*[c]	...
1 476	1 540	1 934	(2 220)	...	...	...	...	*0.01*[b]	*0.7*	*(2.5)*	*(2.5)*[d]
2 218	(2 275)	2 336	...	...	...	...	...	...	...	...	...
1 256	(1 174)	1 100	1 200	...	...	...	...	*1.6*[b]	*2.4*	*2.5*	...
105	101	94	91	91	94	...	...	*1.9*[b]	*2.4*	*3.0*	*2.3*
741	741	860	...	...	...	...	...	*0.9*[e]	*1.4*	*1.3*	*1.0*
39.0	47.2	46.8	44.5	42.5	...	...	*0.8*	*1.6*	*1.8*	*1.4*	*2.0*
3 448	3 489	3 518	...	...	...	...	...	...	*(1.8)*	...	...
3 600	4 000	4 300	4 600	...	...	...	...	*1.3*[e]	*1.0*	*1.3*	*1.2*
5.7	5.8	5.7	6.1	7.9	...	...	...	...	*0.6*[c]	*1.1*	*1.1*
3.3	2.8	3.3	3.8	...	...	...	...	...	*(0.9)*	*0.9*	*0.8*[f]
12.7	13.5	15.9	26.6	30.0	37.5	...	...	*2.5*[e]	*1.9*	*2.3*	*1.3*
3.0	3.2	3.4	3.4	...	...	...	...	*0.07*	*(0.8)*	*1.5*	*1.5*
1.2	1.1	1.2	1.3	...	...	...	...	...	*0.5*[c]	*0.5*	*0.5*
2 676	2 871	(3 000)	...	...	...	...	...	...	*(3.0)*	*(2.9)*[g]	...
1 482	1 976	1 976	1 976	...	...	...	...	...	*(3.6)*	*(1.3)*[g]	*4.2*[f]
1.5	1.5	1.6	...	...	...	...	*0.3*[h]	*0.2*	*0.1*	*0.2*	*0.2*
356	419	464	490	491	568	...	...	*2.3*	*3.2*	*2.7*	*2.9*
778	902	921	...	...	...	...	...	*0.5*[e]	*0.7*	*0.7*	*0.9*
50.5	67.6	157.5	146.3	111.1	...	*0.1*	*0.2*	*0.5*	*1.0*	*1.3*	...
14.4	15.2	16.1	17.3	18.9	...	...	...	...	*1.5*[c]	*1.7*	*1.7*
3 705	3 705	4 561	4 658	4 896	...	...	...	...	*1.3*	*1.9*	*2.3*
1.7	2.0	2.3	(2.5)	(2.6)	...	...	...	...	*0.7*[c]	*0.6*	*0.7*
53.8	59.6	64.3	80.2	81.3	...	...	...	...	*(2.9)*	...	...
234	238	253	257	302	350	*1.5*	*1.1*	*0.8*	*1.8*	*2.4*	*2.2*
17.7	19.6	24.1	32.5	(35.0)	...	...	*0.9*	*1.6*	*1.7*	*3.2*	*4.1*
87	99	111	(136)	...	...	...	...	...	*0.5*[ci]	*1.0*[i]	*1.3*[i]
636	662	780	849	897	...	...	...	...	*0.7*	*1.1*	...
8.4	10.5	10.5	11.8	10.5	13.8	...	*(1.5)*[k]	*2.2*	*1.8*	*1.7*	*1.7*
120	142	157	159	...	...	...	*0.5*[k]	*0.2*[k]	*0.4*[k]	*1.7*[k]	*2.1*[k]
960	1 235	988	988	...	...	...	...	...	*(2.4)*	*1.6*	*1.6*[f]
18.3	21.8	24.0	30.0	34.7	...	...	...	...	*2.7*[c]	*5.2*	*2.7*
14.4	17.5	13.3	14.2	...	...	...	*1.2*[j]	*1.1*	*1.9*	*1.6*	*1.1*

[b] 1961. [c] 1964. [d] 1967. [e] 1962. [f] 1968. [g] 1965.
[h] 1957. [i] Percentage of GDP for former Tanganyika only. [j] 1958. [k] Percentage of GDP at Factor Cost.

Table 7A.18. Central America: constant price figures

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
Costa Rica[a]	2.1	2.1	2.2	2.4	2.4	2.5	2.7	2.6	2.6	2.6
Cuba[b]	...	...	...	...	...	...	...	...	...	[175.0]
Dominican Republic	...	...	...	...	...	...	...	39.5	48.7	39.8
El Salvador	5.8	6.2	7.1	6.5	7.2	7.5	8.7	8.1	6.7	6.6
Guatemala	6.4	7.0	6.8	7.4	8.6	9.4	10.1	10.5	10.5	10.2
Haiti	5.0	5.4	6.7	6.3	6.3	6.6	7.0	8.3	8.7	8.3
Honduras	4.4	4.5	4.2	4.1	3.8	5.8	5.6	5.6	5.7	5.1
Jamaica	...	...	...	...	...	...	...	...	...	...
Mexico	65.8	62.8	70.5	56.8	64.4	72.7	86.3	93.5	93.9	102.4
Nicaragua	...		...	...	...	...	...	...	...	[8.0]
Panama	...		...	...	...	...	...	...	...	[0.5]
Total Central America	**[290.0]**	**[290.0]**	**[300.0]**	**[280.0]**	**[290.0]**	**[300.0]**	**[320.0]**	**[320.0]**	**[335.0]**	**[360.0]**

[a] No regular armed forces since 1965.
[b] Figures for Cuba are at current prices.
[c] 1970.

Table 7A.19. Central America: current price figures

	Currency	1951–55 annual average[a]	1956–60 annual average[a]	1961	1962	1963	1964	1965	1966
Costa Rica[b]	*mn. colones*	10.4	13.1	13.5	14.1	14.4	15.4	14.4	—
Cuba	*mn. pesos*	...	...	...	...	...	200	220	230
Dominican Republic	*mn. pesos*	...	36.8	31.6	33.1	34.0	37.0	35.0	32.4
El Salvador	*mn. colones*	14.2	17.3	15.5	21.7	21.3	20.0	22.6	23.0
Guatemala	*mn. quetzales*	6.5	9.4	9.2	9.3	10.2	12.7	14.3	14.7
Haiti	*mn. gourdes*	24.1	31.8	31.7	31.6	33.5	38.8	36.8	35.4
Honduras	*mn. lempiras*	6.4	9.0	14.4	14.5	15.4	10.8	11.4	12.4
Jamaica	*mn. dollars*	...	...	...	...	...	...	3.4	3.5
Mexico	*mn. pesos*	450	838	1 111	1 258	1 388	1 589	1 651	1 789
Nicaragua	*mn. cordobas*	...	...	...	51.0	55.0	53.2	57.2	60.4
Panama	*mn. balboas*	...	...	...	...	...	0.6	0.6	0.5

[a] Average for those years for which figures are available.
[b] No regular armed forces since 1965.

US $ mn, at 1970 prices and 1970 exchange rates (Final column, X, at current prices and exchange rates)

1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	*1971X*
2.5	2.6	2.5	2.6	2.4	—	—	—	—	—	—	—
[175.0]	[200.0]	[200.0]	200.0	220.0	230.0	250.0	300.0	250.0	290.0	290.0	*290.0*
38.9	37.5	35.3	37.8	36.5	34.4	32.7	33.5	32.6	31.3	...	*31.3*[c]
6.8	9.6	9.3	8.6	9.7	9.9	10.1	9.6	10.8	10.0	13.2	*13.2*
10.0	9.9	10.9	13.7	15.4	15.7	17.5	16.6	16.1	28.7	...	*28.7*[c]
7.7	7.7	8.1	8.6	8.0	7.1	7.4	7.3	7.2	7.2	6.6	*7.3*
8.8	8.7	9.2	6.1	6.3	6.7	6.5	6.8	7.3	8.7	...	*8.7*[c]
1.1	1.1	3.3	4.3	5.3	5.3	5.6	5.7	5.7	5.8	...	*5.8*[c]
110.5	123.0	135.7	152.2	152.1	163.9	189.8	197.8	214.3	218.0	226.8	*234.3*
[8.0]	8.9	9.6	9.1	9.4	9.8	11.1	10.9	11.2	11.8	...	*11.8*[c]
[0.5]	[0.5]	[0.5]	0.7	0.6	0.5	0.9	0.9	1.3	1.6	...	*1.6*[c]
[370.0]	**[410.0]**	**[425.0]**	**444.0**	**466.0**	**483.0**	**532.0**	**589.0**	**557.0**	**613.0**	**[625.0]**	*[633.0]*

Local currency, current prices					*As a percentage of GDP*					
1967	1968	1969	1970	1971	1952	1956	1960	1963	1966	1969
—	—	—	—	—	*0.6*	*0.6*	*0.5*	*0.4*	*0.4*[c]	...
250	300	250	290	290	...	...	...	*5.0*[de]	*6.1*[d]	...
31.2	32.5	31.0	31.3	...	...	*4.8*[f]	*4.6*	*3.4*	*3.0*	*2.7*[g]
23.7	23.1	26.2	24.9	33.1	...	*1.4*[f]	*1.1*	*1.3*	*1.1*	*1.1*
16.4	15.7	15.6	28.7	...	*0.9*	*1.0*	*0.9*	*0.8*	*1.1*	*0.9*
35.8	35.8	(35.8)	35.8	36.6	...	*1.8*[h, i]	*(2.2)*[h]	*(1.9)*[h]	*(1.7)*[h, j]	*(1.7)*[g, h]
12.3	12.9	14.2	17.3	...	*1.3*	*1.4*	*1.1*	*1.8*	*1.1*	*1.1*
3.8	4.1	4.3	4.8	...	...	...	...	...	*0.5*	*0.4*
2 148	2 285	2 548	2 723	2 926	*0.7*	*0.6*	*0.7*	*0.7*	*0.7*	*0.7*
70.5	70.9	75.0	82.9	...	...	...	*1.6*[k]	*1.7*	*1.3*	*1.3*
0.8	0.9	1.3	1.6	...	...	...	...	*0.1*[e]	*0.1*	*0.1*

[c] 1965. [d] Percentage of Net Material Product.
[e] 1964. [f] 1958. [g] 1968. [h] Fiscal year, ending 30 September. [i] 1955. [j] 1967. [k] 1962.

Table 7A.20. South America: constant price figures

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961
Argentina	327.0	286.2	304.4	331.7	264.5	338.8	355.8	372.4	313.6	335.6	335.4
Bolivia	...	...	8.4	...	5.6	4.1	4.7	6.8	6.6	5.6	7.8
Brazil	383.8	375.8	380.5	375.2	449.5	529.3	582.5	588.7	466.8	425.8	390.6
Chile	61.3	70.1	106.3	67.5	103.9	98.3	104.9	98.8	78.4	93.8	95.6
Colombia	153.2	172.2	194.5	145.1	143.6	95.5	73.3	64.8	53.8	60.5	71.6
Ecuador	5.4	6.7	10.7	14.5	16.8	17.8	17.1	16.5	14.5	19.2	18.5
Guyana	...	...	...	...	...	...	...	...	...	[0.5]	[0.5]
Paraguay	...	...	...	...	...	...	...	...	...	[5.0]	[5.0]
Peru	63.1	60.5	60.0	56.1	59.8	98.0	88.9	100.0	88.2	86.6	[100.0]
Uruguay	...	...	...	...	...	...	...	...	...	[30.0]	37.4
Venezuela	112.5	103.3	96.4	110.3	127.1	134.5	152.7	157.3	151.1	129.7	131.5
Total South America	**[1130.0]**	**[1100.0]**	**[1180.0]**	**[1130.0]**	**[1200.0]**	**[1340.0]**	**[1405.0]**	**[1430.0]**	**[1205.0]**	**[1190.0]**	**[1195.0]**

[a] 1970.

Table 7A.21. South America: current price figures

	Currency	1951–55 annual average[a]	1956–60 annual average[a]	1961	1962	1963	1964	1965	1966
Argentina	*mn. new pesos*	36	128	274	336	402	452	647	962
Bolivia	*mn. pesos*	*3	30	58	61	66	147	178	175
Brazil	*mn. cruzeiros*	12	40	70	115	195	339	924	1 157
Chile	*mn. escudos*	14	81	119	144	179	256	369	565
Colombia	*mn. pesos*	204	293	410	664	965	1 072	1 218	1 467
Ecuador	*mn. sucres*	185	290	336	329	307	370	428	483
Guyana	*mn. dollars*	...	...	...	...	...	...	0.8	1.9
Paraguay	*mn. guaranis*	...	...	...	...	687	731	823	956
Peru	*mn. soles*	552	1 194	...	...	2 614	2 824	3 286	3 575
Uruguay	*mn. pesos*	...	...	187	221	365	509	900	1 500
Venezuela	*mn. bolivares*	246	525	533	509	613	650	734	796

[a] Average for those years for which figures are available.

US $ mn, at 1970 prices and 1970 exchange rates (Final column, X, at current prices and exchange rates)

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	*1971X*
321.9	384.9	353.9	393.6	443.9	482.9	369.9	434.1	449.8	484.0	(433.8)	*521.6*
7.7	8.4	17.0	20.0	18.4	16.9	15.0	16.5	17.8	(16.3)	...	*17.1*
420.6	409.3	382.0	648.1	552.6	761.6	762.5	839.8	780.2	908.5	...	*966.5*
101.6	87.4	85.8	96.1	119.7	119.5	124.8	131.2	163.5	209.7	(247.4)	*194.9*
113.2	124.3	117.1	128.8	129.6	132.8	174.6	162.6	196.2	169.3	(179.7)	*167.9*
18.1	16.7	19.2	21.6	23.4	21.2	23.5	25.0	33.3	...	...	*33.3*[a]
[0.5]	[0.5]	[0.5]	0.5	1.1	2.3	2.1	2.4	3.3	...	...	*3.3*[a]
[5.5]	6.1	6.4	6.9	7.8	10.0	10.4	11.1	12.0	13.1	...	*13.7*
[120.0]	139.8	136.4	135.4	134.9	179.8	163.4	157.6	192.8	207.6	(231.0)	*221.9*
29.5	34.0	33.4	37.5	35.9	41.9	31.5	43.3	44.0	...	...	*44.0*[a]
126.7	151.2	158.9	175.6	187.4	209.5	208.7	197.4	198.0	210.5	(259.3)	*221.1*
[1265.0]	**[1365.0]**	**[1310.0]**	**1 664.0**	**1 655.0**	**1 978.0**	**1 886.0**	**2 021.0**	**2 091.0**	**[2 300.0]**	...	*[2 405.0]*

Local currency, current prices						*As a percentage of GDP*					
1967	1968	1969	1970	1971	1972	1952	1956	1960	1963	1966	1969
1 354	1 204	1 521	1 799	2 608	3 470	*3.0*	*2.5*	*2.4*	*2.2*	*2.1*	*1.9*
179	168	188	212	203	...	*0.5*[b]	*0.4*	*0.9*	*1.2*	*2.2*	*1.7*
2 066	2 574	3 492	3 862	5 446	...	*2.3*	*2.6*	*2.0*	*1.6*	*2.2*	*2.6*
667	884	1 213	2 000	3 080	5 053	*2.3*	*3.1*	*2.6*	*2.1*	*2.3*	*1.9*
1 627	2 263	2 321	2 998	2 810	3 569	*1.6*	*1.9*	*1.2*	*2.2*	*2.0*	*2.1*
456	527	714	833	...	...	*1.3*	*2.6*	*2.4*	*1.8*	*2.1*	*2.3*
4.3	4.1	4.6	6.5	...	...	...	...	...	...	*0.5*	*0.9*
1 229	1 292	1 414	1 514	1 727	...	...	...	...	*1.4*	*1.6*	*2.0*
5 245	5 678	5 806	7 463	8 587	10 193	*2.5*	*3.2*	*2.4*	*3.2*	*2.6*	*2.9*
3 300	5 600	9 300	11 000	...	...	...	...	*1.1*[c]	*1.6*	*1.5*	*1.9*
890	894	867	891	973	1 230	*1.5*	*1.9*	*2.1*	*1.9*	*2.0*	*1.8*

[b] 1953. [c] 1961.

8. Military research and development, 1972

Square-bracketed references, thus [1], *refer to the list of references on page* 284.

I. *Introduction*

Military research and development (R&D) is that area of military activity which is concerned with stimulating the advancement of scientific knowledge and cultivating technical progress for military purposes. It is immediately directed, for the most part, at the creation of new and improved weapons and other military equipment. In addition, it involves attempts to extend knowledge and improve technical expertise in fields where potential military applications are foreseen.

Trends in the amount of resources devoted to military R&D, and in the activities undertaken with these resources, need to be followed with close attention because they are a major determinant of the nature of future world armaments. This chapter updates the information published in the *SIPRI Yearbook 1972* [1] on the size of worldwide military R&D efforts;[1] and it reviews selected developments in military R&D activity and policy in various countries.

While concerned with developments in 1972, the chapter begins with a description of the overall size and nature of worldwide military R&D efforts as they have appeared over a longer period. Major changes in military R&D programmes do not occur, for the most part, between one year and the next: they emerge much more gradually. Equally important, information about such changes is often available only after a considerable time lag. Data relating to developments in 1972 is likely to be incomplete in important respects. The partial data which is available is therefore presented in the context of a longer-term perspective, as supplemental information, rather than as a comprehensive annual review.

II. *The size and nature of world-wide military R&D efforts*

A handful of industrialized countries with high military expenditures dominate the world's military research and development activity. It is estimated that

[1] The estimates of the military R&D expenditures of most Western industrialized countries and a few less industrialized countries, published for the first time in the *SIPRI Yearbook 1972*, have been revised and updated: they are presented in appendix 8A, pp. 290 ff.

during the 1960s, the United States and the Soviet Union alone accounted for about 85 per cent of world-wide military research and development. The United Kingdom and France supported a further 9–10 per cent. The smaller efforts of five other industrialized countries—FR Germany, Sweden, Canada, Japan and Australia—added several per cent more, leaving only 2 or 3 per cent of the global resources devoted to military R&D to be accounted for by all other countries. There was a similar distribution of total military expenditures, but military R&D was even more concentrated in the hands of a few countries: while the USA, USSR, UK and France accounted for about 73 per cent of world military expenditure, they supported nearly 95 per cent of the world's military R&D efforts. [1]

The reason for the unusual concentration of the efforts is two-fold. First, as a result of "economies of scale", industrialized countries with lower military expenditures tend to import their armaments from the main weapon producers, rather than undertake domestic R&D and production programmes.[2] These countries therefore devote much smaller percentages of their military budgets to domestic military R&D and spend relatively more on weapon import than countries with higher military expenditures. Second, almost all non-industrialized countries, including those with large military budgets, are obliged to rely on import for the great bulk of their military equipment. Aside from the question of the scale of production, these countries generally have neither the number of scientists, engineers and skilled technicians needed to design and construct modern weapons, nor the diversified, technologically advanced industrial base required to supply a multitude of high-quality materials and components. Most non-industrialized countries therefore undertake no military R&D at all; and the proportion of the military budget devoted to military R&D in countries where such an effort exists is generally lower than in industrialized countries with equally large military budgets. [1]

This is not to say that the activities of countries with smaller military R&D efforts are completely insignificant. On the contrary, many of the smaller efforts are of particular interest; but the concerns which motivate such interest are different from those raised by the major military R&D programmes of the big powers. In each case, the concerns depend on the nature of the activities undertaken. The remainder of this section will elaborate on this point, looking

[2] Factors relating to scale which may make import cheaper for countries with smaller defence efforts include, first, the fact that these countries tend to procure smaller quantities of weapons. This means that initial R&D and capital investment costs for production of any type of weapon will be spread over a smaller number of finished units; and also that there will be less opportunity for cost-reducing 'learning effects' during the production sequence. Second, the perceived budget 'margin' for R&D project failures may be proportionally smaller in these countries, with very limited procurement budgets, than among countries with higher military expenditures.

first at the nature of the activities involved in the very large military R&D programmes of the United States and the Soviet Union, and then at the activities undertaken by all other countries.

The United States and the Soviet Union

The United States and probably the Soviet Union[3] each spend more on military research and development every year than any other country, except China, devotes to its entire military budget [1]. Hundreds of thousands of scientists and engineers, and even larger numbers of support personnel, are employed in the conduct of thousands of separate projects.[4] These projects can be classified in three groups roughly corresponding to the conventional breakdown of R&D activities. First, there is basic research in military-related areas of science and technology. Second, applied research involving design and exploratory development of potential weapon systems and components is undertaken, to provide a technical base for items to be carried into full-scale development. Finally, full-scale development, prototype construction and testing of selected items are carried out. Individual projects in these three areas tend to be increasingly expensive as one moves from basic research through design and exploratory development and into full-scale development. It is likely that the number of separate projects undertaken within the three areas declines correspondingly.

An idea of the main kinds of activity involved in the US effort is provided by the distribution of funds within the main US military R&D programme—the "Research, Development, Test and Evaluation (RDT&E)" programme of the Department of Defense (table 8.1).[5] Out of a total $8 500 million requested for this programme in the budget for 1972–73, about 65 per cent ($5 550 million) is allocated to R&D specifically directed toward the development of one of the main types of military equipment: missiles, aircraft, satellite systems,

[3] It is uncertain exactly how large the military R&D effort of the Soviet Union is, but it seems to be of the same order of magnitude as that of the United States [1].

[4] About 19 000 separately identifiable projects are currently involved in the 'research' and 'exploratory development' end of the US military R&D effort [13]. The number of scientists and engineers recently employed in R&D work (both civil and military) in the United States is more than 500 000 [2]. Expenditure on military R&D is estimated to have accounted for 30–35 per cent of total R&D expenditure [1]; and the proportion of qualified personnel working on military R&D, while possibly somewhat smaller, is not likely to be lower than 15 per cent (75 000 scientists and engineers), and may be as high as 25–30 per cent (125 000–150 000 scientists and engineers) or more. Although much less information is available for the Soviet Union, there is no reason to suppose that the number of scientists and engineers involved in the military R&D effort is significantly lower in this country, where total qualified personnel employed in R&D activities in recent years has been estimated at over 700 000 [3].

[5] The Defense Department's RDT&E programme accounts for about 90 per cent of estimated US military R&D expenditure, the remainder coming mainly from other Defense Department accounts, and the funds of the Atomic Energy Commission and the National Aeronautics and Space Administration [1].

ships, combat vehicles and ordnance. The aerospace systems absorb most of the funds: missiles, aircraft and satellite systems account for 56 per cent of the total RDT&E budget, while ships, ordnance and combat vehicles take only about 9 per cent. The effort in these areas is oriented toward full-scale development, rather than research or exploratory development; and most of the funds involved in the 1972–73 budget (about 70 per cent) can be accounted for by work on a relatively small number of major weapon development projects (76 projects), which are listed in table 8.1 under the various type-of-equipment headings.

The major projects are about equally divided in terms of total funds between those relating to US strategic (nuclear) weapon forces, and those relating to general purpose (tactical, mainly conventional) forces.[6] There are fewer strategic weapon projects, but these are individually more expensive—costing as much as several hundred million dollars per year each—than the more numerous conventional (non-nuclear) weapon projects, which typically absorb some millions or tens of millions of dollars annually.[7] Most Defense Department-financed basic research, much of the R&D work relating to certain weapon-system components (particularly electronic ones), and development of weapons and support equipment which are not immediately associated with any one of the main types of equipment (for example, in the chemical and biological warfare field) are financed through RDT&E budget categories entitled 'Military sciences' and 'Other equipment'. These two together account for around $2 300 million, or about 27 per cent of the 1972–73 RDT&E funds. At a rough approximation, the overall distribution of the US military R&D effort might, thus, be estimated as being devoted in equal shares to (1) the development of major strategic weapon systems and components; (2) the development of major conventional weapon systems and components; and (3) basic research in military sciences, advances in component technologies, and development of various minor weapons and support equipment, much of which may be applicable to both strategic and general purpose forces.[8]

[6] The classification into these two categories—strategic and general purpose—which is adopted here is that used in US defence budget accounts (insofar as this is known): in many cases, distinctions may be arbitrary, or weapon systems may be useful within the context of both types of forces.

[7] Notable exceptions in the FY 1973 budget are the SAM-D surface-to-air missile system, funded at about $170 million, and the F-15A fighter aircraft with requested funding over $450 million. It should be noted that the costs for the development of any individual weapon system are generally spread over a period of five to ten years, with a peak about two-thirds of the way through the development programme. The weapon systems shown in table 8.1 are in various stages of development—some past the peak in funding, some before it, and some right at it.

[8] This is a very rough breakdown: the information which is available does not permit a more precise one. A similar division of the funds has been shown in tables published by the Defense Department [4].

Table 8.1. Distribution of US Department of Defense research, development, test and evaluation (RDT&E) funds, Fiscal Year 1973[a]

US $ mn	Strategic forces	General purpose forces		
2383.4	**Missiles and related equipment, including:**			
	Safeguard ABM (340.0)	SAM-D (171.1)	Pershing (8.2)	Standard active (6.4)
	Adv. bal. mis. def. (102.1)	Lance (7.4)	Redeye 2 (18.0)	Standard surf.-surf. (15.1)
	Hardsite (80)	(Harpoon) anti-ship (58.0)	Bomber def. mis. (1.5)[b]	Harpoon encapsulated (16.0)
	Minuteman 2 (15.9)	Term. homing & warh. dev. (33.3)	Improved point def. mis. (23.5)[b]	
	Minuteman 3 (138.8)	Agile (26.1)	Sub.-launched cruise (20.0)[b]	
	ABRES (104)	Condor (6.0)	Sidewinder L (6.6)[b]	
	ULMS (520.4)	Maverick (8.3)	Sparrow F (12.3)[b]	
	Poseidon (22.1)	Aegis (82.3)	Phoenix (5.1)	
	Fleet bal. mis. com. & con. communications (25+)[b]	Chapparal (6.2)		
	SSBM defense (20.4)[b]	Hellfire (11.0)[b]		
	Hound Dog II (15.0)[b]	Improved Hawk (5.5)		
1947.5	**Aircraft and related equipment, including:**			
	B-1 (444.5)	UTTAS (hel.) (64.0)	F-15A (454.5)	A-6E Intruder (4.9)
	SCAD (48.6)	Heavy lift hel. (53.0)	Lightweight fighter (46.0)	VC-X COD (4.0)[b]
		Naval V/STOL (24.0)	Adv. med. STOL trans. (46.0)	EA-6B Intruder (12.0)[b]
		F-14A (162.6)	Ramjet tech. (4.6)	A-7E Corsair (3.6)[b]
		S-3A Viking (36.7)	Cheyenne (53.6)	E-2C Hawkeye (14.1)
			F-5E (17.7)	Aerial scout hel. (9.1)[b]
			F-111 (5.0)	
454.1	**Military astronautics and related equipment, including:**			
	Mil. sat. com. sys. (29.8)			
	Space. def. sys. (10.1)			
	Def. sat. com. sys. (18.9)			
429.7	**Ships, small craft and related equipment, including:**			
		Surf. effect ship (50.1)	Adv. ship dev. (12)[b]	N-propulsion (41.8)
			PF patrol esc. (1.5)	
330.6	**Ordnance, combat vehicles and related equipment, including:**			
		Mech. inf. com. veh. (10.8)	Captor (19.4)	XM 198 how. (11.8)[b]
		New MBT (19.7)	Mobility (45.0)	XM 204 how. (3.3)[b]
		Dragon (3.4)	Arm rec. scout veh. (15.6)[b]	CIWS (8.9)[b]
		Mark 48 torpedo (7.0)	XM 163 Vulcan SP-gun (5.3)	Shillelagh (5.9)
				TOW (0.2)
5545.3	*Sub-total, main types of equipment of which:*			
	Strategic-major projects 1936 (*35 per cent*)	General purpose-major projects 1825 (*33 per cent*)		
572.7	**Military sciences**			

"This activity supports research of potential military applications in the physical, mathematical, environmental, engineering, biomedical and behavioral sciences. The objective is to provide the basic understanding necessary to efficiently develop new systems and improve military operations. For example, research in electronics will provide more reliable and higher performance components for sensors, weapons and communications systems; research in oceanography will increase the effectiveness of anti-submarine systems ..."[c]

1692.2	**Other equipment**	
	"Examples of the types of programs funded here are ocean engineering systems and technology development, chemical and biological agent detection and protective devices, combat clothing, tactical data processing systems, communications equipment, mapping and geodetic systems, and biomedical projects. Major continuing programs include ... AWACS, electronic counter-measures, tactical sensor systems for battlefield surveillance, and undersea surveillance systems."[c]	
688.1	**Programwide management and support and emergency fund**	
8497.8	**Total,** of which: Main types of equipment (*65 per cent*); Military sciences and other equipment (*27 per cent*); Management and support (*8 per cent*)	

[a] The amounts shown in the left-hand column and in brackets beside individual items (US $ millions, unless otherwise noted) represent obligational authority requested of Congress in the President's budget for Fiscal Year 1973 (July 1972 – June 1973). Most but not all US military R&D expenditures are financed from Defense Department RDT&E appropriations [1].
[b] These items are believed to be financed through the equipment account under which they are shown, although definite confirmation of this has not been found.
[c] The source of these descriptions is the *Appendix* to the *Budget of the United States Government for the Fiscal Year 1973* [10].

Sources: [10, 16–21].

It is impossible to give a comparable description of the Soviet military R&D effort because, in contrast to the United States, the Soviet Union publishes nothing on the funds and projects involved in its military R&D effort.[9] The only information which is available is that supplied by Western sources (mainly official US sources), concerning the design and performance of weapon systems and equipment which have been observed (from reconnaissance satellites as well as closer vantage points) in construction, test, deployment and operation. On the basis of this kind of data, it can be stated that the Soviet Union undertakes R&D on roughly the same range of different strategic and general purpose weapon and support systems as the United States. The Soviet Union may develop a somewhat smaller number of highly specialized systems, tending to rely on less specialized systems for a wider variety of functions.[10] There is also evidence that some major Soviet weapons are less technologically advanced in various respects than comparable US systems; and that improvements in weapon system performance from one generation to the next derive from smaller, more incremental changes rather than the more radical ones typical of many US developments [1] (see also pp. 272 ff). One possible explanation of these observations is that the Soviet military R&D programme is smaller than that of the USA, or of roughly the same size but less efficient. An alternative explanation, relating to the distribution of the Soviet effort among various kinds of activity, is that the proportion of the

[9] Few if any other countries publish as much as the United States about their military R&D activities and funds.
[10] Comparative numbers of major weapon systems under development in the two countries during the 1960s are given in table 8.2 (page 260) and discussed on page 262.

effort devoted to basic and applied research in military-related areas of science and technology is smaller than is the case in the United States.[11] Beyond this, there is no basis for an analysis of the distribution of the Soviet military R&D effort between different kinds of activity.

Conclusions

Two aspects of the military R&D activities of the United States and the Soviet Union, related to the very large size of their programmes, are unique and are of overriding importance in the context of international comparisons. The first is their work on the development of strategic nuclear weapons. While the United Kingdom, France and probably China all have operational nuclear weapons, only the USA and USSR have nuclear forces capable of wiping out a large portion of the world's population. For this reason, and to the extent that the state of the strategic balance has world-wide political repercussions, the continuing technological development of US and Soviet strategic forces is of paramount importance.

The second significant aspect of US and Soviet military R&D activities is the extent to which they constitute the spearhead of world-wide technological advances in all types of armaments and military equipment, conventional as well as nuclear. Increasingly since the end of World War II, a "technological imperative" has come to prevail in the military field, whereby continuing major improvements in the performance of weapons and equipment are taken for granted by political leaders and military planners. The technological arms race, in which increasingly expensive and effective weaponry is regularly brought into the arsenals to replace "obsolete" stocks, now involves almost all countries in the world—though it is true that most participate as importers rather than designers and producers of the new equipment. Judging by the rate of investment in R&D and by rising procurement and operations and maintenance costs, the rate of technical innovation in armaments is considerably faster than that for almost any civil product. As the countries with by far the largest conventional weapon R&D programmes, and the largest efforts in the area of basic research in military-related science and technology, the United States and the Soviet Union[12] have probably done most to produce the very high rate of innovation in conventional arms. They also contribute most to exploiting new areas of science and technology, new environments and techniques, for military purposes.

[11] Another possibility is that the dimensions of the basic research effort are about the same but the transfer of results to weapons application is undertaken with less success in the Soviet Union.

[12] Again, the exact dimensions of the Soviet effort are uncertain, and it is possible that this overstates the Soviet contribution somewhat.

Other countries

Almost all the military R&D conducted outside the United States and the Soviet Union is devoted to the development of conventional weapons and equipment. Only France and China have active nuclear weapon R&D programmes, and these are relatively small even in the context of the limited military R&D discussed in this section.

The United Kingdom and France, which have by far the largest military R&D efforts outside the USA and USSR (costing $500–1 000 million annually), are the only countries which conduct R&D across the full spectrum of major conventional weapons. The Federal Republic of Germany, Sweden and Japan, with smaller military R&D programmes ($75–275 million annually), work on most but not all main types of conventional weapon. Other countries, most with much smaller efforts ($1–100 million annually), undertake development of fewer types of major weapons.

The nature of the weapons development work which countries with smaller military R&D programmes undertake appears to vary somewhat, depending on how industrially advanced the countries are, and whether or not they belong to one of the main military alliances. This is illustrated in table 8.2, which shows the number and type of major weapon development projects undertaken in all countries during the 1960s. Different types of weapon are arranged in five categories, grouped roughly by degree of sophistication (how technically advanced the least advanced version of the type of weapon is). The first two categories cover weapon systems incorporating nuclear and space technology;[13] the third brings together the most sophisticated conventional weapon systems and components, divided into more advanced (part a) and less advanced (part b);[14] and the fourth and fifth cover less sophisticated conventional systems.[15] The table shows all industrialized countries with average annual military expenditures (in 1960–69) over $100 million, and all less industrialized and non-industrialized countries with average annual military expenditures over $200 million. This selection includes all countries known to

[13] The first category includes anti-ballistic missiles, domestically-launched military satellites, and long-range (over 2 500 miles) ballistic missiles; and the second covers intermediate-range (550–2 500 miles) missiles, nuclear weapons, and nuclear-powered submarines.

[14] The more advanced systems (part a) in the third category are: medium- and short-range missiles designed to attack fixed, land-based targets; aeroengines; supersonic jet fighter and trainer aircraft; and main battle tanks. The less advanced (part b) include: anti-aircraft missiles; subsonic jet fighters and trainers, helicopters and other vertical take-off and landing aircraft; and other aircraft with a maximum take-off weight over 10 000 kg (22 000 lbs).

[15] The fourth category covers remotely-piloted vehicles; anti-tank and anti-ship missiles; conventionally-powered submarines; and aircraft- and helicopter-carrying ships. The fifth includes armoured vehicles other than main battle tanks; light aircraft (maximum take-off weight under 10 000 kg [22 000 lbs]); and fighting ships other than those named previously with a displacement over 1 000 tons (including frigates, destroyers and escorts).

Table 8.2. The number and type of major weapon development projects undertaken in 1960–1968[a]

■ = Development of new and modified domestically-designed systems.
● = Modification of foreign-designed systems.
× = Modification of foreign-designed systems, R&D performed abroad.

Level of av. ann. military expend. 1960–69 *US $ mn*		Number of new systems[d]	Weapon systems, grouped by degree of sophistication[f]																								
			1			2			3a					3b				4					5					
			M1	X	M2	M3	N	S1	M4	E1	A1	E2	T1	M5	A2	A3	A4	A5	M6	S2	S3	T2	A6	S4				
Industrialized[b]																											
Western																											
1. 65 000	USA	147	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
2. 4 500–	France	61				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
5 500	UK	68					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
	FRG	29								■	■	■	■	■	■	■	■	■	■	■		■	■				
3. 700–	Sweden	15							■	●	■	■	■	■	■				■	■		■	■	■			
1900	Japan	19							■	■	■			■	■	■		■	■	■	■		■	■			
	Canada	13								■	●	■			■	■	■	■		●	■		■	■			
	Italy	14												■	■	■	■	■		■	■		■	■			
	Australia	4																■	■		■			■			
	Netherl.	3																		■	■	■	■	■			
4. 200–	Switzer.	3											■									■	■				
500	Belgium	2																■				■					
	Norway	4																	■	■				■			
	Denmark	2																			■			■			
5. 100–	Austria	1																				■					
199	N. Zealand	1																					■				
	Finland	0																									
Warsaw Pact																											
1. 35 000	USSR	75[e]	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
3. 700–	Czechos.	12								■					■		■					■	■				
1900	Poland	2								■					■												
	GDR	0																									
4. 200–	Hungary	0																				■					
500	Romania	0																									
	Bulgaria	0																									
Less industrialized[b]																											
4. 200–	Israel	5							■				●		●	●			■	●		■	■				
500	Spain	5												■	■					■	■			■			
	Yugoslav.	7													■				■	■		●	■				
	S. Africa	2												×		■	■			●							
	Argentina	2																					■				
	Greece	0																									
Non-industrialized[b]																											
2. 5 000	China	5				■	■			■	■													■			
3. 700–	India	6								■	■	■	×			×							■				
4. 200–	Egypt	3							■	■	■																
500	Brazil	6															■		■	×			■				
	Turkey	1																						■			
	Iran	1																						■			
	Portugal	0																					×				
	Other[c]	0																									

have undertaken domestic development of major weapons during the 1960s. Under four broad headings (Western industrialized, Warsaw Pact, less industrialized and non-industrialized), countries are grouped by the general level of their total military spending; and within each military spending group, they are listed according to the degree of sophistication of their most advanced weapon-development projects. (Throughout the remainder of this section,

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Notes and sources to table 8.2:

[a] The table covers government-financed projects which advanced as far as prototype construction and testing.
[b] Classification into 'industrialized', 'less industrialized' and 'non-industrialized' is based on per capita income and per capita energy consumption.
[c] North Korea, North Viet-Nam, South Viet-Nam, Pakistan and Iraq.
[d] Covers indigenously-designed new weapon systems. Modifications to foreign- and indigenously-designed systems are not included.
[e] Excludes aeroengines and remotely-piloted vehicles. For comparison, these types account for 28 of the US projects.
[f] See column headings below.

Source: [1].

Column headings:

Missile systems:

M1 Anti-ballistic missiles
M2–M4 Missiles directed against fixed, land-based targets:
- **M2** Long range (ICBM), over 2500 miles
- **M3** Intermediate range (IRBM), 550–2500 miles
- **M4** Medium and short range, under 550 miles

M5 Anti-aircraft missiles
M6 Anti-ship and anti-tank missiles

Submarines and fighting ships:

S1 Nuclear-powered submarines
S2 Other submarines
S3 Aircraft and helicopter carriers
S4 Other fighting ships (destroyers, frigates, escorts), displacement over 1000 tons

Tanks and other armoured vehicles:

T1 Main battle tank
T2 Other tanks, armoured personnel carriers, tracked support vehicles and self-propelled artillery

Space systems:

X Domestically-launched military satellites

Nuclear weapons:

N Indigenously-developed nuclear devices

Aircraft:

A1 Supersonic jet fighter and trainer
A2 Subsonic jet fighter and trainer
A3 Other heavy aircraft (bomber, heavy transport, reconnaissance, etc.), maximum take-off weight over 10 000 kg (22 000 lbs)
A4 Helicopters and other vertical take-off planes
A5 Remotely piloted vehicles (RPVs, drones), for target, reconnaissance, etc.
A6 Light aircraft (utility, basic trainer, counter-insurgency, etc.), maximum take-off weight under 10 000 kg (22 000 lbs)

Aircraft engines:

E1 Jet
E2 Other

countries are discussed in the order in which they are listed in table 8.2; and reference should be made to the table for illustration and further detail.)

Western industrialized countries tended not to undertake development of weapons of any level of sophistication unless they had also undertaken a considerable amount of work on less sophisticated types. In addition to working on the development of major weapons, data available for the UK, Sweden, Canada, Australia, the Netherlands and Finland suggest that all of these countries, and probably the other Western countries as well, devoted a substantial proportion of their miliary R&D resources to basic and applied research in military-related sciences and technology, and to the development of minor items of equipment not shown in table 8.2.

The military R&D programmes of *Warsaw Pact countries* resemble those of Western countries with comparable military budgets[16] in terms of the level of sophistication at which the most advanced projects are undertaken; but they differ in involving smaller numbers of projects. (This applies to the Soviet Union as well as to the other Warsaw Pact countries. As noted earlier, the activities of the Soviet Union, like those of the United States, covered practically all the weapons set out in table 8.2. The number of identified new weapons designed by the Soviet Union during the 1960s is, however, considerably smaller than that for the United States.[17]) Czechoslovakia and Poland, with relatively large military budgets (over $1 000 million), developed some of the most sophisticated conventional weapons (third category, part a), as did several Western countries with the same level of military spending (Sweden, Canada and Japan). Their efforts are more limited and specialized than those of Western counterparts, however, being concentrated almost exclusively in the aircraft industry; and rather than being backed up by work on a variety of less sophisticated conventional weapons, their major weapon projects are based on experience in the civil aircraft industry. There would appear to be a distribution of labour of sorts in the development of new weapons by Warsaw Pact countries, since the main type of aircraft developed in both Poland and Czechoslovakia during the 1960s (subsonic jet trainer) is the one type not developed by the Soviet Union during the same period. No evidence of development of domestically designed major weapons has been found for any of the

[16] In discussing the military R&D activities of the Warsaw Pact countries and those of most less- and non-industrialized countries, for which exact military R&D expenditure estimates are not available, the overall military budget is used as an indicator of the quantity of resources which may be available for the support of military R&D.

[17] The numbers shown in table 8.2 are not directly comparable, since the figure for the Soviet Union excludes work in the areas of aeroengines and remotely-piloted vehicles, where sufficient data for an accurate count of new systems was not available. It is likely that more new systems were developed in the United States, however, since if US projects involving aeroengines and remotely-piloted vehicles are excluded, the United States continues to lead by a considerable margin (120 to 75).

other Warsaw Pact countries (German Democratic Republic, Romania, Hungary and Bulgaria), all of which import their military equipment from the Soviet Union and Czechoslovakia. These countries all appear to support far smaller military R&D programmes than Western countries with comparable levels of military expenditure.

Four *less industrialized countries*, outside the main military alliances and with comparatively low military expenditures ($200–500 million annually)—Israel, Spain, Yugoslavia and South Africa—present a very different pattern of weapon development from that observed among the industrialized countries.[18] All four developed conventional weapons of the most sophisticated kind (the third category)—albeit the less advanced types (part b)—while undertaking only a moderate amount of work on less sophisticated types of weapon and producing few new domestically designed weapons of any kind. In comparison with Western industrialized countries with the same level of military spending (Switzerland, Norway, Belgium and Denmark), these countries had military R&D efforts which involved the development of about the same number of new weapons, but which extended to more sophisticated types. In comparison with Western countries which undertook development of weapons of comparable sophistication (Sweden, Japan, Canada and Italy), all of which had much higher military expenditures, these four countries had programmes which were much more thinly distributed, encompassing fewer new weapons and less work on the least sophisticated types.

An analogous pattern of weapon development is shown by four *non-industrialized countries*, which are also outside the main military alliances—China (annual military expenditure about $5 000 million), India (military expenditure about $1 000 million), Egypt and Brazil (military expenditure in the $200–500 million range). All four undertook development of sophisticated weapons while doing little concurrent work on less sophisticated types and producing few new weapons of any type. In this case, the weapons developed were generally not more advanced than the most sophisticated types produced by Western countries with similar levels of military expenditure;[19] work on less sophisticated types of weapon was extremely limited; and the number of new

[18] Two criteria have been used to distinguish among industrialized, less industrialized and non-industrialized countries: per capita income and per capita energy consumption. Israel, which by these criteria was a less industrialized country during the 1960s, should now be included among the industrialized countries. The military expenditure ranges shown in table 8.2 and cited throughout this section, which refer to average annual outlays during the 1960s, would be somewhat higher if the period covered were the early 1970s; and Israel, among the less industrialized countries, as well as Egypt and Brazil, among the non-industrialized, would move into the next higher military spending group (with expenditures in the $1 000–2 500 million range) in the more recent period.

[19] The projects undertaken by Egypt, including some of the most advanced types of sophisticated conventional weapon, were an exception: it is noteworthy that none of these projects was successful.

designs very low. The weapon development effort of China, for example, resembles that of the UK or France (both of which had a similar level of military spending during the 1960s) in including work on nuclear weapons of the less advanced type (second category) and on one of the most sophisticated types of conventional weapon; but while the UK and France each developed over 60 new weapons and components of various types, including many in less sophisticated categories, China produced only five new designs, including only one of the less sophisticated conventional weapons. Similarly, India developed weapons of types comparable in sophistication to those produced in Sweden, Canada, Japan and Italy, including the most sophisticated types of conventional weapon (third category, part a), but it developed only six new designs to their 15 (average figure), and most of this difference is accounted for by their work on less sophisticated weapons. The versions of the most sophisticated types of weapon developed in India and China appear, furthermore, to be somewhat less advanced technically than those produced by their Western counterparts.[20]

Differences between industralized and non-industralized countries

Some tentative generalizations may be advanced about the main differences between the military R&D activities of industrialized countries, on the one hand, and those of the less industrialized and non-industrialized countries mentioned above, with significant weapon development programmes, on the other hand. The industrialized countries, first, appear to be integrated into two international weapon markets, within which there are comparatively few political barriers to the export or import of weapons, and comparatively little diversification of military objectives such as to require the production of weapons and equipment not generally available on the market. It is likely that in these countries, the decision to develop and produce weapons domestically, rather than import them, is strongly influenced by *economic* considerations such as the desire to increase domestic employment or improve the balance-of-payments situation.[21] Such concerns appear to be weighed against one main competing objective: the desire to keep abreast of the latest technological developments in the various types of weapon and equipment stocked in the inventories. These factors seem to account for the situation in which military R&D resources are concentrated on the types of weapon which can be produced in up-to-date

[20] This applies particularly to the supersonic combat aircraft produced in India [5] and the ballistic missiles developed in China (regarding the latter, see further pp. 283–284).

[21] Military and political considerations which would favour domestic development—for example, the desire to demonstrate independence of the main weapon suppliers—generally appear to be given less weight, particularly among countries with close-knit military alliance bonds. Such considerations have, however, played some role, for example, in recent Swedish and Japanese decisions to develop indigenously developed combat aircraft (see further pp. 279 and 281) and in the French nuclear weapon development programme.

versions, while more sophisticated types, for which production of the latest version lies beyond the domestic technical or financial capacity, are imported. The emphasis on keeping up in military technology results in the allocation of a substantial portion of the R&D effort to advancing the state-of-the-art in weapon-related technologies.[22] In addition, a good portion of the effort in some countries may be devoted to work on support equipment and weapon components which have close counterparts in civil industries and of which advanced versions can be developed comparatively easily.[23]

The eight less industrialized and non-industrialized countries with significant weapon development efforts—Israel, Spain, Yugoslavia, South Africa, China India, Egypt and Brazil—are not nearly so integrated into either of the two international weapon markets as the industrialized countries are.[24] At the same time, it seems that the nature of the military R&D activities undertaken in these countries is much less determined by a concern to strengthen the domestic economy or to maintain a weapon inventory incorporating the latest developments in technology. Instead, concerns deriving from the varying individual international *military* and *political* environments, and related desires to develop particular types of sophisticated weapon, even if the versions of these weapons which can be produced do not incorporate the most up-to-date technology, appear to play a dominant role in shaping the efforts. Some concerns which appear to be involved include, for example:

(1) The desire to accomplish a rapid build-up of the domestic industry to the point where the country is largely self-sufficient in weapon production, in order to secure the supply of weapons and reduce involvement in and dependence on the policies of industrialized weapon suppliers. (This applies particularly to China, India and South Africa, and to a less extent to all the others.)

(2) The desire to establish an indigenous weapon development capacity extending to comparatively sophisticated types of weapon, in order to demonstrate independence and strength to allies and opponents, and to deter the latter (China, India, Israel, Egypt).

(3) The desire to procure specific types of sophisticated weapon which may not be available from industrialized suppliers (China, Israel, South Africa).

[22] There is a considerable amount of cooperation in basic and applied research within NATO and between some NATO countries and Australia. This is indicative of a roughly comparable state-of-the-art among these countries in the areas where any work is undertaken.

[23] To take one example, development of components in the field of electronic equipment is undertaken in Denmark [6], the Netherlands [7] and Italy [8].

[24] Only four of these countries—Israel, Spain, South Africa and Brazil—have relied exclusively on either the Western or the socialist market for weapon imports; and these four have all been subject to embargoes of one type or another by the main weapon suppliers. The remaining countries have imported weapons from both Western and socialist countries or, in the case of China, developed a self-sufficient defence industry on the basis of imported designs. [9]

Rather than concentrate on the development of less sophisticated types of weapon and import advanced versions of more sophisticated types, these countries tend, therefore, to distribute their R&D efforts more thinly over a broader range of different types, including some of the most sophisticated ones, developing less advanced versions of the latter, if necessary, than those which are current among the industrialized countries. They may rely on import for some items of support equipment and some weapons of less sophisticated types than those being developed indigenously,[25] both of which are available from more numerous industrialized suppliers than the more sophisticated weapons, and both of which may be developed indigenously more rapidly than the sophisticated weapons, at a later date.

The significance of the efforts

In conclusion, there are a number of ways in which the military efforts of countries other than the United States and the Soviet Union are significant. First, they contribute, in varying degrees, to the continual world-wide advancement in weapon technology which constitutes the technological arms race. The activities of the industrialized countries in the conventional weapon area, involving work at the forefront of technology, contribute directly to the technological race in conventional arms, perhaps roughly in proportion to the overall size of the efforts. In contrast, the nuclear weapon R&D activities of France, the United Kingdom and China and the conventional weapon R&D activities of the less industrialized and non-industrialized countries, which lag behind the latest developments in technology elsewhere, support the technological arms race only indirectly. These activities do not help to advance the frontier of weapon technology, but, like the import of increasingly advanced weapons by many countries, they do contribute to the general rise in the level of technology incorporated in the weapon inventories throughout the world.

Second, the R&D programmes of a number of countries, particularly those involving activities which lag behind the forefront of weapon technology, may have political implications of special interest. The efforts of some of the less industrialized and non-industrialized countries, such as China, India, South Africa and Brazil, to the extent that they are successful and lead toward the establishment of a self-sufficient defence industry, may contribute to altering relations between these countries and the main industrialized weapon suppliers. In doing so, they may also affect the broader pattern of relations between the industrialized countries and the third world. Certain R&D activities may change regional power balances. The French and Chinese nuclear weapon programmes are of particular significance for the European balance of power

[25] For example, countries such as India, developing supersonic combat aircraft, may import simpler equipment like helicopters.

and the East-West confrontation in the first case, and for the balance in the Far East and the Sino-Soviet and Sino-American confrontations in the second case. The continued development of sophisticated conventional weapons by Israel and India, to take another example, may have important implications for the conflicts in the Middle East and the Indian sub-continent, and for the involvement of the big powers in these conflicts. New weapon development efforts on the part of Warsaw Pact countries may reflect evolving political relationships between these countries and the Soviet Union.

Third, the military R&D efforts of Western industrialized countries are important because they determine the countries outside the USA and USSR which will be the world's main weapon producers during the next 10–20 years. Within the next decade, it is likely that the United Kingdom and France will be joined by other countries—specifically Japan and West Germany—in this role. In addition, several of the countries with smaller military R&D efforts may expand their defence industries and undertake more cooperative work with the main weapon producers, narrowing the present gap in indigenous weapon development capability between the main producers and the remaining countries. The evolving structure of Western defence industries, in which military R&D efforts play an important role, is likely to have significant implications for the future of the military alliances and the other cooperative and competitive patterns of interaction among the Western countries.

The remainder of this chapter surveys the most recent developments in world-wide military R&D activities, and attempts to place these developments in contexts which are appropriate to the longer-term significance of the activities. The first section, on the United States and the Soviet Union, summarizes advances in strategic nuclear weapons. Limitations of time and space did not permit an analysis of developments in the equally significant conventional weapons and basic research programmes of these two countries. The next section, on Western industrialized countries, focuses on the economic and political considerations that are influencing the maintenance and spread of the capacity to develop the most advanced conventional weapons. The section on less industrialized and non-industrialized countries is mainly concerned with the rate of progress in the attempts to build up self-sufficient defence industries.

III. *Developments in 1972*

The United States and the Soviet Union: advances in strategic nuclear weapons

While the SALT I agreements placing quantitative limitations on strategic nuclear weapons were being concluded and set into motion by the USA and

Table 8.3. Changes in the strategic nuclear forces[a] of the five nuclear powers during 1972

	USA		USSR	
	Early 1972 (Pre-SALT)	Early 1973 (Post-SALT)	Early 1972 (Pre-SALT)	Early 1973 (Post-SALT)
1. Nuclear weapon delivery vehicles				
ICBMs[b] with MIRVed warhead	150	250	—	—
with MRVed warhead	—	—	—	1 520[j]
with single warhead	904	804	1 520[j]	
SLBMs[c] with MIRVed warhead	160	272	—	—
with MRVed warhead	368	256	—	—
with single warhead	128	128	400	496
Long-range bombers[d]	455	455	140	140
2. Force loadings (individual nuclear devices in missile warheads and free-fall bombs) deliverable by:				
ICBMs with MIRVed warhead	375	625	—	—
with MRVed warhead	—	—	—	(1 520)[m]
with single warhead	804	704	(1 520)[j]	
SLBMs with MIRVed warhead	1 600	2 720	—	—
with MRVed warhead	520	280	—	—
with single warhead	128	128	400	496
Long-range bombers	(2 460)[k]	(2 585)	(250)[k]	(250)[k]
Total force loadings	**5 887**[l]	**7 042**[l]	**(2 170)**	**(2 266)**[m]

	UK		France		China	
	Early 1972	Early 1973	Early 1972	Early 1973	Early 1972	Early 1973
1. Nuclear weapon delivery vehicles						
ICBMs[e] with single warhead	—	—	—	—	—	several
IRBMs[f] with single warhead	...	...	9	18	several	<20
MRBMs[g] with single warhead	...	...	...	...	<20	<20
SLBMs[c] with MRVed warhead	64	64	...	...	...	...
SLBMs[h] with single warhead	...	...	16	32	...	...
Medium- and short-range bombers[i]	...	...	36	36	30	100–200
2. Total force loadings deliverable by:						
ICBMs, IRBMs, MRBMs	...	...	9	18	<20	<50
SLBMs	192	192	16	32	...	...
Bombers	...	...	36	36	30	100–200
Total force loadings	**192**	**192**	**61**	**86**	**<50**	**<250**

Note: 'MIRVed warhead' denotes a warhead containing multiple independently-targetable re-entry vehicles; 'MRVed warhead' denotes a warhead containing multiple re-entry vehicles (not independently targetable); and 'single warhead' refers to a warhead with a single re-entry vehicle (not MIRVed or MRVed).

[a] The table covers the *main* nuclear forces of each country, including weapon systems in active inventories which are routinely assigned a nuclear-delivery role. (Details about the assigned role of individual systems are given in subsequent notes.)

In the case of the USA and USSR, only long-range weapon systems capable of reaching the entire territory of the other country are included. Estimates of the number of US and Soviet shorter-range systems with nuclear capability are given in the *SIPRI Yearbook 1972* [29]. These include on the US side carrier-based aircraft and foreign-based, shorter-range aircraft and missiles, capable of reaching parts of the Soviet Union and most or all of the territory of the other Warsaw Pact countries; and on the Soviet side, shorter-range aircraft and missiles capable of reaching European NATO countries and, in some cases, China.

the USSR in 1972,[26] qualitative advances in strategic weapon systems were being pursued in both countries with unabated vigour. Some of these advances took the form of changes in the operational strategic nuclear forces. (Changes in the strategic forces of all of the five nuclear powers during 1972 are shown in table 8.3.) Other advances, which are discussed below, involved weapon systems and techniques which are still under development.

In *the United States*, as development of new systems and improvement of existing ones continued, Administration requests for large increases in funds for strategic weapon R&D projects were put forward in February 1972, in the budget for Fiscal Year (FY) 1973 (July 1972–June 1973). Following a pattern set earlier, these requests were justified in part as a hedge against the uncertain outcome of the SALT negotiations [11]. When the SALT I agreements were put before Congress in June, however, no significant cutbacks in strategic weapon development projects were proposed. On the contrary, Administration officials claimed that the SALT agreements would endanger US security if they were accepted without concurrent support of budget requests for strategic weapon R&D [14–15]; and in the FY 1973 budget passed by Congress in October, all the major strategic weapon development projects originally

[26] A detailed analysis of the agreements is provided in chapter 1.

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[b] Intercontinental land-based ballistic missiles, range at least 5 000 miles, including on the US side Titan and Minuteman 1, 2 and 3, and on the Soviet side, "SS-7 Saddler", "SS-8 Sasin", "SS-9 Scarp", "SS-11" and "SS-13 Savage". (Here and below, Western designations used for Soviet systems of which the Soviet names are not known are shown in inverted commas.)

[c] Long-range submarine-launched ballistic missiles, range at least 1 750 miles, including for the United States, the Polaris A3 and Poseidon; for the Soviet Union, the "SS-N-6" launched from "Y-class" submarines; and for the United Kingdom, the Polaris A3.

[d] Range at least 6 000 miles. Includes all US B-52s in the active inventory, and all Soviet Mya-4 "Bisons" and Tu-95 "Bears", except about 50 of the former reportedly used as air-refuelling tankers and reconnaissance aircraft.

In addition to the long-range bombers, the US medium-range FB-111 bomber (range 3 800 miles) and the Soviet Tu-16 "Badger" aircraft (range 4 000 miles) are both capable of long-range missions with aerial refuelling. Only the FB-111 is equipped for the nuclear delivery role, however: current Tu-16s (the aircraft was first introduced in the mid-1950s) are either armed with anti-shipping missiles or else equipped for maritime reconnaissance. Different sources give 72, 76 or 77 as the number of FB-111s in the active inventory, and 66 or 67 as the number currently assigned a nuclear bomber role.

[e] Intercontinental (long-range) land-based ballistic missiles, range 3 500 miles.

[f] Intermediate-range land-based ballistic missiles, range at least 1 500 miles.

[g] Medium-range land-based ballistic missiles, range at least 600 miles.

[h] Intermediate-range submarine-launched ballistic missiles, range at least 1 300 miles.

[i] Chinese Tu-16 medium-range bombers, range 4 000 miles, and French Mirage IVA short-range bombers, range 2 000 miles.

[j] In addition to these launchers there are reported to be nearly 100 empty ICBM silos.

[k] Committee on Foreign Relations, US Senate, press release, August 1972.

[l] Excludes ICBMs and SLBMs under conversion; and assumes average force loadings of 2.5 warheads per missile on Minuteman 3 and Polaris A3, and 10 warheads per missile on Poseidon, to allow for decoys.

[m] Some Soviet ICBMs may have been supplied with MRV warheads in early 1973, following successful MRV testing in late 1972, but estimates of the increase this would cause are not available.

proposed by the Administration were approved at or near the full level of funding requested [16–17].[27] The progress made in these projects during 1972 and scheduled for the first half of 1973 was as follows [10, 16–19, 21, 25, 29].

In the area of submarine-based strategic forces, development was speeded up on Trident (formerly called ULMS), a system with a new, larger, "quieter" submarine and 20 or 24 larger, longer-range missiles capable of carrying increased payloads, which is to replace or supplement the current Polaris/Poseidon system. A very large and unexpected increase in funds was provided in the FY 1973 budget to bring the planned deployment date of the first Trident submarine forward two or three years, to 1978. Within the Trident programme, work proceeded on a smaller, interim missile (ULMS-1), with a range between that of Poseidon (about 2 900 miles) and the planned Trident missile (6 000 miles), which will fit into Poseidon as well as Trident launch tubes, and which may be deployed as a replacement for Poseidon on existing submarines. Final development of Poseidon was still under way in 1972, as this MIRVed missile continued to be fitted into submarines which previously carried Polaris. (The launching of submarines converted from Polaris to Poseidon, which began in 1971, is now scheduled for completion in 1973–74. Of the 41 ballistic-missile submarines, 31 are to be converted.)

In the area of land-based strategic missiles and strategic bombers, full-scale development of the new B-1 bomber continued, with construction of two prototypes well under way and first flight scheduled for 1974; and further improvements were made to the Minuteman II and III ICBMs, involving increased silo and launcher hardness, increased missile hardness during powered flight, and reduced time to retarget. After a period of dormancy, work on SCAD—a Subsonic Cruise Armed Decoy intended to improve bomber penetration of enemy defences by simulating the radar characteristics of a bomber, thus decoying attacks away from the real planes, and by attacking enemy forces—was resumed, with a large increase in funding and an early potential production date (1975) in view. Development of SRAM, a nuclear-tipped Short-Range Attack Missile designed to provide strategic bombers with a 'stand-off' attack capability, was completed and modification of some B-52s to carry this missile was undertaken, while further work on Hound Dog, the nuclear air-to-surface missile currently carried on advanced models

[27] In comparison with the funds requested (see table 8.1, pages 256–257), there were minor *reductions* in R&D funds actually appropriated for the new Trident submarine-based missile system and for Safeguard. At the same time, *increases* were provided for the Advanced Airborne National Command Post (AABNCP) and for the Airborne Warning and Control System (AWACS), in both cases accompanied by cuts in the requested procurement funds. In the discussion of these and other weapon systems which follows, reference is made to the *actual appropriations* (not to the amounts requested in the budget), and to changes in the level of appropriations over previous years.

of the B-52, was supported. Continuing programmes to improve various aspects of the performance of both bombers and ICBM re-entry systems (the latter under the project name ABRES—Advanced Ballistic Re-entry Systems), under way for many years, were also supported.

Development of several defensive strategic systems was accelerated. While deployment of anti-ballistic missiles (ABMs) was quantitatively limited by the SALT I ABM Treaty, resulting in some reduction of funds for the Safeguad ABM system, tests of Spartan and Sprint missiles and the associated Missile Site Radar continued, together with procurement and construction, in preparation for deployment at the site of one Minuteman complex. At the same time, increased funds were provided for development of Hardsite, a modified ABM system designed to replace or supplement Safeguard;[28] and work on ABM area defence was continued under the Advanced Ballistic Missile Defense programme, which included projects in the area of data processing, solid state radar, and non-nuclear kill techniques. Further development of a new, operational ballistic missile early-warning satellite system which detects ICBM launches was undertaken; and several projects were supported, including the development of new radars and other sensors, to provide earlier warning of attacks by submarine-launched ballistic missiles against strategic bomber bases, to create redundancy in the capabilities of the various early-warning systems (through deployment of a greater variety of sensors not susceptible to the same types of countermeasures), and to integrate these systems. Increases of over 60 per cent were allocated in R&D funds for SAM-D, a major new surface-to-air missile system, and for the new Airborne Warning and Control System (AWACS), designed, first, to provide warning of bomber attack on the USA—by means of advanced, airborne 'lookdown' radars which can detect and track aircraft at any altitude below them, against heavy land and sea clutter—and second, to direct attacks against incoming bombers.[29] In addition, a considerable amount of work was undertaken in the area of anti-submarine warfare (ASW), including projects involving hunter-killer submarines, land-based patrol aircraft, sea-based helicopters and fixed-wing aircraft and carrier ships, missiles, torpedos, mines, sonobuoys and other sensors, and associated electronic equipment and command-and-control and communications systems. Although many of these projects are financed through Defense Department budget accounts for general purpose forces, rather than strategic forces, they are aimed at enemy ballistic-missile submarines, as well as tactical attack submarines. They are also relevant to the defence of ballistic-missile submarines

[28] This system was renamed Site Defense of Minuteman (SDM) during the course of the year.
[29] Development of SAM-D and AWACS is discussed by US defence officials in the context of both strategic forces [25] and general purpose forces [10, 21].

from enemy attack submarines, and to the development of ballistic submarines which will be more inaccessible to enemy ASW efforts.

Continued development of three main new command-and-control and communications systems for strategic forces was also supported. These are the Advanced Airborne National Command Post, the Sanguine low frequency system for continuous communications with ballistic-missile submarines, and a new satellite communications system.

As indicated earlier, the little information which is available about the strategic weapon development programmes of *the Soviet Union* comes from Western sources. This information is generally limited to the description of a few main features of major projects in advanced stages of development.[30] There is, thus, little basis for judging whether Soviet R&D programmes accelerated, slowed down or simply maintained the previous level of activity in 1972. Work was under way on a variety of major strategic weapons, all of types comparable to types under development in the United States—a new, longer-range submarine-launched ballistic missile and modified submarine; a new strategic bomber; modified land-based missiles (ICBMs), missile launchers and re-entry vehicles; and an improved ABM missile. However, a number of major US projects under way in 1972 had no known counterparts in the Soviet Union (for example, SCAD, SRAM, AWACS and point defence ABM missiles); and, as illustrated in the more detailed account below, the advances which were being made appeared to lag behind advances under way in comparable areas in the United States, in a number of cases (multiple warheads for submarine- and land-based missiles, strategic bombers, ABM).

Development and testing of a new long-range submarine-launched ballistic missile, under way since the late 1960s, continued during 1972 [30]. The new missile, referred to in the West as the "SS-N-8 Sawfly",[31] is reportedly larger and has a much longer range (estimated at 3 000–3 500 miles) than the missile currently carried on "Y-class" submarines—the "SS-N-6", with an estimated range of about 1700 miles [30–31].[32] The first reports that a new class of submarine designed to carry this missile was under construction appeared in the spring of 1972 [32–33]. The vessel, which has 12 launch tubes for ballistic missiles (there are 16 on the "Y-class" submarine), is described as a modified version of the "Y-class" by US officials, who call it the "Y-2" (or "Yankee-2")

[30] Additional details may be known by governments in the West but withheld from public distribution, at least initially, on the grounds of helping to conceal the capabilities and limitations of various channels of intelligence.

[31] Here and subsequently, Western designations of Soviet weapon systems are used when Soviet designations are not known, but they are shown in inverted commas.

[32] Reports which appeared in late 1972 and early 1973 indicated that the new missile had been tested at even longer ranges (4 500–5 000 miles) [106–107].

[30, 32–33]. The new submarine had been launched by the autumn of 1972 [30], and was reported in early 1973 to be undergoing sea trials [107].

The swing-wing strategic bomber referred to in the West as "Backfire", which has been observed in construction and testing for several years, appears to have entered the final stage of development in 1972. Five prototypes were being tested early in the year [34]; and this number had increased to 12 by October, indicating a decision to proceed with series production [35–36]. The reports which are available suggest that this aircraft has a comparatively limited unrefueled range (4 000 miles), and that it may not be intended for use as an intercontinental bomber, although it can be refueled [26, 34–35, 37]. The airframe is said to resemble a scaled-up version of the Tu-22 intermediate-range bomber (the "Blinder"), shown in Moscow in 1961; and it is reported that design changes over the Tu-22 represent only moderate advances in technology [37]. The prototype of a potential supersonic bomber with a new delta-wing design is said to have been observed in flight testing at the end of 1972; but it is considered unlikely that the Soviet Union would produce this bomber as well as the "Backfire", and the prototype is thought to be intended for experimental purposes only [38].

The modification and testing of Soviet land-based intercontinental ballistic missiles which took place in 1972 appear to have been directed mainly toward improving missle accuracy and multiple-warhead capability. Reports that the three later-model Soviet ICBMs—the smaller "SS-11" and "SS-13" and the larger "SS-9"—had been tested with multiple warheads (MRVs, not independently targetable) and possibly with independently targetable multiple warheads (MIRVs), and might have been deployed with a MRV or MIRV warhead, were supplemented by US officials early in 1972 with the following information:

(1) The "S-9" was tested with a MRV warhead with three re-entry vehicles between August 1968 and November 1970 in what may have been an unsuccessful attempt to develop a MIRV system.

(2) Testing of improved versions of the "SS-11" had been under way since the latter part of 1969.

(3) No MRV (or MIRV) tests had been observed during 1971, although testing of improved versions of the "SS-9", "SS-11" and "SS-13" was under way [22, 27].

After an incident in early June, in which US Secretary of Defense Laird stated that a Soviet ICBM with a MIRV capability had recently been tested, at the same time that Gerard Smith, leader of the US SALT delegation, asserted elsewhere that the Soviet Union did not have a MIRV capability, the following additional information was released by the US Defense Department:

(1) Multiple warhead tests of the "SS-9", "SS-11" and "SS-13" had been

observed in the late 1960s and early 1970s, and these appeared to have involved the dispersion of the re-entry vehicles by means of a track system, in which "corrections for distance or range could be made by tilting the track up or down and corrections from side to side could be made by rotating the whole system". As a result of the minor amount of individual guidance provided, this system could be considered a MRV system or a very crude MIRV system.

(2) The halt in testing of this system in 1971 may have indicated Soviet dissatisfaction with the system, which might, however, have been deployed on existing ICBMs as an interim measure.

(3) The early 1972 testing of an "SS-9" to which Secretary of Defense Laird had referred appeared to have involved the use of a MIRV 'bus' (a manoeuvrable warhead which can carry more than one re-entry vehicle and which can target the individual re-entry vehicles by manoeuvring into the correct position before releasing them). A 'bus' system, comparable to that employed for US MIRV warheads, would permit much better individual guidance of re-entry vehicles than a crude track system. There were no full-fledged MIRV tests, however, since the bus (if it was one) carried only one re-entry vehicle.

(4) The earliest tests of the US MIRV system involved a bus with a single re-entry vehicle, and by analogy to the development sequence in the United States, a full-scale Soviet MIRV test might be expected to occur within a few months [39; see also 40].

No such test had been reported by the end of 1972. MRV tests of the "SS-11" were, however, reported. One report indicated that long-range testing of a more accurate version of the "SS-11", with a warhead carrying three re-entry vehicles (MRVs), each containing a nuclear device of one-half megaton explosive power, had occurred between early June and the end of September [30]. Two further tests of the "SS-11", with a three-MRV warhead, were conducted on 13 and 18 October: the tests were said to involve an improved, longer-range "SS-11", with a new booster which increased the range of this missile from 3 000 miles to 4 700 miles [41–44]. In addition, it was reported that between the conclusion of the SALT I agreements and the end of September, the Soviet Union had tested a streamlined ICBM warhead, which entered the atmosphere over the target more rapidly than earlier warheads, improving missile accuracy and ABM penetration; and a manoeuvring warhead, which used a ground-scanning device to correct its course and which might be used to improve ICBM accuracy [30].

No new developments were reported during 1972 concerning the nearly 100 empty ICBM silos, which are too large to be suitable for existing Soviet ICBMs, reported under construction during 1971 [23, 34]. The sizes and location of these silos have given rise to the belief that they may be intended for larger, improved versions of the "SS-9", in the case of 25 or 30 of the silos, and of the

"SS-11", in the case of the balance [45–47, 49]. Another indication that development of larger missiles may be under way was found in a report that a new ICBM launching technique had been developed, that appears to pop the missile out of the silo before ignition of the liquid-fueled engine. This would permit the emplacement of larger missiles in existing silos, since the protective devices currently used inside the silos to shield the missile from flame, blast and debris would no longer be required. [30]

Testing of new ABM radars and a new ABM missile that travels more rapidly than the current 'Galosh' missile, improving the ability to intercept incoming missiles, was reported to have taken place during the course of 1972 [30].

Other Western industrialized countries: changing patterns in the support of military R&D

In recent years, there has been a tendency for total military expenditure to remain roughly constant in the other Western industrialized countries with large military budgets—FR Germany, France, the UK, Italy, Canada, Japan, Australia, the Netherlands and Sweden, all with annual military expenditures over $1 000 million. At the same time there have been substantial increases in the compensation of military and civilian personnel, and this type of expenditure has tended to absorb a larger and larger portion of the defence budgets, despite cutbacks in personnel. These economic trends, and the political factors which have produced them, have resulted in increasing pressure on defence officials to make the most of the funds available for the procurement of weapons. The pressure has been heightened by the fact that while procurement funds have probably not increased much—they may have fallen or remained roughly constant in most of these countries—the unit cost of weapons and other items of military equipment has continued to rise, in part as a result of increasing R&D investment in various types of weapon. In reaction to the growing pressures, there have been two main trends of interest from the R&D point of view: first, the support of cooperative weapon development has grown sharply; and second, there has been increasing emphasis on the non-military benefits of domestic development and production as a source of weapons.

The large number of cooperative weapon development projects under way in the past few years is illustrated in table 8.4. In contrast to the few joint projects undertaken earlier in the 1960s, many of those now in development involve weapons of very sophisticated types—for example, the multi-role combat aircraft under development by the United Kingdom, FR Germany and Italy, which is the largest single project under way in any of these countries; the Jaguar advanced strike aircraft being developed by France and FR Germany; and the Martel air-to-surface and modified Ikara anti-submarine

Table 8.4. Main joint weapon projects under study, development or testing in Western industrialized countries, 1970–1972

	United Kingdom	France	F R Germany	Italy	Belgium	Netherlands	Norway	Canada	United States	Australia	Switzerland
Missiles:											
Martel AJ. 168 (air-to-surface, TV-guided)	×	×									
Martel AS. 37 (air-to-surface, anti-radar)	×	×									
Roland I (surface-to-air)		×	×								
Roland II (surface-to-air, all weather)		×	×								
Albatross (air-to-ship)		×		×							
Komoran (air-to-ship)[a]		×	×								
Otomat (ship-to-ship)		×		×							
Penguin (ship-to-ship)[b]			×				×		×		
Sea Sparrow (ship-to-ship)[c]						×		×			
Ikara (anti-submarine), modified version	×									×	
Atlas (anti-tank)[d]	×				×						
Cobra (anti-tank)[e]			×								×
Hot (anti-tank)		×	×								
Milan (anti-tank)		×	×								
Aircraft:											
Panavia 200 MRCA (multi-role combat aircraft)	×		×	×							
Jaguar (supersonic strike, advanced trainer)	×	×									
Mirage F1 (fighter)[f]		×			×						
Alpha Jet (subsonic trainer, ground attack)		×	×								
Lynx (multi-purpose helicopter)	×	×									
Puma (tactical utility helicopter)	×	×									
Gazelle (light utility helicopter)	×	×									
Basic trainer	×			×							
AN/USD-501 (CL-89) (surveillance drone)	×		×	×				×			
Aerial unmanned reconnaissance system	×		×								
Aeroengines:											
RB. 199 (turbofan)	×		×	×							
Adour (turbofan)	×	×									
Pegasus 15 (turbofan)	×								×		
Viper (turbojet)	×			×							
Armoured vehicles:											
MBT-70 (main battle tank)			×						×		
VCL (light command vehicle)		×	×	×							
CVR(T) (tracked combat reconnaissance veh.)	×				×						
155 mm self-propelled howitzer	×		×	×							
Equipment and support systems:											
NADGE (NATO air defence ground environment)	×	×	×	×		×			×		
NAFAR (NATO Azores fixed acoustic range)		×							×		
ZENDA (battlefield surveillance radar)	×		×	×		×					

[a] Originally joint development by French and West German companies; subsequently under development in FR Germany only.
[b] Developed in Norway with assistance from the United States and FR Germany.
[c] Canadian development of US missile (Sparrow III) with fire control system developed in the Netherlands.
[d] Private venture.
[e] West German development with work subcontracted to Swiss company.
[f] French development with work subcontracted to Belgian company.

Sources: [46, 50, 55–56, 102–105]

missile systems, under development by the UK and France and the UK and Australia, respectively. Most of the current cooperative projects include, among supporters, either the United Kingdom or France (or both). These two main weapon producers both conduct a large number of additional, national weapon development projects, but they reduce the economic burden of their R&D effort and increase the types of weapon under development through joint undertakings. In the United Kingdom, there has recently been a large increase in military R&D spending,[33] which probably reflects a shift of funds from procurement to R&D. The British effort remains heavily concentrated in the area of conventional weapons.[34] In France, R&D expenditures may have remained roughly constant,[35] but there has probably been a shift of emphasis from nuclear weapons to conventional weapons. Development of the first generation of French strategic nuclear weapons—including intermediate-range land-based ballistic missiles (IRBMs), submarine-launched ballistic missiles and the associated submarine, and free-fall airborne nuclear bombs—has been completed and weapons of all these types are now operational [53–54]. Fewer resources are required for the continued development of strategic nuclear weapons, which now involves the testing of thermonuclear warheads, and the development of modified land- and submarine-based missiles to carry these warheads [48, 52–54].

In FR Germany, which has had a smaller, newer and more rapidly expanding military R&D effort than the UK or France, joint development projects probably represent a larger share of the overall effort. When conducted together with the UK, France or the USA, as almost all of the German joint projects have been, they become a means of increasing technical competence more rapidly than would probably be the case with independent development. FR Germany remains committed for the next few years to import a large proportion of its military equipment from the United States (to offset the cost of US troops stationed in Germany) [55]—and, thus, to devote a smaller proportion

[33] See appendix 8A, pages 290 ff, for estimates of the military R&D expenditures of the UK and other countries.

[34] The only recent major British R&D activity related to its strategic nuclear force has been the development of submarines to carry American-supplied Polaris ballistic missiles, and of warheads to be used on these missiles, both completed several years ago; and the development now under way of new communications satellites, which are to be launched by the United States to replace the present Skynet satellites [50].

[35] It has not been possible to update the estimates of French military R&D expenditure. There is a very large discrepancy between recent estimates of military R&D funds included in French national R&D expenditure statistics, for example, those reported to the EEC for 1971 [51], which show military R&D spending around 2 900 million francs, and the figures given for 'research, development and testing' in the French defence budget, which total over 6 000 million francs [52]. It is likely that a figure comparable in definition to those available for other countries would lie somewhere between these two. Neither of the two types of estimate which are available shows any major change in the level of military R&D spending in recent years.

of its military budget than the UK or France to a domestic R&D and production effort. In addition, the government has stated that the country "does not seek an autarchic position in arms production" and that:

> Weapons and equipment will be purchased abroad whenever domestic capacities are not available. This will avoid having to subsidize or otherwise support capacities that are not justified from the point of view of the national economy. [57]

However, the variety of conventional weapons now under development in FR Germany and recent increases in military R&D spending imply a considerable growth of domestic defence production in the late 1970s. An expanding domestic defence industry and military R&D effort may, furthermore, be expected to follow from the government's exclusion of high-technology areas from its non-protective procurement policy:

> Projects involving a high degree of technological innovation are not affected by that policy: the German economy cannot afford to forgo the benefits deriving from such defence projects for civilian production, especially since national development of weapons and equipment as well as collaboration in international armament projects are dependent on a high technological standard of our industry. [57]

For the European NATO countries with small military R&D efforts—Italy, the Netherlands, Belgium, Norway and Denmark—participation in joint development projects is a means of increasing the share of weapon procurement expenditures spent domestically, and of keeping abreast of developments in technology which lie beyond the financial resources of the country to support independently. In Italy, Belgium and Norway, joint projects account for most of the national effort in major weapon development.

The joint projects under way among Western countries involve mainly the European NATO countries (table 8.4). There has long been discussion of standardization of weaponry and cooperation in defence production within NATO, but until recently, the main cooperative activity under way was that undertaken by the individual defence industries.[36] Government coordination of weapons "requirements", attempts to avoid duplication of R&D effort and joint finance and supervision of projects were very limited. Even now, most of the joint projects reflect agreements among not more than two or three countries, but there are signs of increasing cooperation. The discussions of the NATO "Eurogroup", formed in 1968 by ten European members of NATO, are

[36] Subcontracting to foreign companies for components of military systems under development has been fairly common and can be quite extensive: it was recently shown, for example, that 22 British companies have contracts under the comparatively small German VAK 191B experimental STOL aircraft programme [58]. In addition, there is a considerable amount of multi-national ownership of defence industries in NATO countries [59]. There have also been a few joint weapon development projects undertaken by companies from two or more countries on a private venture basis.

presently focused on the question of increased cooperation in weapon development and procurement [60]; and the United Kingdom has recently called for the creation of an integrated European aircraft industry [61]. The United States has also given more attention to the idea of cooperation in defence procurement, but the emphasis has been on freeing US R&D resources for other activities by importing weapons already developed in Europe, in addition to engaging in cooperative development projects [12]; and in Europe, there is concern to maintain and expand a defence industry which will be independent of, and competitive with, that in the United States. A potential obstacle to increased integration of European weapon development efforts is the possibility that France would not support such an endeavour: France remains outside the integrated NATO command structure and has not taken part in "Eurogroup" discussions. Signs of increased French reliance on NATO allies have appeared since the retirement of President de Gaulle, however; and there has been much speculation that the entry of Britain into the European Economic Community would mark the beginning of an era of increased cooperation in European defence efforts.

Outside the European NATO group there has been much less of a tendency to turn to joint development projects as a means of supporting military R&D efforts in the face of increasing economic and political pressures. In Sweden and Switzerland, two non-aligned countries which are not engaged in any cooperative projects at the government level,[37] domestic weapon development has been supported by a concern to keep procurement funds within the country and maintain domestic employment, even at the expense of reductions in other areas of military activity, such as training and operations.[38] There has been a sharp rise in Swedish military R&D expenditures in the past two years, reflecting an unexpected increase in the costs of developing an interceptor version of the new Viggen supersonic combat aircraft. The dimensions of the Viggen project have drawn considerable attention within the country, leading to a state-

[37] Swedish companies have subcontracted much work on weapon development projects to firms in the USA, UK and France; and Swiss firms are often involved in undertakings supported by foreign funds.

[38] A Swedish parliamentary committee, which recently investigated alternatives to domestic development and production of a new, costly interceptor aircraft (the JA 37 Viggen), rejected licensed production of a comparable foreign aircraft on the grounds that, when the costs of necessary modifications were included, the unit price would not be significantly lower than the estimated cost of the planned Swedish plane. Import of foreign-made aircraft was also rejected, but not on the same grounds—and this course might presumably have represented a cheaper alternative. However, it was observed that it would lead to "engagement of foreign industry, over a period of many years" to adapt the aircraft to the Swedish air defence system and manufacture it to Swedish specifications. It was felt that this would "create a relationship of dependence"; and it was also observed that it would lead to "a significant outflow of currency". A decision was therefore taken to proceed with development of the Swedish aircraft. At the same time, as a result of the fact that the military budget is being held roughly constant, reductions were being made in military training and in operations [62].

ment by the 1972 congress of the ruling Social Democratic Party that development of a more advanced aircraft would not be undertaken following completion of work on the Viggen [63].[39] Switzerland, with a steadily growing military R&D budget, has continued to support domestic development of advanced armoured vehicles, including a new main battle tank, despite evidence that as a result of shorter production runs, the unit costs of Swiss tanks are higher than those of foreign counterparts. It is now uncertain, however, whether production of the latest tank will be undertaken. [65] In Canada, where a comparatively specialized weapon development programme has long been supported in part as the basis of a potential export industry [66], there has been a reorientation of a further portion of the military R&D effort to provide results which will be of greater potential benefit to civilian areas of concern. This is illustrated in the most recent annual report of the Defence Research Board, which finances about half of Canadian military R&D:

> Recent reorganizations of the Board's scientific program have been largely oriented toward meeting the changing defence priorities announced in the White Paper entitled "Defence in the 70's". More emphasis is being placed on research related to the roles of the Canadian Armed Forces in maintaining Canadian sovereignty and internal security. Relevant to these are studies of human performance under environmental stress, surveillance and communications in the north, military mobility under arctic conditions and sociological studies of military-civilian relationships, particularly in times of social unrest. Since the Defence Research Board has limited resources, this change of emphasis in its scientific program has necessitated a reduction of effort in other areas, such as the programs on Nuclear, Biological and Chemical Defence, Weapons Research and Deep Ocean Anti-submarine Warfare Research. [67]

Japan and Australia differ from the other Western industrialized countries in that both have increased their defence budgets and weapon procurement funds recently and plan to increase them even further over the next five years. In Australia, where withdrawal from Viet-Nam and a reorganization of the defence effort are, together with a rise in the defence budget, providing a six-fold increase in procurement funds over the period from 1971/72 to 1976/77, the military R&D effort will expand to include more domestic development of ships and aircraft and modification of imported major weapons. This is in addition to research in weapons-related technologies and work on electronic systems, support ships and vehicles, where most of the effort is now concentrated [68]. In Japan, a doubling of the defence budget over 1972/73–1976/77 will make this country the seventh in the world (along with the USA, USSR, UK, France, FR Germany and China) to pass the $2-billion mark in military

[39] A subsequent statement issued by the Swedish Defence Department indicated that the adoption of this resolution did not preclude continued domestic development of sophisticated —though not necessarily "more advanced"—aircraft [64].

spending [69]. Although a large portion of new military equipment will continue to be imported during this period, a major expansion of the domestic defence industry is under way; and production of domestically developed conventional weapons of the most sophisticated types, including a supersonic fighter aircraft, a new main battle tank, advanced air-to-surface and surface-to-surface missile systems, and possibly a nuclear-powered submarine, will be undertaken during the 1970s [69–74]. An attempt by the Japanese Ministry of Finance to improve the balance-of-payments situation with the United States by requiring the import of US aircraft, rather than approving the production of the new Japanese-designed supersonic fighter, failed under pressure from the Defence Agency and Japanese industrialists, who reportedly "contended that Japan should build her own defence production facilities, acquire the technology needed for building jet aircraft, and reduce her reliance on the United States" [69; see also 74].

Other Warsaw Pact countries: continued limited efforts

Little new military R&D activity among other Warsaw Pact countries—Czechoslovakia, Poland, German Democratic Republic, Romania, Hungary and Bulgaria—was noted during 1972. Czechoslovakia was reportedly developing an armed version of its advanced jet trainer [75], and a new utility helicopter; and there were reports that Poland might join in the latter venture [76–78]. Another collaborative project, involving the development of a jet trainer/lightweight fighter, has been reported under way in Romania and Yugoslavia [79–81]. If this project is carried through, it will represent the first known major weapon development work by Romania, and the first project involving cooperation in military R&D between a member of the Warsaw Pact and a country outside the Pact.

Less industrialized and non-industrialized countries: moderate advances in domestic development efforts

Following the ground-breaking efforts with which a number of less industrialized and non-industrialized countries initiated development of indigenously designed major weapons during the 1960s, the military R&D undertakings of most of these countries in the early 1970s appear somewhat less spectacular. In general, advances in weapon development capability appear to be continuing, but at a moderate pace, while greater efforts are aimed at consolidating the domestic defence production base through production and deployment of weapons developed earlier, and through licensed production of more sophisticated foreign weapons. (The overall defence production efforts of these are described in chapter 10.)

Among the less industrialized countries, *Israel* has probably advanced most quickly in the capability to develop increasingly sophisticated weapons. Deployment of new Israeli-designed weapons (not included in the 1960–68 survey shown in table 8.2) has not begun, and few details of weapons under development or in production are available. There have, however, been reports that a new television-guided air-to-surface missile with an 18-mile range and a family of surface-to-surface missiles with a maximum range of about 40 miles are under development [82–83]. In addition, a supersonic jet aircraft and a new main battle tank, both based on foreign-designed weapons and incorporating parts of foreign weapons, are reported to have been developed [82]. An armed version of the Arava light transport aircraft has also been produced [84]. More significant, sophisticated electronic equipment, including an advanced airborne computer, an airborne fire-control radar and an air traffic-control radar, have been developed [85]. These are illustrative of a technological base which is probably much more advanced than that in any of the other less industrialized countries. Israeli military expenditure is now much higher (over $1 000 million annually) than it was on average during the 1960s ($300–400 million), which means that more resources are probably available for the support of military R&D. In addition, industrialization has proceeded rapidly in Israel. From a technological point of view, the military R&D effort should probably be viewed within the context of the efforts of industrialized countries rather than those of the less industrialized, although many political and military factors relevant to Israeli weapon development are more comparable to those prevailing in the latter.

Development of comparatively sophisticated weapons in other less industrialized countries, planned or under way in 1972, included: a new class of submarine, the first of which was launched in March, in *Spain* [86]; a jet-powered version of an indigenously developed counter-insurgency aircraft in *Argentina* [87]; a second-generation jet trainer/ground attack aircraft in *Yugoslavia* [79–81]; and second-generation armoured cars in *South Africa* [88]. In addition, a new supersonic anti-aircraft missile was reported in January 1972 to have been successfully tested by South Africa [89] (there have been no further reports of this weapon); and this country is producing domestically designed support equipment, as well as licensed versions of sophisticated foreign weapons [90]. Production and deployment of indigenously designed weapons developed during the 1960s were under way in all of these countries.

Turning to the non-industrialized countries, the weapon development programme of *China*, first, continued to be comparatively small and devoted almost entirely to nuclear weapons. No new major conventional weapons were reported in 1972, the only Chinese-designed types noted as of that date being a destroyer armed with anti-ship missiles and an attack submarine,

possibly nuclear-powered, both still under construction, and the supersonic fighter aircraft referred to in the United States as the "F-9", which was in series production. In addition to a variety of weapons copied directly from original Soviet supplies, a number of modified Soviet types are reportedly produced in China, including the "R-class" conventionally-powered attack submarine, the T-62 medium tank produced in a light tank version, and the "SAM-2" surface-to-air missile [92].

The Chinese nuclear weapon development programme appeared to be proceeding at a moderate pace in 1970–72. There was one test of a thermonuclear device in 1970, one test of a nuclear device in 1971 [92], and two small-yield tests—presumably also nuclear—on 7 January and 18 March 1972 [93–94]. Thermonuclear weapons which are sufficiently light and compact to be deployed in ballistic missiles have apparently not yet been developed. The smaller-yield nuclear tests and an underground test in 1969 have led to some speculation that China may be aiming at production of tactical nuclear weapons, suitable for battlefield use against large troop concentrations—rather than longer-range, higher-yield strategic nuclear weapons intended for deterrence—as the first priority of the nuclear weapon development programme [92, 95–96].

There have been conflicting reports of the progress of China's work on ballistic missiles, but the following main points appear fairly definite in retrospect: medium-range ballistic missiles (MRBMs)—the "SS-3 Shyster" and "SS-4 Sandal", with a range of about 600–1 000 miles—were supplied to China by the Soviet Union in 1958–59 and were tested by China in the early 1960s [92]. Development of a Chinese version of the single-stage "SS-4"—the Chinese medium-range ballistic missile (MRBM)—followed. No details have been found which indicate whether, or to what extent, the Chinese MRBM differs from the "SS-4"—that is, it is uncertain whether the Chinese development effort was simply devoted to reproducing the design and domestically manufacturing copies of the "SS-4", or extended to modifications. The only Chinese nuclear test in which a missile was employed as a delivery vehicle, on 27 October 1966, is reported to have involved the use of an "MRBM (Soviet-type SS-4 Sandal)", or a missile "of one of the early Soviet types, possibly the SS-4" [92, 97]. Testing of the Chinese MRBM, at ranges of 600–1 000 miles, is reported to have occurred between 1967 and the end of 1969. Deployment of the missile is said to have followed, in 1970–72, but the exact dates of deployment and the numbers deployed are uncertain. Estimates of numbers deployed include "a few" [24], nearly 20 [91], and 15–30 [95]. There is some evidence that the missile may not have been deployed in more than a temporary manner. The annual US Secretary of Defense "Posture Statement", which summarizes the latest intelligence, said in early 1971 that limited deployment "may have occurred" [92] and again in early 1972 that the missile "may have

been deployed" [24]; and the annual statement of the US Chairman of the Joint Chiefs of Staff in early 1972 noted that China "has been testing an MRBM for a good many years and can probably deploy this weapon at any time they choose" [28]. Part of the uncertainty about deployment may result from the fact that these missiles are not emplaced in silos, as are all the more advanced strategic missiles now deployed in the USA, USSR and France: silo deployment is impossible because the propellant used to fire the missile involves an admixture of liquid oxygen which cannot be stored in the missile but must be put in just before firing [28, 91]. Since silos are not used, any 'operational' missiles may have been set up for launching at one time, then taken down, moved to another location, and so on, also resulting in uncertainty as to the total number of missiles deployed (if any).

Testing of a three-stage intermediate-range ballistic missile (IRBM), with a range of about 2 000 miles, is reported to have begun in 1970. It is considered likely that a version of this missile was used to launch the two Chinese satellites put into orbit in April 1970 and March 1971 [92, 97]. Deployment of the IRBM, with an improved liquid propellant permitting the emplacement of the missile in silos, is said to have begun by early 1972 [74]; and deployment of an IRBM with an even longer range (about 3 500 miles) was reported late in the year [107].

In *India*, a variety of major projects related to conventional weapon development are in different stages of progress. The first Indian-made frigate is undergoing trials; a new piston aeroengine, designed in the defence laboratories, is about to enter production for an Indian-designed civil aircraft; a basic trainer aircraft, designed in a civil laboratory, is in flight testing for the defence forces; and the first Indian-designed jet aircraft engine has recently completed a successful test run. In addition, development of a high-altitude observation helicopter is just getting under way, and there are plans to produce a modified version of the Gnat light fighter aircraft within the next few years, and a more advanced supersonic combat aircraft of Indian design (the first, the Marut HF-24, has now been produced and deployed) later in the 1970s. [98–101]

A much more limited effort is under way in *Brazil*, including the development of several less sophisticated aircraft and modifications of a number of more sophisticated foreign weapons. No new major projects have been undertaken in *Egypt* since the unsuccessful attempt to develop a supersonic aircraft and surface-to-surface missiles during the 1960s.

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Appendix 8A

Statistical tables, sources and methods

A much more detailed description of sources and methods appeared in the SIPRI Yearbook 1972 [1]. *Only the most important points are repeated here, along with information relating to the most recent figures.*

In compiling the estimates of military R&D expenditure which follow, an attempt has been made to obtain figures which represent:
—the total R&D expenditure of the Defence Department, or comparable administrative unit;
—plus any R&D expenditures of other government departments and agencies, which are made for defence purposes or support development of weapons.

The main sources of information relating to military R&D expenditure are national defence budgets and related documents (annual reports of defence departments and other agencies, white papers on defence, and so on); national R&D statistics, compiled by the central statistical office or national science council, or comparable administrative unit; and international R&D statistics, compiled by UNESCO, OECD and EEC.

Sufficient information has been found for Canada and the United States to assemble series of military R&D expenditure *which have not been published elsewhere* and which are believed to come very close to the definition set out above: the sources include both budgetary documents and national R&D statistics. (For the composition of the US estimates, see [1].) In the case of the Federal Republic of Germany, the Netherlands, Sweden and the United Kingdom, the estimates, which include a small amount of non-defence department expenditure as well as defence department R&D expenditure, are taken directly from official sources—at least for the most recent years: they may exclude minor amounts which ought to be included under the definition given above. The estimates for Australia, Austria, Denmark, Finland, Norway and Switzerland, all taken from defence budget sources, cover defence department expenditures only: it is believed that they represent most if not all defence department R&D expenditures and also come close to total national military R&D expenditures as these are defined above. The figures for Belgium, France and Italy, on the other hand, are taken from national and international

R&D statistics and the exact coverage is not known (figures are simply given under the heading "defence"). The estimates may be on the low side in the case of France (see note 35, page 277) and Italy. The most recent estimates for India and Japan are taken from press reports. In the case of Japan, the figures appear to cover expenditures under the main R&D programme of the Defence Ministry only; and it is possible that substantial amounts of additional military R&D expenditure are channelled through other budget accounts.

Table 8A.1. Military R&D expenditure, 1953–1972[a]

	Local currency	1953–54 1953	1954–55 1954	1955–56 1955	1956–57 1956	1957–58 1957	1958–59 1958	1959–60 1959	1960–61 1960
Australia[c]	*mn. dollars*	...	...	28	29	29	30	30	31
Austria[d]	*mn. shillings*	...	...	...	...	...	...	...	...
Belgium[d]	*mn. francs*	...	...	...	...	...	...	70	100
Canada[e]	*mn. dollars*	...	...	66.3	74.7	82.0	76.0	42.1	45.4
Denmark[e]	*mn. kroner*	...	...	...	...	...	...	...	0.7
Finland[d]	*mn. marks*	...	...	...	...	...	...	...	...
France[d]	*mn. francs*	...	...	...	...	...	925	1 125	1 315
FR Germany[f]	*mn. marks*	—	—	—	9	35	116	172	201
India[e]	*mn. rupees*	...	...	...	...	...	15.0	...	...
Italy[f]	*mn. lire*	...	...	...	...	...	3 450	4 600	4 950
Japan[e]	*bn. yen*	...	...	1.4	1.7	1.5	1.8	2.1	2.6
Netherlands[d]	*mn. guilders*	3.3	3.6	4.8	6.1	6.4	6.9	7.1	8.1
Norway[d]	*mn. kroner*	...	...	...	...	...	...	...	...
Sweden[c]	*mn. kronor*	...	...	...	...	...	...	...	283
Switzerland[d]	*mn. francs*	...	...	13.7	13.9	11.6	14.4	14.6	20.7
UK[e]	*mn. pounds*	...	...	177	...	...	234	...	...
USA[c]	*mn. dollars*	2 795	2 921	2 982	3 821	4213	4 712	6 199	7 166

[a] The periods covered by the annual figures set out in this appendix and in the main part of the study are national fiscal years; that is, the figures have not been adjusted to a uniform, calendar-year base. For the purposes of international comparison, fiscal years which do not coincide with the calendar year are treated as equivalent to the calendar year in which they begin. In subsequent tables and in the main part of the chapter only the equivalent calendar year is shown.
[b] Budgeted expenditure.
[c] Fiscal year beginning 1 July.

Table 8A.2. Military R&D expenditure, 1953–1972

	1953	1954	1955	1956	1957	1958	1959	1960	1961
Australia	...	...	31.4	32.5	32.5	33.6	33.6	34.7	35.8
Austria	...	...	...	...	...	...	...	...	...
Belgium	...	...	...	...	...	...	1.4	2.0	2.2
Canada	...	...	66.4	77.8	83.2	78.8	44.2	45.6	44.9
Denmark	...	...	...	...	...	...	...	0.1	0.2
Finland	...	...	...	...	...	...	...	...	...
France	...	...	...	...	...	220.3	227.9	266.4	249.5
FR Germany	—	—	—	2.1	8.3	27.6	40.9	47.9	101.8
India	...	...	...	...	...	3.2	...	...	6.6
Italy	...	...	...	...	...	5.5	7.4	7.9	7.9
Japan	...	...	3.9	4.7	4.2	5.0	5.8	7.2	7.2
Netherlands	0.9	1.0	1.3	1.6	1.7	1.8	1.9	2.1	2.7
Norway	...	...	...	...	...	...	...	...	3.3
Sweden	...	...	...	...	...	...	...	54.7	54.3
Switzerland	...	...	3.2	3.2	2.7	3.3	3.4	4.8	4.7
UK	...	...	495.6	...	...	655.2	...	...	753.2
USA	2 795	2 921	2 982	3 821	4 213	4 712	6 199	7 166	7 406

Local currency, current prices

1961–62 1961	1962–63 1962	1963–64 1963	1964–65 1964	1965–66 1965	1966–67 1966	1967–68 1967	1968–69 1968	1969–70 1969	1970–71 1970	1971–72 1971	1972–73[b] 1972[b]
32	31	33	34	35	36	40	46	47	49	50	54
...	...	...	7.2	[7.0]	7.0	7.0	8.0	8.0	9.0	10.0	11.0
110	90	100	115	105	105	105	105	125	140	125	...
46.4	50.3	64.3	74.6	99.7	87.1	88.5	85.4	83.0	87.4	89.4	91.3
1.4	1.7	2.0	2.3	2.7	3.0	3.5	3.4	3.6	4.0	4.3	4.6
...	...	...	...	...	...	...	...	...	1.5	1.2	...
1 232	1 400	1 784	2 048	2 778	3 158	3 100	3 076	3 204	2 981	...	...
411	449	586	681	739	803	1 023	982	1 058	1 148	1 414	1 363
31.2	(51.4)	71.4	82.3	97.2	114.6	116.0	141.2	143.2	188.1	(248)	(282)
4 950	6 175	6 750	4 400	12 515	12 310	13 413	10 080	13 410	19 037	11 000	...
2.6	2.7	3.0	3.3	4.5	5.7	6.5	8.6	9.1	[10.5]	12.1	13.9
9.8	9.7	16.2	25.5	29.6	30.0	36.0	40.8	48.2	50.3	56.5	...
23.4	19.0	22.6	25.3	23.0	32.8	37.1	32.8	39.3	37.6	38.6	40.8
281	322	371	432	464	528	572	549	411	385	505	656
20.0	26.8	25.0	30.0	31.0	27.4	27.5	32.0	39.0	50.0	50.0	51.0
269	264	261	283	283	260	241	236	244	227	274	330
7 405	7 419	8 191	7 409	7 390	8 346	8 952	8 793	8 498	8 614	9 118	9 316

[d] Fiscal year beginning 1 January.
[e] Fiscal year beginning 1 April.
[f] FR Germany and Italy changed fiscal years in the middle of the period. The figures refer to the actual fiscal years as follows: FR Germany: 1956–59, 1 April–31 March; 1960, 1 April–31 December (transitional year); since 1961 the fiscal year begins on 1 January. Italy: 1958–63, 1 July – 30 June; 1964, 1 July – 31 December (transitional year); since 1965 the fiscal year begins on 1 January.

US $ mn, at current prices and official exchange rates

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
34.7	37.0	38.1	39.2	40.3	44.8	51.5	52.6	54.9	57.8	64.3
...	...	0.3	[0.3]	0.3	0.3	0.3	0.3	0.3	0.4	0.5
1.8	2.0	2.3	2.1	2.1	2.1	2.1	2.5	2.8	2.5	...
46.5	59.5	69.0	92.2	80.6	81.9	79.0	76.8	80.8	82.7	84.5
0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.5	0.5	0.6	0.7
...	...	...	...	...	...	...	...	0.4	0.3	...
283.6	361.3	414.8	562.7	639.7	627.9	623.0	618.7	536.7	...	...
112.2	146.5	170.3	184.7	200.8	255.8	245.5	268.6	313.7	386.3	423.0
(10.8)	15.0	17.3	20.4	16.4	15.5	18.8	19.1	25.1	(33.3)	(33.7)
9.9	10.8	7.0	20.0	19.7	21.5	16.1	21.5	30.5	17.6	...
7.5	8.3	9.2	12.5	15.8	18.1	23.9	25.3	29.2	[35.1]	45.0
2.7	4.5	7.0	8.2	8.3	9.9	11.3	13.3	13.9	15.6	...
2.7	3.2	3.5	3.2	4.6	5.2	4.6	5.5	5.3	5.4	6.1
62.2	71.7	83.5	89.7	102.1	110.6	106.1	74.4	79.4	97.6	136.2
6.2	5.8	7.0	7.2	6.4	6.4	7.4	9.1	11.6	11.6	13.3
739.2	730.8	792.4	792.4	728.0	636.2	566.4	585.6	544.8	671.7	859.8
7 419	8 191	7 409	7 390	8 346	8 952	8 793	8 498	8 614	9 118	9 316

Table 8A.3. Military R&D expenditure, 1953–1972

	1953	1954	1955	1956	1957	1958	1959	1960	1961
Australia	...	...	38.7	38.4	37.7	38.4	36.1	37.1	37.5
Austria	...	...	...	...	...	...	...	...	...
Belgium	...	...	...	...	...	...	1.5	2.1	2.3
Canada	...	...	71.9	78.3	83.6	75.9	41.1	43.7	44.4
Denmark	...	...	...	...	...	...	...	0.1	0.2
Finland	...	...	...	...	...	...	...	...	...
France	...	...	...	...	...	236.0	270.0	305.8	277.3
FR Germany	—	—	—	2.8	10.4	33.6	49.0	56.3	110.5
India	...	...	...	...	...	3.7	...	...	7.1
Italy	...	...	...	...	...	6.6	8.8	9.2	8.8
Japan	...	...	5.3	6.2	5.2	6.3	7.1	8.4	7.8
Netherlands	1.3	1.4	1.7	2.1	2.1	2.2	2.2	2.5	2.9
Norway	...	...	...	...	...	...	...	...	3.5
Sweden	...	...	...	...	...	...	...	61.1	58.5
Switzerland	...	...	...	...	...	...	4.3	5.3	5.1
UK	...	...	627.3	...	...	735.4	...	...	792.0
USA	3 387.9	3 494.0	3 479.6	4 307.8	4 604.4	5 045.0	6 525.3	7 433.6	7 603.7

Table 8A.4. Military R&D expenditure as a percentage of total military expenditure, 1953–

	1953	1954	1955	1956	1957	1958	1959	1960	1961
Australia	...	...	7.31	7.64	7.78	7.92	7.75	7.82	7.88
Austria	...	...	...	...	...	...	...	...	...
Belgium	...	...	...	...	...	...	0.37	0.52	0.56
Canada	...	...	3.61	3.99	4.54	4.43	2.56	2.72	2.67
Denmark	...	...	...	...	...	...	...	0.06	0.11
Finland	...	...	...	...	...	...	...	...	...
France	...	...	...	...	...	5.58	6.28	6.86	6.04
FR Germany	—	—	—	0.12	0.41	1.47	1.52	2.21	3.12
India	...	...	...	...	...	0.54	...	...	1.00
Italy	...	...	...	...	...	0.53	0.67	0.68	0.61
Japan	...	...	1.04	1.19	1.04	1.21	1.35	1.63	1.42
Netherlands	0.25	0.23	0.28	0.33	0.35	0.42	0.47	0.47	0.49
Norway	...	...	...	...	...	...	...	...	1.98
Sweden	...	...	...	...	...	...	...	9.75	8.49
Switzerland	...	...	1.83	2.04	1.25	1.43	1.50	2.24	1.82
UK	...	...	11.21	...	...	14.71	...	...	15.50
USA	5.93	7.15	7.30	8.79	9.45	10.09	13.50	15.12	14.49

US $ mn, at constant (1963) prices and official 1963 exchange rates

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
36.3	37.0	37.3	37.2	37.0	39.9	44.5	43.6	43.3	42.6	45.3
...	...	0.3	[0.2]	0.2	0.2	0.3	0.3	0.3	0.3	0.3
1.9	2.0	2.2	1.9	1.8	1.8	1.7	2.0	2.1	1.8	...
47.3	59.5	67.1	86.8	72.5	71.1	66.2	61.3	62.5	61.9	60.1
0.3	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4
...	...	...	...	...	...	...	...	0.3	0.2	...
300.9	361.3	398.9	528.3	583.6	557.6	528.0	516.7	457.1	...	...
115.7	146.5	165.6	173.6	181.8	230.0	216.7	227.4	237.8	278.6	254.7
(11.4)	15.0	15.4	16.6	17.5	15.8	19.3	19.1	23.9	30.4	33.4
10.3	10.5	6.6	18.1	17.5	18.5	13.7	17.8	24.0	13.3	...
7.8	8.3	8.8	11.4	13.7	15.1	19.2	19.4	20.9	22.6	26.0
2.8	4.5	6.5	7.2	6.8	7.9	8.6	9.5	9.5	9.9	...
2.7	3.2	3.4	2.9	4.0	4.3	3.7	4.3	3.7	3.6	3.6
64.2	71.7	79.8	80.4	87.6	91.5	85.8	61.3	53.9	66.3	80.4
16.4	5.8	6.8	6.7	5.7	5.5	6.2	7.5	9.2	8.6	9.0
755.8	730.8	765.5	726.3	650.0	585.8	544.8	538.8	481.9	533.6	604.0
7 532.0	8 191.0	7 278.0	7 112.6	7 792.7	8 057.6	7 586.7	6 937.1	6 682.7	6 824.8	6 745.8

1972

Per cent

1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
7.24	6.33	5.58	4.68	3.79	3.61	3.95	4.26	4.31	4.11	4.08
...	...	0.21	[0.24]	0.20	0.19	0.21	0.20	0.22	0.24	0.25
0.43	0.45	0.46	0.42	0.40	0.37	0.35	0.40	0.41	0.32	...
2.82	3.70	4.21	5.91	4.80	4.53	4.45	4.27	4.20	4.19	4.25
0.11	0.12	0.13	0.14	0.14	0.15	0.13	0.13	0.14	0.13	...
...	...	...	...	...	...	...	...	0.25	0.18	...
6.31	7.81	8.43	10.98	11.81	10.72	10.19	10.11	8.98	...	...
2.61	2.94	3.48	3.71	3.96	4.78	5.09	4.90	5.09	5.05	4.84
(1.08)	0.87	1.02	1.10	1.26	1.20	1.37	1.30	1.63	1.76	2.00
0.65	0.63	0.79	1.03	0.92	0.99	0.72	0.95	1.22	0.59	...
1.26	1.21	1.18	1.47	1.65	1.68	2.04	1.84	1.84	1.80	1.73
0.44	0.70	0.96	1.09	1.08	1.13	1.24	1.31	1.26	1.27	...
1.39	1.54	1.61	1.21	1.68	1.77	1.37	1.57	1.36	1.28	1.23
8.62	9.18	9.91	9.26	10.32	11.01	10.27	7.09	6.48	7.67	9.24
2.12	1.90	1.97	1.95	1.57	1.55	1.85	2.06	2.48	2.43	2.22
14.44	13.72	13.99	13.43	11.90	10.52	10.16	10.44	9.05	10.38	11.09
14.20	15.28	14.94	13.01	11.91	11.12	10.82	10.58	11.09	11.64	12.19

9. The trade in major weapons[1] with the third world, 1972

In 1971 SIPRI published a major study on the arms trade with the third world [1]. *In this chapter, comments are limited to some of the more important events during 1972, illustrated in the arms trade register (appendix 9B, p. 324) and in the tables of values (p. 320). The reader is referred to the SIPRI arms trade study for further analysis of supply and import policies and of the trends in the arms trade since 1950.*

The estimates of the value of the arms supplies given in this chapter indicate orders of magnitude; they are not precise figures of actual prices paid. The values were derived by the method described in the appendix on sources and methods (p. 311). The estimates for 1971 have been revised in the light of new information. The conclusions concerning long-term trends presented in previous SIPRI yearbooks and in the arms trade study are not substantially altered by the revisions.

Square-bracketed references, thus [1], *refer to the list of references on p. 310.*

I. *Trends in the value of supplies*

The value of major weapons supplied to the countries of the third world in 1972 amounted to almost $1.7 billion (in constant 1968 prices). This represented a decrease from the all-time peak year, 1971, when the value of all arms supplies was about $2.1 billion. However, year-to-year movements are often erratic. As a result of the large volume of supplies in the previous years, and the major items of equipment currently on order, the long-term trend is still upward and can be expected to remain so over the next few years.

There were decreases in the value of major arms imports in most of the main geographic areas under consideration[2] in 1972. In such important areas as South Asia and the Far East (excluding Viet-Nam),[3] imports fell by 50–70 per cent. In both areas there are, however, major re-equipment plans or major items on order which will push the figures upward over the next two or three

[1] Major weapons include aircraft, ships, missiles and armoured fighting vehicles.
[2] Central America, South America, North Africa, Sub-Saharan Africa, South Africa, Middle East, South Asia, Far East (excluding Viet-Nam), Viet-Nam, Greece and Turkey.
[3] Viet-Nam is accounted for separately among the recipient regions and is not included in the values of arms exports from the main suppliers.

years. The areas where imports rose in 1972 were Europe (Greece and Turkey), North Africa, South America and Viet-Nam. For the first time, Viet-Nam accounted for the largest single share of the total—37 per cent. This is largely due to the fact that the United States provided several years' worth of arms supplies to South Viet-Nam in a period of only a few weeks in November 1972; and the value of supplies to Viet-Nam can be expected to fall again in the future. The Middle East received 29 per cent of total 1972 supplies; and South Asia, Latin America and the whole of Africa about 8 per cent each.

The United States and the Soviet Union, which were responsible for approximately equal shares of arms deliveries to the third world (excluding Viet-Nam) during the 1960s, continued to be the most important suppliers. In 1972 the value of Soviet supplies was higher than that of US supplies—they accounted for 25 and 23 per cent of the total respectively; but in terms of longer-term trends, as shown by five-year moving averages, the USA overtook the USSR as the major supplier for the first time since the beginning of the 1960s.

French exports continued to rise, bringing the French share of the total to 17 per cent with an all time peak of $200 million. The United Kingdom supplied 15 per cent of the arms exports. Taken together, these four main suppliers accounted for 80 per cent of the major weapons delivered to the third world in 1972.

II. *Main suppliers*

The United States

Major arms deliveries from the United States to the third world (excluding Viet-Nam) fell by 55 per cent, to $270 million, between 1971 and 1972, with a decline in supplies to all recipient areas. Major weapon supplies to South Viet-Nam showed a sharp increase, and if supplies to Viet-Nam are included there has merely been a levelling off in total volume of the trade. Even excluding Viet-Nam, however, the long-term trend (as measured by five-year moving averages) is rising. The size of major arms exports from the USA should, however, not be taken as a total measure of the flow of arms from this country. According to official US statistics, *total arms exports*—grant aid, deliveries of excess articles and foreign military sales—amounted to $2.1 billion in the fiscal year ending 30 June 1972. The total amount of *military and related assistance and arms sales* (goods and services) projected for the following year was $7.6 billion. The volume of the trade can be expected to show a drastic increase as the US withdrawal from Viet-Nam frees for the world market, production resources which were previously devoted to supplying the US forces in Viet-

Nam. Further, considerable quantities of excess equipment from the war will also be available.

The authorization of military and related assistance has met with increasing opposition in Congress. The enacting of the Foreign Assistance Act is delayed further every year: the 1971 Act was only approved in February 1972 and military assistance for FY 1973 has also been kept alive by continuing resolutions on spending because of congressional disagreement on authorizations. A number of amendments were included in the 1971 Foreign Assistance Act and have been proposed for the 1972 Act which reflect congressional dissatisfaction with various aspects of the Administration's military aid policy. In particular there is concern "over the failure of the Executive Branch to bring together into one coherent picture all of the bits and pieces in the total program of the United States assistance to foreign countries. ... The military aid programs recommended for authorization in this [FY 1973] bill represent only about one-third of the total foreign assistance package proposed for the 1973 fiscal year, $1.65 billion out of $4.7 billion." [2] This dissatisfaction has led to the creation, in the Foreign Assistance Act of 1971, of the position of the Under Secretary of State for Security Assistance who is responsible for coordinating the security assistance programmes. It was also decided that no military assistance was to be furnished to Thailand except under the Foreign Assistance or the Foreign Military Sales Act. The report of the Senate Foreign Relations Committee on authorizations for FY 1973, submitted in 1972, included an amendment requiring the return of funding for military aid to Laos and Viet-Nam from the Department of Defense to the regular foreign assistance programme. Suspension of aid or the imposing of ceilings on spending for certain countries or areas also serve as means for Congress to reassert its power in opposition to the Administration. During 1972, one of the main issues at stake was the Senate intention to prohibit funds to carry out military base agreements with Portugal and Bahrain unless the agreements are submitted to the Senate for approval as treaties. (The Administration had concluded them as executive agreements which do not require congressional ratification.) Further, amendments requiring US withdrawal from Viet-Nam under certain conditions were included in the recommendations of both the House Foreign Affairs Committee and the Senate Foreign Relations Committee. All these restrictions have been accompanied by severe cuts in the requests, mainly on Senate insistence: FY 1972 foreign aid appropriations were $500 million less than the President had requested and for FY 1973 funds have been provided under continuing spending resolutions, that is, on the same level as for the previous fiscal year, or $700 million less than requested.

The Soviet Union

The value of Soviet major arms supplies fell by more than half between 1971 and 1972, bringing exports to their lowest level since 1965. A decrease in exports to the Indian Sub-continent and the Middle East accounted for most of the decline. These two areas have long absorbed the bulk of Soviet major arms supplies to third world countries (excluding Viet-Nam): their combined share has been around 90 per cent during the past five years. Any change in supplies to these areas, and in particular the major recipients, which are India and Egypt, therefore has a great impact on the size of total Soviet exports.

There was a sharp decline in supplies to India in 1972, which did not mark a significant change in policy, but merely reflected completion of deliveries of Su-7 fighters and other major items of equipment in 1971. Although India is currently evaluating a number of Western weapons for possible future imports, cooperation with the Soviet Union in weapons procurement is continuing. Licensed production of a new, improved version of the MiG-21 has, for example, just been initiated.[4]

In contrast, Soviet aid to the Middle East underwent a dramatic change in 1972. Since 1967, the Soviet Union has attempted to maintain a difficult balance in the Middle East: to support the Arab states in the conflict with Israel, and at the same time to prevent the outbreak of a new war and foster the lessening of tension in the area. In order to do this, the Soviet Union has, on the one hand, supplied Egypt with a variety of equipment, accounting for 75 per cent of Soviet major arms exports to the Middle East in 1965–1971; but it has, on the other hand, withheld the supply of offensive weapons, despite repeated requests for such weapons by Egypt. This finally spurred an Egyptian move, in July 1972, in which the Soviet advisers and experts who had been assisting in military training and operations—generally assumed to number around 15 000—were asked to leave the country, and the supply of major new Soviet weapons was, for a time, ended.

While Soviet military aid to Egypt was being interrupted, bonds were being strengthened with other Middle Eastern countries, in particular Iraq and Syria, which are likely to assume significantly increased importance in Soviet arms exports to the area. A treaty of friendship including provisions regarding military cooperation was signed between Iraq and the Soviet Union on 9 April 1972; and following a visit to the Soviet Union by President Al Bakr in September, it was announced that the two countries had "agreed on special measures to further strengthen the defence potential of the Iraq Republic and to promote the preparedness to fight of the Iraqi forces". [3] Syria signed an

[4] See chapter 10, p. 351.

arms agreement with the Soviet Union in July, and a substantial amount of weapons was delivered in an airlift to this country in September followed by sea shipments throughout the autumn.

The United Kingdom and France

British arms supplies fell slightly in 1972, but the most recent five-year average of the value of these supplies (for 1968–72) maintained the longer-term upward trend begun in the mid–1960s. This long-term growth has been most marked in the Middle East, particularly in the Arabian Peninsula and Iran. The decision taken in the mid-1960s to withdraw British Armed Forces based east of the Suez Canal, which initially led some countries to turn to other arms suppliers, has nevertheless stimulated recent imports of British weapons by some Middle Eastern countries, as well as Malaysia and Singapore. An increase in naval exports to Latin America is also under way, but this is not yet reflected in the value of British major arms exports, since most of the items are still under construction, with delivery dates in the mid-1970s.

French major arms exports to third world countries have shown a steady upward trend since 1950. Official sales figures, which differ from SIPRI estimates in that they cover total arms exports and include items on order, indicate that arms exports tripled between 1969 and 1970, amounting in the latter year to $1.3 billion (the equivalent of 8 per cent of all French exports, and 25 per cent of industrial exports). The enormous rise in 1970 was followed by a decline in 1971 and 1972, when the value of the trade fell sharply by about 40 per cent. Nearly two-thirds of the recent arms exports are aeronautical products, and the large sales in the past three years reflect in particular the 'boom' in Mirage fighter exports to Africa, Latin America and Europe. Although current government policy is aimed at shifting the balance in the aerospace industry towards a greater share of the production of civil goods (the ultimate goal is 40 per cent military, 60 per cent civil), special actions to promote military exports continued to be taken in 1972. It is reported, for example, that when the French company Dassault decided to rejoin an international consortium building an aerospace industry in Greece, the reversal was due to pressure from the French government, which was reluctant to abandon an entrée into the Greek defence market. (Dassault had earlier withdrawn from the consortium following a decision by the Greek government to purchase US Phantoms rather than the competing Dassault Mirages.) A new method of arms promotion was also initiated: several countries in the Middle East were offered French weapons under contracts providing for technical support assistance from Pakistan. This arrangement, which would permit Pakistan to exchange the technical expertise gained as an old client of the

French aerospace industry for valuable foreign currency, allows potential new customers to avoid relying on French after-sales services and to promote regional cooperation.

III. *Recipient regions*

The Far East

In the Far East, the most notable event of 1972 was the build-up in Viet-Nam: the strengthening of the air defence in the North in response to heavy US bombing, and the airlifting of equipment into South Viet-Nam in October/November in anticipation of the cease-fire, which bans any further increase in military equipment. The other countries involved in the Indo-China War—Thailand, Laos and Cambodia—are not covered by this ban, and by the end of 1972 had not received significantly greater amounts of arms. The future course of the conflict in Indo-China will obviously have a decisive impact on arms supplies to these countries.

There has been a growth in mutual assistance among the regional members of ANZUK—Australia, New Zealand, Malaysia and Singapore—as well as that provided by these to Indonesia, the Philippines, Cambodia and South Viet-Nam. In particular, Australia has been more active in providing the other countries with military equipment and training; and it has supplied a large number of patrol boats and ex-RAAF Sabre fighters. A reorientation in regard to military aid can be expected, however, in Australia and New Zealand in 1973, following the election of Labour Governments in both countries in the latter part of 1972.

Viet-Nam

The massive US bombing raids over North Viet-Nam which were resumed on 6 April 1972 did not meet with an unprepared North Viet-Namese air defence. Accoring to most reports, Soviet arms shipments had been increased during 1971; and the five-day bombing campaign carried out by the USA in late December 1971 was followed by pledges of further military aid from both the Soviet Union and China. During the spring of 1972, two new missiles began to appear in the North and with the National Liberation Front in South Viet-Nam. These were the "Sagger"[5] wire-guided anti-tank missile, and the shoulder-fired SA-7 "Strela" surface-to-air missile—a heat-seeking weapon similar to the US "Redeye", which appears to have been highly effective against helicopters and other low-flying aircraft. North Viet-Nam also had stockpiles

[5] Where the NATO designation for a weapon is used, it is placed within inverted commas.

of "SA-2" missiles. According to US sources, 1600 of the latter were fired against US aircraft between April and July, but smaller numbers were available by late summer, when they were fired much more sparingly, at what looked like sure shots.

The US attempt to impose a blockade on North Viet-Nam, through the mining of harbours and bombing of main supply lines, announced on 8 May, is generally judged to have been fairly effective in cutting off arms supplies for a short time. After a few months, there were estimates that the proportion of supplies which were able to come through had risen to as much as 25–50 per cent. Naturally, the supply of small arms and other light equipment would be easier to bring through than, for instance, tanks, aircraft or large missiles. After a two-month halt, US bombings north of the 20th parallel were resumed around Christmas. The air defence of North Viet-Nam appears again to have been strengthened and, for the first time, US B-52 bombers were brought down.

South Viet-Nam received a continuous supply of arms during 1972, largely through taking over equipment from departing US units. One of the main results was a very large increase in helicopter strength. At the end of 1971, South Viet-Namese forces were reportedly operating about 350 Bell Iroquois helicopters: by October 1972 the number had risen to about 630, and the number of Chinook helicopters had also increased. In addition, the Hughes TOW wire-guided anti-tank missile, to be fired from helicopter gunships, was introduced in Viet-Nam in 1972.

The big airlift of US supplies to South Viet-Nam began on 24 October, and in less than a month the "Vietnamization" programme had been about completed, with the supply of a total of 230 fighters, more than 50 transports and 270 helicopters, together with tanks, other armoured vehicles, howitzers and other heavy equipment. Some of this equipment was not on hand in the United States, but was hastily assembled to beat the deadline of the impending ceasefire and ban on new equipment. In place of the F-5E Tiger, for example, which had not yet come off the production line, Iran, South Korea and Taiwan each agreed to provide 30–40 F-5 Freedom Fighters from their inventories. These are later to be replaced on an item-for-item basis by the F-5E. South Korea is receiving a squadron of the more sophisticated F-4 Phantoms as replacement. The United States has also based two US-operated Phantom squadrons on Taiwan, which does not have the personnel to operate or maintain this aircraft but which has requested it for many years.

The Indian Sub-continent

The war between India and Pakistan in December 1971 has not had a great impact on the values of major weapon imports to this region in the last two

years. There was a slight decrease in 1972, but this was due mainly to the completion of Soviet Su-7 deliveries to India. The decline cannot be expected to persist, since there are re-equipment plans in both India and Pakistan, which are likely to raise the value of imports within a few years' time.

India

The Indian Ministry of Defence stated in its annual report to the Lok Sabha, the Indian Parliament, that Indian Air Force combat experience in the two conflicts with Pakistan had served to emphasize the urgency that exists concerning the procurement of a modern deep-penetration strike aircraft. "Creation of such a capability will be an expensive operation, but it cannot be avoided in the years immediately ahead, and it will be necessary to cooperate with friendly countries in establishing such a capability." [4] Since India is currently supporting a determined expansion of the domestic defence production base, the solution likely to be sought for the long-range strike aircraft is licensed production.

In the spring of 1972, licensed production of the improved MiG-21M was started, and the first aircraft came off the production line in late December. India has also been evaluating other fighter aircraft, notably the Anglo-French Jaguar, as part of the plans to expand the air force from 45 to 64 squadrons. The navy is also to be expanded. Three "Leander" class frigates, armed with Seacat ship-to-ship missiles, are being built or outfitted in India and the construction of a further three is planned. Further, India has received for the first time missile-equipped "Osa" class patrol boats from the Soviet Union. In pursuance of plans to strengthen naval air power, the US A-4 Skyhawk and the British Harrier have been evaluated for use on the Indian aircraft carrier "Vikrant". There is also a requirement for a maritime reconnaissance aircraft.

Pakistan

Pakistan's re-equipment was begun in the spring of 1972 with the delivery of Chinese MiG-19 fighters and T-59 tanks. A promise of aid appears to have been given late in 1971, but the details were probably not worked out until President Bhutto's visit to Peking early in February 1972. The re-equipment provided by China does not seem to have been lavish. Estimates of Pakistani Air Force losses range from 30, claimed by Pakistan, to 95, claimed by India. Most independent sources estimate 75 to 85 aircraft and 200 to 220 tanks lost. In the light of these figures, reported Chinese exports of around 60 fighters and 100 tanks barely represent a supply of replacements. Even if the higher Indian estimates that around 100 fighters and 200 tanks are being delivered are correct, they would not indicate a substantial military build-up.

Pakistan's weapons requirements have traditionally had a great impact on

its foreign policy [5] and, in particular the desire to keep the door open to more than one potential arms supplier can still be observed. While maintaining good relations with China, Pakistan has shown a growing interest in CENTO, where, for a long time, it had been little more than a sleeping partner. The bonds with the Middle East have been strengthened, for example through an agreement with France and Abu Dhabi whereby Pakistan is to provide training and after-sales services for 14 Mirage fighters sold to Abu Dhabi: in return, these aircraft would be available to Pakistan in case of emergency.

Future plans include a naval build-up. Pakistan is evaluating new patrol boats, ship-to-ship missiles and electronic equipment. Sea King ASW helicopters have been ordered from the UK. Four gunboats purchased from China are probably being fitted with missiles in the Karachi dockyard. This may be an explanation to reports—mostly from Indian sources—that Pakistan had acquired missile-equipped "Osa" class patrol boats from China.

The Middle East

Arms imports in the Middle East, which had risen steadily since the early 1960s, fell to almost half their 1971 peak value in 1972, but they are still more than twice as high as before 1967. Together, Egypt, Israel and Iran accounted for 83 per cent of the region's arms imports in 1972. A further 11 per cent was supplied to Syria by the Soviet Union in the autumn of 1972. The Arabian Peninsula, which became the site of a marked arms build-up toward the end of the 1960s, only accounted for 4 per cent.

Egypt

On 18 July 1972, President Anwar Sadat announced to the central committee of the Arab Socialist Union:

(1) The mission of the Soviet experts and advisers in Egypt will end at the request of the Egyptian authorities; this decision takes effect from July 17. Egyptian personnel will replace the Soviet experts and advisers.

(2) Military equipment and installations established in Egypt after the conflict of June 1967 will become the exclusive property of Egypt and will be placed under the command of the Egyptian Army.

(3) We propose an Egyptian-Soviet meeting within the framework of the friendship and co-operation treaty with the USSR. This meeting will take place at a level to be jointly agreed upon, and will have as its object consultations on the next step to be taken. [6]

This decision marked the culmination of Soviet-Egyptian differences over the policy that Egypt should pursue in the conflict with Israel, and over the type of weapons required to back that policy. In particular, the issue concerned the supply of offensive weapons.

Egypt's losses in the war with Israel in June 1967 were promptly replaced by the Soviet Union. Furthermore, its air defences were much strengthened by the introduction of advanced surface-to-air missiles (the SA-2, -3, -4 and SA-6) and, during the course of 1971 and 1972, of advanced fighter aircraft (the Su-7, in both standard and swing-wing versions, the Su-11 and the MiG-25). In addition, small numbers of Tu-16 bombers were brought in during 1971 and possibly 1972. Most of the Tu-16s and all of the most advanced fighters and surface-to-air missiles were, however, manned by Soviet personnel, with weapon operators accompanied by large numbers of technicians and other support personnel. In the spring of 1972, the semi-official Egyptian daily *Al Ahram*, citing official statistics, indicated that Soviet military aid to Egypt had reached a total of nearly $5000 million, and was continuing at a rate of about $5 million a day.

A series of meetings between Soviet and Egyptian officials, in May and October 1971 and February and April 1972, were probably mainly concerned with the Soviet supply of weapons. At the first of these meetings, when a friendship treaty between the two countries was signed, Egypt is said to have received the promise of offensive weapons, such as long-range fighter-bombers or surface-to-surface missiles—the type of equipment that would enable Egypt to launch a major offensive against Israel. Egyptian pressure for the supply of offensive weapons is likely to have continued at the subsequent meetings: but while defensive stocks and Soviet-manned weapons were increased, the offensive types demanded by Egypt were withheld altogether, or were provided in small numbers and under the control of Soviet operators. In announcing the termination of the mission of Soviet advisers in July 1972, President Sadat remarked,

> The principal difference has always been with regard to the nature of these armaments to be supplied by the Soviet Union and the date of their delivery to Egypt.

He added further,

> We do not ignore the fact that the Soviet Union, being a great Power, has its own role to play on the international scene and its own strategy. As for ourselves, part of our territory is occupied and our goal ... is to liberate it. Moreover we are convinced, in face of the intransigence of Israel and the permanent support she enjoys from the United States, that the Middle East crisis can only be resolved by a decisive battle. [6]

The Soviet withdrawal appears to have been virtually complete. By August, there were reported to be only 300 advisers left in Egypt. Most of the equipment operated by Soviet personnel was withdrawn, including the MiG-25s, the Su-11s, most if not all of the Tu-16s and all of the missile defence systems except the SA-2. A modest flow of spare parts and replacement items is believed

to have continued, however; and negotiations concerning the renewal of Soviet aid were undertaken later in the year. In October, Egyptian Premier Aziz visited Moscow, and about a month later 60 SA-6 missiles are said to have arrived in Egypt, accompanied by Soviet technicians, to equip five batteries around Cairo.

Three alternative sources of weapons have been tried by Egypt. First, during the spring of 1972 there were increasingly frequent allusions to Egyptian attempts to revive its domestic arms production capacity, both independently, and in cooperation with Libya and Syria. Nothing is known to have come of these attempts at present. Second, through the union with Libya, which was announced in August 1972 and which is to be completed by 1 September 1973, Egypt will have access to the Libyan arsenals. However, an end-use agreement with France, which prevents the use of Libya's Mirage fighters by a third country, will presumably keep these aircraft out of Egyptian service. Third, Egypt has approached Western European countries for arms supplies. A procurement programme to be negotiated for British equipment has been expected to total $240 million, and to involve, among other things, Rapier surface-to-air missiles, to replace the SA-3s withdrawn by the Soviet Union, Swingfire anti-tank missiles, patrol boats and armoured cars. The United Kingdom has, however, generally vetoed the supply of offensive weapons to Egypt; and France has consistently maintained an embargo on major items of equipment to the participants in the Arab-Israeli War of June 1967: so the outcome of the 'shopping tour' in the West is still uncertain. However, several Arab states have already agreed to assist with the financing of the arms purchases from the West. For instance, Kuwait, Qatar and Abu Dhabi will provide about $270 million which is slightly more than the estimated programme from the UK.

Israel

Like Egypt, Israel pressed its main supplier—the United States—for more weapons during 1971. In particular, Israel requested additional Phantom fighter-bombers and Skyhawk fighters, in part as replacements for its old French Vautours, Ouragans and Mystères.[6] The United States was withholding supplies, however, both to match Soviet restraint in exports to Egypt and to spur Israeli participation in negotiations on the re-opening of the Suez Canal. The official visit of President Sadat to the Soviet Union in October 1971 was followed by renewed Israeli demands for a resumption of fighter deliveries.

[6] An agreement between France and Israel on 15 February 1972 finally settled differences over the 50 Mirage 5s ordered by Israel before the Arab-Israeli War of June 1967 and subsequently embargoed by France. Under the agreement, France is to refund Israel $58 million paid by Israel for the aircraft and spares at 7 per cent interest or a total of $76 million. The Mirages will enter service with the French Air Force and not be exported.

On 15 October, 78 US Senators signed a resolution calling on the Administration to resume the shipment of F-4 Phantoms to Israel "without further delay". However, it was not until Prime Minister Meir's visit to the United States in December that the United States agreed to resume deliveries of Skyhawk aircraft and, shortly afterwards, of Phantoms. A few weeks later, Israel announced its willingness to participate in indirect talks with Egypt for a re-opening of the Suez Canal. Phantom deliveries began in March 1972 and Skyhawk deliveries in November. Both types are diverted from the production line for the US armed forces. The cost is about $500 million with a credit to be repaid in 10 years. The loan has been granted on less favourable terms than that for previous purchases.

Iran

The military build-up in Iran during the past five years has been spectacular. The value of major weapon imports has grown from a yearly $8.5 million in the early 1960s to an average $156 million a year from 1968 on. The air force, which received more than 100 F-5 Freedom Fighters in the mid-1960s, with supplementary deliveries bringing the total to 125 by the end of 1970, has been further augmented by the more sophisticated F-4 Phantom since 1968. The Phantom force is planned to reach a total of 135–140 by the mid-1970s. In addition, Iran has ordered 30 of the new F-5E international fighter, with a further large order anticipated. The helicopter strength has also grown considerably in recent years, mainly through the purchase of 126 Italian Agusta Bell 205s and 206s, and 22 Boeing-Vertol CH-47s. In December 1972 reports were confirmed that Iran had decided to purchase almost 580 additional Bell helicopters, including 202 of the A-1J Sea Cobra gunship version and 287 of the new Model 214 Huey Plus general-purpose helicopters. A recent purchase of 800 Chieftain tanks from the United Kingdom is the largest tank deal known to have been concluded by a third world country. The build-up in missiles and ships has also been substantial.

This rapid expansion of the inventories, which will make Iran the strongest military power in the region, is reflected in the military budget which is currently running at about $1 300 million a year, or about 11 per cent of the country's gross national product. Until the end of the 1960s Iran received US military aid, but the aid has been phased out since 1967 when Iran was declared a developed country. Iran is now eligible for the favourable US Export-Import bank loans for military purchases,[7] and it also has substantial oil revenues to draw from.

[7] The loans from the Export-Import Bank for arms purchases are restricted to developed countries since 1968 [7].

Africa

Of the three areas in Africa—North Africa, South Africa and Sub-Saharan Africa—only North Africa has shown a continuation of earlier upward trends in the value of major weapon imports in recent years. With a total of over $100 million worth of imports, an all-time peak was reached for this area in 1972. Libya is entirely responsible for the increase, and the high figure reflects in particular the continued delivery of the 110 Dassault Mirage fighter aircraft ordered in January 1970 from France. The French reaction to the proposed union between Libya and Egypt has been to continue Mirage deliveries until the union takes a more concrete shape. The French government has indicated that if the union led to the merger of military forces, the situation would have to be re-examined.[8]

No major items of equipment were delivered to South Africa in 1972, apart from a second battery of Cactus missiles developed in France on South African specifications and with 85 per cent South African funding. However, a new peak is to be expected in a few years when deliveries are started of the licence-produced French Mirage III and F1 fighters.

Arms imports into Sub-Saharan Africa accounted for 25 per cent of the African total in 1972. In value terms, they have shown a small, but steady decline since the mid-1960s.

Latin America

In Latin America and North Africa arms imports show an increase in 1972 for much the same reason. In Latin America the important purchases were made in 1970/71 and by 1972 deliveries had started. Few new agreements of greater significance have been concluded in 1972. The United States has declined in importance as a supplier of major weapons to Latin America, due to the fact that recent Latin American purchases of sophisticated equipment have been made from Europe. The USA now accounts for only 20 per cent of the total. The United States is nevertheless still the most important supplier of helicopters and other light equipment, and figures of total Latin American arms purchases (including small arms) would probably show a higher US share.

The quest for supersonic fighters in Latin America which began in the mid-1960s has continued. This re-equipment programme, which now encompasses most countries in South America, was initiated against US attempts to impose limits on the acquisition of sophisticated weapons in Latin America. Consequently, this type of equipment has been sought mostly from Europe. In particular, the French Mirage fighter has been very successful on the Latin American market, a total of 77 having been bought by five countries.

[8] Cf. the section on Egypt's arms imports, p. 306.

Deliveries of the Mirage were begun in 1972 to Argentina, Brazil and Colombia; Venezuela will receive the first of its order in 1973. Ecuador has also evaluated the Mirage, as well as the British HS Harrier, the HS Northrop F-5 and the British-French Jaguar. Although no firm order has been confirmed, it is reported that the Jaguar is preferred and that the successful conclusion of a deal depends on the ability of Hawker Siddeley to promise early delivery. Meanwhile Ecuador has ordered the BAC 167 Strikemaster trainer and strike aircraft.

Another country which has evaluated the Mirage is Chile;[9] however, in this case the main choice appears to be between the US F-5 and the Soviet MiG-21. There were numerous reports during the autumn of 1972 that Chile was offered Soviet equipment on very generous credit terms—a total price of only $15.6 million for 25 MiG-21s, with long-term credit at 2.5 per cent interest. The Foreign Ministry of Chile denied another report emanating from Washington that the Soviet Union had promised a $50 million arms credit over 50 years at 1 per cent interest. Chile's ultimate decision is impossible to predict. The armed forces are reported to prefer continuing to buy US equipment for logistic reasons. US military aid to Chile has continued, and in the autumn of 1972 it was anounced that it had been doubled. It remains small, however, and the purchase of the F-5 would represent a major political decision in view of the poor relations between the two countries since the election of a a Marxist president in Chile and, more particularly, since the nationalization of the Chilean copper industry in October 1971. On the other hand, the USA can be expected to disfavour strongly the introduction of Soviet arms to Latin America. Up to 1972, only two countries in Latin America had purchased weapons from the socialist camp: Guatemala, whose purchase of Czechoslovak small arms in 1954 provided a justification for US intervention there, and Cuba.

The round of fighter purchases from Europe put pressure on the USA to ease restrictions on the sale of sophisticated fighter aircraft to Latin America. As a result, Argentina purchased 50 A-4 Skyhawks for the air force which were released in 1965 after Argentina had begun negotiations for French Mystères. Sixteen additional Skyhawks were later purchased for the navy. Brazil has been negotiating since 1969 for 15 of the same type, while Peru is reported to have started negotiations both for the A-4 and the Cessna A-37 attack version of the T-37 trainer. Venezuela, only one month after concluding the order for Mirages, purchased the F-5 from Canadian producers as well as the NA-Rockwell OV-10A Bronco COIN aircraft from the USA under the foreign military sales programme.

[9] Chile has already purchased European fighter aircraft: 21 refurbished Hunters from Britain, supplemented in 1972 by a further seven.

The fighter purchases in Latin America have been accompanied by a naval build-up which is also supplied mainly through Europe. Argentina, Brazil and Chile have missile-equipped frigates on order from the UK, as well as submarines from the UK and the Federal Republic of Germany.

Europe

Arms supplies to Greece and Turkey have risen in 1972 and the rise can be expected to continue. Both these countries are expecting deliveries of F-4 Phantom fighter aircraft over the next few years. For Greece, the decision to purchase the Phantom represents the end of long negotiations for the purchase of a fighter aircraft and it was long believed that the French Mirage was to receive the order. Although any direct links have been denied, the Phantom order coincided closely in time with the successful conclusion of negotiations making the Greek port Piraeus a "home-port" for the US Sixth Fleet. President Nixon, citing "overriding requirements of the national security" also waived the congressional ban on military aid and sales to Greece, voted in January, to provide $72 million in military aid to Greece.

Dassault, the French firm, reacted to the Phantom order by withdrawing from the international consortium that had been awarded the $50 million order to build a Greek aerospace industry. Later, however, the decision was reversed and Dassault is now to participate in the project together with Lockheed of the USA and the Greek Olympic Airways.

The USA has generally tried to maintain a balance in supplies to Greece and Turkey and in August an agreement was signed for the delivery of 40 Phantoms to Turkey. Turkey is also to replace its M-47 tanks with about 400 M-48s.

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Appendix 9A

Sources and methods

I. *Introduction*

Neither the register nor the tables on the arms trade in major weapons makes any claim to be official, complete or final. They are published on our responsibility. Due to the printing schedule, the cut-off date for new information entered in the register and tables must be set as early as the beginning of January 1973. This means that much information, particularly for the latter part of 1972, the year covered, has not yet reached us. For this reason, the values which appeared in the arms trade tables in the *SIPRI Yearbook 1972* have also been revised extensively. When there were conflicting reports—and this was often the case for the number of items supplied—we have used our judgement, based on general experience of the reliability of different sources. Any corrections, additions or deletions, from official or unofficial sources, would be welcome.

II. *Sources of information*

In collecting the basic information, two types of sources have been used. Unofficial sources, for example technical journals, press reports and other publications concerning defence equipment, military aid and alliances, were used. Second, information was gathered from official sources—parliamentary statements, hearings and debates, official publications and press releases.

III. *Coverage*

Weapons

Both the tables and the register cover the deliveries of major weapons—ships, aircraft, armoured fighting vehicles and missiles. The coverage of warships, combat aircraft and tanks is probably reasonable. Even if it were possible, very few countries attempt to conceal deliveries of these items. The coverage

of such items as light aircraft, helicopters, armoured cars and missiles is not quite so good, but probably sufficient to provide a basically accurate picture of the trade in these weapons. Small arms, for example machine-guns, are not included.

The tables include spares and equipment for aircraft and ground equipment which is part of the missile system. But they do not include a whole range of equipment that may be needed to acquire a particular weapon system. For instance, a country purchasing a fighter squadron will, in addition to spares and equipment for the aircraft itself, need to acquire various kinds of munitions for the aircraft, a radar tracking and warning system, ground equipment, repair and maintenance facilities, training for its pilots and technicians and so on. Thus, the figures in the tables may appear rather low when compared with, for instance, figures for US grant aid or sales.

In a number of countries, the air force is responsible for some of the country's civil transport and for training pilots for civil planes. This is particularly true for many South American countries. The general principle of inclusion or exclusion in the arms trade register has been to include all planes supplied to the armed forces of the countries concerned, except when it was known that the planes were for civil use only. Often, however, it was not known, and it should be borne in mind when considering the register that transport and trainer aircraft may be used for both civil and military purposes. Where it is known that a particular trainer has been purchased especially for counter-insurgency duties, this is indicated in the register in the column for comments.

Joint and licensed production of weapons have been included in both the tables and the register. In the register, both countries involved in the production are shown in the column for suppliers.

Countries

The countries covered by the register and the tables are the non-arms-producing countries. Many of the countries under consideration do have domestic defence industries, but they are still heavily dependent on imports for meeting their defence requirements. The two countries possessing the most developed domestic defence industries—Israel and South Africa—are still far from self-sufficiency.

Viet-Nam (North and South) is shown separately in the tables of major weapon imports, and totals are given including and excluding Viet-Nam. In the table of major weapon exports by supplier, both North and South Viet-Nam are excluded. For the US supply of arms to Viet-Nam, only the major weapons supplied to South Viet-Namese forces are entered as arms trade: the weapons supplied to US troops do not appear in the tables. Since

the United States is intervening directly in this conflict, while the Soviet Union is simply supplying arms to North Viet-Nam, any comparison of the arms supplied by the two great powers to the two sides would be inappropriate. The cost of the United States intervention vastly exceeds the whole of the trade in major weapons recorded in the tables.

The third world regions listed in the tables are as follows:

Far East. All countries east of Pakistan, except China, Japan, Australia and New Zealand. Viet-Nam is shown separately.

Middle East. Abu Dhabi, Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, People's Democratic Republic of Yemen, Qatar, Saudi Arabia, Syria, Egypt, Yemen, Sharjah.

North Africa. Algeria, Libya, Morocco, Tunisia.

Sub-Saharan Africa. The rest of Africa, except for *South Africa*, which is shown separately.

Indian Sub-continent. Afghanistan, India, Pakistan, Bangla Desh, Nepal, Sri Lanka.

Central America. All countries from Panama northwards up to the United States.

South America. The rest of Latin America.

Europe. Only Greece and Turkey are included in the table. In the register, Portugal is also included, because Portugal's arms procurement is relevant to the discussion of the arms trade with Africa.

Arms supplies to colonies or dependencies are included when these countries have armed forces separate from the metropolitan power—for example, the Central African Federation during the 1950s.

IV. *The tables*

There may be some slight upward bias in the figures for recent years due to extra information. This upward bias could account for approximately 10 per cent of the total. But it is unlikely to be higher than this. It concerns primarily the smaller items—helicopters, light aircraft and inexpensive military vehicles—whose values are low compared with those of tanks and combat aircraft. It is unlikely that there is any upward bias in the estimates for ships and missiles. The ship estimates are based almost entirely on one source, *Jane's Fighting Ships* (London, annual). There were very few transfers of missiles in the earlier years.

In order to obtain aggregate statistics of the trade in major weapons, it was necessary first to reconcile conflicting data and to estimate the numbers and

types of weapons and the dates of the deliveries when such information was not available, and then to value individual transactions.

Reconciliation and estimation

There is little difficulty in obtaining reliable and unconflicting information about the deliveries of warships, combat aircraft and main battle tanks. In value terms, these amount to about 80 per cent of total arms deliveries. The problems of reconciliation and estimation primarily concern light tanks and other vehicles, missiles, light aircraft and helicopters. When there was conflicting information, we have, when possible, made our decision on the basis of general experience of the reliability of different sources.

For armoured fighting vehicles, other than main battle tanks, the main problem has been the lack of sources. For certain countries whose armed forces are well publicized, such as India, Pakistan, Egypt or Israel, the information on deliveries of armoured fighting vehicles has been fairly good. These are the countries in the third world which have been the major importers of main battle tanks. For some countries (which, for the most part, imported light tanks or armoured cars) there is only information on the types the country possesses and the numbers of battalions or armoured divisions in that country. To estimate the dates and numbers of tank deliveries, we took into account the dates of production of particular types, or, in the case of second-hand equipment, the dates of replacement of the particular type in the supplying country, the dates of aid or sales agreements or other political and diplomatic ties between the suppliers and the recipient countries, the dates at which the presence of these types was first reported, and the number of tanks, armoured cars and armoured personnel carriers in an armoured battalion or division. Where we have not known the latter, we have assumed that the size of a battalion or division is the same as that of the main supplier, or in the case of ex-colonies, the same as that of the former metropolitan power.

Estimates for light aircraft—helicopters, trainers, liaison and light transport types—have followed a similar pattern. Here we have taken into account the size of squadrons and the relative requirements in an air force for combat aircraft and other types.

The problems concerning missiles are somewhat different. Once it is known that a country possesses a particular missile, it is fairly easy to pin down the date of delivery. The period between the initial date of production and the date the missile was reported is usually limited. The main problem concerns the estimation of numbers of missiles, which are small and easily concealed. For missiles launched from tanks, ships or aircraft, the estimates are based on the numbers of tanks, ships and aircraft a country possesses which are

capable of delivering a particular missile. The remaining missiles are almost entirely anti-tank and anti-aircraft missiles. The deliveries of anti-aircraft missiles such as SA-2, Hawk or Bloodhound have tended to attract considerable attention. There is usually, therefore, fairly good information on the numbers of missile sites, launchers or even the missiles themselves. As far as we know, only a few countries possess anti-tank missiles and for most of these we have reasonable information.

Valuation

The purpose of valuing all items in a common unit is to be able to measure changes in the total flow of weapons and its geographic pattern. Various methods of valuation are conceivable. The obvious ones are military value and monetary value. Military value is generally unmeasurable because it depends on the circumstances in which the weapons may be used. Monetary value, on the other hand, measures something that is relatively precise and is interesting in itself—the quantity of resources used. This valuation therefore, is the one we have used. The monetary values chosen may not correspond to actual prices paid, which vary considerably according to different pricing methods, the length of production series and the terms involved in individual transactions. We have tried to draw up a list of comparable prices in 1968 US dollars based on actual prices and on criteria such as weight, speed and role. These criteria have been different for each of the four different types of weapons—ships, aircraft, missiles and armoured fighting vehicles. One consequence of this method of valuation is that our values of Soviet weapon exports tend to be higher than their quoted prices. For this reason, our figures of the relative flows of major weapons from the United States and the Soviet Union may be much closer together than other statistics comparing weapon flows from these two countries. There is an additional reason for the smaller difference between the two figures. Soviet weapon exports to developing countries include a smaller proportion of small arms than exports from the United States: a comparison of *total* weapon exports from the countries would look very different from a comparison of major weapon exports alone.

Ships

Ships were divided into 11 different categories.[1] For each category, we calculated a 1968 dollar price per ton, based on actual prices in 1968. We also

[1] The categories were:
1. Aircraft carriers
2. Submarines
3. Cruisers
4. Destroyers, 1300 tons and over (*continued overleaf*)

assumed a technical improvement factor of 3.5 per cent per annum. This means that the price of a ship completed in 1967 is 3.5 per cent less than the price of a similar ship completed in 1968. This improvement factor has nothing to do with general price inflation; it is merely intended to measure the increase in the sophistication of ships.

A large proportion of the ships sold to the countries under consideration are second-hand. It was therefore necessary to take into account the depreciation of ship values. A simple exponential depreciation was taken, based on the length of life of ships in each of the 11 categories and a scrap value of 1 per cent. This yields a rather rapid depreciation in the first few years of a ship's life. For this reason, among others, the export of warships by the United Kingdom, which has exported many new ships to developing countries, is higher in value terms than the export of warships from either the United States or the Soviet Union, both of which have exported large numbers of second-hand warships.

Aircraft

For aircraft we derived a price for each individual type of aeroplane. This price was based on two factors. First, it was based on actual prices, taking into account factors which cause these prices to vary, such as the length of the production series, the sales or aid terms, and the support facilities, spares and extra equipment included in the price. Secondly, we used kilo prices for the empty weight of different categories of aircraft,[2] as a rule of thumb. These categories were roughly divided into older construction and fully modern construction. We included a certain percentage of the price for spares and equipment for each of the three categories of aircraft. Explosives, missiles and ground equipment were not included.

Note 1 continued:

5. Frigates, corvettes, patrol vessels, 600–1300 tons
6. Patrol boats, torpedo boats, gunboats, and so on, 300–550 tons
7. Patrol boats, torpedo boats, gunboats and so on, 100–300 tons
8. Patrol boats, torpedo boats, gunboats and so on, under 100 tons
9. Minesweepers
10. Minelayers
11. Landing ships, landing craft, transports, supply ships, survey ships, oilers, tugs and so on.

[2] These categories were:

(*a*) Combat aircraft (fighter/bombers)
  Supersonic
  Subsonic
    (i) conventional
    (ii) STOL (short take-off and landing)
(b) Helicopters
(*c*) Others (transport, trainers and so on)
    (i) piston-engined
    (ii) turbo jet
    (iii) turbo fan jet

The problem of depreciation is much more difficult for aircraft than for ships. The life of an aircraft is shorter than that of a ship and the scrap value approaches zero. A simple exponential depreciation yielded too rapid a depreciation in early years. Many of the second-hand aircraft sold during the period had been part of a long production series. It was often impossible to discover the date the aircraft had been built, the extent they had been used, and the extent of refurbishing. Since second-hand aircraft are a rather small proportion of total aircraft deliveries[3] a blanket assumption of 10 per cent of the original price for each second-hand aeroplane was taken. An assumption of 50 per cent of the original price was made for planes having undergone a more thorough refurbishing.

Tanks

We calculated individual prices for each armoured fighting vehicle. The prices were based on the type and the date when the vehicle had first been used. The five types were: main battle tank, light tank, tank destroyer, armoured car and armoured personnel carrier. Second-hand tanks were valued at 50 per cent of the original price.

Missiles

Here again, we calculated individual prices for each missile. The prices were based on type, date of production, range and guidance. There were seven types: artillery rockets, anti-tank missiles, surface-to-surface missiles, air-to-surface missiles, long-range surface-to-air missiles, short-range surface-to-air missiles and air-to-air missiles.

We had separate prices for missiles and their launchers, radar, computers and so on.

V. *Joint and licensed production*

Licensed production can vary from assembly to complete manufacture. In most cases, it is known what proportion of a particular weapon is imported and what proportion is produced at home. The tables include only the import content of the weapon. In obtaining values for weapons produced under licence, we took a percentage of the total value of the weapon equivalent to the proportion of the weapon which was imported. In the few cases where this per-

[3] Unless our sources indicated that a particular aicraft *was* second-hand or unless they gave a delivery date after the production line had closed down, we assumed that it was new. If we did not know when the production line had closed down, we took as the closing date the last date the aircraft had appeared in *Jane's All the World's Aircraft* (London, annual).

centage was not known, it was assumed to be 100 per cent, since the foreign exchange cost involved in producing major arms under licence is often as high, or higher, than the cost of importing the weapon.[4]

Rounding

All figures above $10 million in the main tables are rounded to the nearest $10 million. Figures below $10 million are rounded to the nearest $5 million. The erratic year-to-year movement makes it difficult to see the trend in the yearly figures: so five-year moving averages are presented in the tables and the charts. The five-year moving average shown under the year 1952 is the average for the years 1950 to 1954 inclusive; the figure under the year 1953 is the average for 1951 to 1955 inclusive, and so on.

VI. *The register*

For the register, no attempt was made to estimate where information was not available or to reconcile conflicting data from equally unreliable sources. In such cases, three dots (thus, ...) indicate that the information is not available.

The register is not simply a record of deliveries in 1972: it includes, as well as deliveries in these years, items known to be on order or ordered. The final columns indicate the information available about the dates of orders or deliveries. When no information is given about either the date of the order or of the delivery, this implies that the item is known to be on order. When deliveries have been spread over a number of years and it is not known how they have been divided among the years, the whole transaction has been entered, and the years over which the supplies were spread are shown in the delivery columns, thus: 1969–1972.

The information is arranged by region.

[4] See *The Arms Trade with the Third World* (Stockholm, Almqvist and Wiksell, 1971, Stockholm International Peace Research Institute), chapter 22.

Conventions

... = Not available
— = Nil
* = Less than $2.5 million
( ) = A greater degree of uncertainty about, for example, the date of an order or the identity of a supplier
\+ = When + is added to a figure, it means at least the number given and probably more.
batt. = battery (of missiles)
u.c. = Unit cost
Displ. = Displacement of naval vessels, in numbers of tons
1969– = 1969 and subsequent years
squad. = Squadron
Srs = Series
Mk = Mark
AAM = Air-to-air missile
AF = Air Force
AC = Armoured car
APC = Armoured personnel carrier
ASM = Air-to-surface missile
ASW = Anti-submarine warfare
ATM = Anti-tank missile
COIN = Counter-insurgency
MAP = (US) Military Assistance Program
RAAF = Royal Australian Air Force
SAM = Surface-to-air missile
SAR = Search and rescue
SSM = Surface-to-surface missile
STOL = Short take-off and landing
USAF = United States Air Force
WEU = Western European Union

Table 9A.1. Values of imports of major weapons by third world countries: by region, 1950–1972[a]

		1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
Far East, excl. Viet-Nam	A	100	160	60	170	120	180	140	160	330	300	320
	B	—	—	120	140	130	150	190	220	250	250	260
South Asia	A	30	20	10	70	80	80	90	180	330	110	160
	B	—	—	40	50	70	100	150	160	170	190	180
Middle East	A	30	20	10	60	70	130	270	230	190	180	90
	B	—	—	40	60	110	150	180	200	190	160	170
North Africa[b]	A	—	—	—	—	—	—	20	*	*	5	5
	B	—	—	—	—	—	—	—	—	5	5	10
Sub-Saharan Africa	A	*	5	5	10	10	10	*	*	5	30	20
	B	—	—	10	10	10	5	5	10	10	20	20
South Africa	A	5	*	10	10	10	10	40	10	10	10	*
	B	—	—	10	10	20	20	20	20	20	10	10
Central America	A	5	*	20	10	10	10	10	5	10	10	30
	B	—	—	10	10	10	10	10	10	10	30	60
South America	A	40	50	20	60	110	140	90	90	110	30	120
	B	—	—	60	80	80	100	110	90	90	100	90
Greece and Turkey	A	10	20	70	140	110	50	110	70	330	90	110
	B	—	—	70	80	90	100	130	130	140	130	120
Total (excl. Viet-Nam)	A	**220**	**270**	**210**	**520**	**510**	**610**	**770**	**760**	**1 310**	**770**	**860**
	B	—	—	**350**	**420**	**520**	**630**	**790**	**840**	**890**	**890**	**920**
Viet-Nam, North and South	A	—	—	—	—	10	10	10	5	40	5	20
	B	—	—	—	—	—	—	10	10	20	30	50
Total	A	**220**	**270**	**210**	**520**	**520**	**620**	**780**	**760**	**1 350**	**770**	**880**
	B	—	—	**350**	**430**	**530**	**640**	**800**	**860**	**910**	**920**	**970**

[a] Figures rounded to nearest 10, except for figures under 10 which are rounded to nearest 5. Items may not add to totals because of rounding.

[b] Five-year moving averages are calculated from the year arms imports began.

Source: SIPRI worksheets of arms transfers 1950–72. The figures in the *SIPRI Yearbook 1972*, pages 120–23, have been extensively revised in the light of new information.

US $ mn, at constant (1968) prices. A = yearly figures, B = five-year moving averages

961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	Total
30	220	190	240	170	250	120	70	160	140	210	60	**4 020**
30	220	190	210	190	170	160	150	150	130			
90	120	130	60	80	280	170	350	140	110	280	130	**3 200**
40	130	120	140	140	190	200	210	200	200			
30	250	230	200	260	210	590	610	640	710	910	550	**6 550**
70	180	210	230	300	380	460	560	730	680			
10	20	20	10	40	60	60	30	40	60	80	110	**580**
10	10	20	30	40	40	50	50	50	60			
30	30	30	40	60	80	40	20	30	50	70	40	**630**
30	30	40	50	50	50	50	40	40	40			
5	10	80	20	120	50	40	20	40	50	50	5	**610**
20	20	50	60	60	50	50	40	40	30			
90	150	20	20	10	10	10	*	*	5	30	20	**480**
60	60	60	40	10	10	5	5	10	10			
40	50	40	20	50	70	60	90	100	90	130	140	**1 870**
80	70	60	50	50	60	80	80	100	110			
30	20	100	70	150	80	80	70	130	20	90	130	**2 070**
70	70	70	90	100	90	100	80	80	90			
760	**890**	**840**	**690**	**930**	**1 100**	**1 180**	**1 250**	**1 300**	**1 240**	**1 830**	**1 180**	**20 020**
820	**810**	**820**	**890**	**950**	**1 030**	**1 150**	**1 220**	**1 360**	**1 360**			
90	100	40	50	50	160	300	280	170	250	260	710	**2 540**
50	60	70	30	120	170	190	230	250	330			
850	**980**	**870**	**740**	**980**	**1 260**	**1 480**	**1 530**	**1 470**	**1 500**	**2 090**	**1 890**	**22 450**
870	**870**	**890**	**970**	**1 070**	**1 200**	**1 350**	**1 450**	**1 610**	**1 700**			

Table 9A.2. Values of exports of major weapons to regions listed in table 9A.1: by supplier, 1950-

		1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	196
USA	A	50	130	130	210	290	250	270	240	630	300	470
	B	—	—	160	200	230	260	340	340	380	370	370
USSR	A	20	30	20	120	*	50	80	160	120	80	110
	B	—	—	40	40	50	80	80	100	110	150	220
UK	A	70	30	40	120	120	130	140	190	260	140	170
	B	—	—	80	90	110	140	170	170	180	190	160
France	A	*	*	*	30	50	40	120	50	100	40	20
	B	—	—	20	20	50	60	70	70	70	50	50
Canada	A	20	5	*	*	20	20	80	30	5	50	10
	B	—	—	10	10	20	30	30	40	30	20	10
China	A	40	40	—	10	—	—	—	40	80	60	10
	B	—	—	20	10	*	5	20	30	30	30	30
FR Germany[b]	A	—	—	—	*	5	10	5	*	10	20	20
	B	—	—	—	—	—	5	5	10	10	10	20
Italy	A	5	30	—	*	*	*	20	20	20	*	10
	B	—	—	10	5	5	10	10	10	20	10	5
Czechoslovakia[b]	A	—	—	—	—	—	30	40	5	20	40	30
	B	—	—	—	—	—	—	—	30	30	20	20
Netherlands	A	20	10	5	*	*	60	*	*	—	5	*
	B	—	—	10	20	10	10	10	10	*	*	5
Japan	A	—	—	—	*	20	—	5	5	10	*	*
	B	—	—	—	—	—	5	10	5	5	5	10
Sweden	A	*	*	10	5	5	5	5	—	30	*	*
	B	—	—	5	5	5	5	10	10	5	5	5
All other[b]	A	—	—	—	20	*	5	5	5	30	30	5
	B	—	—	—	—	—	5	10	10	10	10	20
Total (excl. Viet-Nam)	**A**	**220**	**270**	**210**	**520**	**510**	**610**	**770**	**760**	**1 310**	**770**	**860**
	B	—	—	**350**	**420**	**520**	**630**	**790**	**840**	**890**	**890**	**920**

[a] Figures rounded to nearest 10, except for figures under 10 which are rounded to nearest 5. Items may not add to totals because of rounding.

[b] Five-year moving averages are calculated from the year arms exports began.

Source: SIPRI worksheets of arms transfers 1950–72. The figures in the *SIPRI Yearbook 1972*, pages 120–23, have been extensively revised in the light of new information.

1972[a] *US $ mn, at constant (1968) prices. A = yearly figures, B = five-year moving averages*

1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	Total
230	200	280	250	420	310	270	320	570	510	610	270	**7 220**
300	280	270	290	300	310	370	390	450	460			
280	510	210	180	200	400	680	510	300	420	620	300	**5 390**
240	260	280	300	340	400	420	460	500	430			
180	50	80	80	140	120	60	180	200	100	210	180	**2 980**
120	110	110	90	100	120	140	130	150	170			
30	70	110	90	50	70	50	140	110	120	160	200	**1 640**
50	60	70	80	70	80	80	100	110	150			
10	—	100	30	40	5	5	20	10	20	40	20	**540**
30	30	40	40	40	20	20	10	20	20			
—	—	—	*	5	30	10	5	—	5	40	60	**430**
10	*	*	5	10	10	10	10	10	20			
20	5	10	30	10	100	20	10	10	20	40	60	**420**
20	20	10	30	30	30	30	30	20	30			
—	*	10	10	5	10	10	30	40	30	50	40	**350**
5	5	5	5	10	10	20	20	30	40			
5	5	10	5	*	5	5	5	*	*	5	10	**230**
20	10	5	5	5	5	5	5	5	5			
*	10	10	5	10	—	—	—	20	5	20	10	**210**
5	5	10	10	5	5	5	5	10	10			
10	20	20	10	10	10	30	10	*	—	*	—	**170**
10	10	10	10	20	10	10	10	10	5			
*	—	—	—	—	*	—	—	*	—	—	5	**60**
*	*	*	*	*	*	*	*	*	*			
*	10	*	*	20	60	40	10	60	10	50	20	**384**
10	5	10	20	30	30	40	30	30	30			
760	**890**	**840**	**690**	**930**	**1 100**	**1 180**	**1 250**	**1 300**	**1 240**	**1 830**	**1 180**	**20 020**
820	**810**	**820**	**890**	**950**	**1 030**	**1 150**	**1 220**	**1 360**	**1 360**			

Appendix 9B. Arms trade register: register of major weapon transfers to third world countries, 1971–1972

Recipient	Supplier	Number	Item	Description	Comment	Date: number of items	
						Order	Delivery
Middle East							
Abu Dhabi	USA	1	Lake LA.4-200	Amphibian		...	(1972)
	UK	1	Britten-Norman BN2 Islander	Transport		1971	1972
		...	BAC Vigilant	Anti-tank missile	Repeat order	Late 1971/ early 1972	...
	France	12	Dassault Mirage 5	Fighter/ground attack	$15 mn. Pakistan AF will provide training and technical aid	July 1972	1973
		2	Dassault Mirage 5D	Trainer			
		3	Aérospatiale/Westland SA-330 Puma	Helicopter		May 1972	1972
		5	Aérospatiale Alouette III	Helicopter		(May) 1972	1972
	Canada	1	DHC-4A Caribou	STOL transport		1971	(1972)
Egypt	USSR	25	MiG-21	Fighter	Replacements	...	1972
		60–80	MiG-21MF	Fighter	Multi-role version of the MiG-21. Flown by Soviet pilots, reportedly turned over to Egypt	...	(July) 1972
		...	Su-7	Fighter/ground attack	Replacements and a few of the swing-wing version	...	1972
		...	Tu-16	Bomber	A few may have been supplied	...	June 1972
		...	"Atoll"	A-A missile	To arm MiG-21MF	...	(July) 1972
		(10 batt.)	SA-2 "Guideline"	S-A missile		...	Spring 1972
		60	SA-6 "Gainful"	S-A missile		Oct 1972	Nov 1972
		30–40	T-62	Tank		...	Spring 1972
		(100)	Armoured personnel carrier			...	Spring 1972
Iran	USA	32	McDonnell-Douglas F-4 Phantom	Fighter	In addition to 64 previously purchased	...	By 1974

	30	Northrop F-5E Tiger II	Fighter	U.c.: $1.6 mn, incl. avionics	April 1972	...
	4	Lockheed P-3C Orion	ASW aircraft		(Aug) 1972	1974–
	6	Boeing 707-320	Tanker transport	$62.5 mn, incl. spares	Late 1972	1973–74
	18	Beech F33 Bonanza	Cabin monoplane	$1 mn, incl. spares, service support, training and shipping	(July 1972)	Aug 1972–Jan 1973
	3	NA-Rockwell 690 Turbo Commander	Light aircraft	$2.5 mn	...	1972–73
	6	NA-Rockwell Aero Commander Shrike	Light aircraft			
	202	Bell AH-1J Sea Cobra	Helicopter	$720 mn	Dec 1972	1974–79
	287	Bell 214A Huey Plus	Helicopter	Initial funding $38.5 mn for Sea Cobra and $63 mn for Huey Plus		
	100	(Bell 206 Jet Ranger)	Helicopter			
	...	Hughes TOW	Anti-tank missile	$15 mn	1971	1971–73
		Destroyer, "Allen M Sumner" class	Displ.: 2 200 t.	Launched 1944–45; 2 were refitted before transfer	(1971)	1972
UK	...	BAC Rapier	S-A missile	$113 mn for land-based version; $60 mn+ may be spent for naval version	June 1970	1971–72
	...	Short Seacat	Naval S-A missile	$2.4 mn; 1 triple launcher on each "SAAM" class frigate	Oct 1971	1971–72
	...	BAC Swingfire	Anti-tank missile	On order to arm Scorpion light tanks	...	...
	800	Chieftain Mk 5	Tank	$346 mn, incl. spares, training and support equipment	1971	1971–75
	...	Scorpion	Light tank	$72 mn for Scorpion and Fox. Scorpion may be armed with Swingfire anti-tank missile	(Aug 1972)	...
	...	Fox	Armoured reconnaissance vehicle			
	4	Frigate "SAAM" class	Displ.: 1 200 t.	Completed 1971–72; armed with Seacat SAM and Sea Killer SSM	Aug 1966	1971: 2 1972: 2
	4	Hovercraft, BH. 7 "Wellington" class	Displ.: 50 t. max.	Approx. $13 mn	March 1971	1973–74
Italy/USA	10	Agusta-Sikorsky SH-3D Sea King	Helicopter	For ASW	(1971)	Sept 1971–March 1973
		Meridionali/Boeing-Vertol CH-47C	Helicopter	For Army and Air Force	Early 1970	1971–

Recipient	Supplier	Number	Item	Description	Comment	Date: number of items	
						Order	Delivery
	Italy	...	Contraves Sea Killer Mk 2	S-S missile	1 quintuple launcher on each "SAAM" class frigate	...	1971–72
	Netherlands	12	Fokker-VFW F.27 Friendship	Transport		Dec 1970	1971–92
Iraq	USSR	2	Missile boat ("Komar" or "Osa" class)	Displ.: 75 t. or 160 t.		(April 1972)	Nov 1972
Israel	USA	42	McDonnell-Douglas F-4 Phantom	Fighter	$500 mn, incl. 90 A-4. Armed with improved Sidewinder AAM	Dec 1971	March 1972–end-1973
		(90)	McDonnell-Douglas A-4N Skyhawk	Fighter	Specifically developed for Israel with new navigation and weapons delivery system	Dec 1971	Nov 1972–end-1973
		...	NWC Sidewinder	A-A missile	To arm Phantom	(Dec 1971)	(March 1972–end-1973)
		...	M-107	Self-prop. howitzer		...	(April 1972)
	UK	3	Submarine	Displ.: 500 t.		April 1972	...
Jordan	USA	(24–30)	Northrop F-5E Tiger II	Fighter	MAP	(April) 1972	1973–
		2–3	Northrop F-5B	Trainer		(April) 1972	1972
		4	Fairchild C-119K Packet	Transport	US military aid; 1 crashed	...	1972: 2
		200	M-113	Armoured personnel carrier		1972	1974
	UK	3	HS Hunter	Fighter	Refurbished	...	July 1972
Lebanon	USSR	...	Armoured personnel carrier		Part of $66 mn arms programme	Oct 1971	...
		18–24	122 mm Howitzer		Part of $66 mn arms programme	Oct 1971	...
	UK	...	Armoured vehicles		Part of $66 mn arms programme	May 1972	...
	France	...	Helicopters		Part of $66 mn arms programme	Jan 1972	...
		22	AMX-13	Tank	Part of $66 mn arms programme	Jan 1972	1972–

	France/South Africa	(1 batt.)	Matra/Thomson-CSF Crotale	S-A missile	$13 mn. Order cancelled in July 1972	Aug 1968	···
Oman	UK	12	HS Hunter FGA.76	Fighter	Refurbished; part of $96 mn arms order	Late 1971	···
		8	BAC 167 Strikemaster	Trainer/COIN	In addition to 12 previously purchased	Late 1971	···
		2	Short Skyvan	STOL transport	In addition to 8 previously purchased	(Aug) 1972	···
		3	Fast patrol boat	Displ.: ···		1970	(1972)
Qatar	UK	6	HS Hunter	Fighter	Refurbished	Oct 1971	1971: 2 1972: 4
		4	Fast patrol boat	Displ.: ···	On order	···	···
Saudi Arabia	USA	30	Northrop F-5E Tiger II	Fighter	$130 mn. Modified for low-altitude reconnaissance and strike missions	Oct 1971	···
		20	Northrop F-5B	Trainer			
		4	Lockheed C-130E Hercules	Transport	Equipped for aerial tanker operations	(Aug) 1972	···
	UK	10–12	BAC 167 Strikemaster	Trainer/COIN	In addition to 25 previously purchased	Dec 1972	···
	France	···	AMX-30	Tank		1972	···
Syria	USSR	35	MiG-21	Fighter	Including some of the advanced MiG-21M version	(May) 1972	1972
			MiG-17	Fighter		(May 1972)	1972
		4	Helicopter			(May 1972)	Dec 1972
		···	SA-3	S-A missile		(May) 1972	1972
	Czechoslovakia	2 squad.	Aero 29 Delfin	Trainer		···	(1972)
South Yemen	UK	15	Coastal patrol boats	Displ.: ···	On order	1969	···
Africa							
Burundi	(France)	···	Aérospatiale Alouette	Helicopter	Reportedly operated by Army	···	(1972)
Cameroon	USA	1	Grumman Gulf Stream 2	Transport		(Jan) 1972	···
Ethiopia	USA	3	Northrop F-5A Freedom Fighter	Fighter		···	1972

Recipient	Supplier	Number	Item	Description	Comment	Date: number of items	
						Order	Delivery
	Belgium	5+	Fairchild C-119 Packet	Transport		···	1972
	Netherlands	···	Lockheed T-33A	Trainer	Ex-Royal Netherlands Air Force	···	1972
Gabon	France	1	Coast guard vessel	Displ.: ···		···	March 1972
		···	Fast gunboat	Displ.: ···		···	(1972)
Ghana	USA	2	Bell 212 Twin-Pac	Helicopter	1 for VIP use	···	Autumn 1972
	Italy	9	Aermacchi M.B.326	Trainer/COIN		Mid-1972	···
Guinea	France	···	Aérospatiale Alouette	Helicopter		1971	(1972)
Kenya	UK	5	Scottish Aviation B.125 Bulldog M.103	Trainer	$240 000	Oct 1969	July 1972
	Canada	2	DHC-4 Caribou	STOL transport	In addition to 4 previously delivered	1971	1972
Libya	UK	···	Short Seacat	Naval S-A missile	2 triple launchers on Vosper Mk 7 frigate	Feb 1968	(1973)
		1	Frigate, Vosper Mk 7	Displ.: 1325 t.	Planned for completion Dec 1972. Armed with Seacat	Feb 1968	Dec 1972
	France	58	Dassault Mirage 5	Fighter			
		32	Dassault Mirage IIIE	Fighter	$144 mn+	Jan 1970	1971–72: 55+
		10	Dassault Mirage IIIR	Reconnaissance			
		10	Dassault Mirage IIIB	Trainer			
		9	Aérospatiale Super Frelon	Helicopter		Jan 1970	1971–72
		4	Aérospatiale Alouette	Helicopter		Jan 1970	1971–72
		···	Matra R-550 Magic	A-A missile	To arm Mirages. Will receive before the French Air Force	(Jan 1970)	···
		···	AMX-30	Tank		Nov 1972	···

	Italy/USA	...	M-113	Armoured personnel carrier	Produced in Italy under US licence	1971	1972
Madagascar	UK	...	Aérospatiale-Westland SA-330 Puma	Helicopter		(1972)	...
Malawi	UK	3+	Gunboat	Displ.: ...		(1972)	...
	South Africa	9	Ferret	Armoured car		1971	1972
Nigeria	UK	2	Corvette, Vosper Thorny-croft Mk 3	Displ.: 500 t.	$9.6 mn. Completed 1972	March 1968	1972
		2	Fast patrol boat	Displ.: ...	$3 mn+. 107 ft.	(June) 1972	...
	Netherlands	6	Fokker-VFW F.27 Friendship Srs.400 and 600	Transport		Dec 1971	1972
		1	Fokker-VFW F.28	Transport	$15.7 mn	(May) 1972	1973
Rwanda	Italy	6	Aermacchi MB.326 GB	Trainer/COIN		1972	...
		3	Aerfer-Aermacchi AM.3C	General-purpose monoplane	First military aircraft operated by Rwanda	...	1972
South Africa	UK	7	Westland Wasp	Helicopter	$2.4 mn, incl. spares	Nov 1971	1973
	France	...	Aérospatiale MM38 Exocet	Naval S-S missile	To arm corvettes from Portugal	1972	...
	France/South Africa	...	Dassault Mirage III	Fighter	$350 mn for production and sales agreement; first phase involves 36 planes. Super Mirage will probably be armed with Matra R-550 AAM	June 1971	...
		...	Dassault F1 Super Mirage	Fighter/interceptor			
		3 batt.	Matra/Thomson-CSF Cactus	S-A missile	Initial cost: $100–120 mn, of which 85 per cent financed by South Africa. Total requirement 6–10 batt.	...	1971–72: 2 batt. 1973: 1 batt.
		...	Panhard AML 60/90	Armoured car	Being produced under licence	...	...

Recipient	Supplier	Number	Item	Description	Comment	Date: number of items	
						Order	Delivery
	Italy	40	Aerfer-Aermacchi AM-3C	General-purpose monoplane		1971	1973
	Italy/South Africa	234	Atlas/Aermacchi MB 326M "Impala"	Trainer/COIN	Licensed production	1965	1966–
	Portugal	6	Corvette, "Joao Coutinho" class	Displ.: 1 203 t.	Hulls to be built in Portugal, fitting in South Africa. Armed with Exocet SSM and possibly Seacat SAM	Oct 1971	...
Sudan	China	8	MiG-17	Fighter		1970	(1972)
		10	Tank			1970	(1972)
Tanzania	(USA)	5	Piper Cherokee	Cabin monoplane		...	(1972)
	China	12	MiG-17 or MiG-19	Fighter	Type to be decided in 1973. To be based at new air base, built with Chinese aid	...	1973
Uganda	France	(30)	AML-60/90	Armoured car	Instead of Saladin	(Oct) 1972	...
Zaïre	Italy	12	SIAI-Marchetti SF.260	Cabin monoplane	In addition to 12 delivered 1970	(Sept) 1972	...
Zambia	Italy	9	Aermacchi MB.326 GB	Trainer/COIN	In addition to 6 delivered 1971	Late 1971	...
		8	SIAI-Marchetti SF.260	Cabin monoplane		(June 1970)	1971–72
Indian Sub-continent							
Afghanistan	USSR	30	Sukhoi Su-7	Fighter/ground attack	In 2 squadrons	...	(1971–72)
Bangladesh	USSR	1 squad.	MiG-21	Fighter	Reportedly promised during Sheikh Mujibur Rahman's visit to Moscow in March	March 1972	...

		4	Mil Mi-8	Helicopter	On loan for one year, according to Soviet Army newspaper *Kraznaya Zvezda*	April 1972	1972
	India	2	Alouette III	Helicopter	In addition to 1 or 2 provided in Dec 1971	...	1972
		...	Patrol boat	Displ.: ...	Some of India's modern patrol boats for coastal patrol	...	1972
India	USSR/India	154	MiG-21FL	Fighter	Produced under licence in India since 1966	1963	1967–72: 130
	USSR	7	MiG-21MF	Fighter	Delivered prior to start of licensed production	(1971)	1972
	USSR/India	150	MiG-21M	Fighter	Produced under licence in India. Initial order approx. 60 planes	1971	1972: 1 1973–: rest
	USSR/India	...	HAL K-13A "Atoll"	A-A missile	Produced under licence in India	1964	1968–
	USSR	...	"Styx"	Naval S-S missile	4 missile launchers on each motor torpedo boat	...	1971–72
		2	Destroyer, "Petya" class	Displ.: 1050 t.		...	Oct 1972
		8	Motor torpedo boat	Displ.: (165 t.)	Similar to "Osa" class; armed with "Styx" SSM	...	1971–72
	UK	5	HS Hunter	Fighter	Refurbished; approx. u.c.: $270 000. On order	...	...
	UK	3	Westland Sea King	Helicopter	Order for 3 and option for further 3 for ASW. In addition to 6 previously purchased	July 1972	...
	UK/India	69	HAL/HS 748	Transport	Produced under licence in India	1959	1965–72: 45
		...	HAL/HS 748	Transport	Freighter version, to be produced from 1975	1971	1975–: (200)
	UK	40 systems	Short Seacat	Naval S-A missile	$10.4 mn. Order conditional on quick deliveries	Oct 1971	1972–
		...	Short Seacat	Naval S-A missile	2 quadruple launchers on each "Leander" class frigate built in India	...	1971–

Recipient	Supplier	Number	Item	Description	Comment	Date: number of items	
						Order	Delivery
	UK/India	400	"Vijayanta"	Tank	Produced under licence in India	1965	1966–72
		6	Frigate, "Leander" class	Displ.: 2 450 t.	Built under licence in India. Armed with Seacat	...	1971: 1 1974–78: 5
	France	8	Aérospatiale Alouette III	Helicopter	Specially equipped, for use on "Leander" class frigates	...	1972: 1 ...: 7
	France/India	120	HAL/Aérospatiale Alouette III	Helicopter	Produced under licence in India. 96 per cent of components indigenous	1963	1966–72: 85
		200	HAL/Aérospatiale SA-315 "Cheetah"	Helicopter	Produced under licence in India. Specifically developed to meet Indian requirements	(1970)	1972–
		...	Aérospatiale/Bharat SS.11	Anti-tank missile	Produced under licence in India	1969	July 1971–
	Czechoslo-vakia/India	...	OT-62	Armoured personnel carrier	Produced under licence in India	...	...
Pakistan	USA/ Pakistan	...	Cessna L-19 Bird Dog	Light aircraft	Being produced in Pakistan from previously acquired spares and approx. 60 per cent indigenous components	...	1972
	France	28	Dassault Mirage 5	Fighter	In addition to 24 previously purchased	1970	June 1972
		2	Dassault Mirage IIID	Trainer			
		1	Dassault Falcon	Transport	For VIP transport	(Sept) 1972	...
	France/ Pakistan	...	Aérospatiale Alouette III	Helicopter	Being assembled in Pakistan from French components. For all three services	(1971)	1972
	China	50+	MiG-19	Fighter		(Feb 1972)	Spring 1972
		100	T-59	Tank		(Feb 1972)	Spring 1972
		6	Gunboat, "Shanghai" class	Displ.: 120 t. full load	In addition to 3 delivered before Dec 1971. 4 will probably be converted for missile firing in Pakistan	...	1972

Sri Lanka (Ceylon)	USA	4	Bell Jet Ranger	Helicopter	Gift, part of $3 mn military assistance programme	...	April 1972
	China	5	Gunboat, "Shanghai" class	Displ.: 120 t. full load	U.c.: $0.8–1.0 mn	...	1972
Far East							
Brunei	France	...	Aérospatiale SS.12	S-S missile	2 quadruple launchers fitted on a Vosper patrol boat, delivered in 1967	...	May 1972
Indonesia	USA	1 squad.	Lockheed T-33	Trainer		(1972)	...
	UK	...	Aérospatiale/Westland SA-330 Puma	Helicopter	On order	...	...
	Australia	16	Avon Sabre	Fighter	$11.9 mn, incl. training, spares and ancillary equipment. Ex-RAAF. Gift	(March 1972)	1973
		...	Patrol boat	Displ.: ...	With $23.9 mn military assistance programme	(June 1972)	...
	New Zealand	(2)	AESL T6 Airtourer	Light aircraft		Nov 1971	1972
Khmer	USA	20	Douglas A-1 Skyraider	Fighter		...	Nov 1972
		2	Cessna L-19 Bird Dog	Light aircraft		...	Nov 1972
	Australia	6	Douglas C-47	Transport	5 ex-RAAF, 1 ex-Jetair; gift	...	Jan 1972
Korea, North	USSR	...	"Styx"	Naval S-S missile	To arm 8 "Osa" class and 6 "Komar" class patrol boats	...	(1971–72)
		8	Patrol boat, "Osa" class	Displ.: 165 t.	Armed with "Styx" SSM	...	(1971–72)
		6	Patrol boat, "Komar" class	Displ.: 75 t.	Armed with "Styx" SSM	...	(1971–72)
Korea, South	USA	1 squad.	McDonnell-Douglas F-4 Phantom	Fighter	To replace Northrop F-5 supplied by South Korea to South Viet-Nam	Nov 1972	...
		...	Northrop F-5E Tiger II	Fighter	On order	...	...
	South Korea/ USA	1	Pazmany PL-2	Light aircraft	Building for evaluation	...	...

Recipient	Supplier	Number	Item	Description	Comment	Date: number of items	
						Order	Delivery
	USA	2	Destroyer	Displ.: ...	On loan for 5 years	April 1972	...
		3	Patrol boat	Displ.: 70 t. full load	$16 mn credit	...	1973–74
Malaysia	USA	16	Northrop F-5E Tiger II	Fighter	$35 mn, incl. spares and technical support. Ordered instead of Mirage	July 1972	1973–75
	UK	15	Scottish Aviation/Beagle B.125 Bulldog	Trainer	$800 000	May 1971	1972
	France	...	Aérospatiale MM 38 Exocet	S-S missile	2 launchers on each fast patrol boat	Aug 1970	1973
		4	Fast patrol boat, "La Combattante II" class	Displ.: 234 t.	$22.5 mn, incl. Exocet SSM; being built	Aug 1970	1973
	Australia	6	Avon Sabre	Fighter	Gift; in addition to 10 previously delivered. Ex-RAAF	1971	1971–72
		6	Patrol boat	Displ.: ...	Gift under defence aid programme	...	1972–
	Canada	4	DHC-4 Caribou	STOL transport	On order. Part of an order for 14	...	...
Philippines	USA	(10)	Cessna T-41D	Trainer		...	1972
		6	Inshore patrol craft	Displ.: 33 t. full load	On order	1971	...
		1	Supply ship	Displ.: 4 900–5 636 t.	Launched 1945	...	March 1972
		1	Lighthouse tender	Displ.: 935 t.	Launched 1943	...	March 1972
	Australia	6	Fast patrol boat	Displ.: ...		...	June 1972
Singapore	USA	40	McDonnell-Douglas A-4B Skyhawk	Fighter	Ex-US Navy; refurbished	(June)1972	...
	UK	10	HS Hunter FGA.74	Fighter	Refurbished	...	(1972)
		6	Short Skyvan	STOL transport	Approx. $3.6 mn. For SAR	(Nov 1972)	April 1973–

	Israel	...	Gabriel	S-S missile	Reportedly equipping 6 fast patrol boats with Gabriel	...	(1972)
	New Zealand	4	AESL T6 Airtourer	Light aircraft	In addition to 2 previously purchased	July 1971	1973
Taiwan	USA	...	Northrop F-5E Tiger II	Fighter	MAP	...	1973–75
		1	Boeing 720-047B	Transport	Ex-Northwest Airlines. For VIP use	1972	...
	USA/Taiwan	50	Pazmany PL-1	Light aircraft	Being built in Taiwan	1968	1970–72
		74	Bell 205	Helicopter	Produced under licence in Taiwan	1969: 50 1972: 24	1971–
		1	Submarine	Displ.: ...	On loan; for ASW training	...	(1972)
	USA	1	Repair ship, "Liberty" type	Displ.: 5 766 t.	Completed 1944	...	Feb 1972
		1	Surveying ship	Displ.: 6 090 t.	Built 1945, refitted for oceanographic work 1966–67	...	March 1972
		1	Tug	Displ.: 435 t.	Launched 1944	...	April 1972
Thailand	USA	(30)	Northrop F-5E Tiger II	Fighter	Thailand and South Viet-Nam to receive 105	...	1973–75
		17	Douglas A-1 Skyraider	Fighter	$9.52 mn. For COIN use	(July 1972)	...
		16	NA Rockwell OV-10 Bronco	COIN aircraft	$5.8 mn; through Foreign Military Sales Programme. In addition to 16 previously delivered	(June 1972)	1973
	USA/Thailand	2	Pazmany PL-2	Light aircraft	Being built in Thailand for evaluation	...	...
	USA	2	Frigate, Corvette type	Displ.: 900 t.	Being built	June 1969: 1 June 1971: 1	... ...
		10	River patrol boat	Displ.: 10.4 t.	MAP. For COIN use	...	1972
	UK	1	HS 748	Transport	For VIP use	(July 1972)	1972
		...	Short Seacat	Naval S-S missile	1 quadruple launcher on "Yarrow" type frigate	Aug 1969	1973
		1	Frigate, "Yarrow" type	Displ.: 1 780 t.	$15.6 mn. Armed with Seacat; being built	Aug 1969	1973
	Italy	12	SIAI-Marchetti SF.260	Cabin monoplane		Late 1972	...
	New Zealand	24	AESL CT4 Airtrainer	Light monoplane	$1.3 mn	Mid-1972	1973–74

Recipient	Supplier	Number	Item	Description	Comment	Date: number of items	
						Order	Delivery
Viet-Nam, North	USSR	...	MiG-21	Fighter	Armed with "Atoll" AAM	(Dec 1971)	1972
		...	SA-2 "Guideline"	S-A missile		(Dec 1971)!	1972
		...	SA-7 "Strela"	S-A missile		(Dec 1971)	1972
		...	"Sagger"	Anti-tank missile		(Dec 1971)	1972
		...	"Atoll"	A-A missile	To arm MiG-21	(Dec 1971)	1972
		...	T-34	Tank		(Dec 1971)	1972
		...	T-54	Tank		(Dec 1971)	1972
	USSR/China	...	PT-76	Tank		(Dec 1971)	1972
Viet-Nam, South	USA	72–78	Northrop F-5E Tiger II	Fighter	To replace F-5 delivered in 1972	...	1975
		120	Northrop F-5 Freedom Fighter	Fighter	20 supplied by USA, 30 on loan from Iran and 70 on loan from South Korea and Taiwan	(Oct) 1972	Nov 1972
		20	Douglas A-1 Skyraider	Fighter	From USAF in Thailand	(Oct) 1972	Nov 1972
		90	Cessna A-37	COIN aircraft	In addition to 164 previously delivered. From USAF reserve units	...	Nov 1972
		32	Lockheed C-130 Hercules	Transport		...	Nov 1972
		20	Fairchild AC-119 Packet	Gunship		...	Nov 1972
		...	Douglas EC-47	Electronic warfare plane	Several	...	Nov 1972
		...	Bell UH-1H Iroquois	Helicopter		...	1972
		...	Boeing-Vertol CH-47 Chinook	Helicopter		...	1972
		...	Hughes TOW	Anti-tank missile		...	Spring 1972
		57	M-48	Tank	After refurbishing in Japan	...	Nov 1972
		80–100	M-113	Armoured personnel carrier		...	Nov 1972

Central America							
Cuba	USSR	...	MiG-21	Fighter		...	Spring 1972
		...	"Styx"	Naval S-S missile	4 launchers on each "Osa" class patrol boat	...	Jan 1972
		2	Patrol boat, "Osa" class	Displ.: 165 t.	Armed with "Styx" SSM	...	Jan 1972
Haiti	USA	4	Helicopter			1971	(1972)
		6	Coast guard vessel	Displ.: 100 t.	$1.2 mn; 65 ft. unarmed. Licensed by US State Dept. in Feb 1972	1971	(1972)
Mexico	USA	5	Bell 205A-1	Helicopter		Nov 1972	Jan 1973–
		5	Bell 206B Jet Ranger	Helicopter		Nov 1972	April 1973–
Trinidad and Tobago		2	Patrol boat, "Trinity" class	Displ.: 100 t.		(1971)	1972
South America							
Argentina	USA	16	McDonnell-Douglas A-40 Skyhawk	Fighter	Refurbished; for use on aircraft carrier "25 de Mayo". In addition to 50 previously delivered	1970	1972
		3	Lockheed C-130 Hercules	Transport		1970	1971: 2 1972: 1
		4	Sikorsky S-61	Helicopter	For Navy, ASW and SAR duties	July 1971	1972
		2	Patrol boat, "ATA" class	Displ.: 689 t.	Built 1945	...	1972
	UK	2	Westland WG.13 Lynx	Helicopter	For use on Vickers Type 42 frigates	(May 1970)	1973
		...	HS Sea Dart	Naval S-A missile	1 twin launcher on each Vickers Type 42 frigate	(May 1970)	1973
	UK/Argentina	2	Frigate, Vickers Type 42	Displ.: 3 500 t.	$72 mn, incl. $24 mn for missile system and gas turbines. First launched Oct 1972 in UK. Second being assembled in Argentina	May 1970	End-1973: 1

Recipient	Supplier	Number	Item	Description	Comment	Date: number of items	
						Order	Delivery
	France	12	Dassault Mirage IIIE	Fighter	Armed with Matra R.530 AAM	Oct 1970	Sept 1972–73
		2	Dassault Mirage IIID	Trainer			
		6	Aérospatiale SA-315 Lama	Helicopter	U.c.: $170 000	Spring 1972	...
		...	Matra R.530	A-A missile	To arm Mirage	(Oct 1970)	(1972–73)
	FR Germany/ Argentina	2	Submarine, Type 205	Displ.: 450 t.	Being built in Argentina from FR German material	Jan 1969	...
Bolivia	Brazil	9	EMB-326GB Xavante	Trainer/COIN	$10 mn incl. option for further 9. Produced in Brazil under Italian licence	March 1972	Early 1973
	Spain	6	Convair CV-440	Transport	From airline surplus stocks	...	1972: 2 (1972: 4)
Brazil	USA	3	Submarine, "Guppy II" type	Displ.: 1870 t.	Completed 1945–49	...	1972
	UK	4	HS 125	Transport	$4.8 mn+. In addition to 6 previously purchased	May 1972	1972–73
		4	Westland WG.13 Lynx	Helicopter	To arm ASW version of Vosper Mk 10 frigates	(Sept 1970)	(1976–79)
		...	Short Seacat	Naval S-A missile	2 triple launchers on each Vosper Mk 10 frigate	Nov 1970	(1976–79)
	UK/Brazil	6	Frigate, Vosper Mk 10 "Nitheroi" class	Displ.: 3 500 t.	$283 mn, of which $226 mn credit at 5.5 per cent over 8 years. Versions: 2 general purpose and 2 ASW to be built in UK, 2 ASW to be built in Brazil. Armed with Seacat, Exocet, Ikara missiles and Lynx helicopters	Sept 1970	1976–79
		3	Submarine, "Oberon" class	Displ.: 1619 t.	Completed 1972–73: 2, third being built	1969: 2 Aug 1972 :1	1972–73: 2 ...

	France	12	Dassault Mirage IIIE	Fighter	Armed with Matra R. 530	May 1970	1972: 2
		4	Dassault Mirage IIID	Trainer		(Mid-1972)	1973: 14
		...	Aérospatiale Alouette III	Helicopter		...	...
		...	Matra R-530	A-A missile	To arm Mirage IIIE	(May 1970)	(1972–73)
		...	Aérospatiale MM 38 Exocet	Naval S-S missile	2 twin launchers on each of 2 Vosper Mk 10 general purpose frigates	1972	(1976–79)
	France/FR Germany	(40)	Aérospatiale/MBB Roland	S-A missile	4 systems, each with 10 missiles, for installation on AMX-30 from France or Spz Neu (Marder) from FRG. Both clear-weather and all-weather versions. Partial assembly in Brazil	(Spring 1972)	...
	FR Germany	4	Fast minesweeper, "Schütze" class	Displ.: 230 t.	Completed 1971. 6 more are projected and 2 will be built in Brazil	April 1969	1971–72
	Italy/Brazil	112	Aermacchi/Embraer EMB. 326GB Xavante	Trainer/COIN		May 1970	1971: 72: (30)
	Australia	...	RN Ikara	ASW missile	$26 mn. 1 launcher on each of 4 Vosper Mk 10 ASW frigates	Feb 1972	1976–79
Chile	USA	3	Lockheed C-130 Hercules	Transport		(1971)	(1972)
	UK	7	HS Hunter	Fighter	Refurbished; in addition to 25 previously purchased	1972	1972–73
		6	HS Sea Vampire T.22	Trainer	Ex-British. Delivery after overhaul	(1972)	...
		...	Short Seacat	Naval S-A missile	1 quadruple launcher on each "Leander" class frigate	Oct 1969	...
		2	Frigate, "Leander" class	Displ.: 2 500 t.	Armed with Seacat SAM and helicopter. Being built	Oct 1969	...
		2	Submarine, "Oberon" class	Displ.: 1 610 t.		Oct 1969	...
	France	9	Aérospatiale SA-330 Puma	Helicopter		Late 1971	...
		(20)	Aérospatiale MM 38 Exocet	Naval S-S missile		(1971)	...
	Sweden	1	Cruiser	Displ.: 8 200 t.	$6 mn. Completed 1947, refurbished 1958.	July 1971	Jan 1972

Recipient	Supplier	Number	Item	Description	Comment	Date: number of items	
						Order	Delivery
Colombia	France	14	Dassault Mirage 5	Fighter		Dec 1970	1972–73
		2	Dassault Mirage 5D	Trainer			
		2	Dassault Mirage 5R	Reconnaissance			
	USA	1	Destroyer, "Allen M Sumner" class	Displ.: 2 200 t.	Completed 1944	...	July 1972
Ecuador	UK	8	BAC 167 Strikemaster	Trainer/COIN		Dec 1971	1972–
	France	6	Aérospatiale Alouette III	Helicopter		Late 1971	...
		41	AMX-13	Tank	For COIN	Dec 1970	(1971–72)
		27	Panhard AML-245	Armoured car		Dec 1970	(1971–72)
	FR Germany	3	Torpedo boat	Displ.: 119 t.		...	(1971–72)
Paraguay	USA	12	Bell 47	Helicopter	MAP	...	March 1972
	Argentina	1	DHC-3 Otter	STOL transport	Gift under military liaison and aid programme	...	(1972)
	Brazil	20	Aerotec T-23 Uirapuru	Trainer		Spring 1972	...
Peru	USA	...	Beech T-42A Baron	Cabin monoplane	A small batch	...	1972
	UK	2	Destroyer, "Ferré" class	Displ.: 2 800 t.	Completed 1953–54	1969	1971–72
	France	20	Aérospatiale MM 38 Exocet	Naval S-S missile	To arm 2 ships	1970	1971–72
Venezuela	USA	16	NA Rockwell OV-10E Bronco	COIN aircraft	$4.2 mn initial cost. Under US Foreign Military Sales Programme	Dec 1971	1973
		12	NA Rockwell T-2D Buckeye	Trainer	Initial funding $5.2 mn. Purchased through Naval Air Systems Command	April 1972	1973
		100	NWC Sidewinder	A-A missile	To arm CF-5 from Canada	...	(Feb 1972–)
		1	Submarine	Displ.: 1 870 t.	$150 000. Obsolete	...	Feb 1972

	UK	6	Fast patrol boat, Vosper	Displ.: ···	$16 mn. 3 armed with Otomat SSM	April 1972	Late 1974
	France	7	Dassault Mirage IIIE	Fighter			
		6	Dassault Mirage 5	Ground attack		Nov 1971	1973–74
		2	Dassault Mirage 5D	Trainer			
		142	AMX-30	Tank			
		20	AMX-155	Self-propelled howitzer	$60 mn	(July) 1972	1972–73
	France/Italy	···	Matra/OTO Melara Otomat	S-S missile	To arm 3 Vosper patrol boats	April 1972	1973
	Canada	16	Canadair CF-5A	Fighter	$35 mn. From Canadian Air Force surplus stocks	Dec 1971	1972–
		4	Canadair CF-5D	Trainer			
Europe							
Greece	USA	36	McDonnell-Douglas F-4 Phantom	Fighter	$150 mn, incl. spares and ground equipment. Extensive US credit under US Foreign Military Sales Act	March 1972	1973–74
		2	Destroyer	Displ.: ···	On loan for 5 years	April 1972	···
	France	(50)	Aérospatiale MM 38 Exocet	Naval S-S missile	To arm 4 missile boats	1969	1972
		4+2	Fast patrol boat	Displ.: 220 t.	$28.1 mn; 4 launched 1971, first units completed 1971. Armed with Exocet SSM	1969	1972
	FR Germany	4	Submarine	Displ.: 1000 t.	$28 mn. WEU approval Jan 1971. Launched 1970–71	1967	1972
Portugal	USA	1	Repair ship	Displ.: 1200 t.	On loan from US Navy. Completed 1969	···	Jan 1972
	Spain	4	Corvette, "Joao Coutinho" class	Displ.: 1203 t.	Being built, in addition to 6 previously purchased	1971	1974
Turkey	USA	40	McDonnell-Douglas F-4 Phantom	Fighter	$200 mn, incl. spares and training. Credits under US Military Sales Programme	Aug 1972	1973–75
		12	Grumman S-2 Tracker	ASW aircraft	In addition to 2 trainers supplied in 1971	June 1971	1972

Recipient	Supplier	Number	Item	Description	Comment	Date: number of items	
						Order	Delivery
		4	Cessna 206	Light aircraft	For Army	Spring 1972	...
		...	Hughes TOW	Anti-tank missile	Gift under MAP	End 1972	...
		400	M-48 Patton	Tank		1972	...
		3	Submarine, "Guppy IIA and IA" type	Displ.: 1526 t.	Completed 194-	...	1972
		1	Destroyer, "Gearing" class	Displ.: 2 425 t.	Completed 194-	...	1972
		1	Destroyer, "Allen M Sumner" class	Displ.: 2 250 t.	Completed 1944, refitted before transfer	...	1972
		1	Patrol boat, "Akhizar" class	Displ.: 280 t.	Being built	...	...
		7	Gunboat	Displ.: (225 t.)	Built for transfer	...	(1971–72)
	UK	2	Britten-Norman Islander	Transport	For photo-survey operations by Air Force	1972	...
	France	...	Republic RF-84F	Reconnaissance	Several	...	1972
		...	Aérospatiale MM 38 Exocet	Naval S-S missile	To arm fast patrol boats	Early 1972	...
		...	Fast patrol boat	Displ.: ...	Armed with Exocet SSM. May be built in Turkey	March 1972	...
	FR Germany	20	Transall C-160	Transport	NATO aid. 16 new, 4 surplus	1971	1971: 9 1972: 11
		2	Submarine, type 209	Displ.: 1000 t.	Built in FR Germany under military aid programme	Jan 1970	...
		...	Landing craft, "LCU" type	Displ.: 403 t. full load	Being built for transfer	...	...
	Italy	3	Agusta Bell 204B Iroquois	Helicopter	For Navy	1971	1972
	NATO	9	Lockheed T-33	Trainer	From USA/Netherlands/Canada	...	1972
	Spain	6+	Lockheed F-104G Starfighter	Fighter		...	1972

10. Domestic defence production in third world countries[1]

Square-bracketed references, thus [1], *refer to the list of references on page 356.*

I. *Introduction*

Domestic defence production encompasses three types of production: licensed projects, indigenously designed and developed projects, and joint development projects.

All countries that have managed to establish defence industries after World War II have to a large extent followed the same pattern. Initially, arms imports cover the total requirements of the armed forces. A suitable type of weapon is then selected from the foreign samples for local production under licence, which means importing the technology, or know-how, rather than merely importing the weapon. When building up a local aircraft industry, for example, the initial task before beginning licensed production often involves the build-up of repair and overhaul facilities, as was done by India and Israel. After some experience of the production processes, training of personnel and so on, has been gained, it may be decided to build up an indigenous design capability, subject of course to the availability of R&D funds and scientists. In Western Europe, the joint weapon development projects illustrate one way of coping with the increasing R&D costs resulting from the technological arms race.[2] Finally, the success of a domestic defence programme allows the country to export some of its products as well as to equip its own armed forces, so that it does not remain totally dependent on foreign suppliers.[3]

[1] This chapter covers the current and planned production in 1972 of major non-nuclear weapons (that is, military aircraft, guided missiles, armoured fighting vehicles and warships) in third world countries. Aero-engines and electronics were included as indicators of the sophistication reached in arms production. Many countries produce less sophisticated equipment—small arms, artillery, and so on—often under foreign licences, but that type of weapon is not included here. The third world countries included in this chapter are the same as those in chapter 9 (see p. 296), except for the inclusion of China. The Chinese nuclear weapons development is discussed in chapter 8, p. 282.

[2] See chapter 8, p. 252. It is estimated that R&D costs rise by 25 per cent, or more, in joint programmes in comparison with national R&D programmes, but, on the other hand, these costs are shared by all the participants.

[3] Cf. the West European arms industries after World War II. During the 1950s they produced US weapons under licence, to appear as competitors to the US on the arms trade market with indigenous products in the 1960s.

The sensitivity of various governments on arms procurement matters has been illustrated in all international debates on the arms trade, for example, at the time of the Maltese proposal to the United Nations in 1965, concerning an arms trade register. The main argument of most third world countries was that any regulations of the trade in arms would be discriminatory against those countries which do not possess arms industries of their own. Since World War II an increasing number of third world countries have joined the group of arms producers, and this trend is likely to increase in the absence of restrictions on arms production by industrial powers.

In retrospect, it is hardly surprising that those third world countries which, by 1972, had the most advanced domestic defence industries—China, India, South Africa and, to a lesser extent, Argentina and Brazil—took the decision to develop such industries against the background either of international arms embargoes, or of a conflict with traditional arms suppliers. The loopholes in these embargoes sufficed to make this build-up of local industries possible—a consequence probably unforeseen at the time.

In 1972 alone, several countries announced future plans for arms industries: Greece signed an agreement with a Dassault-Lockheed-Olympic Airways consortium for aircraft maintenance facilities; Turkey was negotiating for production of a French/West German trainer aircraft as well as for assembly of the Starfighter and the F-5E fighter under US licence; and Iran signed an agreement with the Agusta company of Italy in 1971 and with the US Lockheed company in 1970, initially for maintenance and repair, but with the ultimate aim of licensed production.

In April 1972, the armed forces of the Philippines proposed a five-year plan for the construction of a military-industrial complex to the value of $233 million, with US aid.[4] During 1972 there were several reports indicating a renewed interest in defence production on the part of Egypt[5] and other Arab countries. Cooperation in defence production among Egypt, Libya and Syria has been reported as well as Soviet assistance in re-opening Egypt's missile programme. A more substantial report dates from a meeting in Cairo in late 1972 of the Commanders-in-Chief of 18 Arab countries, where a decision was reportedly taken on the establishment of arms industries, and an agreement was made to set up a joint organization to deal with defence production. A recommendation was adopted to the effect that each Arab country should allocate 2 per cent of its annual income to this organization.

[4] The Philippines have so far only produced small arms and some patrol boats. The unguided rocket Bongbong II was recently developed with aid from President Marcos' private fund for social welfare.

[5] During the 1960s, Egypt had an ambitious defence production programme for a jet combat aircraft with an indigenous engine, and three types of missiles. The programme was led by foreign scientists, but by 1969, however, it was cancelled.

Table 10.1. Survey of production of major weapons and components in third world countries, 1950–1972[a]

Country	Military aircraft			Guided missiles			Armoured fighting vehicles		Warships		Military electronics		Aero-engines	
	A	B	C	A	B	C	A	B	A	B	A	B	A	B
Argentina	×	×	×[b]	×[c]			×		×	×				×
Brazil	×	×	×[b]	×	×			×	×	×	×	×		×
Burma										×				
Chile		×								×				
China, People's Republic of[d]	×	×		×	×		×	×	×	×	×	×	×	×
Colombia										×				
Dominican Republic										×				
Egypt	×	×	×[e]		×									×
Gabon										×				
Greece	×[f]													
India	×	×	×	×			×		×	×	×	×	×	×
Indonesia	×									×				
Iran	×[g]													
Israel	×	×			×	×		×		×		×	×	×
Korea, North										×				
Korea, South	×									×				
Libya			×[e]											
Mexico		×								×				
Pakistan	×			×			×[h]							
Philippines[i]	×			×			×		×		×			
Rhodesia										×				
South Africa	×	×			×	×	×			×[j]		×	×	×
Syria										×[j]				
Taiwan	×	×								×				
Thailand	×								×	×				
Turkey	×[k]	×							×					
Viet-Nam, South	×													

A = Licensed production.
B = Indigenous production.
C = Co-development with a foreign company.

[a] Including production planned in 1972, whenever these plans are estimated to be remotely possible.
[b] Negotiations under way between Argentina and Brazil in 1972.
[c] Argentina plans production of surface-to-surface and surface-to-air missiles.
[d] Production under Soviet licences up to 1960. Thereafter indigenous development, mostly based on Soviet models.
[e] Negotiations under way between Egypt and Libya in 1972, as well as between Egypt and 18 Arab states for the establishment of joint defence industries.
[f] First agreement with Dassault–Lockheed–Olympic Airways (France–USA–Greece) consortium in January 1972, initially for repair, maintenance and overhaul facilities.
[g] First agreement with Lockheed (USA) in 1970 and with Agusta (Italy) in 1971, initially for repair, maintenance and overhaul facilities.
[h] The five-year plan for defence production launched in 1969 includes production of tanks.
[i] Philippine proposal in April 1972 for a five-year plan, with US aid.
[j] Advanced plans for naval production by 1972.
[k] Negotiations under way in 1972 with France/West Germany, possibly for production of the Alpha jet trainer. Discussions also held with USA for eventual assembly of the F-104 and F-5 fighters.

Table 10.2. Licensed production of major arms in third world countries, 1950–1972[a]

Supplier	Item: Aircraft	Guided missiles	Armoured fighting vehicles	Warships	Aero-engines	Military electronics
Czecho-slovakia			India [1970]: OT-62			
France	Argentina 1957: MS-760 Israel 1957: Fouga Magister India 1964: Alouette III India 1970: Lama South Africa 1971: Mirage III and F-1 Pakistan 1971: Alouette III	India 1970: SS. 11 ATM	Argentina 1968: AMX-13 South Africa 1961: Panhard AML-60 and AML-90		India 1964 (for Alouette III) India 1970 (for Lama) Israel 1967 (for Magister) S. Africa 1971 (for Mirage)	India 1971 South Africa 1971 (for Mirage) Brazil 1971 (Thomson-CSF-Matra)
Germany, Federal Republic of		Pakistan 1963: Cobra ATM		Argentina 1969: submarine		
Italy	South Africa 1965: M.B. 326 Brazil 1970: M.B. 326				South Africa 1965 (for M.B. 326)	South Africa 1965 (for M.B. 326)
Netherlands	Brazil 1953: Fokker S.11, S.12, S-14					
Spain	Egypt 1959: Hispano 200					

UK	India 1952: Vampire FB. 9 India 1955: Vampire T. 55 India 1955, 1966, 1972: Gnat India 1959, 1971: HS 748		India 1965: Chieftain	Argentina 1970: Vickers destroyers Brazil 1970: Vosper destroyers India 1965: Vickers frigates Ceylon 1968: Vosper patrol boats	India 1955, –66, –72 (for Gnat) India 1959, 1971 (for HS 748) India 1959 (for HF-24 Marut)	India 1969 (Smiths Industries for HF-24 and HJT-16)
USA	Argentina 1958: T-34 Mentor Argentina 1965: Cessna 182 Taiwan 1969, 1972: Bell 205 Taiwan 1969: Pazmany PL-1B[b] S. Viet-Nam 1971: Pazmany PL-2 Thailand, S. Korea 1972: Pazmany PL-2			Brazil 1970: patrol boats Thailand 1969: patrol boats	Taiwan 1972 (for Bell 205)	Brazil 1970 (Hallicrafters)
USSR	China 1955–1960: MiG-15, MiG-17, An-2, Yak-18, Mi-4 India 1964, 1970: MiG-21	India 1964, 1970: Atoll AAM	China 1955–1960	China 1955–1960	India 1964, 1970 (for MiG-21)	India 1964, 1970 (for MiG-21)

[a] Under each category of major weapons, the date given is that for the conclusion of the agreement for licensed production of that item.
[b] The Pazmany Aircraft Corporation sells the PL-1 and PL-2 light-plane construction plans together with instructions for building to amateur constructors.

Third world producers

Table 10.1 shows a survey of defence production in third world countries between 1950 and 1972, including those projects which were at the planning stage. Tables 10.3–10.8 cover current projects in 1972, and table 10.2 shows the sale of licences to third world countries from 1950 to 1972.

Of the 27 third world countries identified as arms producers in table 10.1, the majority were not involved in current projects in 1972: they usually produce only a few items during a limited number of years. In fact, in 1972 only six of 27 countries—Argentina, Brazil, China, India, Israel and South Africa—were engaged in domestic production of a wide range of armaments, including the development of engine and electronics industries. Of these, only China can be said to have acquired self-sufficiency, in the sense that it is independent of foreign suppliers of components for its domestic weapon projects, with the notable exception of certain electronic equipment. According to a US report, China imported more than $200 million worth of military and industrial electronic equipment during 1960–70 from Japan, the Federal Republic of Germany, the United Kingdom, France and Switzerland, and is likely to continue to import selected items at the same time as its electronics industry is growing. [1]

Before the 1960 escalation of the Sino-Soviet conflict, China imported not only all its electronic equipment but also all its weapons from the Soviet Union. The cancelling of Soviet aid, in combination with the US and Western embargo on strategic materials, left China no other alternative than domestic defence production. At the same time, the Chinese decision to embark on a nuclear programme, combined with the costs for the large standing army (by Western experts usually estimated as accounting for 70 per cent of the defence budget), meant that very little of the defence budget remained for the development of modern conventional weapons. A few Chinese versions of Soviet transport planes were produced in the late 1950s, but the various production facilities built up with Soviet aid seem to have suffered from various shortages (funds, personnel and material) up to the mid-1960s. But China has not yet reached self-sufficiency in the production of sophisticated non-nuclear arms in the sense that it cannot produce all it needs: by 1970 China had the world's largest obsolete air force, with the MiG-19—which was introduced in the Soviet Air Force in 1955—as its most modern combat plane. The production of modern types of weapons does not seem to have started on a large scale until around 1968. It is, in this context, interesting to note that the trade agreement with the Soviet Union in 1971 included $33 million worth of aircraft and aviation equipment, *inter alia* six AN-24 transport aircraft, three MI-6 helicopters and spare parts. [2]

Israel claims to produce 25 per cent of its weapons requirements, and plans to reach 75 per cent by 1975, but by 1972 it was still heavily reliant on the United States for its air force requirements. Ever since 1949, the Israeli government has concentrated on solving its arms procurement problem in the face of various embargoes. Over the years, several "hybrid" weapons have been constructed from the parts of various foreign types: for example, the Isherman and the Supersherman tanks from old US and French M4 and M50 Shermans, and the T 1–67 from about 300 ex-Soviet T-54/55 tanks captured in the 1967 June War. As is the case with China, many of the Israeli-designed projects were developed on the basis of known models; the Chinese-designed F-9 combat plane is said to have originally been based on the MiG-19, while the new Israeli fighter Barak is based on the Mirage III and 5.

At the beginning of 1972, Defence Ministry Director-General Lavi, stated that Israel's defence industries employed 90 000 people and were making rapid progress towards independence in weapons manufacture: "If we can make 60 per cent of any weapons system, no embargo can hurt us." [3] Arms manufacture in 1971/72 amounted to $428 million, an increase of 500 per cent since 1967. [4]

India is directing its policy for defence equipment towards eventual complete self-sufficiency in design and production, partly as a reaction against the embargoes in connection with the conflicts with Pakistan, and partly resulting from the 1962 war with China. Arms manufacture by the 30 ordnance factories was valued at $190.8 million in 1971/72, compared with $56.5 million 10 years earlier. The combined value of the production at the ordnance factories and at the eight public sector undertakings under control of the Defence Ministry reached $430 million in 1971/72. [5]

South Africa began to concentrate resources on domestic arms production after the UN embargoes in 1962, and by 1972 it claimed self-sufficiency in arms production, except for warships and long-range aircraft. According to the official statements, South Africa can no longer be isolated by a weapons boycott. In 1965, $46.3 million were spent on arms manufacture, compared with $140 million by 1972, 80 per cent of which was being invested in South Africa. [6]

Both Argentina and Brazil have had defence industries since the 1920s, in contrast to the other countries studied in this section. The US limitations on arms sales to Latin America in the late 1960s, in particular to Argentina, Brazil and Chile, had two immediate results—European intrusion on the Latin American arms trade market, and renewed concentration on increasing self-sufficiency in arms manufacture in Argentina and Brazil. In 1967 Argentina launched the "Europe Plan", according to which small quantities of sophisticated weapons would be purchased with a view to their later licensed production. Brazil has the same policy, while Chile has so far limited its efforts to naval

production. In 1972 it was reported that the Brazilian Department of War Material spent 80 per cent of its budget in the local industry.

Thus, it is evident that the establishment or revival of defence industries in the above six countries was indeed connected with embargo and conflict situations. The same motivation applies to Egypt's new plans for a defence industry, but in the case of other countries planning to embark on defence production programmes, other factors are at play. The USA has promised the Philippines, South Korea and Taiwan aid with domestic arms production in connection with the withdrawal of US troops, while the US interest in aircraft production in Greece and Turkey is linked to the NATO policy.

II. *Licensed production*

The first phase in a licensed production programme usually involves only the assembly of the weapon from imported sub-assemblies and pre-fabricated parts, often with considerable technical and material assistance from the supplier. In the next phases, the aim is to increase the indigenous content of the weapon to 100 per cent, through various stages of local production of sub-assemblies from imported components to local production of all components needed from indigenous raw materials. A modern arms industry, regardless of the type of sophisticated weapon involved, requires a whole range of back-up industries, adequate infrastructure, skilled personnel and so on. What such an undertaking means for a country with an underdeveloped economy could be illustrated by numerous examples, where the most usual obstacles are the shortage of local raw material (for example, finished steel, aluminium or titanium) or unexpected rises in production costs. In addition, the planning and organization might prove insufficient. The British HS-748 transport aircraft produced under licence in India since 1959 provides an illustration of the technical problems which may arise: in 13 years only 40 planes have been manufactured, none being used in the tactical transport role for which it was intended. The originally estimated unit cost was $320 000, but the 1972 cost ex-factory was quoted as $1.5 million. Also, the performance of the Rolls-Royce Dart engines did not correspond to the guarantees from the licenser.

The construction in India of six "Leander" class frigates under British licence and with considerable technical assistance has suffered from a shortage of special-quality steel and from deliveries of substandard components from private contractors.[6] The licence agreement was signed in 1964, when India accepted

[6] The yearly steel production capacity in India is estimated at 10 million tons, but in 1971 less than five million tons of finished steel emerged, resulting in a scramble for priorities.

a British government offer of a special defence credit for $13 million to cover the external costs of three frigates.

The commissioning of the first frigate was delayed one year, until June 1972. Defence Minister Ram stated that progress in the manufacture was dependent on progress in the related industry. Many of the items needed were being produced for the first time and the Indian insistence on using local raw materials thus meant that it took five and a half years to build the first frigate, compared with four and a half years for the British to produce their first "Leander" class frigate.[7] The cost of the first Indian frigate quoted in 1972 as $25 million is, however, claimed to be $3 million below the price of an imported frigate.[8] [7]

The frigate programme is thus regarded as a success in India, considering the fact that this is one of the most modern warships in the world, and it is expected that the production will gain momentum once the initial stage is complete.

Only China can be said to have come close to the 100 per cent indigenization of components in its production of all weapon systems, allowing for the import of electronics mentioned above. It can be noted, though, that between 1955 and 1960 China imported the engines and instrumentation for all the Soviet weapons produced under licence. In India, the Alouette III programme has reached 94 per cent indigenization of components since 1964, while the MiG programme still needs to import 40 per cent of the material. If the programme for any weapon does not cover the licensed production of the most vital components, such as the engine and electronics, it will obviously never become possible to claim self-sufficiency in production.

The suppliers

The suppliers of licences for the production of sophisticated arms in third world countries are an even more restricted group than those identified as arms exporters in chapter 9. Table 10.2 shows that the main suppliers of weapon licences to the 11 third world countries engaged in licensed production between 1950 and 1972[9] were France and the UK. The explanation for this

[7] Cf. for instance, the fact that the West Germans needed almost 10 years to produce the destroyer "Hessen" after World War II due to the unrecovered state of the related industries. It is estimated that the shipyards' role in construction declined, compared with the pre-war situation, from 60 per cent to 30 per cent, while the share of weapons and electronics now reaches 70 per cent.

[8] The unit cost is low, if it really includes the cost of the imported weapon systems (for example, Wasp helicopters and Seacat missiles). Cf. the quoted unit cost of $36 million for Vickers Type 42 frigates sold to Argentina in 1970, including $12 million for missiles and gas turbines.

[9] Argentina, Brazil, China, Egypt, India, Israel, Pakistan, South Africa, South Korea, South Viet-Nam and Thailand.

small number of countries involved is to be found on both the supply and demand sides. There is a general unwillingness—often considered genuinely economically motivated—on the part of developed countries to part with know-how in order to benefit industrial development in poor countries. This is by no means confined to armaments technology. In addition, national security considerations often prevent the export of the most modern technology, especially in the case of the USA and the USSR. However, the organization of the West European defence industries is becoming increasingly export-oriented, especially in the case of France. The French industry has been officially geared to export since 1970, accommodating domestic R&D to suit foreign requirements. For example, the French SA 315 Lama high-altitude helicopter was developed to meet Indian requirements, and is now being produced under licence in India. France also stands out as the supplier of licences for the widest range of weapons to the largest number of recipients. The UK has sold aircraft, engine, tank and electronics production licences only to India. Before 1960, the USSR provided licences and aid for the establishment of China's arms industry, thus laying the foundation for China's indigenous arms programmes. But after 1960, India remains the only country that has managed to acquire a Soviet licence—for the MiG programme, which includes engines, electronics and missiles. There are unconfirmed reports that Egypt has tried in vain to acquire a licence for the production of the MiG-23. The USA has not supplied any third world country with a licence for production of sophisticated equipment: the PL-1 and PL-2 light planes assembled by Thailand, South Korea and South Viet-Nam cannot yet be counted as weapons programmes, involving one single light plane, designed for local assembly by amateur constructors, although the three countries will evaluate the plane for use as an Air Force trainer. If Turkey manages to purchase the licence for the F-5 this will be the first occasion when the USA provides know-how for sophisticated equipment to a less developed country.[10]

On the demand side, there are such factors as the lack of an industrial base, financial difficulties, and so on, as mentioned above. This means that a government needs strong motivation to embark on a defence production programme, which in an underdeveloped country necessarily takes place at the expense of over-all development of the civilian sector. The material shortages provide a definite constraint on the selection of weapons for production. In some cases the problem may be solved by modifications of the foreign design: for example, the new MiG-21 (M) under production in India since 1972 uses an engine

[10] On the other hand, it should be noted that Turkey is a European country and a NATO member.

with considerably fewer titanium components than the original engine. This gives less thrust but the costs for developing titanium production were considered too high.

III. *Indigenous production and joint development programmes*

While indigenously designed weapon projects and joint development projects are the most common types of defence production in industrialized countries, in third world defence industries they are not. For example, only the six most advanced third world countries have designed an aircraft beyond the prototype stage. Usually the R&D costs are underestimated,[11] difficulties occur in finding a suitable engine, or performance is deficient. The Argentinian light transport aircraft, the Guarani II, was begun in 1960, and by 1972, 16 planes had been delivered, which can hardly cover the development costs. Both of the Argentinian planes currently in production use engines imported from France, while the Brazilian light transport Bandeirante uses a Canadian engine and other equipment imported from the UK, the USA and France. Both the other two Brazilian-designed planes in production use US engines. Combat aircraft reaching speeds of Mach 1.5 or above have been developed only by China and Israel, both using indigenous engines. After 13 years of development work the Indian supersonic fighter HF-24 still lacks a power plant that can give the intended Mach 2 performance. Nevertheless, India is developing a multi-role combat aircraft (MRCA) with a Mach 2 plus capability, to be produced as the main combat plane for the air force during the 1980s, but the design is supposed to centre around a foreign engine. The costs for air frame R&D through the required number of prototypes for this MRCA aircraft was in 1971 estimated at $150–$200 million over the next ten years, without the engine, [8] but those costs might turn out to be double, keeping in mind the experiences of the European MRCA programme.

In the field of missiles, only Brazil, Israel and South Africa have developed indigenous types, while China produces versions of most Soviet models. Collaboration with French industry has been essential for South Africa and Israel in this field. Only Brazil, China and Israel have designed their own types of armoured fighting vehicles. With the exception of China, there are no indigenous designs of ships in the destroyer/frigate class, whereas several countries produce smaller types—patrol boats, submarine chasers and so on.

With the increasing sophistication and rising unit cost of armaments, only the USA and the USSR can still afford to embark on independent programmes

[11] Cf. the fact that R&D costs for modern sophisticated arms projects in Western Europe are said to account for 50 per cent of total development costs through the prototype stage.

for the development of new versions of all types of major weapons. Other major industrialized nations—France, the Federal Republic of Germany, Italy and the UK—rely more and more on joint programmes for development of major new items of equipment. This trend is likely to increase, for example, as aluminium for aircraft is replaced by lighter, heat-resistant metals such as titanium for the Mach 3 speed aircraft of the 1980s. Obviously there are both technical and financial reasons for the hesitation of construction firms in developed countries to enter into joint programmes in underdeveloped countries. The French industry is rather a pioneer in the field: apart from collaboration with missile programmes in Israel and South Africa, which is not so original, considering the fact that these two countries cannot be classified as underdeveloped, France has established some collaboration with India. Joint programmes among underdeveloped countries are very rare: one example was the effort in the mid-1960s to fit the Egyptian E-300 jet engine to the Indian HF-24 fighter, which failed, however. By 1972 Argentina and Brazil were considering joint development of a 40-passenger STOL transport aircraft, for their own air forces as well as for export. This would be the first major cooperative aircraft programme in South America, and it would replace the Brazilian EMB-500 Amazonas project which was cancelled because of an unexpected rise in R&D costs. Both India and South Africa are considering the production of submarines, but these will almost certainly be assembled under licence.

IV. *Costs and consequences*

The arguments in favour of indigenous production usually centre on the expected cheaper unit cost of the weapon, the savings in foreign exchange, the independence of outside suppliers, and also on the general stimulation of industrial development related to arms production. In the case of licensed production there are many examples where the final unit cost of a domestically produced weapon was higher than the import price of the same weapon.[12] Material costs increase as the process of indigenization accelerates, and preferential prices are paid to domestic producers. Also, the import of components tends to be more expensive, in relative terms, than the import of the complete weapon (cf. the fact that the prices for spare parts for weapons are usually very high in relation to the import price of the complete weapon). The lack of testing facilities within the country often increases the costs: the

[12] The Australian Defence Minister has given as an example of cost penalties linked to licensed production, the fact that the production in Australia of 200 Bell Kiowa helicopters would cost 40 per cent more than if they had been purchased overseas. [9]

Argentine COIN fighter Pucara, for example, underwent a series of test trials in France in 1971. Savings in foreign exchange remain a possible advantage, though in that case at present only the USSR remains a possible supplier of licences for major weapons. However, during 1972 there were unconfirmed reports to the effect that, whereas the USSR had previously accepted licence payment in kind, it now demanded payment in dollars, and this might influence India's production plans for the MiG-21 (M). Developing countries do not generally have such long production runs as the established arms producers. And if the local armed forces are not large enough to absorb the production, they need to create an export potential, competing with the established producers on the international market. Israel is the only country that has penetrated the European market with some of its products, notably the UZI machine-gun, produced under licence by the Belgian Fabrique Nationale. In 1972, Belgium was also mentioned in connection with licensed production of the Israeli-designed Arava transport plane. On the whole, indigenously designed weapons involve heavy R&D investment. Even Israel found that the final costs for its Arava STOL transport by far exceeded the original estimates: production costs were calculated at $7.15 million in 1966, but by March 1971 Israeli Aircraft Industries had invested $18.6 million in the project, and the development of the military COIN version necessitated an additional $10 million investment. [9]

Thus, at least for market economy countries, it is evident that one consequence of the formidable costs involved in defence production is that, as such production actually starts, they face the necessity to export in order to cover at least part of their expenses. The same conclusion cannot, as yet, be drawn for countries with centralized economies, since China is the only example in this chapter of such a country: there is no sign of any Chinese decision to sell its weapons on any scale, though the R&D costs and the problems of establishing a defence industry must have been largely the same as for other countries. By 1972 India, Israel and South Africa, and on some occasions also Argentina and Brazil, had announced their intentions to export various weapons. In the case of South Africa, the export possibilities include such items as the indigenously produced guided missiles, aircraft and classified electronics, and small arms and ammunition of various types. The recipients are likely to include Portugal and Rhodesia.

India announced its entry to the arms sales market in April 1972, with such items as self-loading rifles, carbines, light machine-guns, mountain howitzer guns and anti-aircraft guns, as well as aircraft. The sale of licence-produced weapons will obviously depend on the existence of re-sale regulations on the part of the original supplier. Various African and Arab countries are among the clients, and by 1972 the orders on hand amounted to $370 000. [10] A separate

public sector corporation will be set up in India to organize the arms exports, and the production of the ordnance factories that rose by 20 per cent during the East Pakistan crisis in late 1971 has been kept at that level for export purposes.

In the case of Israel, the industry has long been export-oriented. The Arava project was undertaken in order to export to developing countries rather than for internal requirements. By the end of 1972 the export of arms had reached the value of $90 million, compared to $10 million in 1966. In February 1972 it was reported that export sales of the Gabriel ship-to-ship missile had already reached $38 million. [11]

The leading Brazilian aircraft enterprise, Embraer, reported gross sales worth $5.6 million in 1971, which was said to represent an increase of 864 per cent since 1970. The net profit of the company was $0.4 million [12]. The export of the Brazilian-designed light utility aircraft Bandeirante and the Ipanema agricultural aircraft are being promoted with good prospects for sales in developing countries, according to the company. Argentina intends to export its AMX tanks, produced under French licence, to other Latin American countries, as well as its indigenously designed COIN fighter.

The establishment of a domestic defence industry also results in a spiral increase of the R&D allocations: first, R&D funds are needed at the take-off stage. Secondly, as a project evolves, increasing R&D means are requested. In connection with the Indian plans for a rise of R&D in 1972, the argument was advanced that this is necessary not only for indigenously designed projects, but also to enable an adequate decision on the type of foreign weapon most suitable for licensed production. Finally, a sophisticated weapons programme means that a large sector of an underdeveloped country's economy—both in terms of material and human resources—are being tied to the armaments industry.

The desired independence from foreign suppliers is very difficult to achieve. At the initial stage, what is achieved is just another form of dependence, namely a dependence on a foreign supplier for a licence, vital components and technical aid. The argument that military production creates beneficial spin-off effects for the civilian sector cannot be taken at face value; it is still not known what the benefits would be in a case where a country decides to transfer military production into civilian industry.

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6. *Milavnews News Letter* No. 126, April 1972.
7. *International Herald Tribune*, 28 May 1972.
8. *Aviation Week and Space Technology*, 17 January 1972.
9. *Milavnews News Letter* No. 127, May 1972.
10. *Far Eastern Economic Review*, 19 August 1972.
11. *Armed Forces Journal*, March 1972.
12. *Interavia Air Letter*, 20 July 1972.

Notes to table 10.3, pp. 358–369:

[a] Total over several years, unless otherwise stated in *Comment*.
[b] Designation by the third world country given where known.
[c] Year in which indigenous designs were initiated.
[d] For space reasons, only the powerplant is specified in this column. *Other* = electronics and other equipment, usually involving several companies in the country of origin given here. See table 10.6 (Electronics) for details.
[e] *Interavia Data*, 1 August 1972.
[f] *Milavnews Newsletter* 131, (London) September 1972.
[g] *Milavnews Newsletter* 129, (London) July 1972.
[h] *Interavia Airletter*, 6 June 1972.
[i] *Aviation Week and Space Technology*.
[j] The Pazmany Aircraft Corp. sells plans and building instructions for the PL-1 and PL-2 to amateur constructors.
[k] *Financial Times*, 28 July 1971.

Table 10.3. Current and planned indigenous aircraft projects in third world countries, 1972

Country/manufacturer	Number[a]	Designation[b]	Type	Licensed production Country/year
Argentina				
Fabrica Militar de Aviones (FMA)	33	IA-50 GII	Light transport	
	75	IA-58 Pucará	COIN fighter	
		Pucará jet-powered version	Jet trainer	
		Pucará navalized version		
	[65]	Mirage III	Interceptor/ground attack fighter	[France]
	255	Helicopter		
	[100]		40-passenger STOL transport	
Brazil				
Empresa Brasileira de Aeronáutica SA (EMBRAER)	112	AT-26 Xavante (Aermacchi M.B. 326 GB)	Armed jet trainer/ COIN	Italy, 1970, incl. engine produced in Brazil by subsidiary Rolls-Royce do Brazil Ltda
	150	EMB-110 Bandeirante	12-passenger light transport	

Notes a to k on p. 357.

Indigenous design[c]	Identified components: Foreign[d]	Identified components: Indigenous	Indigenization of components by 1972 *per cent*	Comment
1960	Two Turboméca Bastan VI-A turboprop engines (France) Other: UK, USA, France			By 1972, 16 planes had been delivered to the Air Force. First prototype flew in 1963
1966	Two Turboméca Astazou XVI-G turboprop engines (France) Other: UK, USA, France			Production started in 1972, at a planned rate of 1.5/ month. The Air Force has ordered 50 planes. Negotiations under way for 25 planes for Peru's Air Force
1971	Turboméca Astafan single-shaft engine (France)			To replace the MS 760s of the Air Force
1971				For the Navy
	One SNECMA Atar 09C turbojet engine (France) Other: UK			Under assessment by FMA 1972. Total Air Force requirement approx. 80 planes, to equip 5 or 6 strike groups by end of 1970s. In addition to 1 squadron purchased from France
				Three-services requirement. According to "Europa Plan" of 1967 to be selected *i.a.* from SA-341 Gazelle, SA-330 Puma, WG-13 Lynx. (UK/France)
Co-development discussed in 1972 with Brazil	One turbofan engine	Wings, empennage		To replace Brazilian EMB-500 Amazonas STOL, cancelled in 1971 due to financial difficulties. For export to other Latin American countries
	One Rolls-Royce Viper 540 turbojet engine (UK) Other: UK, Italy	All armament loads		By end-1972 approx. 30 planes built. First Brazilian-assembled Xavante delivered Sept. 1971. Rate of production: 2/month. Bolivian Air Force signed letter of intent for purchase of 9 planes by end-1972, and might increase the order up to 80 planes
1965	Two 680 shp PT6A-27 (UACL) turboprop engines (Canada) Other: UK, USA, France	One 140-channel VHF transceiver		First prototype flew in 1968. Flight trials of production type started in Aug. 1972. Rate of production Jan.1973–July 1973: 2/month. Thereafter: 4/month. Initial Air

Country/manufacturer	Number[a]	Designation[b]	Type	Licensed production Country/year
		EMB-120	Pressurized light transport version of EMB-110	
	[400]	SA-341 Gazelle	Light utility helicopter	Negotiations in 1972 with Aérospatiale/ Westland (France/ UK)
	[100]		40-passenger STOL-transport	
Neiva Ltda	150	Neiva N621 Universal	2–3 seat basic trainer	
		Neiva Bi-Universal	6-seat transport version of N621	
Aerotec Ltda	90	AEROTEC 122 Uirapuru	2-seat primary trainer	
		Lockheed P-3 Orion/Fiat G. 91/ Dassault Mirage III	Fighter	
China, People's Republic of				
State factory at Chengtu	1000+	MiG-19 (US designation F-6)	Fighter	USSR, [1958], cancelled 1960

Indigenous design[c]	Identified components: Foreign[d]	Identified components: Indigenous	Indigenization of components by 1972 *per cent*	Comment
				Force order for 80 planes; delivery up to 1975. At least 70 more will be built for other military and civil customers in Latin America. The unit price for Bandeirante was quoted in Aug. 1972 as $1 mn[e]
1971				By May 1972 the design was being finalized
			Planned at *80* by 1976	Production to start in 1973
Co-development discussed with Argentina in 1972	One turbofan engine	Fuselages		See *Argentina* above. An initial market for 200 in the two countries is foreseen, and several hundred more throughout Latin America. Both countries will have final assembly lines
1963	One 300 hp Lycoming engine (USA) Other: USA	One 140-channel VHF transceiver		First prototype flew in 1966. First production type flew in 1971. By mid-1972, 40 planes delivered to the Air Force which had ordered 150
1972	Two 300 hp Lycoming engines (USA) Other: USA			The plane could be ready for series production by 1974
1961	One 160 hp Lycoming engine (USA) Other: USA			First prototype flew in 1965. By 1971, 70 planes were delivered to the Air Force. Production line re-activated in 1972 for 20 planes ordered by the Paraguayan Air Force
				US, Italian and French companies competing in 1972 for the construction of a new aircraft factory for licensed production
[1960]			*100*	Production believed started in early 1960s. By 1971 the production rate was said to be 16/month. The Chinese MiG-19 has been exported to North Korea, North Viet-Nam, Pakistan and Tanzania

Country/manufacturer	Number[a]	Designation[b]	Type	Licensed production Country/year
		MiG-21	Supersonic fighter	USSR, [1958] cancelled 1960
State factory at Sian	[35]	TU-16	Bomber	USSR, [1958], possibly cancelled 1960, incl. engine
			Fighter/trainer	Romania/Yugoslavia
State factory at Shen-yang	[100]	US designation F-9	Supersonic fighter bomber	
India				
Hindustan Aeronautics Ltd. (HAL): HAL MiG factories at Nasik (airframe), at Hyderabad (electronics and missiles) and at Koraput (engines)	154	HAL MiG-21 FL	Supersonic interceptor/fighter-bomber, version of Soviet MiG-21 PF series	USSR, 1964, incl. engine, electronics and missiles
	[60]	HAL MiG-21 M	Multi-purpose version of Soviet MiG-21 MF	USSR, 1970, incl. engine, electronics and missiles
HAL: Bangalore Division	200+	HAL Gnat Mark 1	Light-weight fighter	UK, 1956, 1966, incl. engine
	[300]	HAL Gnat Mark 2	Development of Mark 1, redesigned tail-plane	UK, 1972, incl. engine
		HAL Gnat Mark 3	Transonic version	

Indigenous design[c]	Identified components: Foreign[d]	Identified components: Indigenous	Indigenization of components by 1972 *per cent*	Comment
[1966]			*100*	Before 1960, the USSR delivered 30 MiG-21s, which were assembled in China. Chinese production said to have started in 1966
[1969]			*100*	Before 1960, the USSR delivered a few planes, and assisted in building the Sian aircraft factory. First Chinese-built plane completed in 1969. Estimated production rate by 1972: 2/month
	Rolls-Royce engine (UK)			Under discussion in 1972
[1968]			*100*	Reportedly in production since April 1971, at a rate of 10/month. Western reports describe the F-9 as either a MiG-19 development or a simplified MiG-21 version, with a Mach 2 capability
	One Tumansky TDR MK37F turbojet engine (USSR) Other: USSR	External gunpods bombs	*60*	First Indian-built MiG-21 delivered to Air Force in 1970. By 1972, more than 120 of the total 154 were completed. As the MiG-21 FL production run comes to an end, the 3 MiG factories will be used for production of the improved version MiG-21 M
	One Turmansky RD-11-300 turbojet engine Other: USSR			Initial plans for 100 aircraft might be changed due to payment conditions: USSR no longer accepts licence payment in kind but only in dollars. First HAL-built plane delivered to Air Force Dec. 1972
	One Rolls-Royce Bristol Orpheus 701 turbojet (UK) Other: UK		*85*	Initial production run of 100 planes completed in 1962. By mid-1972 more than 200 planes completed, when decision was taken to produce a Mark 2 version
				Development trials due to start by end-1972. Air Force may order 300 planes, and there are major export plans. Unit price of Mark 2 was in 1972 quoted as $720 000, compared to $672 000 for Mark 1.[f] Gnat Mark 3 would be developed after 1976

Country/manufacturer	Number[a]	Designation[b]	Type	Licensed production Country/year
HAL Kanpur Division	45	HAL HS-748 Series 2	40–58 passengers short/medium range transport	UK, 1959, incl. engine 1969
	[200+]	HAL HS-748 MF	Military freighter/ paratroop version	UK, 1971, incl. engine
HAL Helicopter factory, Bangalore	120	HAL Alouette III (SA-316 B)	Helicopter	France, 1964, incl. engine
	200	HAL Cheetah (Lama SA-315)	High-altitude helicopter	France, 1970, incl. engine
HAL Bangalore Division	70	HF-24 Marut Mark 1	Supersonic ground attack fighter	UK, [1959]: engine
	25	HF-24 Marut Mark 1T	2-seat trainer version of Mark 1	UK, [1959]: engine
		HF-24 Marut Mark 1R	Reconnaissance version of Mark 1	UK, [1959]: engine

Indigenous design[c]	Identified components: Foreign[d]	Identified components: Indigenous	Indigenization of components by 1972 *per cent*	Comment
	Two Rolls-Royce Dart 531 turboprop engines Other: UK	Most of the airframe HAL-built from local raw materials. Some HF, VHF and other radio equipment built by Bharat Electronics Ltd.	By 1972 *60* per cent of engine	First Indian-built HS 748 flew in 1964. Programme delayed due to funding and material problems. By 1972 only approx. 45 planes produced for the Air Force and Indian Airlines. The unit cost ex-Kanpur was in mid-1972 quoted as $1.47 mn [g]
1971 by HAL	Two Rolls-Royce Dart 532 turboprop engines Other: UK	Most of the airframe HAL-built from local raw materials. Some HF, VHF and other radio equipment built by Bharat Electronics Ltd.		Prototype flight trials started March 1972. By Oct. 1972 the Air Force had ordered 48 planes, plus 14 for maritime reconnaissance. The Army had funded a letter of intent for 100 planes. Production to start in 1975
	One Turboméca Artouste III B 870 shp turboshaft engine (France)		*96*	By mid–1972, HAL had produced 85 helicopters of a total of 120. HAL is exporting fuselage sections, doors, etc. to France from offset contracts
	One Turboméca Artouste III B 870 shp turboshaft engine (France)			The Lama was designed in 1968 by Aérospatiale (France) to meet an Indian requirement. The first HAL-manufactured helicopter was delivered to the Air Force by end 1972
1956	Two Rolls-Royce Bristol Orpheus 703 turbojet engines Other: UK	Airframe	*70*	First prototype flew in 1961. Main problem has been to find a suitable engine for intended Mach 2 capability, instead of present Mach 1.04. Project entirely Indian-led after the departure of the German team in 1967. Approx. 70 planes produced by mid-1972
1967	Two Rolls-Royce Bristol Orpheus 703 turbojet engines Other: UK	Airframe		First prototype flew in 1970. By mid-1972 firm Air Force order for 25 planes for delivery from 1974
1967	Two Rolls-Royce Bristol Orpheus 703 turbojet engines Other: UK	Airframe. Afterburner giving Mach 1.4 capacity		Two prototypes built, one of which lost in accident

Country/manufacturer	Number[a]	Designation[b]	Type	Licensed production Country/year
	200+	HF-24 Marut Mark 2	Development of Mark 1 fighter	Negotiations with France for engine, 1972
	150	HJT-16 Kiran	2-seat basic jet trainer	
		HAL multi-role combat aircraft	Supersonic, long-range interceptor	
HAL Helicopter factory, Bangalore			Light observation helicopter	French engine planned
Israel				
Israel Aircraft Industries Ltd. (IAI)	[33]	IAI 201 Arava	STOL light transport/COIN fighter	
		IAI Barak	Supersonic Delta-winged multi-role combat aircraft	
Korea, South	1	Pazmany PL-2[j]	Light primary trainer	USA, 1972

Indigenous design[c]	Identified components: Foreign[d]	Identified components: Indigenous	Indigenization of components by 1972 *per cent*	Comment
1972	Two Rolls-Royce/ Turboméca Adour engines (UK, France)	Airframe		The Adour engine would give Mach 2 capability, but development is subject to a satisfactory licence agreement for the engine. Production to start in 1975
1959	One Rolls-Royce Bristol Viper II turbojet engine (UK) Other: UK	Landing-gear, HAL HJE-2500 turbojet engine to replace Viper II from 100th aircraft in 1974/75		First prototype flew in 1964. By mid-1972 some 40 HJT-16s completed, out of a total Air Force order for 150. Production behind schedule due to material shortages. Import price of engine rose in 1971 from $37 700 to $86 800[h]
1965	Rolls-Royce RB. 199 engine, or Soviet engine	Airframe		In 1967 design had reached an advanced stage, and the project was confirmed in 1971. The plane will replace the HF-24 in the 1980s, carrying tactical missiles in addition to conventional weapons. Development costs through the prototype stage were by 1972 estimated at $200 mn[i] excl. the cost of the engine
Co-development with Aéro-spatiale in 1970				
1966	Two 783 eshp Pratt+Whitney (UACL) PT6A-34 turboprop engines (Canada) Other: USA			Prototype flight tests of military version started 1971. By 1972, 33 planes ordered from developing countries reported. Unit price quoted as $445 000.[e] Production rate: 1/month
1970	One General Electric J79 turbojet engine (USA) on prototypes	Radar and all-weather performance gear on third prototype. Production-type may be powered by Israeli-developed engine, similar to the J79		First prototype flown in 1971. The plane is based on Mirage III and Mirage 5, Mach 2.5+ capability. By end-1972, 24 planes delivered to the Air Force. Production rate: 2/month
	One 150 hp Lycoming engine (USA); Other: USA			For Air Force evaluation as trainer

Country/manufacturer	Number[a]	Designation[b]	Type	Licensed production Country/year
Pakistan				
		Alouette III	Helicopter	France, 1971
South Africa				
Atlas Aircraft Corp.	234	Atlas Impala (Aermacchi M.B. 326)	Armed jet trainer/COIN fighter	Italy, 1965, incl. engine
	100	Mirage III	Interceptor/ground attack fighter	France, 1971, incl. engine
		Mirage F-1	Multi-purpose supersonic fighter	
		[Impala version]	Advanced COIN fighter	[Italy, 1971]
		Helicopter		[France/Italy]
			Jet fighter Light transport	
Taiwan				
Aero Industry Development Centre of the Air Force, Taichuing	50	Chienshou Pazmany PL-1B	Light primary trainer	USA, 1969
		Chunghsing XT-CH-1A	Medium tandem trainer	
	68	Bell 205	Helicopter	USA, 1972, incl. engine
Thailand				
	2	Pazmany PL-2	Light primary trainer	USA, 1972
Viet-Nam, South				
	1	Pazmany PL-2	Light primary trainer	USA, 1971

Indigenous design[c]	Identified components: Foreign[d]	Identified components: Indigenous	Indigenization of components by 1972 *per cent*	Comment
	One Turboméca-Artouste IIIB 870 shp engine (France); Other: France			Assembly at Dhamial workshop. Deliveries to all 3 services started in 1972
	One Rolls-Royce Viper 11 engine (UK) Other: UK, Italy		*70*	By end-1971 more than 100 had been built. First Atlas-assembled plane flew in Nov 1966
	One SNECMA Attar 09C turbojet (France) Other: UK		South Africa may decide what percentage of French-made parts will be used	Preliminary work towards local production completed in early 1972, involving expansion of the Atlas factory and training of personnel.
	One SNECMA Attar 09K-50 turbojet			Unit cost in initial phase estimated as $1 mn[k]
				First model to be completed in 1974. The aircraft may be either a version of the Impala or an indigenous design.
				Plan announced in mid-1972
[1972]				To be designed and manufactured in South Africa, announced in mid-1972
	One 150 hp Lycoming engine (USA) Other: USA			In addition to 40 planes completed in 1971, 10 more are built for the Army
1971	One 1 450 eshp Lycoming engine (USA) Other: USA			Two prototypes were built in 1972, first flight late 1973. To replace obsolete T-28 trainers for the Air Force
	One Lycoming T53-L-13B gas turbine engine (USA) Other: USA			In addition to 50 produced earlier, a new contract was reported in Aug 1972 for 24–68 more. The agreement for the licensed production of the engine was signed by end-1972, initially covering 24 units
	One 150 hp Lycoming engine (USA) Other: USA			For Air Force evaluation as trainer
	One 150 hp Lycoming engine (USA) Other: USA			Completed in 1971. Air Force evaluation in 1972

Table 10.4. Current and planned guided-missile system projects in third world countries, 1972

Country/manufacturer	Designation	Licensed production Country/year	Indigenous design[a]	Capacity	Comment
Brazil					
Brazilian Army's Central Missile Commission	Wire-guided anti-tank missile		1967	Range: 3 km	By 1970 some prototypes had been built
	Roland I low-altitude surface-to-air missile	France/ FR Germany, 1972		Mobile anti-aircraft system with optical aiming and infrared tracking	Partial licence for final assembly only
China, People's Republic of	Soviet type surface-to-air missile (SAM-2)		[1962]		Since the early 1960s China has been producing a version of the Soviet SAM-2, a number of which have been exported to Albania. Several other Soviet missiles are also being produced
	US type Sidewinder air-to-air missile		[1970]		Official French sources by Jan. 1972 reported that China is producing copies of captured US Sidewinder missiles[c]
India					
HAL Hyderabad factory	HAL K-13A Atoll air-to-air missile	USSR, 1964			To arm MiG-21
Bharat Dynamics, Hyderabad	Bharat SS. 11 anti-tank missile	France, 1970			Bharat Dynamics was set up by the Indian government to establish a national guided missile industry. Production of the SS. 11 started in July 1971. Future plans include the French AS. 30 air-to-surface missile

Israel					
IAI	MD. 660 Jericho surface-to-surface missile	Co-developed with Marcel Dassault, France, [1965]	[1969]	Two-stage solid-propellant missile; range: 450 km, capable of carrying nuclear warhead	Originally, Jericho was developed by Dassault under an Israeli government contract. 2 missiles were delivered to Israel before the total embargo of Jan. 1969. By 1971, Israel was producing a developed version at a rate of 3–6/month. No information on deployment
	Gabriel ship-to-ship missile, version 1: 20 km range; version 2: 40 km range		1970[b]	Designed for installation in ships from 250 tons upwards. Sophisticated guidance and homing electronics system, all Israeli-designed	Gabriel was announced in 1970, and is fitted to the 12 missile boats purchased from France in 1971. The price was quoted as $5 000–$95 000. A total on-board system (6 launchers, radar and directors) was priced at $2.5 mn.[d] By 1972 export orders had reached $40 mn, incl. Singapore
	Luz air-to-surface missile		1971[b]	Television-guided; range: 30 km	Announced in 1971
	Air-to-air missile		1971[b]	For use on interceptor aircraft	In late 1971 it was reported that IAI was completing development of a new air-to-air missile system
Vulcan Eng. Works Ltd.	Hawk surface-to-air missile	USA, 1972		For training purposes only	The missile does not contain the sophisticated systems used in the operational US missiles, imported by Israel
South Africa					
	Air-to-air missile, supersonic		1969[b]	Solid-fuel rocket propulsion, and infrared homing device, to be used against aircraft flying at Mach 2	The missile was announced in 1969 and tested from a Mirage in 1971. It will be in series production also for export. It was developed by the National Institute for Defence Research

[a] Year in which indigenous designs were initiated.
[b] Work on the design probably started a few years earlier. See *Comment*.
[c] *Air Actualités*, January 1972.
[d] *Interavia Airletter*, 1 March 1971.

Table 10.5. Current and planned armoured fighting vehicle projects in third world countries, 1972[a]

Country/ manufacturer	Designation	Licensed production Country/ year	Indigenous design[b]	Comment
Brazil				
Engesa S.A., Sao Paolo	EE-9 Cascavel wheeled reconnaissance/COIN vehicle		1970	Developed on Army request. Speed: 95 km/hr; range: 700 km. Cascavel has a special armour and a wheel system with bullet-proof tyres. The vehicle was designed for COIN duties.
	EE-11 Urutu amphibious transport/ COIN vehicle		Jan. 1970	Two versions of the Urutu are in production; one 14-passenger transport and one for COIN duties, fitted either with a 90 mm cannon or a machine-gun.
China, People's Republic of				
State factory at Shenyang	T-59 medium battle tank, 32 tons, (version of Soviet T-54)		1963	Initially, large numbers of the Soviet version were purchased. Production of the Chinese version, 4 tons lighter than the T-54 and lacking infrared equipment, is believed to have started in 1963. In 1966 China began to export the T-59 to Pakistan.
	T-62 light tank, 21 tons		[1968]	A light tank is in series production in China. It is equipped with one 85 mm cannon and 2 machine-guns. The T-62 has been exported to Tanzania.
	T-60 amphibious tank (version of Soviet PT-76)		[1968]	The T-60 is in series production. In addition, several types of Soviet-designed armoured cars and armoured personnel carriers are produced.
	Tracked amphibious armoured personnel carrier, 11 tons		[1970]	The existence of this Chinese-designed vehicle was first reported in 1972. It is similar to the Japanese SU-60.
India				
Heavy vehicles factory, Avadi	Vijayanta main battle tank, 37 tons modified (modified Chieftain type)	UK, Vickers Armstrong 1965		Production of a total of 1000 units began in 1966. By 1972 indigenization of components had reached 68 per cent. The 105 mm gun and the infrared equipment is imported By 1972, production rate was 100/year, and approx. 400 units were in service.
	OT-62 tracked armoured personnel carrier (Soviet BTR-50)	Czechoslovakia, [1970]		It was reported by mid–1972 that India is producing the OT-62 armoured personnel carrier.

Country/ manufacturer	Designation	Licensed production Country/ year	Indigenous design[b]	Comment
Israel				
	Sabra medium battle tank, 40 tons		[1970]	It was reported in 1971 that Israel was about to begin production of a tank specially designed for desert warfare. Sabra has one Continental diesel engine (USA), and is developed from the Soviet T-54, the British Chieftain and the US M-48 Patton. It should enter service in 1972.
South Africa				
	Panhard AML 60 armoured car Panhard AML 90 armoured car	France, 1960		Approx. 600–800 produced up to 1972. Exported to Portuguese Mozambique.
	Armoured car	[France, 1972]		Defence Minister Botha announced in 1972 that South Africa is developing a second generation of armoured cars.

[a] Information on the number of vehicles produced, when known, appears in the *Comment*.
[b] Year in which indigenous designs were initiated.

Table 10.6. Current and planned warship projects in third world countries, 1972

Country/ manufacturer	Designation[a]	Licensed production Country/ year	Indigenous design[b]	Comment
Argentina				
Naval Shipyard, Rio Santiago	Vickers type 42 guided missile destroyer (UK "Sheffield" class), 3 500 tons	UK, 1970		One of the 2 destroyers purchased from the UK will be assembled in Argentina with British oversight of construction.
	Submarine, type 205, 450 tons surface	West Germany, 1969		Being assembled in Argentina from West German material and pre-fabricated sections.
Naval Aviation Base, Puerto Indio	Guaipo 1 hovercraft		[1971]	The hovercraft uses 2 65 hp Continental engines (USA) and is in production.
Brazil				
Naval Dockyard, Rio de Janeiro	Vosper Thornycroft Mark 10 guided missile destroyer, 3900 tons	UK, Vosper 1970		Two of the 4 destroyers purchased from the UK will be assembled in Brazil with materials, equipment and lead-yard services supplied by Vosper. If the order is extended to 10 ships, 4 will be built in Brazil.

Country/ manufacturer	Designation[a]	Licensed production Country/ year	Indigenous design[b]	Comment
Max Holste Engenharia Ltda, Sao Paolo	Hovercraft		1970	It was reported in 1970 that the French aircraft designer M. Holste had formed a new company, whose first task would be development of a hovercraft carrying 30 passengers or 4 000 kg cargo.
China, People's Republic of				
Naval Dockyard, Canton	Medium-range diesel-powered submarine (Soviet R class), 1 100 tons surface		[1965]	China is currently building the R-class submarines, and by 1972 at least 14 were in service
	Destroyer escort, Kiangnan class, 1 350 tons		1968	The Chinese Navy has embarked on a building programme of which this class is the beginning. It is a different design from the original destroyer escort class. By 1972, 5 ships were reported in service.
Hutang Shipyard, Shanghai	Fast gunboat Shanghai II class, 120 tons		[1965]	Shanghai II is a development of the Shanghai class that first appeared in 1959. By 1972, more than 100 ships had been built, with production continuing. Shanghai II is designed as a convertible gunboat/torpedo boat.
	Fast hydrofoil torpedo boat, Huchwan class, 45 tons		1966	Production started in 1966, By 1972 approx. 70 were in service, and another 12 had been leased to Albania.
India				
Mazagon Dock, Bombay	Leander class frigate	UK, 1965 Yarrow, Vickers for 6 ships		In May 1966, the first of a total of 6 frigates, INS Nilgiri, began to be constructed. It was launched in 1968 and commissioned in June 1972. The second frigate, INS Himgiri, was begun in 1968, launched in 1970 and will be commissioned in 1974. Indigenization of Nilgiri was 53 per cent; the proportion of locally produced material is rising. Himgiri uses Indian-built main boilers and steam turbines. The third frigate, INS Udaygiri, was started in 1970, and the fourth in 1972. By 1974 Mazagon Dock expects to turn out 1 frigate/year.
Garden Reach Workshop, Calcutta	Ocean-going tug, 1 400 tons		1970	INS Gaj was launched in June 1972. Indigenization: 70 per cent. It is fully air-conditioned with a high degree of automation and remote control system. Cost: $ 2.5 million[c]

Country/ manufacturer	Designation[a]	Licensed production Country/ year	Indigenous design[b]	Comment
	Ocean-going tug		1972	The Garden Reach is developing another tug of the same type as INS Gaj, but with a higher degree of indigenization.
	Seaward defence boat		[1970]	Designed by the Indian Naval Design Organisation. To enter production in 1973.
Indonesia				
	Submarine chaser, Mawar class, 147 tons		1972	In 1972, Indonesia was building 5 submarine chasers. At least 2 had reached launch stage. During Indonesia's second 5-year plan, starting 1974, destroyers and motor torpedo boats will be built.
Israel				
	Missile-carrying gunboat, 415 tons, similar to French Saar class		[1970]	First reported in 1972. Four diesel engines of W. German manufacture
Korea, North				
	Motor gunboat, 160 tons			Under construction in 1972. At least 2 ships will be submarine chasers. Probably indigenous developments.
Rhodesia				
Hovercraft Development Ltd.	Hovercraft		1969	The company is considering a military hovercraft for river and lake patrol duties.
Syria				
	Patrol boat, 150 tons			At planning stage in 1972.
	Seaward defence boat, 60 tons			At planning stage in 1972.
Thailand				
Royal Thai Naval Dockyard, Bangkok	Fast patrol boat, 87.5 tons			Two boats under construction in 1972. With US MAP aid.
Turkey				
Gölcuk Naval Dockyard	Frigate, 1450 tons		1968	The two frigates are the first major warships built in Turkey. Launched in June 1971 for completion in 1972 and 1974. Fiat-diesel engines.
	Destroyer escort Landing ship Submarine		1972	Production planned. At least the submarines are likely to be of foreign design.

[a] Information on the number of vehicles produced, when known, appears in the Comment.
[b] Year in which indigenous designs were initiated.
[c] *Hindustan Times*, 29 June 1972.

Table 10.7. Current aero-engine projects in third world countries,[a] 1972

Country/manufacturer	Designation	Comment
Brazil		
Centro Tecnico Aerospacial: Powerplant Department	Pulse-jet and ram-jet engine	Under development.
India		
Hindustan Aeronautics Ltd., Bangalore Division	HJE-2500 turbojet	This engine was built as an experimental project, possibly for use with the HJT-16 jet trainer after 1974. All components except the fuel system were manufactured at Bangalore. The engine ran for the first time on the test-bed in 1966 and is under further development.
	10 000 lb thrust engine	In 1972 it was reported that HAL had designed this engine, the most advanced Indian engine design to date. It has been examined by French experts and declared feasible.
Israel		
Israel Aircraft Industries Ltd.	17 900 lb thrust engine	By end 1972 it was reported that IAI had developed a jet engine of the same thrust class as the US J79 which powers the Phantom. Production may start in 1973. The engine might be used on the Barak fighter.
South Africa		
South African Aeronautics Research Unit	Valveless pulse-jet engine	The engine was reported in 1971 as a project under development.

[a] Information on licensed production of aero-engines appears in table 10.1. There is no detailed information on China's engine production.

Table 10.8. Current production of military electronics and communications equipment in third world countries

Country/ manufacturer	Type of equipment	Licensed production Country/year	Indigenous[a]	Comment
Brazil				
CTA: Electronics department	VHF, VOR and glide-slope antennae, glide-slope receiver, single-channel VHF transceiver, 10-channel VHF transceiver		1969	Under development since 1969. The CTA has for many years produced various electronics for the armed forces. Electronic equipment is also developed in various armed forces laboratories and ordered from local suppliers
Indeletron S.A.	FM and SSB communications equipment	USA, 1970 Hallicrafters & Co.		The licence covers complete manufacturing data and technical assistance
Aidroservice S.A.	DACTA air traffic control and air defence system	France, October 1972 Thomson–CSF		With the signing in October 1972 of a $70 mn contract between the Brazilian Ministry of Aeronautics and the Thomson–CSF, the French industry is also committed to the build-up of an electronics industry in Brazil
China				
	Air defence radar		1972	US sources reported in 1972 the development of a radar entirely different from Soviet models
	Military transmitters and receivers Microwave equipment Missile instrumentation			The electronics industry is concentrated in Shanghai, Peking, Nanking, Tientsin, Chengtu and Canton with 200 large facilities plus around 500 smaller units. Between 50–75 per cent of the production concerns military projects[b]
India				
The National Aeronautical laboratory: (NAL) Electronics division, Bangalore	Avionics[c]		1960	NAL is one of the largest research organizations in India. It employs some 750 scientists, and its first effort was to build up a design capability
Bharat Electronics Ltd., Bangalore	Airborne communications equipment, radar	1956	[1967]	Bharat is the largest electronic undertaking in India, with a work force in 1971 of some 11 245. Current production covers over 250 different types of equipment and a wide variety of components
Bharat Electronics Ltd., Ghaziabad	Microwave and radar equipment			

Country/ manufacturer	Type of equipment	Licensed production Country/year	Indigenous[a]	Comment
The electronics group of the Defence Research and Development Organization	Battlefield surveillance radar, ground radar tropo-scatter equipment, semi-conductor materials and radio communications equipment	[UK] 1965	[1965]	Under development in 1972. Among equipment already produced is S and X band radars. A large number of communication products are produced under licence
HAL: Lucknow division	Avionics and aircraft accessories	UK,[d] 1969 France,[e] 1971		Production starts 1974. The division was set up in 1969 to produce avionics under UK, US and French licences
HAL: Hyderabad division	Electronic equipment	USSR, 1964		All avionics for MiG-21
Israel				
IAI: Elta Electronics Industries Ltd.	ISAC-77 airborne computer; communication and navigation aids; radars; alpha numeric displays; S-band radar EL/K-1005 airborne UHF transceiver		1960	Elta is the largest electronics undertaking in Israel with a work force of 1600, of which 200 are scientists
Tadiran Israel Electronics Industries	Radar		1960	In 1969 General Telephone and Electronics (USA)bought a 35 per cent holding in Tadiran
South Africa				
	Light-weight transmitter/ receiver communications system for commanders		1972	Has been developed
	Radio beacon for paratroopers		1972	In production
	Portable radar detection system		1972	Under development
	Advanced aircraft identification system		1972	Under development

[a] Development work probably started a few years earlier. See *Comment.*
[b] "The electronics industry of China", by Philip D. Reichers. *In People's Republic of China; An Economic Assessment.* A compendium of papers submitted to the Joint Economic Committee, Congress of the United States, 18 May 1972.
[c] For example, brakes and other hydraulic equipment, flight instrumentation, air-conditioning, pressurization and fuel system equipment.
[d] Agreement with the Aviation Division of Smith's Industries for the assembly and manufacture in India of all Smith's aviation accessories and systems currently in production.
[e] Agreement with 18 French aerospace companies under the terms of which India may select various items for production. In return, HAL shall favour the choice of French equipment for its aircraft projects.

V. *Sources*

In addition to the list of references above (p. 356), the following sources, as well as 19 daily newspapers, have also been examined regularly at SIPRI for information on third world domestic defence production for the period 1950–1972.

Books and periodicals

The Arms Trade with the Third World (Stockholm, Almqvist and Wiksell, 1971, Stockholm International Peace Research Institute)

Arab Report and Record (London)

Interavia Data. Current Aircraft Prices (Geneva)

Jane's All the World's Aircraft (London, Samson Low, Marston and Co., annual)

Jane's Fighting Ships (London, Samson Low, Marston and Co., annual)

Jane's Surface Skimmers (London, Samson Low, Marston and Co., annual)

Jane's Weapons Systems (London, Samson Low, Marston and Co., annual)

Keesing's Contemporary Archives (Bristol, weekly)

Miksche, F. O., *Rüstungswettlauf—Ursachen und Auswirkungen* (Stuttgart, Seevald Verlag, 1972)

The Military Balance (London, International Institute for Strategic Studies, annual)

New Review on West Asia (New Delhi, Institute for Defence Studies and Analyses, monthly)

News Review on China, Mongolia and the Koreas (New Delhi, Institute for Defence Studies and Analyses, monthly)

News Review on South Asia (New Delhi, Institute for Defence Studies and Analyses, monthly)

Journals

Air et Cosmos (Paris)

Bulletin of the Atomic Scientists (Chicago)

China Report (New Delhi)

Europa Archiv (Bonn)

Flight International (London)

Indian Aviation (Calcutta)

International Defense Review (Geneva)

NATO Review (Brussels)

Strategic Survey (London)

Survival (London)

Wehr und Wirtschaft (Stuttgart)

11. Disarmament and development: summary and conclusions of the UN report

At the 25th General Assembly of the United Nations a resolution was adopted requesting the Secretary-General to submit a report "through the Economic and Social Council, in time for consideration by the General Assembly at the first biennial review of the implementation of the International Development Strategy for the Second United Nations Development Decade, to be made in 1973". The resolution recalled that the International Development Strategy for the Second United Nations Development Decade had called for a close link between disarmament and development in the 1970s, and recognized the importance of adopting appropriate measures to ensure that this link between disarmament and development be fully understood and utilized in as practical and comprehensive a manner as possible.

The report, entitled *Disarmament and Development*, has been prepared and unanimously adopted by a group of nine experts, which held two sessions between March and August 1972.

In view of the importance attached to the subject inside and outside the United Nations, a summary of the main conclusions and recommendations of the report is reproduced here.

a. Disarmament and development can be linked to each other because the enormous amount of resources wasted in the arms race might be utilized to facilitate development and progress. Furthermore, the blatant contrast between this waste of resources and the unfilled needs of development can be used to help rouse public opinion in favour of effective disarmament, and in favour of the achievement of further progress in development particularly of the developing countries.

b. World military expenditures in 1970 were roughly $200 billion,[1] that is, 6.5 per cent of the GNP of the countries of the world. Military expenditures of the countries which provide aid for development are estimated to be approximately 6.7 per cent of their GNP, or 25 times greater than the official develop-

[1] This figure, derived from the US Arms Control and Disarmament Agency (ACDA) [1], differs from the SIPRI figure in table 7A.1. The reason for this difference is the higher ACDA estimate of Soviet military expenditure, as explained in chapter 7, pp. 214–15.

ment assistance they provide.[2] The major part of the world's military expenditure is made by a very small number of countries; the six main military spenders are responsible for more than four-fifths of the total. The developing countries spend approximately 4.2 per cent of their GNP, or only about 7 per cent of the world total, although for some of them, the share of military expenditure in their GNP is high.

c. The two principal aims of policies of world-wide economic and social development are the increase in the levels of living of all peoples and the reduction in income disparities both within and between countries. On the basis of the modest achievements of the First United Nations Development Decade, and even if growth objectives of the Second United Nations Development Decade are attained, the problem of reducing mass poverty and unemployment in the less developed regions of the world still remains. More efforts therefore should be made by the world community. While, in the opinion of the group, developing countries bear responsibility for adopting adequate measures to mobilize their own resources more effectively, and for reducing income disparities, the solution of that problem would, in many developing countries, depend on the contribution to their external resources made by expansion of their exports and also, to a significant extent, on stepped-up foreign assistance.

d. Disarmament would contribute to economic and social development through the promotion of peace and the relaxation of international tensions as well as through the release of resources for peaceful uses. The transfer to peaceful uses of resources used in each country for military purposes will bring about greater satisfaction of civilian needs of the country. The resources thus released, sometimes referred to as the "disarmament dividend", can be redirected to raise standards of living and to promote faster growth.

e. There will be considerable variation among developing countries respecting the magnitude of their own "disarmament dividend". In case of general and complete disarmament—and also, to a lesser extent when the cuts in military

[2] At present the flow of official development assistance to developing countries—which depends on governmental decisions taken in the developed countries—amounts to only about 0.35 per cent of the gross national product of the latter countries. In order to achieve the Second United Nations Development Decade target of 6 per cent growth on average, it is estimated that official development assistance from developed countries would have to double in relative terms, that is, to increase to 0.7 per cent of their GNP. (Official development assistance, however, constitutes only a part of the import balance of the developing countries. The gross flow of both official and private financial resources they receive from abroad is sometimes offset by income transfer back to the developed countries and/or outflow of domestic capital.)

If population growth is held down to about 2.5 per cent, the rate of growth of income per person will be about 3.5 per cent. That this target—if achieved—would represent an increase over the 2.5 per cent rate of growth of income per person observed in the 1960s is encouraging. But the prospect is nevertheless not satisfactory. At a rate of growth of 3.5 per cent, average income per person in the developing world would rise from the 1970 level of $200 to the level of only around $280 (in 1970 prices) by 1980.

expenditure are significant but less than total—economic assistance granted by developed to developing countries could and should be greatly increased and should be given higher priority in the allocation of released resources. Since military expenditures now absorb a larger proportion of the combined GNP of the developed than of the developing countries, a general (proportional) reduction in military expenditures will increase the non-military part of the GNP of the first group of countries proportionally more than that of the second group. However, a simultaneous increase in the fraction of GNP in the advanced donor countries allocated to international development assistance could not only prevent a widening of the "gap", but contribute greatly to its closing.

f. The group suggests that consideration should be given to progress in disarmament in the periodic reviews and appraisals of progress towards achieving the goals and objectives of the International Development Strategy for the Second United Nations Development Decade.

g. Most of the resources released by disarmament, total or partial, would be readily transferable to other uses—for example, manpower, food, clothing, transport, fuel and products of the metal and engineering industries. Budgetary action to raise civil demand will be enough to induce redeployment of these resources either to investment or to consumption, public or private. But other resources—for example, nuclear-weapon plants and military-aircraft and missile plants—may not be readily transferable.

h. The group suggests that governments, when placing orders for specialized military production or creating specialized plants likely to give rise to transfer difficulties in the event of disarmament, should make advance plans to deal with the redeployment to peaceful work of the manpower and plant (in so far as the latter is reusable).

i. Apart from catering for these areas of special difficulty, all countries might be urged to consider what would be the most valuable ways of redeploying resources from military to civil use and to consider, in particular: which specialized resources now used by the military might make a particularly valuable contribution to development in any area; and, in the light of such an assessment, which specialized resources would be suitable as aid or technical assistance from developed to developing countries. Planning of this kind would benefit from international cooperation.

Reference

1. *World Military Expenditure 1971* (Washington, US Arms Control and Disarmament Agency, 1972).

Part IV. Developments in arms control and disarmament

Chapter 12. Multilateral disarmament negotiations in 1972

Chemical disarmament Other measures The disarmament negotiating machinery List of states which have signed, ratified, acceded or succeeded to the Geneva Protocol of 17 June 1925, for the prohibition of the use in war of asphyxiating, poisonous and other gases, and of bacteriological methods of warfare, as of 31 December 1972 List of United Nations General Assembly resolutions on disarmament and related matters in 1972

Chapter 13. The status of implementation of agreements related to disarmament

Bilateral US–Soviet agreements Multilateral agreements Bilateral arms-control agreements between the USA and the USSR as of 31 December 1972 Multilateral agreements related to disarmament as of 31 December 1972 List of states which have signed, ratified, acceded or succeeded to the agreements Preliminary list of announced and presumed nuclear explosions in 1972

Chapter 14. The arms-control experiment in the Antarctic

Introduction Essential disarmament provisions Verification and consultation Conclusions The Antarctic Treaty

Chapter 15. Chronology of major events related to disarmament issues

12. Multilateral disarmament negotiations in 1972

I. *Chemical disarmament*

Under the biological disarmament convention, opened for signature on 10 April 1972,[1] the parties are committed to negotiating an agreement on effective measures for the prohibition of the development, production and stockpiling of chemical weapons and for their destruction, as well as on appropriate measures concerning equipment and means of delivery specifically designed for the production or use of chemical agents for weapons purposes. Discussions on political and technical levels have been taking place at the Conference of the Committee on Disarmament (CCD) in Geneva. On 28 March 1972, a draft convention was tabled by the Soviet Union and the other Socialist countries, members of the Committee, on the prohibition of the development, production and stockpiling of chemical weapons and on their destruction, its language being almost identical to that of the biological convention [2]. A number of working papers were later presented and discussed.

No significant progress was recorded in 1972. One reason for this is the technical complexity of the problem. Stocks of chemical warfare agents, of different types, may exist in a number of countries, and many more countries possess the basic materials needed for their production; the knowledge of how to manufacture and use them is not a monopoly of the big powers. Another, more important, and perhaps decisive, reason is that chemical means of warfare, unlike biological means, are considered to be militarily useful, and military establishments may be reluctant to give them up. The argument usually put forward is that states cannot deprive themselves of a retaliatory capability unless foolproof control is ensured. The biological disarmament convention can serve as a model, but some of its weaknesses and ambiguities could not be tolerated in a chemical disarmament convention, considering the nature of the weapons to be banned.

The main issues in the chemical disarmament debate are the scope of the prohibitions and the definition of agents subject to prohibitions, as

[1] The text of the convention and a detailed analysis of its provisions can be found in the *SIPRI Yearbook 1972* [1].

well as verification of compliance with the obligations assumed by the parties. They are all interrelated.

In 1972, the most controversal question was *what* should be banned under a chemical disarmament convention. The question will be examined here in the light of the opinions expressed by the participants in the debate.[2]

Object of the prohibitions

Chemical agents form a basic element of chemical warfare capability, whatever the systems employed for their delivery to the target. A definition of chemical warfare agents is therefore essential in order to define the ban under a disarmament convention. It is also important to ensure uniform application of the international obligations which would subsequently have to be translated into national legislation with a view to their enforcement on the territory of each party.

According to the UN Secretary-General's report of 1969 [5], chemical agents of warfare are chemical substances, whether gaseous, liquid or solid, which might be employed because of their direct toxic effects on man, animals and plants. (It is understood that chemical substances used for conventional weapons, such as explosives, smoke and incendiaries which exert their primary effects through physical force, fire, air deprivation or reduced visibility, as well as fuel, are not chemical warfare agents.) The definition contained in the 1925 Geneva Protocol, which prohibits the use of "asphyxiating, poisonous or other gases" and of "all analogous liquids, materials or devices", is covered by the above UN formula.

Such a description, however, is insufficient when it comes to determining whether a particular chemical product should be classified as a warfare agent and, consequently, whether its possession should be prohibited. Besides, the wording of the Geneva Protocol has given rise to conflicting interpretations and it is considered risky to subject a new convention to similar vicissitudes.

Chemical agents can be grouped into three categories: single-purpose agents, which have no use other than for warfare (except that very small quantities may be employed for scientific and medical purposes); dual-purpose agents, which are commonly used for civilian needs, but which can also be used in war; and intermediates, which may or may not have civilian applications and which do not have immediate military significance unless converted into agents.

[2] The chemical disarmament negotiating history, up to 1971, is reviewed in detail in previous SIPRI publications [3–4].

The first category, that of single-purpose agents, covers the most dangerous chemicals—the nerve agents. These are organophosphorus compounds but are more toxic than insecticides and pesticides which belong to the same type of chemical compounds. There exists yet another type of compounds—namely the carbamates—which act in the same way as nerve agents, that is, by affecting the nervous system, but which, in view of their chemical and physical properties, have very limited usefulness as chemical warfare agents.

The distinction between the categories of agents becomes confused in the case of so-called binary weapons. These weapons, still in an experimental stage, generate a toxic agent when two separate components, stored in the ammunition, are brought together; each of the components possesses a much lower, or even an insignificant, toxicity as compared with the resulting mixture, and could not itself be classified as a chemical warfare agent. Production of the actual warfare agent takes place just prior to firing the ammunition or when the charge is already on its way to a target.

Technically speaking, the following criteria could be used to discern substances utilizable for chemical warfare: the degree of toxicity; general structural formulae; and identification by name and specific structural formula.

According to the degree of toxicity, chemical warfare agents can be divided into two groups—those whose toxic effects are achieved in minimum concentrations, and which therefore could be called super-toxic, and those whose toxic effects are achieved through high concentrations. Only single-purpose agents fall within the first group. To be used in an international convention, a criterion based on a toxicity threshold would require an internationally accepted laboratory method of determining it, because the procedures used at present are not uniform [6]. The toxicity criterion has the advantage of covering chemical warfare agents which may be discovered in the future. However, the degree of toxicity, while directly reflecting the potential danger from a chemical substance, is not the only important factor in judging the military usefulness of an agent. Other properties, such as storage stability, stability during and after dissemination, and ease of dissemination, are also essential in a toxic substance if it is to become a chemical warfare agent.

General structural formulae, which were suggested in the CCD, might be used to describe known classes of super-toxic compounds, such as nerve agents [7–9]. Other types of chemical compounds would require other general formulae. But, of course, no formulae could cover all the compounds which may be discovered in the future.

The listing of warfare agents, including specific structural formulae,

may be helpful [8, 10], but, given military secrecy, it would not be possible to cover all agents accumulated by states; it would be even less possible to cover those under development. A register of agents, if accepted, would have to be kept constantly up-to-date.

Precise technical criteria would be indispensable in an agreement prohibiting selected categories of chemical warfare agents, such as super-toxic agents, in order to distinguish them from those remaining outside the ban. The wider the object of the prohibition in a non-comprehensive ban, the more difficult it may be to draw an exact dividing line. None of the above criteria, taken separately, would seem satisfactory for the purpose of a chemical convention, and it is most probable that a combination of them would be needed.

A general ban on chemical warfare agents requires a broad definition. Detailed characteristics of chemical warfare agents were provided in the CCD, taking account of the manner and conditions of their application [10], or aimed at preventing misuse of chemical compounds not classified as chemical warfare agents, and of those which may be synthesized in the future [11].

But the prevailing opinion seems to be that a criterion based on the purpose which the agents are intended to serve, with reference to qualitative characteristics and to quantitative factors, would provide the simplest solution. It could describe the prohibited agents as substances of types and in quantities that have no justification for peaceful purposes, or as those destined for the production of chemical weapons.

In the former case, if doubts arose with regard to compliance, evidence would have to be provided that certain types or quantities of agents are used for peaceful purposes, which should be feasible. In the latter case, it is the absence of intent to use the agents for weapons purposes which would have to be proved, and this may be very difficult, if not impossible. For instance, dual-purpose agents may be originally intended only for civilian industries but, once produced, they can be used both for peaceful and warlike purposes. A change of intention on the part of the producing states, which is clearly unverifiable, would be enough to consider civilian stockpiles as military stockpiles.

The "purpose criterion" characterizing the prohibited agents as those which have no justification for peaceful purposes, was used in the biological disarmament convention. For chemical disarmament, such a definition may need additional qualifications in order to establish clearly the limits of the prohibitions and facilitate the implementation of a convention. It could be supplemented by some technical guidelines (incorporated in the text of the convention or in an annex to it) relating at

least to the most dangerous agents which require the strictest control and verification measures. To this end, delimitation of super-toxic agents has been suggested [12] on the basis of the effects of these chemicals on living organisms. Considering the size and output of the chemical industries in different countries, as well as the manifold uses to which their products are put, a recognized authority would have to judge, on an *ad-hoc* or current basis, whether or not the volume of substances produced, or otherwise acquired and stockpiled, exceeded normal industrial and other peaceful requirements.

Activities to be prohibited

Among the activities involved in building up a chemical warfare capability, production and stockpiling of agents deserve special attention.

The scope of non-production and non-stockpiling commitments would depend on the object of prohibition. Under a partial agreement prohibiting single-purpose agents—that is, those which have only belligerent use—relevant facilities would have to be shut down, dismantled or converted to peaceful uses, and the accumulated stocks destroyed. An exception could be made for some small, militarily insignificant amounts, which may be needed for scientific and medical purposes, and which would have to be declared and justified.

Under a comprehensive agreement, prohibiting all chemical warfare agents, there would have to be, in addition to an absolute ban on the possession of single-purpose agents, a restriction on the manufacture of dual-purpose agents, so as strictly to adjust the output and stockpiles to civilian needs.

Whatever methods of verification are eventually agreed upon[3]—and there seems to be a consensus that they should not be overly intrusive, and that the interests of the chemical industry should be safeguarded at least to the same extent as the interests of the nuclear industry are protected under the International Atomic Energy Agency's safeguards system—there may be a possibility of evasion. Thus, for example, abuses in the case of dual-purpose agents, which are produced in very large quantities, cannot be excluded. Dealing with the components of binary weapons poses even greater problems. Manufacture of items unconditionally forbidden could continue at undeclared facilities. Stocks of warfare agents could be illicitly retained, if not with the intention of eventually using them, then at least

[3] Discussions on problems involved in verifying chemical disarmament are contained in previous SIPRI publications [13–14].

with the object of avoiding costly and hazardous destruction operations; it is very unlikely that all states would agree to open to inspection all their installations that could possibly conceal such stocks. The whole question of verification is of much greater importance to smaller and weaker nations than to the great powers because the former do not possess a wide choice of weapons available for retaliation against a possible chemical aggression, and may lack protection against such aggression. A possibility of lodging complaints of violations and of having them investigated by an international body may give some re-assurance, if impartial enquiries, including on-site inspection when necessary, are initiated promptly, without hindrance or discrimination. But again it should be borne in mind that some countries may have no means to collect evidence about clandestine production or stockpiling by others.

These uncertainties could be attenuated and reasonable assurance of compliance might be provided if a prohibition were also imposed on chemical warfare research conducted as part of a military programme, on development of warfare agents, on production of chemical ammunition and means of delivery of chemical weapons, on training in the use of these weapons and on the very existence of special military units for chemical warfare. It is true that laboratory research is not subject to direct supervision, but development may be detected at the stage of field testing; the use of remote sensing devices mounted on satellites was suggested in the CCD to detect such testing [15]. Munitions containing chemical agents resemble conventional munitions, but training in chemical warfare and the existence of chemical warfare units is difficult to conceal. The methods available for verifying all these activities are by no means fully effective, but then they do not need to be in order to deter possible violations. It is the cumulative effect of the main and supplementary prohibitions, as well as the cumulative effect of various types of control —unilateral and international, and relating to different classes of agents and different kinds of activities—which may be significant. The broader the ban on activities connected with chemical warfare, the lesser the likelihood of violations. The narrower the ban, the easier it may be to escape detection of breaches because the permitted chemical warfare activities would be difficult to distinguish from the prohibited ones, and a refusal to allow inspection could be justified on the grounds of military secrecy in addition to industrial secrecy.

In any event, if the aim of the chemical disarmament agreement is to complement and reinforce the Geneva Protocol, some international machinery would be needed to deal with allegations of use. Collective action in defence of the country attacked or exposed to danger as a result of

violations committed by another country would also have to be provided for. The deterring effect of such provisions may bridge the unavoidable residual gaps in the verification of non-possession of chemical weapons.

Partial or comprehensive ban

To be comprehensive, so as to reduce to a minimum the possibility of chemical weapons being used, a chemical disarmament convention would have to prohibit all chemical warfare agents and all activities related to preparation for chemical warfare. From the disarmament point of view this would certainly be the most desirable approach. The 27th UN General Assembly stressed the importance of working towards the complete realization of the objective of effective prohibition of chemical weapons and urged governments to work to that end [16].

Partial agreements, covering selected categories of agents and only certain relevant activities, may have some intrinsic merit, but would be deficient in many respects. Thus, for example, a prohibition of super-toxic agents would have a limited value to many countries, if other agents remained unaffected. In a confrontation between a major military power and a less advanced nation, or between two developing countries which have inadequate defences and means of protection against a chemical attack, even less toxic agents would suffice to cause great destruction.

As far as irritant agents, such as tear gas, and anti-plant agents are concerned, *specific* limitations on their production under a chemical disarmament convention, in addition to those covered by the "purpose criterion", would appear to be less essential than general acceptance that their use in armed conflicts is contrary to the rules of international law as embodied in the 1925 Geneva Protocol.

The central issue is the treatment of stockpiles. If the stocks of super-toxic agents and of munitions filled with these agents were destroyed, however lengthy the operation may be, and their development and production prohibited, a weapon would be disposed of, the destructive force of which is second only to nuclear weapons. If, in addition to that, the relevant productive capacity were eliminated, the cause of disarmament would be further enhanced.

On the other hand, if the existing arsenals were left intact, a prohibition on the development, production and transfer of super-toxic agents and, for that matter, of other chemical warfare agents, and weapons designed to use them, would have no more than a preventive effect. The non-producing countries would be prevented from acquiring a chemical warfare capability. The producing countries would be prevented from further manu-

facturing known agents or developing new ones; they would retain the existing stockpiles of agents and weapons, but would be prevented from adding to them. An arrangement of this kind would bear close resemblance to the treaty on the non-proliferation of nuclear weapons, with the sole but important difference that, while the nuclear arms race has been allowed to continue and the use of nuclear weapons has not been formally banned, the chemical potential would be frozen and the use of chemical weapons would remain prohibited. In other words, ceilings would be established, both quantitative and qualitative, on the chemical weapon strength in the world at the levels existing at the time of concluding the convention. Such a partial agreement would not be a disarmament measure. While it is true that unless replenished at regular intervals, which would not be possible under a production ban, chemical weapon stockpiles are subject to losses resulting from deterioration, the diminution may not, in the foreseeable future, affect to an appreciable extent chemical arsenals which have reached a point of saturation.

Moreover, the built-in inequality of obligations under a partial agreement that did not provide for the elimination of stockpiles may be considered discriminatory in that it would strengthen the monopolistic positions of the great powers. But it could not be more objectionable than the Non-Proliferation Treaty which has already been accepted by most countries, except insofar as there may be more than five powers possessing the chemical warfare agents to be prohibited. Besides, it may be assumed that a cessation of production and development of chemical weapons would downgrade the role of these weapons in military planning and gradually diminish the interest of military establishments in their possible use. An additional prohibition on testing could undermine confidence in the effectiveness of stockpiled weapons. All this has not resulted from the Non-Proliferation Treaty.

Any partial disarmament measure is presumed to be a phase in a process of dismantling warfare capabilities. An agreement concerning chemical weapons could not be an exception. There is no justification for perpetuating a situation where the great powers possessing the most modern armaments, conventional and nuclear, or, for that matter, other militarily important powers, would remain the exclusive possessors of the most dangerous chemical weapons.

In 1972 the debate on chemical disarmament was still in the stage of an exchange of views. Concrete negotiations will be possible only when it is decided what kind of agreement is actually being sought.

The experience with arms-control measures hitherto agreed upon shows that the scope of agreement is determined by the military value of the

weapons to be prohibited, as perceived by the military, rather than by the degree of verifiability of compliance. This may also be the case with a chemical disarmament convention. But the cause of a comprehensive ban on possession of chemical weapons would be promoted, if the Geneva Protocol prohibiting the use of these weapons were universally adhered to (42 UN members have not yet expressly accepted the obligations under the Protocol), and especially if the comprehensive character of the ban on use were also universally accepted. Another important step in this direction would be the withdrawal, by all states concerned, of the reservations limiting the applicability of the Protocol to nations party to the Protocol, and to first use only, so as to make the prohibition of use absolute and unconditional. Ireland has already decided to withdraw these reservations with effect from 10 February 1972.

The parties to the Geneva Protocol[4] are listed in appendix 12A.

II. *Other measures*

Besides chemical disarmament, the multilateral disarmament negotiations in 1972 continued to be concerned with a comprehensive ban on nuclear weapon testing. The idea of declaring the Indian Ocean a zone of peace, which had been put forward in 1971, received some further attention at the 27th UN General Assembly. At the same Assembly, the proposal for prohibiting the use of nuclear weapons was revived.

Comprehensive ban on nuclear-weapon testing

The expectations of many nations that the US–Soviet Strategic Arms Limitation Talks would provide an immediate impulse to an agreement on the cessation of all nuclear-weapon tests, have not been fulfilled. The testing has been going on, both underground by the USA and the USSR, and in the atmosphere by China and France,[5] in spite of more than 20 successive UN resolutions, some of which formally condemned nuclear-weapon tests without exception [18–20]. The question has not even been accorded high priority in disarmament negotiations, as requested by the United Nations. Nor have proposals formulated by non-nuclear-weapon states for unilateral or agreed measures of restraint, or a moratorium, on testing, and suggestions for partial or gradual prohibitions [21–29] met with a positive response on the part of the testing powers.

[4] The full text of the Geneva Protocol can be found in Volume IV of the SIPRI study, *The Problem of Chemical and Biological Warfare* [17].

[5] For a list of nuclear-weapon tests conducted in 1972, see p. 477.

Ever since the conclusion of the Partial Test Ban Treaty in 1963, the question of verification has remained ostensibly the main stumbling block to a comprehensive agreement. The USSR has not explained how the national means of detection and identification of seismic events, which it considers sufficient for monitoring the observance of such an agreement, would be applied in practice. Equally, the United States, which insists on on-site inspection as an indispensable element of control to identify ambiguous events, has not clarified how, when and under what conditions, such inspection would be carried into effect. Whereas on other occasions the USA and the USSR submitted complete draft treaties at early stages of negotiations, they have still not specified, in treaty language, the terms that would be acceptable to either of them for the prohibition of underground nuclear-weapon testing.

The inertia of the big powers stands in contrast to the efforts made by other states to facilitate the achievement of an agreement by ameliorating verification methods. In June 1972, Canada, Japan and Sweden agreed on steps to improve tripartite cooperation by these countries in the detection, location and identification of underground nuclear explosions by seismological means [30]. In addition, Canada and Sweden tabled a working paper in the CCD on an experiment in international cooperation regarding short-period seismological discrimination of shallow earthquakes and underground nuclear explosions [31], and the United Kingdom described new data processing equipment for use by individual seismic stations in monitoring underground nuclear explosions [32].

Whether or not all the interested parties will eventually recognize, as a good number of countries already do, that a comprehensive test-ban treaty can be verified by seismological means only, and that such monitoring could provide sufficient deterrent against clandestine explosions, seismological verification will, most probably, constitute the principal component of a control system under a possible comprehensive test-ban treaty. If this is so, there remains a number of questions to be answered, such as the following: Through what channels and in which form will the exchange of seismological data between states be effected? Will the states contribute the data on a voluntary or compulsory basis? How and by whom will they be evaluated? Which body, if any, will be competent to clarify doubts that might arise concerning compliance? Will nuclear explosions for peaceful purposes be allowed, and if so, under what régime?

These questions and problems relating to the improvement of world-wide seismological capabilities and the availability of relevant information to all states, have not even been considered in an orderly manner.

The USA and the USSR have reaffirmed their commitment to work to-

wards a comprehensive test-ban treaty [33–35]. But the continued reluctance of the two powers to engage in substantive negotiations on matters which have to be solved in any such treaty, with or without on-site inspection, adds to the doubts, widely entertained, as to their willingness to stop testing soon. The Soviet demand for a simultaneous cessation of tests by "everyone", that is, also by China and France, could cause an indefinite delay, if it is meant as a condition for the stopping of tests by the Soviet Union itself.

Whatever the real value of tests for further qualitative improvement of nuclear weapons, and whether or not they are still essential for the development of warheads at the present stage of sophistication of Soviet and US nuclear-weapon systems, the cessation of testing has come to be considered by the United Nations as an important element in the consolidation of the progress towards disarmament and arms control made thus far [36], as a measure likely to inhibit the wider dissemination of nuclear weapons [37] and, above all, as a touchstone of the two powers' readiness to brake the arms race.[6]

The Indian Ocean as a zone of peace[7]

The response to the UN Secretary-General's request for information on measures taken by member states with regard to the implementation of the 1971 resolution declaring the Indian Ocean a zone of peace [40] was very weak; replies from 10 member states only were received. Only a few of these replies contained direct comment on the question of implementation of the above mentioned resolution and none addressed itself to any specific measure of implementation [41]. No consultations among the countries concerned, as envisaged by that resolution, were held in 1972, but support for the idea was clearly expressed at the conference of foreign ministers of non-aligned countries, which took place during August 1972 in Georgetown, Guyana.

Further attempts to revive interest in the issue were made at the 27th UN General Assembly and have partially succeeded: the Assembly called upon the littoral and hinterland states of the Indian Ocean, the permanent members of the Security Council and other major maritime users of the Indian Ocean to support the concept that the Indian Ocean should be a zone of peace [42].

[6] For an analysis of the strategic and political problems involved in a comprehensive test-ban treaty, see *SIPRI Yearbook 1972* [38].

[7] A more detailed discussion of the proposal to declare the Indian Ocean a zone of peace can be found in the *SIPRI Yearbook 1972* [39].

As compared with 1971, the number of states voting in favour of the resolution on the Indian Ocean in 1972 increased from 61 to 95, and included almost all the littoral states, some of which had previously abstained.[8] The vote must be understood as an endorsement of a general concept rather than of any specific undertakings. It was decided to establish an *ad hoc* committee to study the implications of the proposal, with special reference to the practical measures that may be taken in furtherance of the objectives of the resolution. The committee consists of Australia, China, India, Indonesia, Iran, Iraq, Japan, Madagascar, Malaysia, Mauritius, Pakistan, Sri Lanka, Tanzania, Yemen and Zambia [43]. Its composition may facilitate elaboration of a programme of action.

A comprehensive plan for the strengthening of peace and security in the Indian Ocean would have to combine measures of a political nature with arms-control, disarmament or non-armament measures. If a step-by-step approach were adopted, denuclearization or prevention of nuclearization might be a logical first step. To ensure stability of the arrangements agreed upon, commitments would have to be undertaken both by the countries of the region as well as by outsiders active in the region.

For the countries in the region, denuclearization would imply permanent renunciation of a nuclear-weapon option, and an obligation not to allow the presence on their territories and territorial waters and in their air-space, of nuclear weapons belonging to other states. For the nuclear-weapon powers, it would imply an obligation not to deploy nuclear weapons in the area in question. The two requirements are interrelated, but not necessarily dependent upon each other. The first is more difficult to meet than the second.

There is a clear indication that not all the near-nuclear-weapon countries in the region are prepared to accept the régime established by the Non-Proliferation Treaty. If a new nuclear-weapon power emerged in the region, denuclearization and, *ipso facto,* demilitarization would be to a great extent compromised: other near-nuclear-weapon countries may decide to follow suit, considering that their supreme interests have been jeopardized. They may also welcome nuclear presence of extra-regional powers as a counterbalance and, possibly, as a protective umbrella. The intended zone of peace would then turn into a zone of increased tension and conflict.

Even as things stand now, when no state in the region has, as yet, acquired a nuclear-weapon capability, there is no sign of willingness by the nuclear-weapon powers, especially the USA and the USSR, to withdraw from the scene; as evidenced by recent developments, they are rather

[8] For the full voting record, see appendix 12B.

bent on building up their presence there. These powers could maintain their forces in the area, in particular their nuclear submarines, even without shore facilities. Legally, they could not be removed. The argument is that the principle of the freedom of the high seas gives them the liberty to conduct any military activity in the Indian Ocean, as in any part of the high seas, as long as the sovereign rights of littoral states are not infringed.

The principle of the freedom of the high seas in itself would, of course, not be an obstacle to denuclearization, it being understood that peaceful navigation would go on unhampered. But it provides a convenient excuse. Any arms-control commitment, undertaken by sovereign states, involves some agreed restrictions on freedoms otherwise exercised by those states. If states were not prepared to pay this "price", no arms-control measures could be carried into effect, or even discussed. The sea environment is not an exception, as exemplified by the treaty prohibiting the placement of nuclear weapons on the sea-bed and ocean floor under the high seas, which was proposed and pushed through recently by the nuclear powers themselves.

Security interests of the two biggest nuclear powers are not directly involved in the Indian Ocean. Under the conditions of a continuing détente between them, they may, in time, find it advantageous to avoid nuclear competition in that area. Stationing nuclear-missile carrying submarines may have some strategic importance to the USA and the USSR but it offers more advantage to the United States, as their submarines operating in the Indian Ocean can cover many significant Soviet as well as Chinese targets from there. Soviet submarines, when operating in the area, cannot reach any part of the USA with their missiles, and coverage of Chinese targets from the sea is less essential for the USSR which borders on China. From the strategic point of view, the presence of Soviet submarines in the Indian Ocean could be justified only as a counter-measure to offset the US presence. It would seem, therefore, that the initiative in renouncing a strategic role in the Indian Ocean should belong to the USA. With the new generation of submarine-launched missiles being created in the USA and the USSR, having ranges which enable any part of the adversary's territory to be reached even from the great powers' own off-shore waters, a nuclear disengagement in the Indian Ocean would hardly be a great sacrifice for either of them.

Whatever the modalities of such a disengagement might be, the powers concerned would probably not give up the right of transit for any type of warships, including submarines. It can also be assumed that they would be interested in maintaining means of detecting enemy submarines to check compliance with a mutual commitment to keep away from the area.

A nuclear disengagement measure, is, of course, restricted in scope. It would not stop the contest for hegemony in the Indian Ocean, but might have some beneficial impact on the situation in the region, as a whole, by stemming further inroads into matters pertaining to its security. It should, therefore, precede rather than follow denuclearization of the littoral and hinterland states.

The decisive factor is the degree of cohesion and political consensus of the countries in the region. As long as intra-regional disputes persist, the danger to the peace, including the possibility of great-power interference and involvement in local conflicts, and the concomitant show of force, including nuclear force, will not disappear.

Prohibition of the use of nuclear weapons

On 29 November 1972, at the initiative of the Soviet Union, the UN General Assembly adopted a resolution on the renunciation of the use or threat of force in all its forms and manifestations in international relations and the permanent prohibition of the use of nuclear weapons. The Assembly recommended that the UN Security Council should take appropriate measures for the full implementation of this declaration. [44]

The idea of prohibiting the use of nuclear weapons has for many years been the subject of considerable discussion.[9] But for the first time, the non-use of nuclear weapons has been proposed as an obligation indissolubly associated with a UN Charter provision regarding the non-use of force. The reasons, as given by the sponsors of the resolution, are that the security of all countries should be treated equally, that it would be unrealistic and contrary to the interests of peace to prohibit the use of nuclear weapons without settling the question of the non-use of force, or *vice-versa,* and that the prohibitions of the use of conventional weapons and of nuclear weapons, introduced together, would reinforce each other. The wording of the adopted resolution is ambiguous, but the sponsors themselves consider the linkage inseparable. [47–48] This indivisibility casts doubts on the plausibility of either ban.

The prohibition of the use of nuclear weapons has a merit of its own, whether the use of conventional weapons is simultaneously forbidden or

[9] In 1961 the UN General Assembly declared the use of nuclear weapons a crime against mankind and civilization [45]; in 1967 the USSR submitted a draft convention on the prohibition of use of nuclear weapons [46]; and in 1968, in connection with the Non-Proliferation Treaty, the UN Security Council adopted a resolution welcoming the intention expressed by certain states that they would provide or support immediate assistance, in accordance with the Charter, to any non-nuclear-weapon state, party to the NPT, that is a victim of an act or an object of a threat of aggression in which nuclear weapons are used.

not. For example, non-nuclear-weapon countries, if they are non-aligned (and they constitute a majority), have nothing to lose and everything to gain from a ban on nuclear weapons alone. But a nuclear-weapon prohibition conditional on the renunciation of the use of force in general, can make sense to a nuclear-weapon power (or its ally) which feels threatened by a superior conventional force of a potential adversary, and therefore hesitates to forego the use of nuclear weapons unreservedly. A breach of the principle of non-use of force could then be taken by the attacked nation (or its ally) as freeing it from the associated obligation, and as justifying resort to all means of warfare, without restraint. Instead of being "permanent", the proclaimed prohibition of the use of nuclear weapons would, in reality, be tantamount to licensing their first use under certain circumstances, namely, in defence against an aggression by conventional means of warfare. The doctrine of nuclear deterrence which for years has been the official strategic doctrine of only one military alliance, would thus receive universal recognition.

On the other hand, although reaffirmation of the UN Charter principle of the non-use of force or threat of force against the territorial integrity or political independence of any state (Article 2(4)), as made in a number of UN documents, including the Declaration on the Strengthening of International Security [49] and the Declaration on Principles of International Law concerning Friendly Relations and Cooperation among States [50], may have political usefulness, it has no immediate effect for the cause of disarmament or even for the cause of strengthening international security. It does not affect the underlying causes of the use of force. It defines an end without specifying the means.

UN Charter provisions governing relations among states are all interconnected and mutually complementary. The non-use of force, the primordial obligation of states, must be read in close conjunction with the remaining Charter obligations—among others, with that concerning peaceful settlement of disputes. The latter is an alternative to the use of force. If strictly observed, it would eliminate the use of force from international relations altogether. However, UN member states have not lived up to the precepts of the Charter. No adequate machinery for settling disputes has been established, there is no common understanding of the peacekeeping and peacemaking role of the United Nations, there is, as yet, no agreed definition of aggression, and the present effectiveness of the United Nations, in general, leaves much to be desired. It would be too simplistic to expect that force will cease to be resorted to as a result of a mere UN Assembly exhortation, and that the most difficult problem facing mankind will thereby be automatically solved.

Even under the UN Charter, the prohibition of the use of force in international relations is not absolute. According to Article 51, states have the inherent right of self-defence in the case of an armed attack, and Chapter VII provides for the use of force by the Organization to sanction violators of the peace. The United Nations has also recognized the legitimacy of the struggle of colonial peoples for self-determination. But the resolution on the prohibition of the use of force establishes yet another exception: while recalling the inadmissibility of the acquisition of territory by force, which is covered by the non-use of force clause anyway, it proclaims the inherent right of states to recover lost territories by all the means at their disposal, and raises this right to the rank of a general principle (paragraph 6 of the preamble). Whatever the motives of the sponsors, this new principle, if accepted without qualification, could create a loophole to the non-use of force obligation, dangerous to world order. It might become an encouragement to an overall revision of the state frontiers everywhere, since cases of acquisition of foreign territories by force have been abundant throughout history. In fact, the trend seems to be different: it is rather the principle of inviolability of existing borders which is being increasingly recognized, especially in Europe.

The resolution also poses some important constitutional problems. It asks the UN Security Council to take appropriate measures for the full implementation of the non-use declaration. The nature of the envisaged measures is not indicated in the text of the resolution, and it is not clear what "full" implementation means. The sponsors explained that their aim was to give the declaration the force of law with an internationally binding effect, and they referred to Article 25 of the Charter, under which UN members agree to accept and carry out the decisions of the Security Council.

It is true that the Security Council is vested with vast powers for the maintenance of international peace and security. Its decisions are certainly binding when they are adopted under Chapter VII of the Charter, which deals with action with respect to threats to the peace, breaches of the peace and acts of aggression. But it is not at all certain whether other Security Council decisions can be regarded as binding, even though Article 25 of the Charter contains no precise delimitation of the range of decisions to which it relates. The matter becomes still more debatable when it comes to a prohibition of specific weapons and to substituting agreements reached in one of the organs of the United Nations, albeit the most important organ, for obligations freely contracted by states under international conventions.

Another question which arises in this connection is the competence of the Security Council *vis-à-vis* resolutions adopted by the General Assembly.

It may be argued that the validity of General Assembly resolutions cannot be subordinated to subsequent decisions of the Security Council. In any event, in view of the attitude of the nuclear-weapon states (with the exception of the USSR) which are also permanent members of the Security Council and have the right of veto, there will probably be no follow-up action. China voted against the resolution, while the USA, the United Kingdom and France, which also opposed it (though for different reasons) chose to abstain. The other 43 abstentions included the Western states, as a whole, most of the Latin American countries, Japan, and about 12 African–Asian countries.[10]

The prohibition of nuclear weapons is a major topical issue in the field of arms control. Even though the UN Charter, in prohibiting the use of force, makes no distinction between different categories of weapons, conventional or nuclear, the prohibition of the latter cannot be taken simply as a function of the non-use of force, or as a law already in existence; given the nature of the weapons in question, it deserves a separate treatment. Neither can it be imposed by majority resolutions against the will of the countries directly concerned, but requires a negotiated international agreement. The problem has two aspects: it regards relations between the nuclear-weapon powers and relations between them and non-nuclear-weapon states.

As to the first aspect, one is bound to conclude that as long as nuclear weapons exist, and until general and complete nuclear disarmament is achieved, the only realistic proposition would be to negotiate a prohibition of their first use. For one can hardly imagine a nuclear-weapon state being restrained by any norm of international law from responding in kind to a nuclear attack.

As to the second aspect, it would seem that an unconditional ban on the use of nuclear weapons against nuclear weapon-free zones would be both realistic and justified. As a matter of fact, it is already partly in force under the Treaty of Tlatelolco. A similar commitment with regard to non-nuclear-weapon countries, in general, and with regard to the parties to the Non-Proliferation Treaty, in particular (the latter being especially entitled to a guarantee that nuclear weapons would not be used against them), may pose problems when nuclear weapons are stationed on the territory of such countries. It would probably have to be hedged with reservations which would make the ban somewhat less than unconditional. And under all circumstances, the threat of use of nuclear weapons would have to be prohibited.

As in other international agreements relating to the rules of conduct

[10] For the full voting record, see appendix 12B.

in war, there could be no iron-clad guarantees that the banned weapons would not be used in violation of the undertaken commitments. But a non-use of nuclear weapons agreement would create a political, legal and moral barrier to the employment of the most devastating means of warfare, and might facilitate nuclear disarmament.

Possible measures concerning the prohibition of use of certain other weapons, such as incendiary weapons, including napalm, which are considered especially cruel or indiscriminate, are discussed separately in chapter 5.

III. *The disarmament negotiating machinery*

The Conference of the Committee on Disarmament (CCD) continues to be the main forum for multilateral disarmament negotiations, but its work has been suffering from the absence of France and China. Indeed, it is becoming increasingly difficult to discuss meaningfully any important measures of arms control and disarmament, especially in the nuclear field, without the participation of these two powers.

To make the CCD more attractive to France and China, specific suggestions have been put forward, mostly by non-aligned countries, to modify its organization and procedures. The main suggestion is to discontinue the institution of co-chairmanship exercised by the USA and the USSR since 1962, and replace it by an elected or rotating chairmanship [51–52]. But no amount of structural changes in the CCD, however radical they might be, and however desirable they are *per se,* are likely to induce France and China, especially the latter power, to revise their negative attitude toward that body.

After the failure of the proposition to bring the nuclear-weapon powers to a conference table, a proposal to convene a world disarmament conference was again put on the agenda of the United Nations.

The report of the UN Secretary-General of 25 September 1972 [53], which was submitted pursuant to the 26th General Assembly's resolution [54], as well as subsequent discussion at the 27th Assembly, confirmed that the idea enjoys overwhelming support. There is a general understanding that the conference would serve its purpose only if it were adequately prepared, and if all nuclear-weapon states, as well as all the other militarily significant countries, were to participate. A world disarmament conference would, of course, be mainly a deliberative body. But the expectation is that it would set up a new negotiating machinery, more representative than the one now in existence.

In view of the positions of the USA and China, the prospects of the disarmament conference being held in the foreseeable future are not bright.

The USA does not deny that the proposed conference could play a role in the disarmament process at an appropriate time, but is opposed to setting a specific date or to establishing, at this stage, a machinery for its preparation. China has reiterated the conditions which, in its view, should be met before convening the conference, namely that all the nuclear powers, particularly the USSR and the USA, undertake obligations not to be the first to use nuclear weapons, at any time and under any circumstances, against each other and against the non-nuclear-weapon countries, and to withdraw all their armed forces, including nuclear missile forces, and all their military bases, from foreign territories. These conditions being unacceptable to the other nuclear-weapon powers, the UN General Assembly has tried, at least, to keep the idea alive by adopting a resolution [55] which invites the governments of all states to exert further efforts with a view to creating adequate conditions for the convening of a world disarmament conference.[11] A special committee has to examine all the views and suggestions on the convening of such a conference. The committee, as appointed by the President of the General Assembly, is to consist of Argentina, Belgium, Brazil, Bulgaria, Canada, Chile, Colombia, Czechoslovakia, Egypt, Ethiopia, Hungary, India, Indonesia, Iran, Italy, Japan, Liberia, Mexico, Mongolia, Morocco, the Netherlands, Nigeria, Pakistan, Poland, Romania, Spain, Sri Lanka, Sweden, USSR, Yugoslavia and Zambia, while the remaining four seats, out of the total of 35, are reserved for the nuclear-weapon states which may wish to become members of the committee in the future.

China protested against the decision of the President of the Assembly and opposed the reservation of seats for itself or any other country not intending to participate in the work of the special committee [56]. Unless all the nuclear-weapon powers, in addition to the USSR, agree to attend, the committee is not likely to achieve concrete results in its work.

The important question for the future of multilateral disarmament negotiations is the attitude of China. It seems that China will not be ready to enter into any disarmament commitments as long as it is in a position of marked nuclear inferiority compared with the United States and the USSR. It has described all the arms-control and disarmament agreements worked out in the CCD, as well as bilateral US–Soviet agreements, as a fraud.

[11] For the voting record, see appendix 12B.

What remains unclear is whether China actually intends to catch up with the other powers and attain a similar military status. If this were so, the nuclear arms race would be doomed to continue indefinitely, unless the USA and the USSR decided drastically to bring down the levels of their nuclear arsenals and by reducing the present disparity between the nuclear-weapon powers allay China's apprehensions about possible unequal treatment. At the present time, international efforts are directed mainly at engaging China in a discussion on disarmament, whatever the immediate results of such a discussion might be, and this is the main purpose of the proposed world disarmament conference. In this respect, it may be considered significant that under the pressure of non-aligned states, China, while refusing to participate in the special committee mentioned above, has agreed to maintain contact with it and to exchange views on disarmament questions [57].

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1. *World Armaments and Disarmament. SIPRI Yearbook 1972* (Stockholm, Almqvist & Wiksell, 1972, Stockholm International Peace Research Institute) pp. 501–22.
2. Disarmament Conference document CCD/361.
3. *The Problem of Chemical and Biological Warfare,* Volume IV, *CB Disarmament Negotiations, 1970–71* (Stockholm, Almqvist & Wiksell, 1971, Stockholm International Peace Research Institute).
4. *World Armaments and Disarmament. SIPRI Yearbook 1972, op. cit.,* Part IV.
5. UN document A/7575/Rev. 1.
6. Disarmament Conference document CCD/387.
7. Disarmament Conference document CCD/320.
8. Disarmament Conference document CCD/365.
9. Disarmament Conference document CCD/374.
10. Disarmament Conference document CCD/373.
11. Disarmament Conference document CCD/375.
12. Disarmament Conference document CCD/372.
13. *The problem of Chemical and Biological Warfare,* Volume V, *The Prevention of CBW* (Stockholm, Almqvist & Wiksell ,1971, Stockholm International Peace Research Institute).
14. *Chemical Disarmament: Some Problems of Verification* (Stockholm, Almqvist & Wiksell, 1973, Stockholm International Peace Research Institute).
15. Disarmament Conference document CCD/371.
16. UN document A/RES/2933(XXVII).
17. *The Problem of Chemical and Biological Warfare,* Volume IV *CB Disarmament Negotiations, 1920–1970* (Stockholm, Almqvist & Wiksell, 1971, Stockholm International Peace Research Institute) pp. 69–70.
18. UN document A/RES/1762A(XVII).

19. UN document A/RES/2828A(XXVI).
20. UN document A/RES/2934C(XXVII).
21. Disarmament Conference document CCD/PV.546.
22. Disarmament Conference document CCD/PV.547.
23. Disarmament Conference document CCD/PV.553.
24. Disarmament Conference document CCD/PV.555.
25. Disarmament Conference document CCD/PV.562.
26. Disarmament Conference document CCD/PV.571.
27. Disarmament Conference document CCD/PV.572.
28. Disarmament Conference document CCD/PV.580.
29. Disarmament Conference document CCD/PV.581.
30. Disarmament Conference document CCD/376.
31. Disarmament Conference document CCD/380.
32. Disarmament Conference document CCD/386.
33. Disarmament Conference document CCD/PV.545.
34. Disarmament Conference document CCD/PV.561.
35. Disarmament Conference document CCD/PV.577.
36. UN document A/RES/2934A (XXVII).
37. UN document A/RES/2934B (XXVII).
38. *World Armaments and Disarmament, SIPRI Yearbook 1972, op. cit.*, Chapters 11 and 17.
39. *World Armaments and Disarmament, SIPRI Yearbook 1972, op. cit.*, Chapters 20.
40. UN document A/RES/2832 (XXVI).
41. UN document A/8809.
42. UN document A/RES/2992 (XXVII).
43. UN document A/8976.
44. UN document A/RES/2936 (XXVII).
45. UN document A/RES/1653 (XVI).
46. UN document A/6834.
47. UN document A/8793.
48. UN document A/PV.2093.
49. UN document A/RES/2734 (XXV).
50. UN document A/RES/2625 (XXV).
51. Disarmament Conference document CCD/385.
52. Disarmament Conference document CCD/390.
53. UN document A/8817.
54. UN document A/RES/2833 (XXVI).
55. UN document A/RES/2930 (XXVII).
56. UN document A/9033.
57. UN document A/C.1/PV.1899.

Appendix 12A

List of states which have signed, ratified, acceded or succeeded to the Geneva Protocol of 17 June 1925, for the prohibition of the use in war of asphyxiating, poisonous and other gases, and of bacteriological methods of warfare, as of 31 December 1972

Note

Some states, former non-self-governing territories, acceded to the Geneva Protocol without referring to the obligations previously undertaken on their behalf by the colonial power. In these cases, the date of the notification by the government of France, the depositary government, is indicated as the date of entry into force of the accession for the countries concerned, in accordance with paragraph 2 of the operative part of the Protocol.

Other states, former non-self-governing territories, officially informed the government of France that they consider themselves bound by the Geneva Protocol by virtue of its ratification by the power formerly responsible for their administration. In such cases of continuity of obligations under the Geneva Protocol, the date of the country's communication, addressed to the French government, is indicated. In the absence of a statement to the contrary the succession is regarded as applying also to reservations attached to the ratification of the Protocol.

States which, upon attaining independence, made general statements of continuity to the treaties concluded by the power formerly responsible for their administration, but have not notified the government of France that their statements specifically applied to the Geneva Protocol, are not listed here.

To determine the actual number of parties to the Geneva Protocol, account should also be taken of the facts that Estonia, Latvia and Lithuania, which signed and ratified the Protocol, no longer have independent status; both the Federal Republic of Germany and the German Democratic Republic are bound by ratification on behalf of Germany; both the People's Republic of China and Taiwan are bound by accession on behalf of China.

A. List of signatories and ratifications

Signatory	*Deposit of ratification*	
Austria	9 May	1928
Belgium	4 Dec	1928[1]
Brazil	28 Aug	1970
British Empire	9 Apr	1930[2]
Bulgaria	7 Mar	1934[3]
Canada	6 May	1930[4]
Chile	2 Jul	1935[5]
Czechoslovakia	16 Aug	1938[6]
Denmark	5 May	1930
Egypt	6 Dec	1928
El Salvador		
Estonia	28 Aug	1931[7]
Ethiopia	20 Sep	1935[8]
Finland	26 Jun	1929
France	10 May	1926[9]
Germany	25 Apr	1929[10]
Greece	30 May	1931
India	9 Apr	1930[11]
Italy	3 Apr	1928
Japan	21 May	1970
Latvia	3 Jun	1931
Lithuania	15 Jun	1933
Luxembourg	1 Sep	1936
Netherlands	31 Oct	1930[12]
Nicaragua		
Norway	27 Jul	1932
Poland	4 Feb	1929
Portugal	1 Jul	1930[13]
Romania	23 Aug	1929[14]
Serbs, Croats and Slovenes, Kingdom of the (Yugoslavia)	12 Apr	1929[15]
Siam (Thailand)	6 Jun	1931
Spain	22 Aug	1929[16]
Sweden	25 Apr	1930
Switzerland	12 Jul	1932
Turkey	5 Oct	1929
USA		
Uruguay		
Venezuela	8 Feb	1928

B. List of accessions and successions

Country	*Notification*	
Argentina	12 May	1969
Australia	24 May	1930[17]
Central African Republic	31 Jul	1970
Ceylon (Sri Lanka)	20 Jan	1954
China	24 Aug	1929[18]
Cuba	24 Jun	1966
Cyprus	21 Nov	1966[19]
Dominican Republic	8 Dec	1970
Ecuador	16 Sep	1970
Gambia	11 Oct	1966[20]
Ghana	3 May	1967
Holy See	18 Oct	1966
Hungary	11 Oct	1952
Iceland	2 Nov	1967
Indonesia	13 Jan	1971[21]
Iraq	8 Sep	1931[22]
Irish Free State (Ireland)	29 Aug	1930[23]
Israel	20 Feb	1969[24]
Ivory Coast	27 Jul	1970
Jamaica	28 Jul	1970[25]
Kenya	6 Jul	1970
Kuwait	15 Dec	1971[26]
Lebanon	17 Apr	1969
Lesotho	10 Feb	1972[27]
Liberia	17 Jun	1927
Libya	29 Dec	1971[28]
Malagasy Republic	2 Aug	1967
Malaysia	10 Dec	1970
Malawi	14 Sep	1970
Maldives	19 Dec	1966[29]
Malta	25 Sep	1970[30]
Mauritius	27 Nov	1970[31]
Mexico	28 May	1932
Monaco	6 Jan	1967
Mongolia	6 Dec	1968[32]
Morocco	13 Oct	1970
Nepal	9 May	1969
New Zealand	24 May	1930[33]

Niger	18 Mar	1967[34]
Nigeria	15 Oct	1968[35]
Pakistan	13 Apr	1960[36]
Panama	4 Dec	1970
Paraguay	22 Oct	1933[37]
Persia (Iran)	5 Nov	1929
Rwanda	21 Mar	1964[38]
Saudi Arabia	27 Jan	1971
Sierra Leone	20 Mar	1967
South Africa	24 May	1930[39]
Syria	17 Dec	1968[40]
Tanzania	22 Apr	1963
Togo	5 Apr	1971
Tonga	28 Jul	1971
Trinidad and Tobago	9 Oct	1970[41]
Tunisia	12 Jul	1967
Uganda	24 May	1965
Upper Volta	3 Mar	1971
USSR	15 Apr	1928[42]
Yemen (Arab Republic of)	17 Mar	1971

[1] (1) The said Protocol is only binding on the Belgian government as regards States which have signed or ratified it or which may accede to it. (2) The said Protocol shall *ipso facto* cease to be binding on the Belgian government in regard to any enemy State whose armed forces or whose allies fail to respect the prohibitions laid down in the Protocol.

[2] The British Plenipotentiary declared when signing: "my signature does not bind India or any British Dominion which is a separate Member of the League of Nations and does not separately sign or adhere to the Protocol".

(1) The said Protocol is only binding on His Britannic Majesty as regards those Powers and States which have both signed and ratified the Protocol or have finally acceded thereto. (2) The said Protocol shall cease to be binding on His Britannic Majesty towards any Power at enmity with Him whose armed forces, or the armed forces of whose allies, fail to respect the prohibitions laid down in the Protocol.

[3] The said Protocol is only binding on the Bulgarian government as regards States which have signed or ratified it or which may accede to it. The said Protocol shall *ipso facto* cease to be binding on the Bulgarian government in regard to any enemy State whose armed forces or whose allies fail to respect the prohibitions laid down in the Protocol.

[4] (1) The said Protocol is only binding on His Britannic Majesty as regards those States which have both signed and ratified it, or have finally acceded thereto. (2) The said Protocol shall cease to be binding on His Britannic Majesty towards any State at enmity with Him whose armed forces, or whose allies *de jure* or in fact fail to respect the prohibitions laid down in the Protocol.

[5] (1) The said Protocol is only binding on the Chilean government as regards States which have signed and ratified it or which may definitely accede to it. (2) The said Protocol shall *ipso facto* cease to be binding on the Chilean government in regard to any enemy State whose armed forces, or whose allies, fail to respect the prohibitions which are the object of this Protocol.

[6] The Czechoslovak Republic shall *ipso facto* 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.

[7] (1) The said Protocol is only binding on the Estonian government as regards States which have signed or ratified it or which may accede to it. (2) The said Protocol shall *ipso facto* cease to be binding on the Estonian government in regard to any enemy State whose armed forces or whose allies fail to respect the prohibitions laid down in the Protocol.

[8] The document deposited by Ethiopia, a signer of the Protocol, is registered as an acession. The date given is therefore the date of notification by the French government.

[9] (1) The said Protocol is only binding on the government of the French Republic as regards States which have signed or ratified it or which may accede to it. (2) The said Protocol shall *ipso facto* cease to be binding on the government of the French Republic in regard to any enemy State whose armed forces or whose allies fail to respect the prohibitions laid down in the Protocol.

[10] On 2 March 1959, the embassy of Czechoslovakia transmitted to the French Ministry for Foreign Affairs a document stating the applicability of the Protocol to the German Democratic Republic.

[11] (1) The said Protocol is only binding on His Britannic Majesty as regards those States which have both signed and ratified it, or have finally acceded thereto. (2) The said Protocol shall cease to be binding on His Britannic Majesty towards any Power at enmity with Him whose armed forces, or the armed forces of whose allies, fail to respect the prohibitions laid down in the Protocol.

[12] Including Netherlands Indies, Surinam and Curaçao.

As regards the use in war of asphyxiating, poisonous or other gases, and of all analogous liquids, materials or devices, this Protocol shall *ipso facto* cease to be binding on the Royal Netherlands government with regard to any enemy State whose armed forces or whose allies fail to respect the prohibitions laid down in the Protocol.

[13] (1) The said Protocol is only binding on the government of the Portuguese Republic as regards States which have signed and ratified it or which may accede to it. (2) The said Protocol shall *ipso facto* cease to be binding on the government of the Portuguese Republic in regard to any enemy State whose armed forces or whose allies fail to respect the prohibitions which are the object of this Protocol.

[14] (1) The said Protocol only binds the Romanian government in relation to States which have signed and ratified or which have definitely acceded to the Protocol. (2) The said Protocol shall cease to be binding on the Romanian government in regard to all enemy States whose armed forces or whose allies *de jure* or in fact do not respect the restrictions which are the object of this Protocol.

[15] The said Protocol shall cease to be binding on the government of the Serbs, Croats and Slovenes in regard to any enemy State whose armed forces or whose allies fail to respect the prohibitions which are the object of this Protocol.

[16] Declares as binding *ipso facto*, without special agreement with respect to any other Member or State accepting and observing the same obligation, that is to say, on condition of reciprocity, the Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous and other Gases and of Bacteriological Methods of Warfare, signed at Geneva on 17 June, 1925.

[17] Subject to the reservations that His Majesty is bound by the said Protocol only towards those Powers and States which have both signed and ratified the Protocol or have acceded thereto, and that His Majesty shall cease to be bound by the Protocol towards any Power at enmity with Him whose armed forces, or the armed forces of whose allies, do not respect the Protocol.

[18] On 13 July 1952, the People's Republic of China issued a statement recognizing as binding upon it the accession to the Protocol in the name of China. The People's Republic of China considers itself bound by the Protocol on condition of reciprocity on the part of all the other contracting and acceding powers.

[19] In a note of this date Cyprus declared that it was bound by the Protocol which had been made applicable to it by the British Empire.

[20] In a declaration of this date, Gambia confirmed its participation in the Protocol which had been made applicable to it by Great Britain.

[21] In an official declaration of this date, addressed to the French government, the government of Indonesia reaffirmed its acceptance of the Geneva Protocol which had been ratified on its behalf by the Netherlands on 31 October 1930, and stated that it remained signatory to that Protocol.

[22] On condition that the Iraq government shall be bound by the provisions of the Protocol

only towards those States which have both signed and ratified it or have acceded thereto, and that they shall not be bound by the Protocol towards any State at enmity with them, whose armed forces, or the forces of whose allies, do not respect the provisions of the Protocol.

[23] The government of the Irish Free State does not intend to assume, by this accession, any obligation except towards the States having signed and ratified this Protocol or which shall have finally acceded thereto, and should the armed forces or the allies of an enemy State fail to respect the said Protocol, the government of the Irish Free State would cease to be bound by the said Protocol in regard to such State. In a note of 7 February 1972, received by the depositary government on 10 February 1972, the government of Ireland declared that it had decided to withdraw the above reservations made at the time of accession to the Protocol.

[24] The said Protocol is only binding on the State of Israel as regards States which have signed and ratified or acceded to it. The said Protocol shall cease *ipso facto* to be binding on the State of 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 this Protocol.

[25] On this date Jamaica declared to the depositary government that it considered itself bound by the provisions of the Protocol on the basis of the ratification by the British Empire in 1930.

[26] The accession of the State of Kuwait to this 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 mentioned in this Protocol by any of the Parties, the State of Kuwait will not be bound, with regard to the Party committing the breach, to apply the provisions of this Protocol. In a note of 25 January 1972, addressed to the depositary government, Israel objected to the above reservations.

[27] By a note of this date, addressed to the depositary government, Lesotho confirmed that the provisions of the Protocol were applicable to it by virtue of the ratification by the British Empire on 9 April 1930.

[28] The accession to the Protocol does not imply recognition or the establishment of any relations with Israel. The present Protocol is binding on the Libyan Arab Republic only as regards States which are effectively bound by it and will cease to be binding on the Libyan Arab Republic as regards States whose armed forces, or the armed forces of whose allies, fail to respect the prohibitions which are the object of this Protocol. In a note of 25 January 1972, addressed to the depositary government, Israel objected to the above reservations.

[29] In a declaration of this date Maldives confirmed its adherence to the Protocol.

[30] By a notification of this date the government of Malta informed the French government that it considers itself bound by the Geneva Protocol as from 21 September 1964, the provisions of the Protocol having been extended to Malta by the Government of the United Kingdom, prior to the former's accession to independence.

[31] By a notification of this date the government of Mauritius informed the French government that it considers itself bound by the Geneva Protocol as from 12 March 1968, the date of its accession to independence.

[32] In the case of violation of this prohibition by any State in relation to the People's Republic of Mongolia or its allies, the government of the People's Republic of Mongolia shall not consider itself bound by the obligations of the Protocol towards that State.

[33] Same reservations as Australia. (See footnote 17.)

[34] In a letter of this date Niger declared that it was bound by the adherence of France to the Protocol.

[35] The Protocol is only binding on Nigeria as regards States which are effectively bound by it and shall cease to be binding on Nigeria as regards States whose forces or whose allies' armed forces fail to respect the prohibitions which are the object of the Protocol.

[36] By a note of this date Pakistan informed the depositary government that it was a party to the Protocol, by virtue of Paragraph 4 of the Annex to the Indian Independence Act of 1947.

[37] This is the date of receipt of the instrument of accession. The date of the notification by the French government "for the purpose of regularization" is 13 January 1969.

[38] In a declaration of this date Rwanda recognized that it was bound by the Protocol which had been made applicable to it by Belgium.

[39] Same reservation as Australia. (See footnote 17.)

[40] The accession by the Syrian Arab Republic to this Protocol and the ratification of the Protocol by its government 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 this Protocol.

[41] By a note of this date the government of Trinidad and Tobago notified the French government that it considers itself bound by the Geneva Protocol, the provisions of which had been made applicable to Trinidad and Tobago by the British Empire prior to the former's accession to independence.

[42] (1) The said Protocol only binds the government of the Union of Soviet Socialist Republics in relation to the States which have signed and ratified or which have definitely acceded to the Protocol. (2) The said Protocol shall cease to be binding on the government of the Union of Soviet Socialist Republics 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.

On 2 March 1970, the Byelorussian Soviet Socialist Republic stated that "it recognizes itself to be a Party" to the Geneva Protocol of 1925 (United Nations doc. A/8052, Annex III).

Appendix 12 B

List of United Nations General Assembly resolutions on disarmament and related matters in 1972

This list includes resolutions exclusively concerning disarmament, as well as those dealing with economic, colonial, legal and general political questions, but referring explicitly to disarmament matters. In the latter case, the negative votes or abstentions do not necessarily reflect the positions of states on the disarmament paragraphs of the relevant resolutions.

Only the essential parts of each resolution are given here. The text has been abridged, but the wording is close to that of the resolution.

The resolutions are grouped according to subjects, irrespective of the agenda items under which they were discussed.

Resolution no. and date of adoption	Subject and contents of resolution	Voting results
	Strategic nuclear weapons	
2932 B (XXVII) 29 November 1972	Appeals to the governments of the USSR and the USA to make every effort to expedite the conclusion of further agreements including important qualitative limitations and substantial reductions of offensive and defensive strategic nuclear-weapon systems, and invites those two governments to keep the General Assembly informed of the results of their negotiations.	*In favour* 87 *Against* 0 *Abstentions* 27: Australia, Belgium, Bulgaria, Byelorussia, Canada, Central African Republic, Chile, Cuba, Czechoslovakia, France, Greece, Hungary, Israel, Italy, Japan, Luxembourg, Mongolia, Netherlands, Poland, Portugal, Romania, South Africa, Turkey, Ukraine, USSR, United Kingdom, United States *Absent:* Albania, Botswana, China, Dahomey, Equatorial Guinea, Gabon, Gambia, Guinea, Haiti, Honduras, Malawi, Morocco, Nepal, Nicaragua, Sierra Leone, Somalia, Trinidad and Tobago,[a] Yemen
	Chemical and biological weapons	
2933 (XXVII) 29 November 1972	Stresses the importance of working towards the complete realization of the objective of effective prohibition of chemical weapons and urges governments to work to that end; reaffirms the hope for the widest possible adherence to the Convention on the prohibition of biological and toxin weapons; invites all states that have not yet done so to accede to the Protocol of 17 June 1925 and/or ratify this Protocol, and calls anew for the strict observance by all states of the principles and objectives contained therein.	*In favour* 113 *Against* 0 *Abstentions* 2: China, France *Absent:* Albania, Botswana, Dahomey, Ecuador, Equatorial Guinea, Gabon, Gambia, Guinea, Haiti, Honduras, Malawi, Morocco, Nicaragua, Sierra Leone, Somalia, Trinidad and Tobago,[a] Yemen

Napalm and other incendiary weapons

2932 A (XXVII) 29 November 1972	Deplores the use of napalm and other incendiary weapons in all conflicts; welcomes the report of the Secretary-General on napalm and other incendiary weapons and all aspects of their possible use; takes note of the views expressed in the report regarding the production, development and stockpiling of these weapons; requests the Secretary-General to circulate the report to the governments of member states for their comments and to report on these comments to the 28th General Assembly.	*In favour* 99 *Against* 0 *Abstentions* 15: Australia, Belgium, Canada, France, Greece, Israel, Italy, Japan, Luxembourg, Netherlands, New Zealand, Portugal, South Africa, United Kingdom, United States *Absent:* Albania, Botswana, Dahomey, Equatorial Guinea, Gabon, Gambia, Guinea, Haiti, Honduras, Malawi, Morocco, Nepal, Nicaragua, Saudi Arabia, Sierra Leone, Somalia, Trinidad and Tobago,[a] Yemen
2918 (XXVII) 14 November 1972	Condemns the continuation by Portuguese military forces of the indiscriminate bombing of civilians, the wholesale destruction of villages and property and the ruthless use of napalm and chemical substances in Angola, Guinea (Bissau) and Cape Verde and Mozambique.	*In favour* 98 *Against* 6: Brazil, Portugal, South Africa, Spain, United Kingdom, United States *Abstentions* 8: Belgium, France, Guatemala, Honduras, Italy, Luxembourg, Uruguay, Venezuela *Absent:* Bolivia, Colombia, Costa Rica, Democratic Republic of Yemen, Dominican Republic, El Salvador, Equatorial Guinea,[a] Gambia, Guyana,[a] Haiti, Lesotho,[a] Malawi, Maldives, Mali, Malta, Nicaragua, Niger,[a] Paraguay, Sri Lanka, Togo[a]

Nuclear weapon tests

2934 A (XXVII) 29 November 1972	Stresses the urgency of bringing to a halt all atmospheric testing of nuclear weapons in the Pacific or anywhere else in the world; urges all states that have not yet done so to adhere without further delay to the Partial Test Ban Treaty and, meanwhile, to refrain from testing in the environments covered by that Treaty; calls upon all nuclear-weapon states to suspend nuclear weapon tests in all environments.	*In favour* 105 *Against* 4: Albania, China, France, Portugal *Abstentions* 9: Algeria, Congo, Cuba, India,[a] Madagascar, Mali, Mauritania, Romania, Zaïre *Absent:* Botswana, Dahomey, Equatorial Guinea, Gabon, Gambia, Guinea, Haiti, Honduras, Malawi, Morocco, Nicaragua, Sierra Leone, Somalia, Yemen
2934 B (XXVII) 29 November 1972	Calls upon all governments conducting underground nuclear weapon tests, particularly those parties to the Partial Test Ban Treaty, immediately to undertake unilateral or negotiated measures that would suspend or reduce such testing, pending the early entry into force of a ban on all nuclear weapon tests in all environments; urges governments that have been carrying out nuclear weapon tests to take an active and constructive part in presenting and developing specific proposals for a comprehensive test ban; urges governments to take all appropriate measures further to develop existing capabilities for detection and identification of underground nuclear tests through seismological and other technical means, and to increase international cooperation in the elaboration of relevant techniques	*In favour* 89 *Against* 4: Albania, China, France, Portugal *Abstentions* 23: Argentina, Brazil, Bulgaria, Byelorussia, Congo, Costa Rica, Cuba, Czechoslovakia, El Salvador, Greece, Hungary, India, Mauritania, Mongolia, Peru, Poland, Romania, Sri Lanka, Ukraine, USSR, United Kingdom, United States, Zaïre *Absent:* Botswana, Dahomey, Ecuador, Equatorial Guinea, Gabon, Gambia, Guinea, Haiti, Honduras, Malawi, Morocco, Nicaragua, Saudi Arabia, Sierra Leone, Somalia, Yemen

Resolution no. and date of adoption	Subject and contents of resolution	Voting results
	and evaluation of seismographic data, in order to facilitate an underground nuclear weapon test ban; and calls upon governments to endeavour to achieve at the earliest possible date a comprehensive test ban and to obtain universal adherence to such a ban.	
2934 C (XXVII) 29 November 1972	Reiterates with the utmost vigour the condemnation of all nuclear weapon tests. Urges once more the governments of nuclear-weapon states to bring to a halt all nuclear weapon tests at the earliest possible date, and in any case not later than 5 August 1973, either through a permanent agreement or through unilateral or agreed moratoria.	*In favour* 80 *Against* 4: Albania, China, France, Portugal *Abstentions* 29: Afghanistan, Algeria, Belgium, Bulgaria, Byelorussia, Congo, Cuba, Czechoslovakia, Greece, Hungary, Iraq, Italy, Japan, Luxembourg, Madagascar, Mali, Mauritania, Mongolia, Netherlands, Poland, Romania, South Africa, Syria, Togo, Turkey, Ukraine, USSR, United Kingdom, United States *Absent:* Botswana, Dahomey, Ecuador, Equatorial Guinea, Gabon, Gambia, Guinea, Haiti, Honduras, India,[a] Indonesia, Malawi, Morocco, Nicaragua, Saudi Arabia, Sierra Leone, Somalia, Sri Lanka, Yemen
	Atomic radiation	
2905 (XXVII) 17 November 1972	Requests the UN Scientific Committee on the effects of atomic radiation to continue its work, including its coordinating activities, to increase knowledge of levels and effects of atomic radiation from all sources.	Adopted without vote.
	Non-use of nuclear weapons	
2936 (XXVII) 29 November 1972	Solemnly declares the renunciation of the use or threat of force in all its forms and manifestations in international relations, in accordance with the Charter of the United Nations, and the permanent prohibition of the use of nuclear weapons; recommends that the Security Council should take, as soon as possible, appropriate measures for the full implementation of this declaration.	*In favour* 73 *Against* 4: Albania, China, Portugal, South Africa *Abstentions* 46: Argentina, Australia, Austria, Belgium, Bolivia, Botswana, Brazil, Burundi, Canada, Central African Republic, Colombia, Costa Rica, Denmark, Dominican Republic, El Salvador, France, Greece, Guatemala, Honduras, Iceland, Ireland, Israel, Italy, Ivory Coast, Japan, Luxembourg, Malawi, Mexico, Morocco, Netherlands, New Zealand, Norway, Pakistan, Paraguay, Peru, Spain, Sweden, Thailand, Togo, Tunisia, Turkey, United Kingdom, United States, Uruguay, Venezuela, Zaïre *Absent:* Dahomey, Ecuador, Equatorial Guinea, Gambia, Haiti, Liberia,[a] Nicaragua, Somalia,[a] Swaziland

	Latin American nuclear-free zone	
2935 (XXVII) 29 November 1972	Recalls that the UK and the USA became parties to Additional Protocol II of the Treaty of Tlatelolco in 1969 and 1971, respectively; welcomes, as a preliminary measure, the solemn declaration made by the government of China on 14 November 1972, by which it entered into obligations similar to those implicit in Additional Protocol II for states parties thereto, and invites the government of China to try to find procedures that will enable it to accede to the Protocol as soon as possible; and deplores that the other two nuclear-weapon states have not yet heeded the urgent appeals which the General Assembly has made in four different resolutions and urges them once again to sign and ratify without further delay Additional Protocol II of the Treaty.	*In favour* 101 *Against* 0 *Abstentions* 17: Bulgaria, Burma, Byelorussia, Central African Republic, Cuba, Czechoslovakia, France, Gabon, Guyana, Hungary, India, Mongolia, Nepal, Poland, Portugal, Ukraine, USSR *Absent:* Albania, Botswana, China, Dahomey, Ecuador, Equatorial Guinea, Gambia, Guinea, Haiti, Liberia, Malawi, Morocco, Nicaragua, Somalia
	Indian Ocean as a zone of peace	
2992 (XXVII) 15 December 1972	Calls upon the littoral and hinterland states of the Indian Ocean, the permanent members of the Security Council and other major maritime users of the Indian Ocean to support the concept that the Indian Ocean should be a zone of peace; decides to establish an *ad hoc* committee, consisting of Australia, China, India, Indonesia, Iran, Iraq, Japan, Madagascar, Malaysia, Mauritius, Pakistan, Sri Lanka, Tanzania, Yemen and Zambia, to study the implications ot the proposal, with special reference to the practical measures that may be taken in furtherance of the objectives of the resolution, having due regard to the security interests of the littoral and hinterland states of the Indian Ocean and the interests of any other state consistent with the purposes and principles of the UN Charter.	*In favour* 95 *Against* 0 *Abstentions* 33: Argentina, Austria, Belgium, Bulgaria, Byelorussia, Canada, Cuba, Czechoslovakia, Denmark, Finland, France, Greece, Guatemala, Honduras, Hungary, Ireland, Israel, Italy, Luxembourg, Mongolia, Netherlands, Norway, Oman, Poland, Portugal, South Africa, Sweden, Thailand,[a] Turkey, Ukraine, USSR, United Kingdom, United States *Absent:* Albania, Democratic Republic of Yemen, Dominican Republic, Rwanda[a]
	Nuclear safeguards	
2907 (XXVII) 31 October 1972	Commends the IAEA for the progress it has made in meeting its safeguards responsibilities and in negotiating agreements for the application of safeguards with non-nuclear-weapon states.	Adopted without vote.
	Peaceful uses of nuclear energy	
2931 (XXVII) 29 November 1972	Invites the IAEA to keep under review ways and means to allow the developing countries to benefit fully, and in accordance with their respective stages of nuclear industrialization, from the technical assistance provided by international organizations.	*In favour* 100 *Against* 0 *Abstentions* 10: Bulgaria, Byelorussia, Cuba, Czechoslovakia, Hungary, Israel, Mongolia, Poland, Ukraine, USSR *Absent:* Albania, Bolivia, Botswana, China, Colombia, Congo,[a] Dahomey, Equatorial Guinea, Gabon, Gambia, Guinea, Haiti, Honduras, Malawi, Morocco, Nepal, Nicaragua, Panama, Saudi Arabia, Sierra Leone, Trinidad and Tobago,[a] Yemen

Resolution no. and date of adoption	Subject and contents of resolution	Voting results
	Outer space	
2915 (XXVII) 9 November 1972	Invites states which have not yet become parties to the Outer Space Treaty, the Agreement on the rescue of astronauts, the return of astronauts and the return of objects launched into outer space and the Convention on international liability for damage caused by space objects, to give early consideration to ratifying or acceding to those agreements so that they may have the broadest possible effect; notes that the Legal Subcommittee of the Committee on the peaceful uses of outer space has achieved significant progress in approving a substantial part of the draft treaty relating to the moon and that it has made notable progress in preparing the draft convention on registration of objects launched into outer space.	Adopted unanimously.
	Peacekeeping operations	
2965 (XXVII) 13 December 1972	Urges the Special Committee on peacekeeping operations to accelerate and intensify its work so as to make substantive progress, in view of the importance of achieving, in pursuance of its mandate, agreed guidelines for carrying out peacekeeping operations in conformity with the UN Charter.	Adopted without objection.
	Strengthening of international security	
2993 (XXVII) 15 December 1972	Believes that the coordinated consideration of related issues, *inter alia*, disarmament, peacekeeping and strengthening of the role of the United Nations, would to a large extent enhance the political and diplomatic effectiveness of the United Nations, including the work of the General Assembly, thus facilitating action towards the strengthening of international security.	*In favour* 113 *Against* 2: Portugal, South Africa *Abstentions* 11: Belgium, Canada, France, Ireland, Israel, Italy, Japan, Luxembourg, Netherlands, United Kingdom, United States *Absent:* Albania, China, Dominican Republic, Fiji, Gambia, Rwanda[a]
	Definition of aggression	
2967 (XXVII) 14 December 1972	Decides that the Special Committee on the question of defining aggression shall resume its work as early as possible after 1 April 1973.	*In favour* 121 *Against* 0 *Abstentions* 0
	Human rights in armed conflicts	
3032 (XXVII) 18 December 1972	Noting with concern that agreement has not emerged among government experts on such issues as:	*In favour* 103 *Against* 0

	(a) methods to ensure a better application of existing rules relating to armed conflicts, (b) definitions of military objectives and protected objects, in order to counter the tendency in armed conflicts to regard ever growing categories of objects as permissible targets for attack, (c) definitions of protected persons and combatants, responsive to the need for improved protection of civilians and of combatants in modern armed conflicts, (d) the question of guerilla warfare, (e) prohibition of use of weapons and methods of warfare which indiscriminately affect civilians and combatants, (f) prohibition or restriction of the use of specific weapons which are deemed to cause unnecessary suffering, (g) rules facilitating humanitarian relief in armed conflicts, (h) definition of those armed conflicts of a non-international character which should be subject to rules additional to those contained in the Geneva Conventions of 1949, urges all governments and invites the International Committee of the Red Cross to continue to seek through consultations to achieve rapprochement in the positions of governments to ensure that the envisaged diplomatic conference on the reaffirmation and development of international humanitarian law applicable in armed conflicts will adopt rules which mark substantial progress on fundamental legal issues connected with modern armed conflicts and which will contribute significantly in the alleviation of the suffering brought by such conflicts; and calls upon all parties to armed conflicts to observe the international humanitarian rules which are applicable, in particular the Hague Conventions of 1899 and 1907, the Geneva Protocol of 1925 and the Geneva Conventions of 1949, and, to this end, to provide instruction concerning these rules to their armed forces and information concerning the same rules to the civilian population.	*Abstentions* 25: Argentina, Australia, Belgium, Bolivia, Brazil, Burma, Canada, Colombia, Cuba, France, Greece, Guatemala, Honduras, Israel, Italy, Japan, Laos, Luxembourg, Malawi, Nepal, Portugal, South Africa, United Kingdom, United States, Uruguay *Absent:* Albania, Bhutan, China, Gambia
	World disarmament conference	
2930 (XXVII) 29 November 1972	Invites all states to exert further efforts with a view to creating adequate conditions for the convening of a world disarmament conference at an appropriate time;[1] decides to establish a special committee, consisting of 35 member states, to examine all the views and suggestions expressed by governments on the convening of a world disarmament conference and related problems and to present, on the basis of consensus, a report to the General Assembly at its 28th session.	*In favour* 105 *Against* 0 *Abstention* 1: United States *Absent:* Albania, Bolivia, Botswana, Colombia, Congo,[a] Dahomey, Equatorial Guinea, Gabon, Gambia, Ghana, Guinea, Haiti, Honduras, Malawi, Morocco, Nepal, Nicaragua, Pakistan,[a] Panama Saudi Arabia, Sierra Leone, Sudan, Trinidad and Tobago,[a] Uganda United Republic of Tanzania, Yemen

[a] Later advised it had intended to vote in favour.

Record of the nuclear-weapon powers' votes on the main resolutions concerning disarmament at the 27th UN General Assembly

Subject	Resolution no.	China	France	USSR	UK	USA
Strategic nuclear weapons	2932 B	Absent	Abstaining	Abstaining	Abstaining	Abstaining
Chemical and biological weapons	2933	Abstaining	Abstaining	Yes	Yes	Yes
Napalm and other incendiary weapons	2932 A	Yes	Abstaining	Yes	Abstaining	Abstaining
Nuclear weapon tests	2934 A	No	No	Yes	Yes	Yes
	2934 B	No	No	Abstaining	Abstaining	Abstaining
	2934 C	No	No	Abstaining	Abstaining	Abstaining
Non-use of nuclear weapons	2936	No	Abstaining	Yes	Abstaining	Abstaining
Latin American nuclear-free zone	2935	Absent	Abstaining	Abstaining	Yes	Yes
Indian Ocean as a zone of peace	2992	Yes	Abstaining	Abstaining	Abstaining	Abstaining
World disarmament conference	2930	Yes	Yes	Yes	Yes	Abstaining

13. The status of the implementation of agreements related to disarmament

I. *Bilateral US-Soviet agreements*

The strategic arms limitation agreements between the USA and the USSR, signed in Moscow on 26 May 1972, officially entered into force on 3 October 1972.

Prior to that event, an extensive debate was held in the US Senate, particularly with regard to the Interim Agreement dealing with offensive weapons. As a result of the debate, the US Congress resolution authorizing the President to approve the agreement urged and requested him to seek a future treaty that, *inter alia*, would not limit the USA to levels of intercontinental strategic forces inferior to the limits provided for the Soviet Union. (For the present levels of these forces, see table 8.3, p. 268.) The relevant clause, introduced by senator Henry M. Jackson, came to be known as the "Jackson amendment". Its opponents have argued that insistence on *numerical* equality in specific weapons may jeopardize prospects of a permanent nuclear understanding, because such an approach ignores the strategic position of the USA *vis-à-vis* the USSR, and US superiority in missile accuracy and multiple warhead technology. They consider that further limitations on offensive systems should be achieved on the basis of *overall* equality, parity and sufficiency, taking into account all relevant qualitative and quantitative factors pertaining to the strategic nuclear-weapon systems of the two powers.

The US administration has supported the "Jackson amendment", but is not formally bound by it. (For the discussion of its implications, see chapter 2.)

The second phase of the Strategic Arms Limitation Talks, SALT II, opened on 21 November 1972 in Geneva. Ten meetings were held before the end of the year. An official communiqué said that the two sides had engaged in further consideration of the issues relating to achieving an agreement on more complete measures limiting strategic offensive arms, and that an understanding was reached on the general range of questions which will be the subject of further US-Soviet discussions.

A Memorandum of Understanding between the two governments was signed on 21 December, regarding the establishment of a Standing Consultative Commission, called for in the SALT I agreements. The task of the commission,

as defined in the Memorandum, is to promote the objectives and implementation of the provisions of the ABM Treaty and the Interim Agreement, of 26 May 1972, and the Agreement on measures to reduce the risk of outbreak of nuclear war between the USA and the USSR, of 30 September 1971. The commission will exercise its competence in accordance with the provisions of Article 13 of the ABM Treaty, Article 6 of the Interim Agreement, and Article 7 of the agreement on measures to reduce the risk of nuclear war. (For the text of the treaty and the agreements, see chapter 1.) Each government will be represented on the commission by a commissioner and a deputy commissioner, assisted by such staff as it deems necessary. The commission will hold periodic sessions on dates mutually agreed by the commissioners, but no less than twice a year. Sessions will also be convened as soon as possible, following reasonable notice, at the request of either commissioner. The commission will establish and approve regulations governing procedures and other relevant matters, and may amend them as it deems appropriate.

The first session of SALT II failed to make any significant progress. It has been reported that a controversy arose as to whether US aircraft based in Western Europe and on carriers, and capable of carrying nuclear weapons, and the Soviet intermediate-range missiles aimed at Western Europe, should not be regarded as "strategic" and included in the category of offensive weapons subject to limitations.

The 27th UN General Assembly appealed to the governments of the USA and the USSR to make every effort to expedite the conclusion of further agreements including important qualitative limitations and substantial reductions of offensive and defensive strategic nuclear-weapon systems. It also invited the two governments to keep the General Assembly informed of the results of their negotiations [1]. The latter request reflected the resentment of the UN members about the secrecy of the talks between the two powers.

In the view of some US politicians, rapid advances by China in the field of intercontinental ballistic missiles, which have been recently reported by US intelligence sources, may reduce the practical effects of the bilateral Strategic Arms Limitation Talks.

II. *Multilateral agreements*

The BW Convention

The convention on the prohibition of the development, production and stockpiling of bacteriological (biological) and toxin weapons and on their destruction was opened for signature on 10 April 1972. By 31 December 1972 it had been

signed by more than 100 states. The convention will come into force after the deposit of the instruments of its ratification by 22 governments, including the depositaries—the governments of the USSR, the UK and the USA. Besides the ratification requirement, before the convention becomes fully operative in so far as its verification is concerned, the UN Security Council must formally agree to assume the functions assigned to it by the parties, namely to receive, consider and act upon complaints of breaches of obligations. A draft Security Council resolution to that effect was submitted by Poland, the United Kingdom and Yugoslavia, as early as 25 April 1972 [2], but was not considered because of the threat of a Chinese veto. Some countries have refrained from signing the convention until a satisfactory text is adopted by the Council. Nevertheless, the United States has continued the destruction of its stocks of biological warfare agents.

France and China have refused to sign the convention. The main argument put forward by France is that the convention does not include any satisfactory provision for international control. However, France adopted a law (Nr 72–467 of 9 June 1972) prohibiting on its territory the development, production, retention, stockpiling, acquisition or transfer of microbial or other biological agents, or biological toxins, whatever their origin or method of production, of types and in quantities not intended for prophylactic, protective or other peaceful purposes. In addition, it has decreed it illegal to induce or assist in any way a state, undertaking, organization or any group or person to engage in the prohibited operations. Thus, the language of the main provisions of the law is almost identical to that of the BW Convention. But the law also provides for severe punishment of violators by fines and imprisonment, and elaborate procedures have been set down to ensure that the prohibitions are respected.

Such stringent measures can be expected to be taken by the parties to the BW Convention in order to enforce on their national territories the obligations contracted internationally. However, the French law has not resulted from international commitments. In passing it, France has confirmed that it is prepared to renounce at least certain weapons without satisfactory assurance that other states would do the same. Therefore, the criticism of the convention on the grounds that it does not provide for international control, the purpose of which is to give precisely such an assurance, does not appear plausible, unless France defends the principle of control for the sake of control.

Another reason given by France for not signing the convention is that biological weapons prohibition should not have been separated from a chemical weapons prohibition. It is certainly regrettable that a split has occurred in the treatment of chemical and biological weapons, the use of which has been jointly forbidden under the 1925 Geneva Protocol. But a refusal to adhere to a

convention for biological disarmament does not promote the cause of chemical disarmament which France has always favoured.

The French attitude towards the BW Convention is probably motivated chiefly by the fact that the latter was worked out at the Conference of the Committee on Disarmament (CCD), a body which France has decided to ignore for political reasons. France abstained even on a UN resolution dealing only with chemical disarmament because of a reference to the CCD.

China considers the convention as a "product of Soviet-US collusion" and has criticized it for not including the prohibition of chemical weapons and for not banning explicitly the use of biological weapons. China also strongly objected to the signing of the convention by the government of Taiwan.

Under Article IX of the BW Convention the parties have undertaken to continue negotiations in good faith with a view to reaching agreement on effective measures for the prohibition of the development, production and stockpiling of chemical weapons and for their destruction. These negotiations are being conducted in the CCD. (For a review of the recent debate, see chapter 12.)

The Sea-Bed Treaty

The treaty on the prohibition of the emplacement of nuclear weapons and other weapons of mass destruction on the sea-bed and the ocean floor and in the subsoil thereof, which was opened for signature on 11 February 1971, entered into force on 18 May 1972. By 31 December 1972 there were 46 parties to the treaty.

No action was taken pursuant to Article V, under which the parties have pledged to continue negotiations concerning further measures in the field of disarmament for the prevention of an arms race on the sea-bed. But attention is being devoted to the question of peaceful uses of the sea-bed, in particular to the setting up of an international régime for the sea-bed and the ocean floor beyond national jurisdiction, which is one of the subjects to be considered by the forthcoming conference on the Law of the Sea.

The Non-Proliferation Treaty

On 31 December 1972, there were 77 parties to the treaty on the non-proliferation of nuclear weapons (NPT), which entered into force in March 1970. Many militarily significant and near-nuclear states, except Canada, the German Democratic Republic and Sweden, still remained outside the nonproliferation régime. (In January 1973, Australia also joined the treaty.) One issue that delayed adherence to the treaty, especially in Europe, was the implementation

of Article III providing for safeguards agreements with the International Atomic Energy Agency (IAEA) to prevent diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices. The European Atomic Energy Community (Euratom) was reluctant to yield to the IAEA its responsibilities and preferred a transfer to its own control organ of the IAEA safeguards functions under the NPT. When the five non-nuclear-weapon members of Euratom (Belgium, the Federal Republic of Germany, Italy, Luxembourg and the Netherlands) signed the NPT, they stated that they would only ratify it after a satisfactory agreement with the IAEA had been negotiated.

States outside the Western European group were opposed to Euratom assuming the IAEA control functions, and argued that such an arrangement would be equivalent to self-control. Australia and Japan, on signing the NPT, made it clear that the safeguards agreements to be concluded by them with the IAEA in accordance with Article III of the treaty must in no way subject them to a treatment less favourable than is accorded to other states which individually or collectively conclude agreements with that Agency. Now, as a result of negotiations which lasted from November 1971 to July 1972, the above mentioned obstacle to the implementation of the NPT seems to have been overcome. On 22 September 1972, the Board of Governors of the IAEA approved an agreement between Euratom, the five non-nuclear-weapon states of the Community and the IAEA which those countries are required to conclude for the application of safeguards under the NPT.

The fact that Euratom has its own safeguards system has been taken into account in the agreement. Euratom, in effect, will place this safeguards system in the five states in a cooperative arrangement with the IAEA by which it will work together with the Agency. The territories of the five states are treated as a single area for the purpose of the application of safeguards. Other non-nuclear-weapon states joining Euratom, which are parties to the NPT, will also come under this agreement.

The cooperative arrangements between IAEA and Euratom are spelt out in detail in a special Protocol. Euratom will adapt some of its procedures to meet IAEA's requirements under the agreement. It will provide the accounting information, which IAEA needs, in the form of input to the IAEA's computer after preliminary checking and analysis.

Under the agreement there will be rules for estimating the amount of routine inspection by both IAEA and Euratom at each nuclear plant; under normal conditions this will be the maximum actual routine inspection as long as Euratom continues to meet a number of conditions stipulated in the agreement.

IAEA's routine inspections will be done at the same time as some, but not

all, Euratom inspections. When IAEA can achieve the purposes of its routine inspections by observing Euratom inspection activities, it will do so.

To enable this cooperative inspection to work effectively, Euratom will give IAEA detailed advanced notice about Euratom's technical inspection plans and there will be a full exchange of inspection information. A technical liaison committee will be established between the two organizations to facilitate the carrying out of the agreement.

The agreed arrangements constitute a mixed solution, whereby Euratom is in part to act as agent of its member states, in part as an instrument of the Agency, in part as an independent unit carrying out its peculiar responsibilities, and in most respects as a buffer between the Agency and the Euratom states.

The agreement between the IAEA and Euratom will, no doubt, facilitate wider adherence to the NPT by both European and non-European states, although in some cases the parliamentary procedure for treaty ratification may require an extended period of time.

By 31 December 1972, 26 states, that is only about one-third of the total number of parties to the NPT, had signed safeguards agreements provided for by the treaty. For six of them, the entry into force of the agreement was still subject to notification that the constitutional requirements had been met. Seven more agreements were approved by the IAEA Board of Governors, but not signed.

Whatever are the practical considerations and commercial interests of the countries concerned, continued supplies of source or special fissionable material, as well as equipment or material specially designed or prepared for the processing, use or production of special fissionable material, to states which three years after the entry into force of the NPT have not concluded safeguards agreements with the IAEA, as stipulated by that treaty, are contrary to the letter and spirit of the NPT. They are certainly illegal with regard to non-parties to the NPT.

Yet another obligation undertaken by the parties to the NPT, that under Article V, to conclude a special international agreement or agreements concerning potential benefits from peaceful applications of nuclear explosions, remains to be fulfilled. Negotiations on this subject should have commenced, according to the treaty, as soon as possible after the treaty entered into force. But only technical discussions about characteristics and effects of peaceful nuclear explosions have been held. There has been no progress with regard to the creation of an international régime to conduct such explosions. Among the problems which have to be solved, the following deserve special attention: supply and control of the nuclear device, mechanics of supervision, control of instrumentation, timing of the explosion, prevention of contamination and the decision-making procedure.

The economic value of peaceful nuclear explosions is disputable, and the original enthusiasm as to their potentialities has somewhat decreased in the face of the problems involved. Nevertheless, formal international guarantees of future availability of relevant services to non-nuclear-weapon states, at low cost, and on a non-discriminatory basis, seem necessary. Lack of such guarantees may erode the NPT by providing a convenient pretext for some non-nuclear-weapon countries to "turn nuclear" under the guise of peaceful uses of nuclear explosions.

The Treaty of Tlatelolco

The zone of application of the treaty for the prohibition of nuclear weapons in Latin America, which was signed in 1968, has increased with the 18th ratification deposited by Colombia in August 1972. The nuclear-free zone already covers an area of some eight million square kilometers with a population in excess of 140 million. Argentina and Brazil, the two largest countries in the region, are still not party to it.

The positions of the USSR and France on Additional Protocol II of the treaty, which provides for an undertaking by nuclear-weapon states to respect the statute of military denuclearization of Latin America, have remained unchanged; they have not signed the Protocol. However, China, in a declaration of 14 November 1972, solemnly undertook never to use or threaten to use nuclear weapons against non-nuclear Latin American countries and the Latin American nuclear-free zone; it pledged itself not to test, manufacture, produce, stockpile, install or deploy nuclear weapons in these countries or in this zone, or direct its means of transportation and delivery carrying nuclear weapons to traverse the territory, territorial sea and territorial air space of Latin American countries. The Chinese declaration was taken note of in a UN General Assembly resolution of 29 November 1972 [3].

The commitments undertaken by China are broader in scope than those contained in Additional Protocol II, in so far as they include renunciation of transit of nuclear weapons through the countries concerned. But from the legal point of view, they are less binding than obligations under an international instrument, such as a treaty, convention or protocol. As explained by the government of China, its unwillingness to sign Additional Protocol II and formally become a party to it, is due to the fact that the Treaty of Tlatelolco and the Protocol itself make references to UN resolutions aimed at preventing proliferation of nuclear weapons and commending the partial Test-Ban Treaty, to which China has always been opposed. The Latin American countries, particularly Mexico, consider the Chinese declaration as a preliminary step and believe that procedures can be found to enable China to accede to

Additional Protocol II. The 27th UN General Assembly invited the government of China to try to find such procedures. (China could, for example, at the time of ratification of Additional Protocol II, make a declaration restating its position on the questions of nuclear proliferation and testing. Declarations of understanding accompanied other ratifications of the Protocol.) The Assembly deplored the fact that the remaining two nuclear-weapon states, that is France and the USSR (the UK and the USA are already parties to the Protocol), had not heeded the appeals which the General Assembly had made in four previous resolutions, and urged them once again to sign and ratify without further delay Additional Protocol II of the Treaty of Tlatelolco.

Since the existence of long-range missiles, especially on submarines, has considerably decreased strategic interest in placing nuclear weapons on foreign territories, in addition to those already deployed (as in Europe), the *primum mobile* in establishing a nuclear-free zone for the countries which have already renounced nuclear weapons under the NPT, is to obtain assurance that nuclear weapons would not be used against them. Cooperation of the nuclear powers is, therefore, essential to ensure viability of any such zone.

The Outer Space Treaty

By 31 December 1972, 69 nations had joined the treaty on principles governing the activities of states in the exploration and use of outer space, including the moon and other celestial bodies, which has been in force since 1967. The 27th UN General Assembly invited other states to consider ratifying or acceding to the treaty, as well as the agreement on the rescue of astronauts, the return of astronauts and the return of objects launched into outer space, and the convention on international liability for damage caused by space objects, which recently entered into force, so that these international instruments may have the broadest possible effect [4]. Some progress has been made in preparing a treaty relating to the Moon and a convention on the registration of objects launched into outer space.

The Partial Test-Ban Treaty

Five nuclear-weapon tests were conducted in the atmosphere in 1972–three by France, and two by China. These powers are not parties to the treaty of 1963, banning nuclear weapon tests in the atmosphere, in outer space and under water, which has been ratified by 106 states. The explosions have provoked a wave of strong protest all over the world. There is particular anxiety about the ecological consequences of atmospheric tests due to the contamination of the environment by radioactive debris. It has been reported by the UN

Scientific Committee on the effects of atomic radiation that the presence of iodine-131[1] has been detected in milk in a number of countries of the southern hemisphere after each of the 1970 and 1971 series of tests in that hemisphere [5].

Main criticism is directed against French tests, probably because, unlike China, France has been conducting them not on its own territory, but in the Pacific. A number of official representations were made by the states in the region. The Stockholm Conference on the human environment urged countries planning tests to abandon them. (See the chronology of major events related to disarmament issues—p. 496.) The United Nations expressed concern that tests of nuclear weapons continued in the atmosphere, in disregard of the spirit of the Partial Test Ban Treaty and of world opinion, and specifically stressed the urgency of bringing to a halt those carried out in the Pacific [6]. France has rejected all pleas, insisting that its tests were not big enough to reach the fall-out threshold of hazard, but has not indicated the characteristics of the tests and even discontinued the practice of announcing them. It is planning further tests in 1973, again in the same area. According to press reports, some of these will be the biggest yet in its nuclear test programme. New protests have been made. Certain states have even threatened to break off diplomatic relations with France, and to bring a case against it in the International Court of Justice.

However objectionable the French and Chinese atmospheric tests may be, the underground tests, conducted by the other nuclear-weapon powers, contribute most to the on-going nuclear arms race. In 1972, according to preliminary reports, the Soviet Union conducted at least 19 tests, (seven of which were presumably for peaceful purposes) and the USA carried out seven tests. (For the list of these tests and their characteristics see appendix 13 C.) The USA and the USSR are, therefore, in a weak moral position to urge the cessation of tests by others. The United Nations reiterated its appeal to the governments of nuclear-weapon states to stop all nuclear weapon tests at the earliest possible date, and in any case not later than 5 August 1973 (the 10th anniversary of the signing of the Partial Test Ban Treaty), either through a permanent agreement or through unilateral or agreed moratoria [7]. Recent negotiations for a comprehensive test-ban treaty are reviewed in chapter 12.

The Antarctic Treaty

The number of parties to the 1959 Antarctic Treaty (in force since 1961), which, *inter alia*, prohibits any measures of a military nature in the Antarctic,

[1] Iodine-131 is a radio-nuclide that poses special problems because it is concentrated in the thyroid gland and irradiates that gland more than any other tissue, the doses per unit intake (mostly through milk) being highest in infants.

has remained restricted to the 12 original signers and the five acceding states. It is thus considerably smaller than in the case of any other multilateral arms-control agreement.

The Seventh Antarctic Treaty Consultative Meeting, held from 30 October to 10 November 1972, in Wellington, in accordance with Article IX of the treaty, considered the question of possible substantial activities or territorial claims in the Antarctic treaty area by states that are not contracting parties to the treaty. The meeting agreed that, in such circumstances, it would be advisable for governments to consult together and to be ready to urge or invite as appropriate the state or states concerned to accede to the treaty.

However, as pointed out in chapter 14, the present structure of the treaty is not conducive to promoting wide accession.

References

1. UN document A/RES/2932B (XXVII).
2. UN document S/10619.
3. UN document A/RES/2935 (XXVII).
4. UN document A/RES/2915 (XXVII).
5. UN document A/8725.
6. UN document A/RES/2934A (XXVII).
7. UN document A/RES/2934C (XXVII).

Appendix 13A

Bilateral arms-control agreements between the USA and the USSR as of 31 December 1972

Memorandum of understanding regarding the establishment of a direct communications link ("Hot Line" Agreement)

Establishes a direct communications link between the governments of the USA and the USSR for use in time of emergency. An Annex attached to the Memorandum provides for two circuits, namely a duplex wire telegraph circuit and a duplex radio telegraph circuit, as well as two terminal points with telegraph-teleprinter equipment between which communications are to be exchanged.

Signed at Geneva on 20 June 1963.

Entered into force on 20 June 1963.

Agreement on measures to improve the USA-USSR direct communications link ("Hot Line" Modernization Agreement)

Establishes, for the purpose of increasing the reliability of the Direct Communications Link set up pursuant to the Memorandum of understanding of 20 June 1963, two additional circuits between the USA and the USSR each using a satellite communications system (the US circuit being arranged through Intelsat and the Soviet circuit through the Molniya II system), and a system of terminals (more than one) in the territory of each party. Matters relating to the implementation of these improvements are set forth in an Annex to the Agreement.

Signed at Washington on 30 September 1971.

Entered into force on 30 September 1971.

Agreement on measures to reduce the risk of outbreak of nuclear war between the USA and the USSR (Nuclear Accidents Agreement)

Provides for immediate notification in the event of an accidental, unauthorized incident involving a possible detonation of a nuclear weapon (the party whose nuclear weapon is involved should take necessary measures to render harmless

or destroy such weapon), immediate notification in the event of detection by missile warning systems of unidentified objects, or in the event of signs of interference with these systems or with related communications facilities, as well as advance notification of planned missile launches extending beyond the national territory in the direction of the other party.

Signed at Washington on 30 September 1971.

Entered into force on 30 September 1971.

Agreement on the prevention of incidents on and over the high seas

Provides for measures to assure the safety of navigation of the ships of the armed forces of the USA and USSR on the high seas and flight of their military aircraft over the high seas, advance notification of actions on the high seas which represent a danger to navigation or to aircraft in flight, as well as exchange of information concerning instances of collision or other incidents at sea between ships and aircraft of the parties.

Signed at Moscow on 25 May 1972.

Entered into force on 25 May 1972.

Treaty on the limitation of anti-ballistic missile systems (SALT ABM treaty)

Prohibits the deployment of ABM systems for the defence of the territory of the USA and the USSR and of an individual region, except as expressly permitted. Permitted ABM deployments are limited to two areas in each country—one for the defence of the national capital, and the other for the defence of some intercontinental ballistic missiles (ICBMs). No more than 100 ABM launchers and 100 ABM interceptor missiles may be deployed in each ABM deployment area. ABM radars should not exceed specified numbers and are subject to qualitative restrictions.

Signed at Moscow on 26 May 1972.

Entered into force on 3 October 1972.

Interim agreement on certain measures with respect to the limitation of strategic offensive arms (SALT Interim Agreement)

Provides for a freeze of up to five years of the aggregate number of fixed land-based intercontinental ballistic missile (ICBM) launchers and ballistic missile launchers on modern submarines. The parties are free to choose the mix, except that conversion of land-based launchers for light ICBMs, or for ICBMs of older types, into land-based launchers for modern "heavy" ICBMs is prohibited.

A protocol which is an integral part of the Interim Agreement specifies that the USA may have not more than 710 ballistic missile launchers on submarines and 44 modern ballistic missile submarines, while the USSR may have not more than 950 ballistic missile launchers on submarines and 62 modern ballistic missile submarines. Up to those levels, additional SLBMs—in the USA over 656 ballistic missile launchers on nuclear-powered submarines and in the USSR over 740 ballistic missile launchers on nuclear-powered submarines, operational and under construction—may become operational as replacements for equal numbers of ballistic missile launchers of types deployed prior to 1964, or of ballistic missile launchers on older submarines.

Signed at Moscow on 26 May 1972.

Entered into force on 3 October 1972.

Appendix 13B

Multilateral agreements related to disarmament as of 31 December 1972

I. *Summary of the relevant provisions of the agreements*

Antarctic Treaty

Prohibits any measure of a military nature in Antarctica, such as the establishment of military bases and fortifications, the carrying out of military manoeuvres, as well as the testing of any type of weapons.

Signed at Washington on 1 December 1959.

Entered into force on 23 June 1961.

The depositary government: USA.

Treaty banning nuclear weapon tests in the atmosphere, in outer space and under water (Partial Test Ban Treaty)

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.

Signed at Moscow on 5 August 1963.

Entered into force on 10 October 1963.

The depositary governments: UK, USA, USSR.

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)

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 stationing them in outer space in any other manner. The establishment of military bases, installations and fortifica-

tions, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies are also forbidden.

Signed at London, Moscow and Washington on 27 January 1967.

Entered into force on 10 October 1967.

The depositary governments: UK, USA, USSR.

Treaty for the prohibition of nuclear weapons in Latin America (Treaty of Tlatelolco)

Prohibits the testing, use, manufacture, production or acquisition by any means, as well as the receipt, storage, installation, deployment and any form of possession of any nuclear weapons by Latin American countries.

The parties should conclude agreements with the International Atomic Energy Agency (IAEA) for the application of safeguards to their nuclear activities.

Under *Additional Protocol I*, annexed to the treaty, the extra-continental or continental states which, *de jure* or *de facto*, are internationally responsible for territories lying within the limits of the geographical zone established by the treaty (France, the Netherlands, the UK and the USA), undertake to apply the statute of military denuclearization, as defined in the treaty, to such territories.

Under *Additional Protocol II*, annexed to the treaty, the nuclear-weapon states undertake to respect the statute of military denuclearization of Latin America as defined in the treaty, not to contribute to acts involving a violation of the treaty, and not to use or threaten to use nuclear weapons against the parties to the treaty.

Signed at Mexico City on 14 February 1967.

The treaty enters into force for each state that has ratified it when the requirements specified in the treaty have been met, that is, that all states in the region deposit the instruments of ratification, that Additional Protocols I and II be signed and ratified by those states to which they apply (see above), and that agreements on safeguards be concluded with the IAEA. The signatory states have the right to waive, wholly or in part, those requirements.

The Additional Protocols enter into force for the states that have ratified them on the date of the deposit of their instruments of ratification.

The depositary government: Mexico.

Treaty on the non-proliferation of nuclear weapons (Non-Proliferation Treaty)

Prohibits the transfer by nuclear-weapon states to any recipient whatsoever of nuclear weapons or other nuclear explosive devices or of control over them.

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.

Signed at London, Moscow and Washington on 1 July 1968.

Entered into force on 5 March 1970.

The depositary governments: UK, USA, USSR.

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)

Prohibits emplanting or emplacement 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), of 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.

Signed at London, Moscow and Washington on 11 February 1971.

Entered into force on 18 May 1972.

The depositary governments: UK, USA, USSR.

Convention on the prohibition of the development, production and stockpiling of bacteriological (biological) and toxin weapons and on their destruction (BW Convention)

Prohibits the development, production, stockpiling, 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.

Signed at London, Moscow and Washington on 10 April 1972.

The depositary governments: UK, USA, USSR.

II. *List of states which have signed, ratified, acceded or succeeded to the agreements*

Note:

1. Only the dates of the signature and of the deposit of the instrument of ratification, accession or succession with the depositary government are indicated. The date of ratification by national legislative bodies is not given here.

2. Abbreviations used in the list:

S: signature

R: deposit of instruments of ratification, accession or succession

Place of signature and/or deposit of the instrument of ratification, accession or succession:

L: London

M: Moscow

W: Washington

P.I: Additional Protocol I to the Treaty of Tlatelolco

P.II: Additional Protocol II to the Treaty of Tlatelolco

S.A.: Safeguards agreement concluded with the International Atomic Energy Agency (IAEA) under the Non-Proliferation Treaty or the Treaty of Tlatelolco.

3. The footnotes at the end of the table are grouped separately for each treaty.

Total number of parties to multilateral agreements related to disarmament, as of 31 December 1972

Antarctic Treaty: 17
Partial Test Ban Treaty: 106
Outer Space Treaty: 69
Treaty of Tlatelolco: 18
Non-Proliferation Treaty: 77
Sea-Bed Treaty: 46

	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty
Afghanistan		S: 8 Aug. 1963 LW 9 Aug. 1963 M R: 12 Mar. 1964 L 13 Mar. 1964 W 23 Mar. 1964 M	S: 27 Jan. 1967 W 30 Jan. 1967 M
Algeria		S: 14 Aug. 1963 LW 19 Aug. 1963 M	
Argentina	S: 1 Dec. 1959 R: 23 Jun. 1961	S: 8 Aug. 1963 W 9 Aug. 1963 LM	S: 27 Jan. 1967 W 18 Apr. 1967 M R: 26 Mar. 1969 MW
Australia	S: 1 Dec. 1959 R: 23 Jun. 1961	S: 8 Aug. 1963 LMW R: 12 Nov. 1963 LMW	S: 27 Jan. 1967 W R: 10 Oct. 1967 LMW
Austria		S: 11 Sep. 1963 MW 12 Sep. 1963 L R: 17 Jul. 1964 LMW	S: 20 Feb. 1967 LMW R: 26 Feb. 1968 LMW
Barbados			R: 12 Sep. 1968 W
Belgium	S: 1 Dec. 1959 R: 26 Jul. 1960	S: 8 Aug. 1963 LMW R: 1 Mar. 1966 LMW	S: 27 Jan. 1967 LM 2 Feb. 1967 W
Bolivia		S: 8 Aug. 1963 W 21 Aug. 1963 L 20 Sep. 1963 M R: 4 Aug. 1965 MW 25 Jan. 1966 L	S: 27 Jan. 1967 W

Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention
	S: 1 Jul. 1968 LMW R: 4 Feb. 1970 W 5 Feb. 1970 M 5 Mar. 1970 L	S: 11 Feb. 1971 LMW R: 22 Apr. 1971 M 23 Apr. 1971 L 21 May 1971 W	S: 10 Apr. 1972 LMW
S:[1] 27 Sep. 1967		S:[1] 3 Sep. 1971 LMW	S: 1 Aug. 1972 M 3 Aug. 1972 L 7 Aug. 1972 W
	S:[1,33] 27 Feb. 1970 LMW	S:[9] 11 Feb. 1971 LMW	S: 10 Apr. 1972 LMW
	S: 1 Jul. 1968 LMW R: 27 Jun. 1969 LMW S.A.:[3] 23 Jul. 1972	S: 11 Feb. 1971 LMW R: 10 Aug. 1972 LMW	S: 10 Apr. 1972 LMW
S: 18 Oct. 1968 R:[2] 25 Apr. 1969	S: 1 Jul. 1968 W		
	S: 20 Aug. 1968 LMW	S: 11 Feb. 1971 LMW R: 20 Nov. 1972 LW	S: 10 Apr. 1972 LMW
S: 14 Feb. 1967 R:[2] 18 Feb. 1969	S: 1 Jul. 1968 W R: 26 May 1970 W	S: 11 Feb. 1971 LMW	S: 10 Apr. 1972 W

	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty
Botswana		R:[1] 5 Jan. 1968 M 14 Feb. 1968 L 4 Mar. 1968 W	S: 27 Jan. 1967 W
Brazil		S: 8 Aug. 1963 LW 9 Aug. 1963 M R: 15 Dec. 1964 M 15 Jan. 1965 W 4 Mar. 1965 L	S: 30 Jan. 1967 M 2 Feb. 1967 LW R:[1] 5 Mar. 1969 LMW
Bulgaria		S: 8 Aug. 1963 LMW R: 13 Nov. 1963 W 21 Nov. 1963 M 2 Dec. 1963 L	S: 27 Jan. 1967 LMW R: 28 Mar. 1967 M 11 Apr. 1967 W 19 Apr. 1967 L
Burma		S: 14 Aug. 1963 LMW R: 15 Nov. 1963 LMW	S: 22 May 1967 LMW R: 18 Mar. 1970 LMW
Burundi		S: 4 Oct. 1963 W	S: 27 Jan. 1967 W
Byelorussian Soviet Socialist Republic		S: 8 Oct. 1963 M R:[2] 16 Dec. 1963 M	S:[2] 10 Feb. 1967 M R: 31 Oct. 1967 M
Cameroon		S:[3] 27 Aug. 1963 W 6 Sep. 1963 L	S: 27 Jan. 1967 W
Canada		S: 8 Aug. 1963 LMW R: 28 Jan. 1964 LMW	S: 27 Jan. 1967 LMW R: 10 Oct. 1967 LMW

Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention
	S: 1 Jul. 1968 W R: 28 Apr. 1969 L	S: 11 Feb. 1971 W R: 10 Nov. 1972 W	S: 10 Apr. 1972 W
S:[3] 9 May 1967 R:[4] 29 Jan. 1968		S:[2] 3 Sep. 1971 LMW	S: 10 Apr. 1972 LMW R: 27 Feb. 1973 M
	S: 1 Jul. 1968 LMW R: 5 Sep. 1969 W 18 Sep. 1969 M 3 Nov. 1969 L S.A.: 29 Feb. 1972	S: 11 Feb. 1971 LMW R: 16 Apr. 1971 M 7 May 1971 W 26 May 1971 L	S: 10 Apr. 1972 LMW R: 2 Aug. 1972 L 13 Sep. 1972 W 19 Sep. 1972 M
		S: 11 Feb. 1971 LMW	S: 10 Apr. 1972 LMW
	R: 19 Mar. 1971 M	S: 11 Feb. 1971 MW	S: 10 Apr. 1972 MW
		S: 3 Mar. 1971 M R: 14 Sep. 1971 M	S: 10 Apr. 1972 M
	S: 17 Jul. 1968 W 18 Jul. 1968 M R: 8 Jan. 1969 W	S: 11 Nov. 1971 M	
	S: 23 Jul. 1968 LW 29 Jul. 1968 M R: 8 Jan. 1969 LMW S.A.: 21 Feb. 1972	S: 11 Feb. 1971 LMW R:[8] 17 May 1972 LMW	S: 10 Apr. 1972 LMW R: 18 Sep. 1972 LMW

	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty
Central African Republic		R: 22 Dec. 1964 W 24 Aug. 1965 L 25 Sep. 1965 M	S: 27 Jan. 1967 W
Chad		S: 26 Aug. 1963 W R: 1 Mar. 1965 W	
Chile	S: 1 Dec. 1959 R: 23 Jun. 1961	S: 8 Aug. 1963 W 9 Aug. 1963 LM R: 6 Oct. 1965 L	S: 27 Jan. 1967 W 3 Feb. 1967 L 20 Feb. 1967 M
Colombia		S: 16 Aug. 1963 MW 20 Aug. 1963 L	S: 27 Jan. 1967 W
Congo			
Costa Rica		S: 9 Aug. 1963 L 13 Aug. 1963 W 23 Aug. 1963 M R: 10 Jul. 1967 W	
Cuba			
Cyprus		S: 8 Aug. 1963 LMW R: 15 Apr. 1965 L 21 Apr. 1965 M 7 May 1965 W	S: 27 Jan. 1967 W 15 Feb. 1967 M 16 Feb. 1967 L R: 5 Jul. 1972 LW

Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention
	R: 25 Oct. 1970 W	S: 11 Feb. 1971 W	S: 10 Apr. 1972 W
	S: 1 Jul. 1968 M R: 10 Mar. 1971 W 11 Mar. 1971 M 23 Mar. 1971 L		
S: 14 Feb. 1967			S: 10 Apr. 1972 LMW
S: 14 Feb. 1967 R:[2] 4 Aug. 1972	S: 1 Jul. 1968 W	S: 11 Feb .1971 W	S: 10 Apr. 1972 W
	S: 17 Sep. 1968 L		
S: 14 Feb. 1967 R:[2] 25 Aug. 1969	S: 1 Jul. 1968 W R: 3 Mar. 1970 W	S: 11 Feb. 1971 W	S: 10 Apr. 1972 W
			S: 12 Apr. 1972 M
	S: 1 Jul. 1968 LMW R: 10 Feb. 1970 M 16 Feb. 1970 W 5 Mar. 1970 L S.A.:[17,18] 26 Jun. 1972	S: 11 Feb. 1971 LMW R: 17 Nov. 1971 LM 30 Dec. 1971 W	S: 10 Apr. 1972 LW 14 Apr. 1972 M

	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty
Czechoslovakia	R: 14 Jun. 1962	S: 8 Aug. 1963 LMW R: 14 Oct. 1963 LM 17 Oct. 1963 W	S: 27 Jan. 1967 LMW R: 11 May 1967 L 18 May 1967 M 22 May 1967 W
Dahomey		S:[3] 27 Aug. 1963 W 3 Sep. 1963 L 9 Oct. 1963 M R: 15 Dec. 1964 W 23 Dec. 1964 M 22 Apr. 1965 L	
Denmark	R: 20 May 1965	S: 9 Aug. 1963 LMW R: 15 Jan. 1964 LMW	S: 27 Jan. 1967 LMW R: 10 Oct. 1967 LMW
Dominican Republic		S: 16 Sep. 1963 W 17 Sep. 1963 L 19 Sep. 1963 M R: 3 Jun. 1964 M 18 Jun. 1964 L 22 Jul. 1964 W	S: 27 Jan. 1967 W R: 21 Nov. 1968 W
Ecuador		S: 27 Sep. 1963 W 1 Oct. 1963 LM R: 6 May 1964 W 8 May 1964 L 13 Nov. 1964 M	S: 27 Jan. 1967 W 16 May 1967 L 7 Jun. 1967 M R: 7 Mar. 1969 W
Egypt		S:[4] 8 Aug. 1963 LMW R: 10 Jan. 1964 LMW	S: 27 Jan. 1967 MW R: 10 Oct. 1967 W 23 Jan. 1968 M
El Salvador		S: 21 Aug. 1963 W 22 Aug. 1963 L 23 Aug. 1963 M R: 3 Dec. 1964 W 7 Dec. 1964 L 9 Feb. 1965 M	S: 27 Jan. 1967 W R: 15 Jan. 1969 W
Equatorial Guinea			

Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention
	S: 1 Jul. 1968 LMW R: 22 Jul. 1969 LMW S.A.: 3 Mar. 1972	S: 11 Feb. 1971 LMW R: 11 Jan. 1972 LMW	S: 10 Apr. 1972 LMW
	S: 1 Jul. 1968 W R: 31 Oct. 1972 W	S: 18 Mar. 1971 W	S: 10 Apr. 1972 W
	S: 1 Jul. 1968 LMW R: 3 Jan. 1969 LMW S.A.:[19,20] 1 Mar. 1972	S: 11 Feb. 1971 LMW R: 15 Jun. 1971 LMW	S: 10 Apr. 1972 LMW
S: 28 Jul. 1967 R:[2] 14 Jun. 1968	S: 1 Jul. 1968 W R: 24 Jul. 1971 W	S: 11 Feb. 1971 W R: 11 Feb. 1972 W	S: 10 Apr. 1972 W
S: 14 Feb. 1967 R:[2] 11 Feb. 1969	S: 9 Jul. 1968 W R: 7 Mar. 1969 W		S: 14 Jun. 1972 W
	S: 1 Jul. 1968 LM		S: 10 Apr. 1972 LM
S: 14 Feb. 1967 R:[2] 22 Apr. 1968	S: 1 Jul. 1968 W R: 11 Jul. 1972 W		S: 10 Apr. 1972 W
		S: 4 Jun. 1971 W	

	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty
Ethiopia		S: 9 Aug. 1963 LW 19 Sep. 1963 M	S: 27 Jan. 1967 LW 10 Feb. 1967 M
Fiji		R:[1] 18 Jul. 1972 W 14 Aug. 1972 L	R:[7] 18 Jul. 1972 W 14 Aug. 1972 L
Finland		S: 8 Aug. 1963 LMW R: 9 Jan. 1964 LMW	S: 27 Jan. 1967 LMW R: 12 Jul. 1967 LMW
France	S: 1 Dec. 1959 R: 16 Sep. 1960		S: 25 Sep. 1967 LMW R: 5 Aug. 1970 LMW
Gabon		S: 10 Sep. 1963 W R: 20 Feb. 1964 W 4 Mar. 1964 L 9 Mar. 1964 M	
Gambia		R:[1] 27 Apr. 1965 MW 6 May 1965 L	S: 2 Jun. 1967 L
German Democratic Republic		S: 8 Aug. 1963 M R:[5] 30 Dec. 1963 M	S: 27 Jan. 1967 M R:[3] 2 Feb. 1967 M
Germany, Federal Republic of		S: 19 Aug. 1963 LMW R:[6] 1 Dec. 1964 LW	S: 27 Jan. 1967 LMW R:[4] 10 Feb. 1971 LW

Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention
	S: 5 Sep. 1968 LMW R: 5 Feb. 1970 M 5 Mar. 1970 LW	S: 11 Feb. 1971 LMW	S: 10 Apr. 1972 LMW
	R:[18] 18 Jul. 1972 W 14 Aug. 1972 L		
	S: 1 Jul. 1968 LMW R: 5 Feb. 1969 LMW S.A.:[3] 9 Feb. 1972	S: 11 Feb. 1971 LMW R: 8 Jun. 1971 LMW	S: 10 Apr. 1972 LMW
			S: 10 Apr. 1972 L
	S: 4 Sep. 1968 L 20 Sep. 1968 W 24 Sep. 1968 M	S: 18 May 1971 L 21 May 1971 M 29 Oct. 1971 W	S: 2 Jun. 1972 M 8 Aug. 1972 L 9 Nov. 1972 W
	S: 1 Jul. 1968 M R:[4] 31 Oct. 1969 M S.A.: 7 Mar. 1972	S:[3] 11 Feb. 1971 M R: 27 Jul. 1971 M	S: 10 Apr. 1972 M R: 28 Nov. 1972 M
	S:[5] 28 Nov. 1969 LMW	S:[4] 8 Jun. 1971 LMW	S: 10 Apr. 1972 LMW

	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty
Ghana		S: 8 Aug. 1963 M 9 Aug. 1963 W 4 Sep. 1963 L R: 27 Nov. 1963 L 9 Jan. 1964 W 31 May 1965 M	S: 27 Jan. 1967 W 15 Feb. 1967 M 3 Mar. 1967 L
Greece		S: 8 Aug. 1963 W 9 Aug. 1963 LM R: 18 Dec. 1963 LMW	S: 27 Jan. 1967 W R: 19 Jan. 1971 L
Guatemala		S: 23 Sep. 1963 W R:[3] 6 Jan. 1964 W	
Guinea			
Guyana			S: 3 Feb. 1967 W
Haiti		S: 9 Oct. 1963 W	S: 27 Jan. 1967 W
Holy See			S: 5 Apr. 1967 L
Honduras		S: 8 Aug. 1963 W 15 Aug. 1963 L 16 Aug. 1963 M R: 2 Oct. 1964 W 2 Dec. 1964 L	S: 27 Jan. 1967 W

Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention
	S: 1 Jul. 1968 MW 24 Jul. 1968 L R: 4 May 1970 L 5 May 1970 W 11 May 1970 M	S: 11 Feb. 1971 LMW R: 9 Aug. 1972 W	S: 10 Apr. 1972 MW
	S: 1 Jul. 1968 MW R: 11 Mar. 1970 W S.A.:[21] 1 Mar. 1972	S: 11 Feb. 1971 M 12 Feb. 1971 W	S: 10 Apr. 1972 L 12 Apr. 1972 W 14 Apr. 1972 M
S: 14 Feb. 1967 R:[3] 6 Feb. 1970	S: 26 Jul. 1968 W R: 22 Sep. 1970 W	S: 11 Feb. 1971 W	S: 9 May 1972 W
		S: 11 Feb. 1971 MW	
S: 14 Feb. 1967 R:[3] 23 May 1969	S: 1 Jul. 1968 W R: 2 Jun. 1970 W		S: 10 Apr. 1972 W
	R:[6] 25 Feb. 1971 LMW S.A.:[18] 1 Aug. 1972		
S: 14 Feb. 1967 R:[3] 23 Sep. 1968	S: 1 Jul. 1968 W	S: 11 Feb. 1971 W	S: 10 Apr. 1972 W

	Antarctic Treaty	Partial Test Ban Treaty	Outer Spaae Treaty
Hungary		S: 8 Aug. 1963 LMW R: 21 Oct. 1963 L 22 Oct. 1963 W 23 Oct. 1963 M	S: 27 Jan. 1967 LMW R: 26 Jun. 1967 LMW
Iceland		S: 12 Aug. 1963 LMW R: 29 Apr. 1964 LMW	S: 27 Jan. 1967 LMW R: 5 Feb. 1968 LMW
India		S: 8 Aug. 1963 LMW R: 10 Oct. 1963 L 14 Oct. 1963 M 18 Oct. 1963 W	S: 3 Mar. 1967 LMW
Indonesia		S: 23 Aug. 1963 LMW R: 20 Jan. 1964 M 27 Jan. 1964 W 8 May 1964 L	S: 27 Jan. 1967 W 30 Jan. 1967 M 14 Feb. 1967 L
Iran		S: 8 Aug. 1963 LMW R: 5 May 1964 LMW	S: 27 Jan. 1967 L
Iraq		S: 13 Aug. 1963 LMW R: 30 Nov. 1964 L 1 Dec. 1964 W 3 Dec. 1964 M	S: 27 Feb. 1967 LW 9 Mar. 1967 M R: 4 Dec. 1968 M 23 Sep. 1969 L
Ireland		S: 8 Aug. 1963 LW 9 Aug. 1963 M R: 18 Dec. 1963 LW 20 Dec. 1963 M	S: 27 Jan. 1967 LW R: 17 Jul. 1968 W 19 Jul. 1968 L
Israel		S: 8 Aug. 1963 LMW R: 15 Jan. 1964 LW 28 Jan. 1964 M	S: 27 Jan. 1967 LMW

Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention
	S: 1 Jul. 1968 LMW R: 27 May 1969 LMW S.A.: 30 Mar. 1972	S: 11 Feb. 1971 LMW R: 13 Aug. 1971 LMW	S: 10 Apr. 1972 LMW R: 27 Dec. 1972 LMW
	S: 1 Jul. 1968 LMW R: 18 Jul. 1969 LMW S.A.:[17,18] 12 Jul. 1972	S: 11 Feb. 1971 LMW R: 30 May 1972 LMW	S: 10 Apr. 1972 LMW R: 15 Feb. 1973 M
			S: 15 Jan. 1973 M
	S:[7] 2 Mar. 1970 LMW		S: 20 Jun. 1972 MW 21 Jun. 1972 L
	S: 1 Jul. 1968 LMW R: 2 Feb. 1970 W 10 Feb. 1970 M 5 Mar. 1970 L	S: 11 Feb. 1971 LMW R: 26 Aug. 1971 LW 6 Sep. 1971 M	S: 10 Apr. 1972 MW 16 Nov. 1972 L
	S: 1 Jul. 1968 M R: 29 Oct. 1969 M S.A.: 29 Feb. 1972	S: 22 Feb. 1971 M R: 13 Sep. 1972 M	S: 11 May 1972 M
	S: 1 Jul. 1968 MW 4 Jul. 1968 L R: 1 Jul. 1968 W 2 Jul. 1968 M 4 Jul. 1968 L S.A.:[18,19] 29 Feb. 1972	S: 11 Feb. 1971 LW R: 19 Aug. 1971 LW	S:[1] 10 Apr. 1972 LW R: 27 Oct. 1972 LW

	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty
Italy		S: 8 Aug. 1963 LMW R: 10 Dec. 1964 LMW	S: 27 Jan. 1967 LMW R: 4 May 1972 LW
Ivory Coast		S: 5 Sep. 1963 W R: 5 Feb. 1965 W	
Jamaica		S: 13 Aug. 1963 LMW	S: 29 Jun. 1967 LMW R: 6 Aug. 1970 W 10 Aug. 1970 L 21 Aug. 1970 M
Japan	S: 1 Dec. 1959 R: 4 Aug. 1960	S: 14 Aug. 1963 LMW R: 15 Jun. 1964 LMW	S: 27 Jan. 1967 LMW R: 10 Oct. 1967 LMW
Jordan		S: 12 Aug. 1963 LW 19 Aug. 1963 M R: 29 May 1964 L 7 Jul. 1964 M 10 Jul. 1964 W	S: 2 Feb. 1967 W
Kenya		R: 10 Jun. 1965 L 11 Jun. 1965 W 30 Jun. 1965 M	
Khmer Republic			
Korea, South		S: 30 Aug. 1963 LW R:[3] 24 Jul. 1964 LW	S: 27 Jan. 1967 W R:[8] 13 Oct. 1967 W

Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention
	S:[8] 28 Jan. 1969 LMW	S:[5] 11 Feb. 1971 LMW	S: 10 Apr. 1972 LMW
	S: 1 Jul. 1968 W	R: 14 Jan. 1972 W	S: 23 May 1972 W
S: 26 Oct. 1967 R:[3] 26 Jun. 1969	S: 14 Apr. 1969 LMW R: 5 Mar. 1970 LMW	S: 11 Oct. 1971 LW 14 Oct. 1971 M	
	S:[9] 3 Feb. 1970 LMW	S: 11 Feb. 1971 LMW R: 21 Jun. 1971 LMW	S: 10 Apr. 1972 LMW
	S: 10 Jul. 1968 W R: 11 Feb. 1970 W	S: 11 Feb. 1971 LMW R: 17 Aug. 1971 W 30 Aug. 1971 M 1 Nov. 1971 L	S: 10 Apr. 1972 W 17 Apr. 1972 L 24 Apr. 1972 M
	S: 1 Jul. 1968 W R: 11 Jun. 1970 M		
	R: 2 Jun. 1972 W	S: 11 Feb. 1971 W	S: 10 Apr. 1972 W
	S:[10] 1 Jul. 1968 W	S:[6] 11 Feb. 1971 LW	S:[3] 10 Apr. 1972 LW

	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty
Kuwait		S:[7] 20 Aug. 1963 LMW R: 20 May 1965 W 21 May 1965 L 17 Jun. 1965 M	R:[9] 7 Jun. 1972 W 20 Jun. 1972 L 4 Jul. 1972 M
Laos		S: 12 Aug. 1963 LMW R: 10 Feb. 1965 L 12 Feb. 1965 W 7 Apr. 1965 M	S: 27 Jan. 1967 W 30 Jan. 1967 L 2 Feb. 1967 M R: 29 Nov. 1972 W
Lebanon		S: 12 Aug. 1963 W 13 Aug. 1963 LM R: 14 May 1965 W 20 May 1965 L 4 Jun. 1965 M	S: 23 Feb. 1967 LMW R: 31 Mar. 1969 LM 30 Jun. 1969 W
Lesotho			S: 27 Jan. 1967 W
Liberia		S: 8 Aug. 1963 W 16 Aug. 1963 L 27 Aug. 1963 M R: 19 May 1964 W 22 May 1964 L 16 Jun. 1964 M	
Libya		S: 9 Aug. 1963 L 16 Aug. 1963 MW R: 15 Jul. 1968 L	R: 3 Jul. 1968 W
Luxembourg		S: 13 Aug. 1963 L 3 Sep. 1963 W 13 Sep. 1963 M R: 10 Feb. 1965 LMW	S: 27 Jan. 1967 MW 31 Jan. 1967 L
Madagascar		S: 23 Sep. 1963 W R: 15 Mar. 1965 W	R:[5] 22 Aug. 1968 W

Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention
	S: 15 Aug. 1968 MW 22 Aug. 1968 L		S: 14 Apr. 1972 MW 27 Apr. 1972 L R:[3] 18 Jul. 1972 W 26 Jul. 1972 L 1 Aug. 1972 M
	S: 1 Jul. 1968 LMW R: 5 Mar. 1970 LW 20 Feb. 1970 M	S: 11 Feb. 1971 LW 15 Feb. 1971 M R: 19 Oct. 1971 L 22 Oct. 1971 M 3 Nov. 1971 W	S: 10 Apr. 1972 LMW
	S: 1 Jul. 1968 LMW R: 15 Jul. 1970 LM 20 Nov. 1970 W	S: 11 Feb. 1971 LMW	S: 10 Apr. 1972 LW 21 Apr. 1972 M
	S: 9 Jul. 1968 W R: 20 May 1970 W	S: 8 Sep. 1971 W	S: 10 Apr. 1972 W
	S: 1 Jul. 1968 W R: 5 Mar. 1970 W	S: 11 Feb. 1971 W	S: 10 Apr. 1972 W 14 Apr. 1972 L
	S: 18 Jul. 1968 L 19 Jul. 1968 W 23 Jul. 1968 M		
	S: 14 Aug. 1968 LMW	S: 11 Feb. 1971 LMW	S: 10 Apr. 1972 LM 12 Apr. 1972 W
	S: 22 Aug. 1968 W R: 8 Oct. 1970 W	S: 14 Sep. 1971 W	S: 13 Oct. 1972 L

	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty
Malawi		R:[1] 26 Nov. 1964 MW 7 Jan. 1965 L	
Malaysia		S: 8 Aug. 1963 W 12 Aug. 1963 L 21 Aug. 1963 M R: 15 Jul. 1964 M 16 Jul. 1964 LW	S: 20 Feb. 1967 W 21 Feb. 1967 L 3 May 1967 M
Maldive Islands			
Mali		S: 23 Aug. 1963 LMW	R: 11 Jun. 1968 M
Malta		R:[1] 25 Nov. 1964 MW 1 Dec. 1964 L	
Mauritania		S: 13 Sep. 1963 W 17 Sep. 1963 L 8 Oct. 1963 M R: 6 Apr. 1964 W 15 Apr. 1964 L 28 Apr. 1964 M	
Mauritius		R:[1] 30 Apr. 1969 MW 12 May 1969 L	R:[7] 7 Apr. 1969 W 21 Apr. 1969 L 13 May 1969 M
Mexico		S: 8 Aug. 1963 LMW R: 27 Dec. 1963 LMW	S: 27 Jan. 1967 LMW R: 31 Jan. 1968 LMW

Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention
			S: 10 Apr. 1972 W
	S: 1 Jul. 1968 LMW R: 5 Mar. 1970 LMW S.A.:[18] 29 Feb. 1972	S: 20 May 1971 LMW R: 21 Jun. 1972 LMW	S: 10 Apr. 1972 LMW
	S: 11 Sep. 1968 W R: 7 Apr. 1970 W		
	S: 14 Jul. 1969 W 15 Jul. 1969 M R: 10 Feb. 1970 M 5 Mar. 1970 W	S: 11 Feb. 1971 W 15 Feb. 1971 M	S: 10 Apr. 1972 W
	S: 17 Apr. 1969 W R: 6 Feb. 1970 W	S: 11 Feb. 1971 LW R: 4 May 1971 W	S: 11 Sep. 1972 L
	S: 1 Jul. 1968 W R: 8 Apr. 1969 W 14 Apr. 1969 L 25 Apr. 1969 M	S: 11 Feb. 1971 W R: 23 Apr. 1971 W 3 May 1971 L 18 May 1971 M	S: 10 Apr. 1972 W R: 7 Aug. 1972 W 15 Jan. 1973 M
S:[5] 14 Feb. 1967 R:[3] 20 Sep. 1967 S.A. 6 Sep. 1968	S:[11] 26 Jul. 1968 LMW R: 21 Jan. 1969 LMW S.A.:[17,22] 27 Sep. 1972		S:[4] 10 Apr. 1972 LMW

	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty
Mongolia		S: 8 Aug. 1963 LM R: 1 Nov. 1963 M 7 Nov. 1963 L	S: 27 Jan. 1967 M R: 10 Oct. 1967 M
Morocco		S: 27 Aug. 1963 MW 30 Aug. 1963 L R: 1 Feb. 1966 L 18 Feb. 1966 M 21 Feb. 1966 W	R: 21 Dec. 1967 LM 22 Dec. 1967 W
Nepal		S: 26 Aug. 1963 LM 30 Aug. 1963 W R: 7 Oct. 1964 LMW	S: 3 Feb. 1967 MW 6 Feb. 1967 L R: 10 Oct. 1967 L 16 Oct. 1967 M 22 Nov. 1967 W
Netherlands	R:[1] 30 Mar. 1967	S: 9 Aug. 1963 LMW R:[8] 14 Sep. 1964 LMW	S: 10 Feb. 1967 LMW R:[10] 10 Oct. 1969 LMW
New Zealand	S: 1 Dec. 1959 R: 1 Nov. 1960	S: 8 Aug. 1963 LMW R: 10 Oct. 1963 LW 16 Oct. 1963 M	S: 27 Jan. 1967 LMW R: 31 May 1968 LMW
Nicaragua		S: 13 Aug. 1963 LW 16 Aug. 1963 M R: 26 Jan. 1965 L 26 Feb. 1965 MW	S: 27 Jan. 1967 W 13 Feb. 1967 L
Niger		S: 24 Sep. 1963 LW R: 3 Jul. 1964 M 6 Jul. 1964 L 9 Jul. 1964 W	S: 1 Feb. 1967 W R: 17 Apr. 1967 L 3 May 1967 W
Nigeria		S: 30 Aug. 1963 M 2 Sep. 1963 L 4 Sep. 1963 W R: 17 Feb. 1967 L 25 Feb. 1967 M 28 Feb. 1967 W	R: 14 Nov. 1967 L

Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention
	S: 1 Jul. 1968 M R: 14 May 1969 M S.A.:[18] 5 Sep. 1972	S: 11 Feb. 1971 LM R: 8 Oct. 1971 M 15 Nov. 1971 L	S: 10 Apr. 1972 LMW R: 14 Sep. 1972 L 20 Oct. 1972 M
	S: 1 Jul. 1968 LMW R: 27 Nov. 1970 M 30 Nov. 1970 L 16 Dec. 1970 W	S: 11 Feb. 1971 MW 18 Feb. 1971 L R: 26 Jul. 1971 L 5 Aug. 1971 W 18 Jan. 1972 M	S: 2 May 1972 L 3 May 1972 W 5 Jun. 1972 M
	S: 1 Jul. 1968 LMW R: 5 Jan. 1970 W 9 Jan. 1970 M 3 Feb. 1970 L S.A.:[18] 22 Jun. 1972	S: 11 Feb. 1971 MW 24 Feb. 1971 L R: 6 Jul. 1971 L 29 Jul. 1971 M 9 Aug. 1971 W	S: 10 Apr. 1972 LMW
P.I.[6] S: 15 Mar. 1968 R: 26 Jul. 1971	S: 20 Aug. 1968 LMW	S: 11 Feb. 1971 LMW	S: 10 Apr. 1972 LMW
	S: 1 Jul. 1968 LMW R: 10 Sep. 1969 LMW S.A.:[17] 29 Feb. 1972	S: 11 Feb. 1971 LMW R: 24 Feb. 1972 LMW	S: 10 Apr. 1972 LMW R: 13 Dec. 1972 W 18 Dec. 1972 L 10 Jan. 1973 M
S: 15 Feb. 1967 R:[3, 7] 24 Oct. 1968	S: 1 Jul. 1968 LW	S: 11 Feb. 1971 W	S: 10 Apr. 1972 LW
		S: 11 Feb. 1971 W R: 9 Aug. 1971 W	S: 21 Apr. 1972 W R: 23 Jun. 1972 W
	S: 1 Jul. 1968 LMW R: 27 Sep. 1968 L 7 Oct. 1968 W 14 Oct. 1968 M		S: 3 Jul. 1972 M 10 Jul. 1972 L 6 Dec. 1972 W

	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty
Norway	S: 1 Dec. 1959 R: 24 Aug. 1960	S: 9 Aug. 1963 LMW R: 21 Nov. 1963 LMW	S: 3 Feb. 1967 LMW R: 1 Jul. 1969 LMW
Pakistan		S: 14 Aug. 1963 LMW	S: 12 Sep. 1967 LMW R: 8 Apr. 1968 LMW
Panama		S: 20 Sep. 1963 W R: 24 Feb. 1966 W	S: 27 Jan. 1967 W
Paraguay		S: 15 Aug. 1963 LW 21 Aug. 1963 M	
Peru		S: 23 Aug. 1963 LMW R: 20 Jul. 1964 W 4 Aug. 1964 L 21 Aug. 1964 M	S: 30 Jun. 1967 W
Philippines		S: 8 Aug. 1963 LW 14 Aug. 1963 M R:[8] 10 Nov. 1965 L 15 Nov. 1965 W 8 Feb. 1966 M	S: 27 Jan. 1967 LW 29 Apr. 1967 M
Poland	R: 8 Jun. 1961	S: 8 Aug. 1963 LMW R: 14 Oct. 1963 LMW	S: 27 Jan. 1967 LMW R: 30 Jan. 1968 LMW
Portugal		S: 9 Oct. 1963 LW	

Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention
	S: 1 Jul. 1968 LMW R: 5 Feb. 1969 LMW S.A.:[19] 1 Mar. 1972	S: 11 Feb. 1971 LMW R: 28 Jun. 1971 LM 29 Jun. 1971 W	S: 10 Apr. 1972 LMW
			S: 10 Apr. 1972 LMW
S: 14 Feb. 1967 R:[2] 11 Jun. 1971	S: 1 Jul. 1968 W	S: 11 Feb. 1971 W	S: 2 May 1972 W
S: 26 Apr. 1967 R:[2] 19 Mar. 1969	S: 1 Jul. 1968 W R: 4 Feb. 1970 W 5 Mar. 1970 L	S: 23 Feb. 1971 W	
S: 14 Feb. 1967 R:[2] 4 Mar. 1969	S: 1 Jul. 1968 W R: 3 Mar. 1970 W		S: 10 Apr. 1972 LMW
	S: 1 Jul. 1968 W 18 Jul. 1968 M R: 5 Oct. 1972 W 16 Oct. 1972 L		S: 10 Apr. 1972 LW 21 Jun. 1972 M
	S: 1 Jul. 1968 LMW R: 12 Jun. 1969 LMW S.A.: 11 Oct. 1972	S: 11 Feb. 1971 LMW R: 15 Nov. 1971 LMW	S: 10 Apr. 1972 LMW R: 25 Jan. 1973 M
			S: 29 Jun. 1972 W

	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty
Quatar			
Romania	R:[2] 15 Sep. 1971	S: 8 Aug. 1963 LMW R: 12 Dec. 1963 LMW	S: 27 Jan. 1967 LMW R: 9 Apr. 1968 LMW
Rwanda		S: 19 Sep. 1963 W R: 22 Okt. 1963 L 16 Dec. 1963 M 27 Dec. 1963 W	S: 27 Jan. 1967 W
San Marino		S: 17 Sep. 1963 W 20 Sep. 1963 L 24 Sep. 1963 M R: 3 Jul. 1964 L 9 Jul. 1964 W 27 Nov. 1964 M	S: 21 Apr. 1967 W 24 Apr. 1967 L 6 Jun. 1967 M R: 29 Oct. 1968 W 21 Nov. 1968 M 3 Feb. 1969 L
Saudi Arabia			
Senegal		S: 20 Sep. 1963 W 23 Sep. 1963 L 9 Oct. 1963 M R: 6 May 1964 L 12 May 1964 M 2 Jun. 1964 W	
Sierra Leone		S: 4 Sep. 1963 L 9 Sep. 1963 M 11 Sep. 1963 W R: 21 Feb. 1964 L 4 Mar. 1964 W 29 Apr. 1964 M	S: 27 Jan. 1967 LM 16 May 1967 W R: 13 Jul. 1967 M 14 Jul. 1967 W 25 Oct. 1967 L
Singapore		R:[1] 12 Jul. 1968 MW 23 Jul. 1968 L	

Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention
			S: 14 Nov. 1972 L
	S: 1 Jul. 1968 LMW R: 4 Feb. 1970 LMW S.A.: 27 Oct. 1972	S: 11 Feb. 1971 LMW R:[10] 10 Jul. 1972 LMW	S: 10 Apr. 1972 LMW
		S: 11 Feb. 1971 W	S: 10 Apr. 1972 MW
	S:[10] 1 Jul. 1968 W 29 Jul. 1968 L 21 Nov. 1968 M R: 10 Aug. 1970 L 20 Aug. 1970 M 31 Aug. 1970 W		S: 12 Sep. 1972 W 30 Jan. 1973 M
		S: 7 Jan. 1972 W R: 23 Jun. 1972 W	S: 12 Apr. 1972 W R: 24 May 1972 W
	S: 1 Jul. 1968 MW 26 Jul. 1968 L R: 17 Dec. 1970 M 22 Dec. 1970 W 15 Jan. 1971 L	S: 17 Mar. 1971 W	S: 10 Apr. 1972 W
		S: 11 Feb. 1971 L 12 Feb. 1971 M 24 Feb. 1971 W	S: 7 Nov. 1972 W 24 Nov. 1972 L
	S: 5 Feb. 1970 LMW	S: 5 May 1971 LMW	S: 19 Jun. 1972 LMW

	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty
Somalia		S: 19 Aug. 1963 MW	S: 2 Feb. 1967 W
South Africa	S: 1 Dec. 1959 R: 21 Jun. 1960	R: 10 Oct. 1963 LW 22 Nov. 1963 M	S: 1 Mar. 1967 W R: 30 Sep. 1968 W 8 Oct. 1968 L
Spain		S: 13 Aug. 1963 W 14 Aug. 1963 L R: 17 Dec. 1964 LW	R: 27 Nov. 1968 L 7 Dec. 1968 W
Sri Lanka		S: 22 Aug. 1963 LW 23 Aug. 1963 M R: 5 Feb. 1964 W 12 Feb. 1964 M 13 Feb. 1964 L	S: 10 Mar. 1967 L
Sudan		S: 9 Aug. 1963 LMW R: 4 Mar. 1966 LW 28 Mar. 1966 M	
Swaziland		R: 29 May 1969 LW 3 Jun. 1969 M	
Sweden		S: 12 Aug. 1963 LMW R: 9 Dec. 1963 LMW	S: 27 Jan. 1967 LMW R: 11 Oct. 1967 LMW
Switzerland		S: 26 Aug. 1963 LMW R: 16 Jan. 1964 LMW	S: 27 Jan. 1967 LW 30 Jan. 1967 M R: 18 Dec. 1969 LMW

Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention
	S: 1 Jul. 1968 LMW R: 5 Mar. 1970 L 12 Nov. 1970 W		S: 3 Jul. 1972 M
		S: 11 Feb. 1971 W	S: 10 Apr. 1972 W
			S: 10 Apr. 1972 LW
	S: 1 Jul. 1968 LMW		S: 10 Apr. 1972 LMW
	S: 24 Dec. 1968 M	S: 11 Feb. 1971 L 12 Feb. 1971 M	
	S: 24 Jun. 1969 L R: 11 Dec. 1969 L 16 Dec. 1969 W 12 Jan. 1970 M	S: 11 Feb. 1971 W R: 9 Aug. 1971 W	
	S: 19 Aug. 1968 LMW R: 9 Jan. 1970 LMW	S: 11 Feb. 1971 LMW R: 28 Apr. 1972 LMW	
	S:[12] 27 Nov. 1969 LMW	S: 11 Feb. 1971 LMW	S:[5] 10 Apr. 1972 LMW

	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty
Syria		S: 13 Aug. 1963 LMW R: 1 Jun. 1964 LMW	R: 14 Nov. 1968 M
Taiwan		S: 23 Aug. 1963 W R: 18 May 1964 W	S: 27 Jan. 1967 W R: 24 Jul. 1970 W
Tanzania		S: 16 Sep. 1963 L 18 Sep. 1963 W 20 Sep. 1963 M R: 6 Feb. 1964 L	
Thailand		S: 8 Aug. 1963 LMW R: 15 Nov. 1963 L 21 Nov. 1963 M 29 Nov. 1963 W	S: 27 Jan. 1967 LMW R: 5 Sep. 1968 L 9 Sep. 1968 M 10 Sep. 1968 W
Togo		S: 18 Sep. 1963 W R: 7 Dec. 1964 W	S: 27 Jan. 1967 W
Tonga		R:[1] 22 Jun. 1971 M 7 Jul. 1971 W	R:[7] 22 Jun. 1971 L 7 Jul. 1971 W 24 Aug. 1971 M
Trinidad & Tobago		S: 12 Aug. 1963 LW 13 Aug. 1963 M R: 14 Jul. 1964 W 16 Jul. 1964 L 6 Aug. 1964 M	S: 24 Jul. 1967 L 17 Aug. 1967 M 28 Sep. 1967 W
Tunisia		S: 8 Aug. 1963 W 12 Aug. 1963 L 13 Aug. 1963 M R: 26 May 1965 LM 3 Jun. 1965 W	S: 27 Jan. 1967 LW 15 Feb. 1967 M R: 28 Mar. 1968 L 4 Apr. 1968 M 17 Apr. 1968 W

Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention
	S: 1 Jul. 1968 M R:[10] 24 Sep. 1969 M		S: 14 Apr. 1972 M
	S: 1 Jul. 1968 W R: 27 Jan. 1970 W	S: 11 Feb. 1971 W R: 22 Feb. 1972 W	S: 10 Apr. 1972 W
		S: 11 Feb. 1971 W	S: 16 Aug. 1972 L
	R: 7 Dec. 1972 L		
	S: 1 Jul. 1968 W R: 26 Feb. 1970 W	S: 2 Apr. 1971 W R: 28 Jun. 1971 W	S: 10 Apr. 1972 W
	R:[13] 7 Jul. 1971 LW 24 Aug. 1971 M		
S: 27 Jun. 1967 R:[12] 3 Dec. 1970	S: 20 Aug. 1968 W 22 Aug. 1968 L		
	S: 1 Jul. 1968 LMW R: 26 Feb. 1970 LMW	S: 11 Feb. 1971 LMW R: 22 Oct. 1971 M 28 Oct. 1971 L 29 Oct. 1971 W	S: 10 Apr. 1972 LMW

	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty
Turkey		S: 9 Aug. 1963 LMW R: 8 Jul. 1965 LMW	S: 27 Jan. 1967 LMW R: 27 Mar. 1968 LMW
Uganda		S: 29 Aug. 1963 LW R: 24 Mar. 1964 L 2 Apr. 1964 W	R: 24 Apr. 1968 W
Ukrainian Soviet Socialist Republic		S: 8 Oct. 1963 M R:[2] 30 Dec. 1963 M	S:[2] 10 Feb. 1967 M R: 31 Oct. 1967 M
Union of Soviet Socialist Republics	S: 1 Dec. 1959 R: 2 Nov. 1960	S: 5 Aug. 1963 M R: 10 Oct. 1963 LMW	S: 27 Jan. 1967 LMW R: 10 Oct. 1967 LMW
United Arab Emirates			
United Kingdom of Great Britain and Northern Ireland	S: 1 Dec. 1959 R: 31 May 1960	S: 5 Aug. 1963 M R:[9] 10 Oct. 1963 LMW	S: 27 Jan. 1967 LMW R:[6] 10 Oct. 1967 LMW
United States of America	S: 1 Dec. 1959 R: 18 Aug. 1960	S: 5 Aug. 1963 M R: 10 Oct. 1963 LMW	S: 27 Jan. 1967 LMW R: 10 Oct. 1967 LMW
Upper Volta		S: 30 Aug. 1963 W	S: 3 Mar. 1967 W R: 18 Jun. 1968 W

Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention
	S: 28 Jan. 1969 LMW	S: 25 Feb. 1971 LMW R: 19 Oct. 1972 W 25 Oct. 1972 L	S: 10 Apr. 1972 LMW
		S: 3 Mar. 1971 M R: 3 Sep. 1971 M	S: 10 Apr. 1972 M
	S: 1 Jul. 1968 LMW R: 5 Mar. 1970 LMW	S: 11 Feb. 1971 LMW R: 18 May 1972 LMW	S: 10 Apr. 1972 LMW
			S: 28 Sep. 1972 L
P.I.[8] S: 20 Dec. 1967 R: 11 Dec. 1969 P.II[8] S: 20 Dec. 1967 R: 11 Dec. 1969	S: 1 Jul. 1968 LMW R:[14] 27 Nov. 1968 LW 29 Nov. 1968 M	S:[7] 11 Feb. 1971 LMW R: 18 May 1972 LMW	S:[6] 10 Apr. 1972 LMW
P.II[9] S: 1 Apr. 1968 R: 12 May 1971	S: 1 Jul. 1968 LMW R: 5 Mar. 1970 LMW	S: 11 Feb. 1971 LMW R: 18 May 1972 LMW	S: 10 Apr. 1972 LMW
	S: 25 Nov. 1968 W 11 Aug. 1969 M R: 3 Mar. 1970 W		

	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty
Uruguay		S: 12 Aug. 1963 W 27 Sep. 1963 LM R: 25 Feb. 1969 L	S: 27 Jan. 1967 W 30 Jan. 1967 M R: 31 Aug. 1970 W
Venezuela		S: 16 Aug. 1963 MW 20 Aug. 1963 L R: 22 Feb. 1965 M 3 Mar. 1965 L 29 Mar. 1965 W	S: 27 Jan. 1967 W R: 3 Mar. 1970 W
Viet-Nam, South		S: 1 Oct. 1963 W	S: 27 Jan. 1967 W
Western Samoa		S: 5 Sep. 1963 L 6 Sep. 1963 MW R: 15 Jan. 1965 W 19 Jan. 1965 L 8 Feb. 1965 M	
Yemen Arab Republic		S: 13 Aug. 1963 M 6 Sep. 1963 W	
Yemen, People's Democratic Republic of			
Yugoslavia		S: 8 Aug. 1963 LMW R: 15 Jan. 1964 L 31 Jan. 1964 M 3 Apr. 1964 W	S: 27 Jan. 1967 LMW
Zaïre		S: 9 Aug. 1963 LW 12 Aug. 1963 M R: 28 Oct. 1965 W	S: 27 Jan. 1967 W 29 Apr. 1967 M 4 May 1967 L

Treaty of Tlateloco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention
S: 14 Feb. 1967 R:[8] 20 Aug. 1968 S.A.:[10] 24 Sep. 1971	S: 1 July 1968 W R: 31 Aug. 1970 W S.A.:[15,17] 24 Sep. 1971	S: 11 Feb. 1971 W	
S: 14 Feb. 1967 R:[2, 11] 23 Mar. 1970	S: 1 Jul. 1968 W		S: 10 Apr. 1972 W
	S: 1 Jul. 1968 W R: 10 Sep. 1971 W S.A.:[17] 3 Oct. 1972	S: 11 Feb. 1971 W	S: 10 Apr. 1972 W
	S: 23 Sep. 1968 M	S: 23 Feb. 1971 M	S: 10 Apr. 1972 W 17 Apr. 1972 M 10 May 1972 L
	S: 14 Nov. 1968 M	S: 23 Feb. 1971 M	S: 26 Apr. 1972 M
	S: 10 Jul. 1968 LMW R:[16] 4 Mar. 1970 W 5 Mar. 1970 LM S.A.:[17] 26 May 1972	S: 2 Mar. 1971 LMW	S: 10 Apr. 1972 LMW
	S: 22 Jul. 1968 W 26 Jul. 1968 M 17 Sep. 1968 L R: 4 Aug. 1970 W S.A.: 9 Nov. 1972		S: 10 Apr. 1972 LMW

	Antarctic Treaty	Partial Test Ban Treaty	Outer Space Treaty
Zambia		R:[1] 11 Jan. 1965 W 8 Feb. 1965 L	

The Antarctic Treaty

[1] The Netherlands stated that the accession is also valid for Surinam and the Netherlands Antilles.
[2] Romania stated that the provisions of the first paragraph of Article XIII of the Antarctic Treaty are not in accordance with the principle according to which multilateral treaties whose object and purposes concern the international community, as a whole, should be opened for universal participation.

The Partial Test Ban Treaty

[1] Notification of succession.
[2] The United States considers that the Byelorussian SSR and the Ukrainian SSR are already covered by the signature and deposit of ratification by the USSR.
[3] With a statement that this does not imply the recognition of any territory or régime not recognized by this state.
[4] Egypt stated that its ratification of the Treaty does not mean or imply any recognition of Israel or any treaty relations with Israel.
[5] The United States did not accept the notification of signature and deposit of ratification by the German Democratic Republic.
[6] The Federal Republic of Germany stated that the Treaty applies also to Land Berlin.
[7] Kuwait stated that its signature and ratification of the Treaty does not in any way imply its recognition of Israel, nor does it oblige it to apply the provisions of the Treaty in respect of the said country.
[8] The Netherlands stated that the ratification is also valid for Surinam and the Netherlands Antilles.
[9] The UK stated its view that if a régime is not recognized as the government of a state, neither signature nor the deposit of any instrument by it nor notification of any of those acts will bring about the recognition of that régime by any other state.

The Outer Space Treaty

[1] The Brazilian government interprets Article 10 of the Treaty as a specific recognition that the granting of tracking facilities by the parties to the Treaty shall be subject to agreement between the states concerned.
[2] The United States considers that the Byelorussian SSR and the Ukrainian SSR are already covered by the signature and deposit of ratification by the USSR.
[3] The USA stated that this did not imply recognition of the German Democratic Republic.
[4] The Federal Republic of Germany stated that the Treaty applies also to Land Berlin.
[5] Madagascar acceded to the Treaty with the understanding that under Article 10 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.
[6] The United Kingdom's ratification is in respect of the United Kingdom of Great Britain and Northern Ireland, the Associated States (Antigua, Dominica, Grenada, Saint Christopher–Nevis–Anguilla and Saint Lucia) and Territories under the territorial sovereignty of the United Kingdom, as well as the State of Brunei, the Kingdom of Swaziland, the Kingdom of Tonga and the British Solomon Islands Protectorate. On depositing its instrument of ratification, the United Kingdom declared that the Treaty will not be applicable in regard to Southern Rhodesia unless and until the United Kingdom informs the other depositary governments that it is in a position to ensure that the obligations imposed by the Treaty in respect of that territory can be fully implemented.
[7] Notification of succession.
[8] With a statement that this does not imply the recognition of any territory or régime not recognized by this state.
[9] 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.
[10] The Netherlands stated that the ratification is also valid for Surinam and the Netherlands Antilles.

The Treaty of Tlatelolco

[1] Argentina stated that it understands Article 18 as recognizing the right of the 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.

Treaty of Tlatelolco	Non-Proliferation Treaty	Sea-Bed Treaty	BW Convention
		R: 9 Oct. 1972 L 1 Nov. 1972 W	

[2] The Treaty is in force for this country due to a declaration, annexed to the instrument of ratification (in the case of Colombia the declaration was made subsequent to the deposit of ratification—on 6 September 1972) in accordance with § 2 of Article 28, which waived the requirements specified in § 1 of that article, namely, that all states in the region deposit the instruments of ratification; that Additional Protocol I and Additional Protocol II be signed and ratified by those states to which they apply; and that agreements on safeguards be concluded with the IAEA.

[3] On signing the Treaty, Brazil stated that, according to its interpretation, Article 18 of the Treaty gives the signatories the right to carry out, by their own means or in association with third parties, nuclear explosions for peaceful purposes, including explosions which involve devices similar to those used in nuclear weapons.

[4] Brazil stated that it did not waive the requirements laid down in Article 28 of the Treaty. (The Treaty is therefore not yet in force for Brazil.) In ratifying the Treaty, Brazil reiterated its interpretation of Article 18, which it made upon signing.

[5] In signing the Treaty, Mexico said that if technological progress makes it possible to differentiate between nuclear weapons and nuclear devices for peaceful purposes it will be necessary to amend the relevant provisions of the Treaty, according to the procedure established therein.

[6] The Netherlands stated that the Protocol shall not be interpreted as prejudicing the position of the Netherlands as regards its recognition or non-recognition of the rights of or claims to sovereignty of the parties to the Treaty, or of the grounds on which such claims are made. With respect to nuclear explosions for peaceful purposes on the territory of Surinam and the Netherlands Antilles no other rules apply than those operative for the parties to the Treaty.

[7] 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.

[8] When signing and ratifying Additional Protocol I and Additional Protocol II, the United Kingdom made the following declarations of understanding:

In connection with Article 3, defining the term "territory" as including the territorial sea, air space and any other space over which the state exercises sovereignty in accordance with "its own legislation", the UK does not regard its signing or ratification of the Additional Protocols as implying recognition of any legislation which does not, in its view, comply with the relevant rules of international law.

The Treaty does not permit the parties to carry out explosions of nuclear devices for peaceful purposes unless and until advances in technology have made possible the development of devices for such explosions which are not capable of being used for weapons purposes.

Its signing and ratification 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 re-consider the extent to which it could be regarded as committed by the provisions of Additional Protocol II.

In addition, the UK declared that its undertaking under Article 3 of Additional Protocol II not to use or threaten to use nuclear weapons against the parties to the Treaty extends also to territories in respect of which the undertaking under Article 1 of Additional Protocol I becomes effective.

[9] The United States signed and ratified Additional Protocol II with the following understandings and declarations:

In connection with Article 3 defining the term "territory" as including the territorial sea, air space 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.

Paragraph 4 of Article 18 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 paragraph 2 of Article 4 of the Treaty, in the same manner as Protocol II requires it to act with respect to the territories of the parties.

[10] The Safeguards Agreement was concluded in accordance with Article III of the NPT. An additional protocol provides that the safeguards under the NPT shall also apply to Uruguay's obligations under Article 13 of the Treaty of Tlatelolco.

[11] Venezuela stated that in view of the existing controversy between Venezuela on the one hand and the United Kingdom and Guyana on the other, § 2 of Article 25 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.

[12] The Treaty is not yet in force for Trinidad and Tobago; the requirements laid down in Article 28 of the Treaty have not been waived.

The Non-Proliferation Treaty

[1] On signing the Treaty, Australia stated, *inter alia*, that it wanted to be assured that there was sufficient degree of support for the Treaty, regarded it as essential that the Treaty should not affect security commitments under existing treaties of mutual security, and considered that the safeguards agreement to be concluded by Australia with the IAEA in accordance with Treaty Art. III must in no way subject Australia to treatment less favourable than is accorded to other states which, individually or collectively, conclude safeguards agreements with that agency.

[2] Together with a protocol on finance and a protocol suspending the trilateral safeguards agreement between Austria, the USA and the IAEA.

[3] Together with a protocol on finance.

[4] The United States notified its non-acceptance of notification of signature and ratification by the German Democratic Republic.

[5] On signing the Treaty, the Federal Republic of Germany stated, *inter alia*, that it understood that its security shall continue to be ensured by NATO and that the Treaty shall not hamper European unification. It did not intend to ratify the Treaty before an agreement in accordance with Art. III of the Tteaty had been concluded between Euratom and the IAEA, and reaffirmed its view that, until the conclusion of the agreement between the IAEA and Euratom, the supply contracts concluded between Euratom and the parties to the Treaty shall remain in force.

[6] On acceding to the Treaty, the Holy See stated, *inter alia*, that the Treaty will attain in full the objectives of security and peace and justify the limitations to which the states party to the Treaty submit, only if it is fully executed in every clause and with all its implications. This concerns not only the obligations to be applied immediately but also those which envisage a process of ulterior commitments. Among the latter, the Holy See considers it suitable to point out the following:

(a) The adoption of appropriate measures to ensure, on a basis of equality, that all non-nuclear weapon states party to the Treaty will have available to them the benefits deriving from peaceful applications of nuclear technology.

(b) The pursuit of negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international 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 of America, 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. Its decision to sign the Treaty is not to be taken in any way as a decision to ratify the Treaty. Its ratification will be considered after matters of national security, which are of deep concern to the government and people of Indonesia, have been clarified to their satisfaction.

[8] On signing the Treaty, Italy stated, *inter alia*, that in its belief nothing in the Treaty was an obstacle to the unification of the countries of Western Europe; noted full compatibility of the Treaty with the existing security agreements; 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; and that pending the conclusion of the agreement between IAEA and Euratom, the understandings reached on the matter of supplies between Euratom and the signatories to the Treaty would remain in force.

[9] On signing the Treaty, Japan stated, *inter alia*, that pending the ratification of the Treaty it would pay particular attention to developments in disarmament negotiations and progress in the implementation of the UN Security Council resolution on the security of non-nuclear-weapon states, and that the safeguards agreement to be concluded by Japan with the IAEA in accordance with Art. III of the Treaty must not be such as would subject it to disadvantageous treatment as compared with the safeguards agreements which other parties conclude with the agency.

[10] A statement was made containing a disclaimer regarding the recognition of states party to the Treaty.

[11] On signing the Treaty, Mexico stated, *inter alia*, that none of the provisions of the Treaty shall be interpreted as affecting in any way whatsoever the rights and obligations of Mexico as a state party to the Treaty for the Prohibition of Nuclear Weapons in Latin America (Treaty of Tlatelolco).

It is the understanding of Mexico that at the present time any nuclear explosive device is capable of being used as a nuclear weapon and that there is no indication that in the near future it will be possible to manufacture nuclear explosive devices that are not potentially nuclear weapons. However, if technological advances modify this situation, it will be necessary to amend the relevant provisions of the Treaty in accordance with the procedure established therein.

[12] On signing the Treaty, Switzerland stated that the Treaty would not be submitted to Parliament for approval until such time as a sufficient measure of universal support has been obtained by the Treaty.

[13] Notification of succession.

[14] The Treaty was ratified in respect of the United Kingdom of Great Britain and Northern Ireland, the Associated States (Antigua, Dominica, Grenada, Saint Christopher-Nevis-Anguilla and Saint Lucia) and Territories under the territorial sovereignty of the United Kingdom, as well as the State of Brunei, the Kingdom of Tonga and the British Solomon Islands Protectorate. The United Kingdom recalled its view that if a régime is not recognized as the government of a state, neither signature nor the deposit of any instrument by it, nor notification of any of those acts will bring about recognition of that régime by any other state. The provisions of the Treaty shall not apply in regard to Southern Rhodesia unless and until the government of the United Kingdom informs the other depositary governments that it is in a position to ensure that the obligations imposed by the Treaty in respect of that territory can be fully implemented; Cameroon stated that it was unable to accept this reservation made by the United Kingdom.

[15] Together with a Protocol on finance and a Protocol relating to Article 13 of the Treaty of Tlatelolco.

[16] In connection with the ratification of the Treaty, Yugoslavia stated, *inter alia*, that it considered a ban on the development, manufacture and use of nuclear weapons and 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 the progress in this direction rested with the nuclear-weapon powers, and expected these powers to undertake not to use nuclear weapons against the countries which have renounced them as well as against non-nuclear-weapon states in general, and to refrain from the threat to use them. It also emphasized the significance it attached to the universality of the efforts relating to the realization of the NPT.

[17] Entry into force is subject to notification that the statutory and constitutional requirements for entry into force have been met.

[18] Together with a Protocol for states having minimal quantities of nuclear material.

[19] Together with a Protocol for states that have signed a Treaty of accession to EURATOM.

[20] Together with a Protocol suspending the trilateral safeguards agreement between the IAEA, Denmark and the UK; and a Protocol suspending the trilateral safeguards agreement between the IAEA, Denmark and the USA.

[21] Together with a Protocol suspending the trilateral safeguards agreement between the IAEA, Greece and the USA.

[22] Covers the NPT and the Treaty of Tlatelolco.

[23] Australia deposited the instrument of ratification on 23 January 1973 in London, Moscow and Washington.

The Sea-Bed Treaty

[1] On signing the Treaty, Argentina made an interpretative declaration. It stated that it interprets the references to the freedoms of the high seas as in no way implying a pronouncement or judgment 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] The United States has not accepted the notification of signature by the German Democratic Republic.

[4] On signing the Treaty, the Federal Republic of Germany stated that its signature does not imply recognition of the German Democratic Republic under international law.

[5] 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.
[6] A statement was made containing a disclaimer regarding the recognition of states party to the Treaty.
[7] The instrument of ratification states that the Treaty is ratified in respect of the United Kingdom of Great Britain and Northern Ireland, the Associated States (Antigua, Dominica, Grenada, St. Christopher-Nevis-Anguilla, St. Lucia and St. Vincent) and Territories under the territorial sovereignty of the United Kingdom, as well as the State of Brunei and the British Solomon Islands Protectorate. The United Kingdom recalled its view that if a régime is not recognized as the government of a state, neither signature nor the deposit of any instrument by it, nor notification of any of those acts, will bring about recognition of that régime by any other state.
[8] 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 seabed 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 seabed 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 seabed 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 seabed zone referred to in Article I and defined in Article II.
[9] Australia deposited the instrument of ratification on 23 January 1973 in London, Moscow and Washington.
[10] Romania stated that it considered null and void the ratification of the Treaty by the Taiwan authorities.

The BW Convention

[1] Ireland considers that the Convention could be undermined if reservations made by the Parties to the 1925 Geneva Protocol were allowed to stand, as the prohibition of possession is incompatible with the right to retaliate, and that there should be an absolute and universal prohibition of the use of the weapons in question. Ireland notified the depositary government for the Geneva Protocol of the withdrawal of its reservations to the Protocol, made at the time of accession in 1930. The withdrawal applies to chemical as well as to bacteriological (biological) and toxin agents of warfare.
[2] The Republic of Korea stated that the signing of the Convention does not in any way mean or imply the recognition of any territory or régime which has not been recognized by the Republic of Korea as a state or government.
[3] In the understanding of Kuwait, its ratification of the Convention does not in any way imply its recognition of Israel, not does it oblige it to apply the provisions of the Convention in respect of the said country.
[4] Mexico considers that the Convention is only a first step towards an agreement prohibiting also the development, production and stockpiling of all chemical weapons, and notes the fact that the Convention contains an express commitment to continue negotiations in good faith with the aim of arriving at such an agreement.
[5] Switzerland stated that the convention would not be submitted to the parliamentary procedure of approval preceding ratification, until such time as the convention has obtained a measure of universal support, considered necessary by the Swiss government. Switzerland reserves the right to decide for itself which means fall under the category of weapon, equipment or means of delivery designed to use biological agents or toxins, to which the Convention is applicable. With regard to Article VII of Convention, Switzerland has made a general reservation, namely, that its cooperation within the framework of the Convention cannot go beyond its obligations resulting from its status of permanent neutrality.
[6] The United Kingdom recalled its view that if a régime is not recognized as the government of a state, neither signature nor the deposit of any instrument by it, nor notification of any of those acts will bring about recognition of that régime by any other state.

Postscript: In addition, by 28 February 1973, India had signed the BW Convention and Brazil, Iceland and Poland had ratified it.

Appendix 13C

Preliminary list of announced and presumed nuclear explosions in 1972

Note

1. The following sources have been used in compiling the list:
   (1) Research Institute of the Swedish National Defence
   (2) US Atomic Energy Commission (AEC)
   (3) US National Oceanic and Atmospheric Administration
   (4) Press reports.
2. The events marked with an asterisk (*) may be part of a programme for peaceful uses of nuclear explosions.
3. The yields given for US explosions are AEC announcements.
4. In the case of weak events, it is impossible to distinguish, through seismological methods only, between chemical and nuclear explosions.
5. m_b, M_s indicate the size of the event; the data have been provided by the Hagfors Observatory.

Date	Coordinates				Region	m_b	M_s	Yield (kt)
	Latitude (deg)		Longitude (deg)					
USSR								
10 Feb	49.986	N	78.886	E	E Kazakh	6.2		
10 Mar	49.755	N	78.180	E	E Kazakh	5.8		
28 Mar	49.730	N	78.186	E	E Kazakh	5.5		
7 Jun	49.761	N	78.175	E	E Kazakh	5.6		
6 Jul	49.724	N	77.979	E	E Kazakh	4.7		
9 Jul	49.9	N	35.2	E	N of Black Sea*	5.0	2.8	
14 Jul	55.8	N	47.4	E	N of Caspian Sea*	3.5		
16 Aug	49.759	N	78.146	E	E Kazakh	5.5		
20 Aug	49.462	N	48.179	E	W Kazakh*	6.0	3.6	
26 Aug	49.994	N	77.781	E	E Kazakh	5.7		
28 Aug	73.336	N	55.085	E	Novaya Zemlya		4.7	
2 Sep	49.957	N	77.726	E	E Kazakh	5.2		
4 Sep	67.689	N	33.445	E	W Russia*		3.1	
21 Sep	52.127	N	51.994	E	W Russia*	5.1		
3 Oct	46.848	N	45.010	E	NW of Caspian Sea*	6.1	3.0	
2 Nov	49.913	N	78.837	E	E Kazakh		3.9	
24 Nov	52.5	N	51.1	E	W Russia*	5.1		
10 Dec	50.1	N	78.1	E	E Kazakh	5.9		
10 Dec	50.2	N	79.0	E	E Kazakh	6.7	4.3	

Date	Coordinates		Region	m_b	M_s	Yield (kt)
	Latitude (deg)	Longitude (deg)				
USA						
19 Apr	37.07.19 N	116.05.02 W	Nevada Test Site			<20
17 May	37.07.14 N	116.05.16 W	Nevada Test Site			<20
19 May	37.03.53 N	116.00.06 W	Nevada Test Site	4.9		<20
20 Jul	37.12.52 N	116.11.00 W	Nevada Test Site	4.8		<20
21 Sep	37.04.55 N	116.02.12 W	Nevada Test Site	5.7	4.1	20–200
26 Sep	37.07.17 N	116.05.09 W	Nevada Test Site			<20
21 Dec	37.0 N	116.6 W	Nevada Test Site	5.1		20–200
France						
25 Jun			Mururoa			
30 Jun			Mururoa			
29 Jul			Mururoa			
China						
7 Jan			Lop Nor			
18 Mar			Lop Nor		4.3	

14. The arms-control experiment in the Antarctic

I. *Introduction*

The Antarctic Treaty, which was signed in Washington on 1 December 1959 and became effective on 23 June 1961, has three main objectives: to ensure that the Antarctic is used only for peaceful purposes; to avert discord over territorial claims; and to establish a foundation for the continuation and development of international cooperation in scientific investigation in the Antarctic. The objectives are closely interrelated.

Negotiations on the treaty began in the wake of the International Geophysical Year (1 July 1957–31 December 1958), which had proved very successful particularly in the scientific exploration of the Antarctic; plans were already being prepared for further research in the Antarctic and the scientific community played an important role in bringing about the agreement. But the prevailing motive was probably political. Rival claims to parts of the Antarctic had made the continent fraught with potential conflict, and it was increasingly urgent to prevent it from becoming a danger zone. The fact that the USA and the USSR had basically similar interests in relation to the Antarctic favoured a speedy solution of the problems involved: each of the two powers was willing to find a framework which would formalize its activity there, and each wanted, without major effort on its own part, to prevent the other from gaining decisive influence in the area.

Now, almost 12 years after the entry into force of the treaty, it is generally conceded that the expectations of both scientists and politicians have been met. Substantial results have been achieved in the field of geophysics, meteorology, glaciology and biology, among others. Peace in the Antarctic has been maintained. The continent has become a model of international cooperation.

The Antarctic Treaty is also considered an important disarmament, or non-armament, agreement, the first of this kind to be concluded after World War II. However, in scientific publications, the disarmament aspect has received less attention than it deserves. This chapter will review those parts of the treaty which deal with the non-militarization of the Antarctic. An attempt will be made to point out the factors likely to endanger its stability. Measures which may contribute to its strengthening will also be suggested. (For the text of the treaty, see appendix 14A.)

II. *Essential disarmament provisions*

The Antarctic Treaty applies to the area south of 60° south latitude, but does not apply to the high seas in that region. The Antarctic is decrlared an area to be used exclusively for peaceful purposes. The declaration is reinforced by the prohibition of any measures of a military nature, such as the establishment of military bases and fortifications, the carrying out of military manoeuvres and the testing of any type of weapons (Article I). Since no military installations existed at the time the treaty was concluded, the prohibition has a preventive force.

The term "peaceful purposes only", as used in the text of the treaty, is equated with "non-military purposes". The non-militarization is to be complete, except for permitting the use of military personnel or equipment for scientific research, or for any other peaceful endeavour. The exception is justified by the fact that military and naval support may be indispensable for mounting large-scale expeditions in the Antarctic. The same formula was later employed in relation to the moon and other celestial bodies under the treaty on principles governing the activities of states in the exploration and use of outer space, including the moon and other celestial bodies.

A ban on nuclear explosions in the Antarctic, whatever their nature, peaceful or military, was also imposed, and the denuclearized status of the area has been strengthened by a prohibition on the disposal there of radioactive waste material (Article V). Thus, the Antarctic Treaty was the first nuclear test-ban accord, albeit a geographically limited one; moreover, it was of a comprehensive nature. It was stipulated that any later international agreements concerning the use of nuclear energy, including nuclear explosions and the disposal of radioactive wastes, would apply in the Antarctic.

From the perspective of more than a decade, it appears that the non-nuclearization clause has been the most important arms-control measure in the Antarctic. Under the present circumstances, when nuclear tests, especially atmospheric tests, are being vigorously opposed in the populated parts of the world, the empty expanses of the Antarctic would have provided an obvious temptation as a testing ground, had it not been for the ban under the Antarctic Treaty. A possibility of setting up nuclear-weapon bases, for example for long-range nuclear-missile carrying submarines, whatever their strategic justification, has also been foreclosed, at least for the parties to the treaty.

However, the number of parties is very small. By 31 December 1972, there were only 17 parties, including 12 founder members and five acceding states (for the list, see p. 436 ff.). This is a weakness of the treaty, especially of its disarmament provisions.

It is true that the 17 parties include most of the world's powers which would be technically and economically capable of engaging in military activities in the Antarctic, if they found it advantageous or necessary to do so. Only a few nations would be in a position to test or install nuclear weapons there. There can be, further, no doubt that participation of militarily significant states in arms-control and disarmament undertakings is of primary importance. But states militarily unimportant at the time the agreements are signed may gradually become important. In a world which is becoming multipolar, as far as the disposition of political and military power is concerned, the value of multilateral undertakings is measured not only by the scope of the commitments contracted, but also by the degree of active acceptance of these commitments (not just acquiescence) by the international community. The broader the adherence to arms-control agreements of universal interest, the more efficacious they are, universality being the ideal goal. There is ample proof that such is the common understanding.

Only four countries were testing nuclear weapons when the Partial Test Ban Treaty was concluded in 1963; and yet, more than 100 states have become party to it within a few years. Only two countries have been conducting substantial activities in outer space or on celestial bodies; and yet nearly 70 states have by now formally adhered to the Outer Space Treaty, signed in 1967. It is doubtful whether any country was technically capable of deploying nuclear and other weapons of mass destruction on the ocean floor, beyond the outer limit of the zone established by the Sea-Bed Treaty, when it was signed in 1971; and yet, more than 40 states have ratified this treaty.

Treaties cannot be binding on states which have not subscribed to them, at least until such time as they may be regarded as stating general international law, which is probably not the case with the Antarctic Treaty. Accordingly, a non-party to the Antarctic Treaty cannot be held responsible for not abiding by prohibitions agreed upon by a restricted group of states. It could decide, for example, to set up a military base in the Antarctic, test a nuclear device and dispose radioactive wastes there, or even put forward a claim to a part of that continent, without violating any of its international obligations. Neither would such a decision by a non-party state contradict Article 2(4) of the UN Charter, prohibiting the threat or use of force against the territorial integrity of states, as long as the territorial claims in the Antarctic have not been universally recognized.

The described eventuality, in addition to the possibility of a party, already present in the Antarctic, breaking away from the treaty,[1] must have been on the minds of the signatories, and there exists a clause in the Antarctic Treaty

[1] Formal withdrawal is only possible 34 years after the date of entry into force of the Treaty, that is, in 1995, and under special circumstances (Article XII).

which is obviously intended to meet those contingencies: each of the parties undertakes to exert appropriate efforts, consistent with the Charter of the United Nations, to the end that no one engages in any activity in the Antarctic contrary to the principles or purposes of the treaty (Article X).

The above clause, though useful, does not offer sufficient guarantee. The key word, "appropriate", may, of course, imply political as well as economic pressure, such as refusal of logistic support and assistance. But political and economic sanctions would not work if a country decided to pursue its goals and if its potential made it sufficiently strong to resist coercion. Unilateral military action, aimed at preventing an activity which is not to the liking of some, would certainly not be legal. Collective action, under the UN Charter, to maintain international peace is possible when the UN Security Council determines the existence of a threat to the peace or breach of the peace, but such determination is usually not easy to reach. It would be difficult to prevent a major power from establishing its military presence in the Antarctic, as long as it is not a party to the Antarctic Treaty.

In spite of such dangers to the Antarctic system, there seems to be no great interest in expanding its membership. The original signatories have not made special efforts to enlist new parties, probably because they have seen no short-term likelihood of new territorial claims arising, or of an attempted military use of the Antarctic by non-parties. As for other states, they may feel no particular urge to participate in a treaty which is marked with exclusiveness, a feature rather unique in a multilateral agreement containing arms-control provisions. Indeed, the treaty recognizes two categories of parties. The signatories, named in the preamble—Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, the USSR, the United Kingdom and the USA—all former participants in the scientific investigations in the Antarctic during the International Geophysical Year, enjoy full rights under the treaty. They are entitled to participate in consultative meetings; they have the right to carry out inspection; they may modify or amend the treaty at any time through an agreement among themselves; they are empowered to decide whether or not non-UN members should be allowed to accede;[2] and only they may call a conference to review the operation of the treaty. The second category of parties are states which acceded to the treaty later; they do not, as yet, have those rights. In effect, they have an inferior status.

Formally speaking, the first group of parties is not closed. It may include other nations, provided that the latter conduct "substantial scientific research

[2] All the more recent multilateral arms-control agreements are open unconditionally to all states.

activity" in the Antarctic, such as the establishment of a scientific station, or the dispatch of a scientific expedition. So far, this has not happened.

Preferential treatment of states having scientific and technical capabilities to engage in the exploration of the Antarctic could be explicable if the treaty dealt only with scientific collaboration. But, with regard to disarmament measures which are of universal concern, the creation of a select club of states holding special privileges cannot be justified. As a mater of fact, the original parties to the Antarctic Treaty would maintain their privileged position even if they ceased to be actively engaged in the Antarctic research.

III. *Verification and consultation*

Each party is obliged to inform the others of all expeditions to and within the Antarctic, of all stations there occupied by its nationals, and of any military personnel or equipment it intends to introduce for scientific research or other peaceful purposes. The correctness of the information provided by the parties does not lend itself to easy checks, but the treaty provides for complete freedom of access by the original parties, at any time, to any or all areas of the Antarctic, including stations, installations and equipment within those areas and all ships and aircraft at points of discharging or embarking cargoes or personnel in the Antarctic. Aerial observation over the Antarctic is allowed (Article VII). In addition, scientific personnel can be exchanged between expeditions and stations; this may also be a form of mutual control (Article III).

Inspectors, while on duty in the Antarctic, and scientific personnel exchanged, remain subject to the jurisdiction of their home state.

The system of verification set up under the Antarctic Treaty is unquestionably far-reaching. At the time of the conclusion of the treaty, the acceptance of on-site inspection and aerial observation by the parties concerned, especially by the Soviet Union, traditionally opposed to this kind of control, was considered as a particularly important event, if not a turning point in the general disarmament debate. However, as borne out by subsequent developments, including the test-ban negotiations, the applicability of the relevant clauses of the Antarctic Treaty to other agreements had been exaggerated.

On-site inspection and, for that matter, aerial observation, on and over an unpopulated area which is remote from the vital interests of major powers, and where there is no universally recognized sovereignty, have not set a positive precedent for disarmament or arms-control measures where military interests and sovereignty of states are directly involved. In any event, it was certainly not the Soviet Union, which has never claimed sovereignty over any part of

the Antarctic, that made a concession by agreeing to such control. Moreover, both types of verification, which in the late 1950s seemed indispensable to ensure observance of arms-control agreements, have by now lost much of their importance. It has turned out that the principle of on-site inspection is not at all immutable; other means of verification may be more reliable to monitor different kinds of arms limitations. Aerial observation can nowadays be successfully replaced by reconnaissance through Earth satellites (see chapter 3, p. 60).

If anything, the Antarctic model of verification could have some negative repercussions for other arms-control agreements. As pointed out above, only certain countries, namely the original parties and the acceding states conducting substantial scientific research activity in the Antarctic, are entitled to designate observers to carry out inspection and aerial observation (Article VII). Others are not.

The countries not directly participating in the Antarctic activities may not possess the means necessary for verification in the hostile environment of the Antarctic, but this circumstance cannot and should not be an excuse for inequitable treatment under the treaty. All the parties undertake the same obligations. Each party should therefore have the same rights to make certain that the obligations are being complied with by others and that the Treaty functions properly.

In fact, the discrimination goes further. Not all the parties formally entitled to carry out inspection or aerial observation may be economically and technically capable to do so, in any event not as often as the major powers. There is nothing in the treaty preventing verification from being conducted jointly by a "have" and a "have-not" state. However, the decision to inspect would no doubt belong to the "have" state, and it is this state that would choose the partner. A joint inspection was undertaken in 1963 by Australia and the United Kingdom, but neither of these countries can be described as a "have-not" country.

Inspection operations in the Antarctic are costly, but since their principal aim, as under most arms-control agreements, is to deter violations, they may be conducted even less often than heretofore, unless specific complaints justify higher frequency. In the six inspections carried out since the treaty entered into force—three by the USA (in 1964, 1967 and 1971), one by Argentina (in 1965), one by New Zealand (in 1963) and one by Australia and the United Kingdom (in 1963)—the decision to inspect was admittedly taken not in anticipation that there had been treaty violations which should be detected, but rather to assert the right to inspect. As a matter of fact, none of the inspections has revealed activities contrary to the spirit and purposes of the treaty.

The credibility of a multilateral arms-control agreement requires that

inspection should be open to all parties, irrespective of the degree of their economic and scientific development, and that all parties should be associated, in one way or another, with verification procedures.

It is significant that while the Outer Space Treaty of 1967 still followed the principle of reciprocity of inspection, as embodied in the Antarctic Treaty, at the insistence of small and medium-sized nations, the Sea-Bed Treaty, signed four years later, has accorded each party the right of verification by its own means, or with the full or partial assistance of any other party, or through appropriate international procedures within the framework of the United Nations and in accordance with its Charter.

The Antarctic Treaty provides for periodic meetings for the purpose of exchanging information, consulting on matters of common interest pertaining to the Antarctic, and formulating pertinent recommendations to the governments. By the end of 1972, seven consultative meetings had been held: in 1961 in Canberra, in 1962 in Buenos Aires, in 1964 in Brussels, in 1966 in Paris, in 1968 in Santiago, in 1970 in Tokyo and in 1972 in Wellington.

The consultations proved a useful mechanism in furthering the objectives of the treaty. They may also be helpful in resolving possible disputes among the parties. But, again, only the original parties and others that have acceded to the treaty and are conducting substantial research activity in the Antarctic are entitled to participate in these meetings. The governments represented at the meetings must approve recommendations on specific problems before they become effective; the approval of all such governments is required. They thus form a kind of "law-making authority". It goes without saying that those are the parties which can meaningfully discuss measures regarding facilitation of international scientific cooperation, or preservation and conservation of the living resources, or even some questions relating to the exercise of jurisdiction in the Antarctic, because they are physically on the spot. But matters regarding the use of the Antarctic for peaceful purposes only, and the exercise of the right of inspection, which are covered by the terms of reference of the consultative meetings, are of concern to all, including countries not yet present in the Antarctic. It would seem to be more in line with the principle of the sovereign equality of states, and also with current practice, if questions which may arise relating to disarmament and affecting the security of nations were considered together by the original and acceding parties, and if all parties participated in the "law-making process" concerning those matters.

IV. *Conclusions*

The Antarctic Treaty has so far not encountered any special problems as far as its implementation is concerned. It seems to have been successful both

in scientific and political terms. But the real strength of a treaty may manifest itself when there is a serious conflict of interests.

The Antarctic Treaty implies neither renunciation nor recognition of previously asserted rights of or claims to territorial sovereignty in the Antarctic, and prohibits the making of new claims, the enlarging of existing claims and the use of activities there as a basis for asserting, supporting or denying territorial claims (Article IV). The moratorium on claims was deemed to be a great achievement. In actual fact, it was rather a palliative. The territorial *status quo* is being steadily eroded in favour of the USA and the USSR which, not being formal claimants themselves, do not recognize the claims of others and, because they possess the capability, are most active in the Antarctic and establish their *de facto* presence through scientific stations all over the continent. If the treaty ever terminated, it would probably be impossible for other states to vindicate the claims to territory in the areas of substantial US and Soviet activities. In spite of this development, it may still be possible to maintain a separation between scientific cooperation and political interests. A similar division between political and economic interests is hardly conceivable.

Intensive scientific exploration can bring nearer the day when exploitation of mineral resources of the Antarctic, as yet untapped, will become a practical proposition. If and when this happens, and the territorial possessions in the Antarctic become valuable assets, a struggle for national rights may erupt among the old claimants—Argentina, Australia, Chile, France, New Zealand, Norway and the UK (especially among Argentina, Chile and the UK whose claims overlap)—between them and other powers now active in the Antarctic, and possibly "third states", that is, new arrivals demanding their share. In order to assert property rights to any part of the Antarctic against other contenders, and to guard against infringements on their economic activities, some nations, particularly those that are not parties to the Antarctic Treaty, may resort to military measures. The whole legal order would then break down, and the Antarctic would cease to be a non-militarized zone. It is not likely that all this could happen in the near future, but there is a growing awareness that economic exploitation of the Antarctic will require agreed regulations to prevent dangerous developments of the kind described above.

Claims to sovereignty in the Antarctic have a long history. They were put forward mostly on the grounds of discovery, prestige being a prime incentive, and, in the case of the Latin American countries, also on the ground of geographical proximity and territorial continuity.

In the present-day world, claims to unilateral annexation based on the nationality of a few individuals—navigators and explorers—who happened to be the first to reach the Antarctic shores, seem anachronistic. Other

arguments, including geographical and geological, are considered by most states as even less valid with regard to the Antarctic. There is no logical explanation for the fact that the most isolated area on our globe, with no permanent population, an area which has never been effectively occupied and over which nobody has ever exercised effective control, is not yet generally considered as a common heritage of mankind. As regards resources, in a *res communis omnium* they should be exploited in the interest of mankind, in the same way as the sea-bed and ocean floor, beyond the limits of national jurisdiction, are planned to be used. The two areas have characteristics which, from the legal point of view, render them similar to one another.

Joint control of economic and other activities in the Antarctic, exercised by a handful of nations capable of scientific exploration, even if accepted by the countries concerned, may not be satisfactory to others. One could, of course, envisage repartition of the Antarctic among all states of the world. But such an approach would present insurmountable practical difficulties. It should be noted that outer space, the moon and other celestial bodies have been recognized as not subject to national appropriation, notwithstanding the fact that there is little prospect for more space powers emerging soon. The regions which are now being explored and put to use due to technological advances should be placed under identical rules.

Internationalization of the Antarctic, whatever its organizational form, seems to be the fairest solution. It would remove sources of inter-state friction and conflict, and by ensuring neutralization it would serve to protect the security of the present claimants and of the rest of the world.

Thus, the stability of the non-militarization régime in the Antarctic will in the last analysis depend on the extent to which limitations upon sovereignty in the area will be accepted. The working out of a settlement satisfactory to all would be a long and painful process, because of the tenacity with which some governments cling to their conservative views, and also because of the emotional aspects of sovereignty issues. In the meantime, however, measures could be taken to minimize the risks of surprise militarization and of use of force, as well as of other action contrary to the spirit of the Antarctic Treaty, on the part of states not yet bound by the treaty obligations. The most obvious step in this direction is to make the treaty universal or almost universal.

But given the present structure of the Antarctic Treaty, wide adherence to it cannot be expected. Provisions such as those included in the treaty would certainly not be acceptable in a multilateral arms-control agreement negotiated under the present international conditions. The principle of sovereign equality of nations with regard to arms-control and disarmament measures of universal interest would have to be recognized and enforced if participation of more

states were to be encouraged. To achieve this, the treaty would not necessarily need to be re-negotiated. Neither would it be necessary to wait for a review conference which can be held at the request of the original parties only 30 years after the date of entry into force of the treaty. The innovation could be made under Article XII, at any time, through an agreed amendment.

To summarize, the arms-control provisions of the Antarctic Treaty, which constituted progress at the time the treaty was signed, fall short of being fully satisfactory now. They do not meet the standards for multilateral arms-control measures, developed during the past decade. If appropriate steps are not taken in due time, the efficacy of the treaty may gradually weaken to the detriment of the Antarctic system.

Appendix 14A

The Antarctic Treaty

The Governments of Argentina, Australia, Belgium, Chile, the French Republic, Japan, New Zealand, Norway, the Union of South Africa, the Union of Soviet Socialist Republics, the United Kingdom of Great Britain and Northern Ireland, and the United States of America,

Recognizing that it is in the interest of all mankind that Antarctica shall continue forever to be used exclusively for peaceful purposes and shall not become the scene or object of international discord;

Acknowledging the substantial contributions to scientific knowledge resulting from international cooperation in scientific investigation in Antarctica;

Convinced that the establishment of a firm foundation for the continuation and development of such cooperation on the basis of freedom of scientific investigation in Antarctica as applied during the International Geophysical Year accords with the interests of science and the progress of all mankind;

Convinced also that a treaty ensuring the use of Antarctica for peaceful purposes only and the continuance of international harmony in Antarctica will further the purposes and principles embodied in the Charter of the United Nations;

Have agreed as follows:

ARTICLE I

1. Antarctica shall be used for peaceful purposes only. There shall be prohibited, *inter alia*, any measures of a military nature, such as the establishment of military bases and fortifications, the carrying out of military maneuvers, as well as the testing of any type of weapons.

2. The present Treaty shall not prevent the use of military personnel or equipment for scientific research or for any other peaceful purpose.

ARTICLE II

Freedom of scientific investigation in Antarctica and cooperation toward that end, as applied during the International Geophysical Year, shall continue, subject to the provisions of the present Treaty.

ARTICLE III

1. In order to promote international cooperation in scientific investigation in Antarctica, as provided for in Article II of the present Treaty, the Contracting Parties agree that, to the greatest extent feasible and practicable:

(*a*) information regarding plans for scientific programs in Antarctica shall be exchanged to permit maximum economy and efficiency of operations;

(*b*) scientific personnel shall be exchanged in Antarctica between expeditions and stations;

(*c*) scientific observations and results from Antarctica shall be exchanged and made freely available.

2. In implementing this Article, every encouragement shall be given to the establishment of cooperative working relations with those Specialized Agencies of the United Nations and other international organizations having a scientific or technical interest in Antarctica.

ARTICLE IV

1. Nothing contained in the present Treaty shall be interpreted as:

(*a*) a renunciation by any Contracting Party of previously asserted rights of or claims to territorial sovereignty in Antarctica;

(*b*) a renunciation or diminution by any Contracting Party of any basis of claim to territorial sovereignty in Antarctica which it may have whether as a result of its activities or those of its nationals in Antarctica, or otherwise;

(*c*) Prejudicing the position of any Contracting Party as regards its recognition or non-recognition of any other State's right of or claim or basis of claim to territorial sovereignty in Antarctica.

2. No acts or activities taking place while the present Treaty is in force shall constitute a basis for asserting, supporting or denying a claim to territorial sovereignty in Antarctica or create any rights of sovereignty in Antarctica. No new claim, or enlargement of an existing claim, to territorial sovereignty in Antarctica shall be asserted while the present Treaty is in force.

ARTICLE V

1. Any nuclear explosions in Antarctica and the disposal there of radioactive waste material shall be prohibited.

2. In the event of the conclusion of international agreements concerning the use of nuclear energy, including nuclear explosions and the disposal of radioactive waste material, to which all of the Contracting Parties whose representatives are entitled to participate in the meetings provided for under Article IX are parties, the rules established under such agreements shall apply in Antarctica.

ARTICLE VI

The provisions of the present Treaty shall apply to the area south of 60°South Latitude, including all ice shelves, but nothing in the present Treaty shall prejudice or in any way affect the rights, or the exercise of the rights, of any State under international law with regard to the high seas within that area.

ARTICLE VII

1. In order to promote the objectives and ensure the observance of the provisions of the present Treaty, each Contracting Party whose representatives are entitled to participate in the meetings referred to in Article IX of the Treaty shall have the right to designate observers to carry out any inspection provided for by the present Article. Observers shall be nationals of the Contracting Parties which designate them. The names of observers shall be communicated to every other Contracting Party having the right to designate observers, and like notice shall be given of the termination of their appointment.

2. Each observer designated in accordance with the provisions of paragraph 1 of this Article shall have complete freedom of access at any time to any or all areas of Antarctica.

3. All areas of Antarctica, including all stations, installations and equipment within those areas, and all ships and aircraft at points of discharging or embarking cargoes or personnel in Antarctica, shall be open at all times to inspection by any observers designated in accordance with paragraph 1 of this Article.

4. Aerial observation may be carried out at any time over any or all areas of Antarctica by any of the Contracting Parties having the right to designate observers.

5. Each Contracting Party shall, at the time when the present Treaty enters into force for it, inform the other Contracting Parties, and thereafter shall give them notice in advance, of

(*a*) all expeditions to and within Antarctica, on the part of its ships or nationals, and all expeditions to Antarctica organized in or proceeding from its territory;

(*b*) all stations in Antarctica occupied by its nationals; and

(*c*) any military personnel or equipment intended to be introduced by it into Antarctica subject to the conditions prescribed in paragraph 2 of Article I of the present Treaty.

ARTICLE VIII

1. In order to facilitate the exercise of their functions under the present Treaty, and without prejudice to the respective positions of the Contracting Parties relating to jurisdiction over all other persons in Antarctica, observers desig-

nated under paragraph 1 of Article VII and scientific personnel exchanged under subparagraph 1 (b) of Article III of the Treaty, and members of the staffs accompanying any such persons, shall be subject only to the jurisdiction of the Contracting Party of which they are nationals in respect of all acts or omissions occurring while they are in Antarctica for the purpose of exercising their functions.

2. Without prejudice to the provisions of paragraph 1 of this Article, and pending the adoption of measures in pursuance of subparagraph 1(e) of Article IX, the Contracting Parties concerned in any case of dispute with regard to the exercise of jurisdiction in Antarctica shall immediately consult together with a view to reaching a mutually acceptable solution.

ARTICLE IX

1. Representatives of the Contracting Parties named in the preamble to the present Treaty shall meet at the City of Canberra within two months after the date of entry into force of the Treaty, and thereafter at suitable intervals and places, for the purpose of exchanging information, consulting together on matters of common interest pertaining to Antarctica, and formulating and considering, and recommending to their Governments, measures in furtherance of the principles and objectives of the Treaty, including measures regarding:

(*a*) use of Antarctica for peaceful purposes only;

(*b*) facilitation of scientific research in Antarctica;

(*c*) facilitation of international scientific cooperation in Antarctica;

(*d*) facilitation of the exercise of the rights of inspection provided for in Article VII of the Treaty;

(*e*) questions relating to the exercise of jurisdiction in Antarctica;

(*f*) preservation and conservation of living resources in Antarctica.

2. Each Contracting Party which has become a party to the present Treaty by accession under Article XIII shall be entitled to appoint representatives to participate in the meetings referred to in paragraph 1 of the present Article, during such time as that Contracting Party demonstrates its interest in Antarctica by conducting substantial scientific research activity there, such as the establishment of a scientific station or the despatch of a scientific expedition.

3. Reports from the observers referred to in Article VII of the present Treaty shall be transmitted to the representatives of the Contracting Parties participating in the meetings referred to in paragraph 1 of the present Article.

4. The measures referred to in paragraph 1 of this Article shall become effective when approved by all the Contracting Parties whose representatives were entitled to participate in the meetings held to consider those measures.

5. Any or all of the rights established in the present Treaty may be exercised

as from the date of entry into force of the Treaty whether or not any measures facilitating the exercise of such rights have been proposed, considered or approved as provided in this Article.

ARTICLE X

Each of the Contracting Parties undertakes to exert appropriate efforts, consistent with the Charter of the United Nations, to the end that no one engages in any activity in Antarctica contrary to the principles or purposes of the present Treaty.

ARTICLE XI

1. If any dispute arises between two or more of the Contracting Parties concerning the interpretation or application of the present Treaty, those Contracting Parties shall consult among themselves with a view to having the dispute resolved by negotiation, inquiry, mediation, conciliation, arbitration, judicial settlement or other peaceful means of their own choice.

2. Any dispute of this character not so resolved shall, with the consent, in each case, of all parties to the dispute, be referred to the International Court of Justice for settlement; but failure to reach agreement on reference to the International Court shall not absolve parties to the dispute from the responsibility of continuing to seek to resolve it by any of the various peaceful means referred to in paragraph 1 of this Article.

ARTICLE XII

1. (*a*) The present Treaty may be modified or amended at any time by unanimous agreement of the Contracting Parties whose representatives are entitled to participate in the meetings provided for under Article IX. Any such modification or amendment shall enter into force when the depositary Government has received notice from all such Contracting Parties that they have ratified it.

(*b*) Such modification or amendment shall thereafter enter into force as to any other Contracting Party when notice of ratification by it has been received by the depositary Government. Any such Contracting Party from which no notice of ratification is received within a period of two years from the date of entry into force of the modification or amendment in accordance with the provisions of subparagraph 1(a) of this Article shall be deemed to have withdrawn from the present Treaty on the date of the expiration of such period.

2. (*a*) If after the expiration of thirty years from the date of entry into force of the present Treaty, any of the Contracting Parties whose representatives are entitled to participate in the meetings provided for under Article IX so requests by a communication addressed to the depositary Government, a Conference

of all the Contracting Parties shall be held as soon as practicable to review the operation of the Treaty.

(*b*) Any modification or amendment to the present Treaty which is approved at such a Conference by a majority of the Contracting Parties there represented, including a majority of those whose representatives are entitled to participate in the meetings provided for under Article IX, shall be communicated by the depositary Government to all the Contracting Parties immediately after the termination of the Conference and shall enter into force in accordance with the provisions of paragraph 1 of the present Article.

(*c*) If any such modification or amendment has not entered into force in accordance with the provisions of subparagraph 1(a) of this Article within a period of two years after the date of its communication to all the Contracting Parties, any Contracting Party may at any time after the expiration of that period give notice to the depositary Government of its withdrawal from the present Treaty; and such withdrawal shall take effect two years after the receipt of the notice by the depositary Government.

ARTICLE XIII

1. The present Treaty shall be subject to ratification by the signatory States. It shall be open for accession by any State which is a Member of the United Nations, or by any other State which may be invited to accede to the Treaty with the consent of all the Contracting Parties whose representatives are entitled to participate in the meetings provided for under Article IX of the Treaty.

2. Ratification of or accession to the present Treaty shall be effected by each State in accordance with its constitutional processes.

3. Instruments of ratification and instruments of accession shall be deposited with the Government of the United States of America, hereby designated as the depositary Government.

4. The depositary Government shall inform all signatory and acceding States of the date of each deposit of an instrument of ratification or accession, and the date of entry into force of the Treaty and of any modification or amendment thereto.

5. Upon the deposit of instruments of ratification by all the signatory States, the present Treaty shall enter into force for those States and for States which have deposited instruments of accession. Thereafter the Treaty shall enter into force for any acceding State upon the deposit of its instrument of accession.

6. The present Treaty shall be registered by the depositary Government pursuant to Article 102 of the Charter of the United Nations.

ARTICLE XIV

The present Treaty, done in the English, French, Russian and Spanish languages, each version being equally authentic, shall be deposited in the archives of the Government of the United States of America, which shall transmit duly certified copies thereof to the Governments of the signatory and acceding States.

IN WITNESS WHEREOF, the undersigned Plenipotentiaries, duly authorized, have signed the present Treaty.

Done at Washington this first day of December, one thousand nine hundred and fifty-nine.

15. Chronology of major events related to disarmament issues

January–December 1972

9 January The Japanese Ministry for Foreign Affairs issues a statement expressing regret over the nuclear-weapon test conducted by China. Japan requests the People's Republic of China not to carry out such tests in the future.

10 January In a talk with Japanese newsmen, the Head of State of the Democratic People's Republic of Korea proposes a drastic cut in the armed forces of both North and South Korea if the US troops are withdrawn from South Korea.

26 January In a declaration on peace, security and cooperation in Europe, issued by the Political Consultative Committee of the Warsaw Treaty States, meeting in Prague, a belief is expressed that agreement on reducing armed forces and armaments in Europe would help to strengthen European security and that the question of reducing armed forces and armaments in Europe, both foreign and national, should be solved in such manner as not to be to the detriment of the countries taking part in such reduction. The examination and determination of ways towards solving this question should not be the prerogative of the existing military-political alliances in Europe.

8 February The UK Foreign Secretary states at a press conference in New Delhi that Britain wishes to maintain a minimal presence in the Indian Ocean and that the area should not be the monopoly of any single power.

14 February In a joint communiqué on the establishment of diplomatic relations between Mexico and the People's Republic of China, the Chinese government supports the position of Mexico and other Latin American states on the establishment of a nuclear weapon-free zone in Latin America and holds that all nuclear-weapon states should undertake the obligation not to use nuclear weapons against the zone or states indicated above.

27 February In a joint communiqué, issued in Shanghai as a result of the US President's visit to China, the USA affirms the ultimate objective of the withdrawal of all US forces and military installations from Taiwan. It declares that in the meantime it will progressively reduce its forces and military installations on Taiwan as the tension in the area diminishes.

17 March In a letter to the UN Secretary-General, the Soviet Union formulates basic guiding principles for the conduct of UN peacekeeping operations, including UN observer missions.

18 March The Prime Ministers of India and Bangla Desh declare that the Indian Ocean area should be kept free of great-power rivalries and military competition. They express their opposition to the creation of land, air and naval bases in the area and their determination to endeavour to make the Indian Ocean area a nuclear-free zone.

21 March The Japanese Ministry for Foreign Affairs expresses regret over the nuclear-weapon test conducted by China, and says that the test again contaminated the atmosphere, directly threatening the people of Japan.

26 March The Prime Minister of New Zealand announces that New Zealand has protested to France over the reported decision to conduct atmospheric nuclear-weapon tests.

28 March The Soviet Union, Bulgaria, Czechoslovakia, Hungary, Mongolia, Poland and Romania submit to the Conference of the Committee on Disarmament (CCD) a draft convention on the prohibition of the development, production and stockpiling of chemical weapons and on their destruction.

28 March The Soviet representative to the CCD announces Soviet support for Romania's proposal to establish a nuclear weapon-free zone in the Balkans.

29 March The Australian Minister for Foreign Affairs says that, in a note to the French authorities, Australia expressed opposition to and concern about the intention of France to resume atmospheric nuclear-weapon tests.

30 March The New Zealand Minister of Foreign Affairs states that a protest was conveyed to the French government about the latter's intention to hold a further series of nuclear-weapon tests in the Pacific.

30 March The USA submits a memorandum to the UN Secretary-General on the establishment and conduct of UN peacekeeping operations which are authorized by the Security Council.

2 April The President of Cyprus states his readiness to discuss the working out of a plan for the abolition by the Greek and Turkish communities of military posts on the island, especially at points of confrontation, for the reduction of the armed forces and for general disarmament by stages.

10 April The Convention on the prohibition of the development, production and stockpiling of bacteriological (biological) and toxin weapons and on their destruction is opened for signature in Washington, London and Moscow.

2 May The Indian Defence Minister says in the Lok Sabha, the Lower House of the Indian Parliament, that the Indian Atomic Energy Commission is studying the technology of conducting underground nuclear explosions for peaceful purposes.

3 May–3 June The International Committee of the Red Cross holds a conference of government experts on the reaffirmation and development of international humanitarian law applicable in armed conflicts.

15 May In a letter to the Japanese Minister for Foreign Affairs on the occasion of the return of the administrative rights over the Ryukyu Islands and the Daito Islands to Japan, the US Secretary of State declares that "the assurances of the government of the United States of America concerning nuclear weapons on Okinawa have been fully carried out".

17 May The United Nations Conference on Trade and Development (UNCTAD) adopts a resolution to the effect that the resources freed by disarmament measures should be used to finance economic and social programmes, particularly in developing countries.

18 May The Treaty on the prohibition of the emplacement of nuclear weapons and other weapons of mass destruction on the sea-bed and the ocean floor and in the subsoil thereof, which was opened for signature on 11 February 1971, enters into force.

24 May In a communiqué, issued in Brussels, the NATO Defence Planning Committee (ministerial session) states that the overall military capability of NATO should not be reduced except as part of a pattern of mutual force reductions balanced in scope and timing.

25 May The Agreement between the USA and the USSR on the prevention of incidents on and over the high seas is signed in Moscow.

26 May Two agreements are signed in Moscow between the USA and the USSR relating to nuclear arms control: the Treaty on the limitation of anti-ballistic missile systems (ABM Treaty) and the Interim Agreement on certain measures with respect to the limitation of strategic offensive arms. A Protocol to the Interim Agreement, specifying numerical levels of modern ballistic missile submarines and ballistic missile launchers on submarines, as well as replacement procedures, is also signed.

29 May In a Statement of Basic Principles of mutual relations between the USA and the USSR, issued in Moscow, the parties declare that they will do their utmost to avoid military confrontations and to prevent the outbreak of nuclear war. They agree to continue their efforts to limit armaments on a

bilateral as well as on a multilateral basis, and to continue to make special efforts to limit strategic armaments.

29 May A joint Soviet–US communiqué, issued in Moscow, states that the two sides intend to continue active negotations for the limitation of strategic offensive arms, that they will actively participate in negotations aimed at working out new measures designed to curb and end the arms race, the ultimate purpose being general and complete disarmament, and that a world disarmament conference could play a role in this process at an appropriate time. A belief is also expressed that the goal of ensuring stability and security in Europe would be served by a reciprocal reduction of armed forces and armaments, first of all in Central Europe.

31 May At the North Atlantic Council Meeting in Bonn, the ministers representing countries which participate in NATO's Integrated Defence Programme propose that multilateral explorations on mutual and balanced force reductions be undertaken as soon as practicable, either before, or in parallel with, multilateral preparatory talks on a conference on security and cooperation in Europe. The ministers also state that unilateral force reductions would detract from the Alliance's efforts to achieve greater stability and détente and would jeopardize the prospects for mutual and balanced force reductions.

2 June At a meeting of the Central Treaty Organization (CENTO), held in London, the US Secretary of State says that the fire-power and overall quality of the US naval presence in the Indian Ocean is to be improved through the replacement of the three ageing warships at present stationed there by more modern types.

3 June The quadripartite agreement on Berlin, signed by France, the UK, the USA and the USSR on 3 September 1971, enters into force.

3 June The Treaty between the Federal Republic of Germany and the USSR, signed on 12 August 1970, enters into force. The parties undertake to refrain from the threat or use of force in questions concerning security in Europe and international security, as well as in their mutual relations.

3 June The Treaty between the Federal Republic of Germany and Poland on the normalization of relations between the two states, signed on 7 December 1970, enters into force. The parties reaffirm the inviolability of their existing frontiers and agree to refrain from any threat or use of force.

7–13 June At an informal conference held in Tokyo, representatives of scientific institutions from Canada, Japan and Sweden agree on measures to improve cooperation among the three countries in the detection of underground nuclear explosions by seismological means.

9 June A law enters into force in France prohibiting the development, production, retention, stockpiling, acquisition and transfer of biological and toxin weapons.

14 June At the UN Conference on the Human Environment, held in Stockholm, a resolution is adopted condemning nuclear-weapon tests, particularly those in the atmosphere, and urging countries planning tests to abandon them since they can involve an increase in the contamination of the environment.

14 June In a letter to the CCD, the permanent representative of Peru to the UN protests against the series of tests of nuclear weapons in the atmosphere which France intends to continue in the Pacific.

14 June The Prime Ministers of Western Samoa, Tonga and Fiji, the Premier of the Cook Islands and representatives of the Niue and Gilbert and Ellice Islands governments adopt a resolution protesting against nuclear-weapon testing in the Pacific.

16 June The UN Conference on the Human Environment adopts a declaration to the effect that Man and his environment must be spared the effects of nuclear weapons and all other means of mass destruction, and that states must strive to reach prompt agreement, in the relevant international organs, on the elimination and complete destruction of such weapons.

20 June In a letter to the CCD, Australia and New Zealand jointly protest that a further series of atmospheric tests of French nuclear weapons should be imminent in the South Pacific.

20 June The Canadian House of Commons adopts a resolution calling on all nuclear powers to cease the testing of nuclear devices, and particularly calling on the government of France to cancel its tests in the Pacific.

21 June The French government announces that a new series of nuclear tests will begin at Mururoa Atoll in the Pacific.

21 June In a joint declaration, the Foreign Ministers of Bolivia, Chile, Colombia, Ecuador and Peru demand an immediate suspension of the French nuclear-weapon tests.

23 June The Philippines government protests against the French nuclear-weapon tests.

26 June In a joint statement, the Foreign Ministers of Australia and New Zealand deplore and condemn the resumption of atmospheric nuclear testing by France.

27 June The International Labour Conference calls upon member states to abstain from carrying out nuclear-weapon tests, especially those in the atmosphere, in view of their harmful consequences in contaminating the rural and urban environment.

28 June The Japanese Ministry for Foreign Affairs issues a statement expressing deep regret over the French nuclear-weapon test series, and requests the French government to stop the tests.

29 June In a communiqué from its meeting, the Council of ANZUS observes that, notwithstanding mounting opposition amongst the countries of the Pacific, nuclear tests are still being conducted in the atmosphere.

4 July In a joint statement on the question of improving the relations between North and South Korea, the two sides agree to install permanent direct telephone links between Pyongyang and Seoul to prevent unforeseen military incidents.

5 July In a joint Sri Lanka–China communiqué, the government of the People's Republic of China reiterates its support for the proposal to declare the Indian Ocean a zone of peace, and holds that the UN resolution of 16 December 1971 on this subject, should be respected.

17 July The Philippines government protests against the continuation of the French nuclear-weapon tests in the Pacific.

27 July In a sub-committee of the UN Sea-Bed Committee, the Chinese representative proposes a prohibition of the activities of all nuclear-powered submarines in the international sea-bed area and in the sea-bed area of other states.

11 August A group of experts on the economic and social consequences of disarmament submits to the UN Secretary-General a report on "Disarmament and Development".

12 August A conference of foreign ministers of non-aligned countries, held in Georgetown, Guyana, adopts a declaration to the effect that all military alliances should be dissolved, all foreign military bases evacuated, and the Mediterranean and the Indian Ocean declared areas of peace.

14 September In a communiqué issued at the conclusion of a meeting of the South Pacific Forum, representatives of the governments of Australia, Fiji, Nauru, New Zealand, Tonga, Western Samoa and the Cook Islands express their deep concern that the French government, in carrying out nuclear-weapon test explosions, should have failed to accord recognition to the wishes of the peoples of the South Pacific.

22 September The Board of Governors of the International Atomic Energy Agency (IAEA), meeting in Mexico City, approves the Agreement between the European Atomic Energy Community (Euratom), the five non-nuclear-weapon states of the community (Belgium, Federal Republic of Germany, Italy, Luxembourg and Netherlands) and the IAEA concerning the application of safeguards under the Non-Proliferation Treaty.

26 September The Soviet delegation to the UN General Assembly proposes the adoption of a resolution on renunciation of the use or threat of force in international relations and on permanent prohibition of the use of nuclear weapons.

29 September In a joint statement issued by China and Japan, both countries declare that all disputes between them shall be settled by peaceful means without resorting to the use or threat of force, that they will not seek hegemony in the Asia–Pacific region and that they are opposed to efforts by any other country or group of countries to establish such hegemony.

29 September An international conference of non-governmental organizations addresses an appeal to the UN General Assembly and to the international community that a world disarmament conference be held as soon as possible.

3 October The Treaty on the limitation of anti-ballistic missile systems and the Interim Agreement on certain measures with respect to the limitation of strategic offensive arms, which were signed on 26 May 1972, enter into force.

9 October The UN Secretary-General issues a report, prepared by a group of governmental consultant experts, on napalm and other incendiary weapons and all aspects of their possible use.

14 November In a note to the Mexican Ambassador to China, the Minister of Foreign Affairs of the People's Republic of China declares on behalf of his government: "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 manufacture, produce, stockpile, install or deploy nuclear weapons in these countries or in this zone, or send her means of transportation and delivery carrying nuclear weapons to traverse the territory, territorial sea and territorial air space of Latin American countries."

16 November It is announced by the NATO press service in Brussels that the governments of Belgium, Canada, the Federal Republic of Germany, Luxembourg, the Netherlands, the UK and the USA officially propose to the governments of Czechoslovakia, Poland, Hungary and the USSR (the government of the Federal Republic of Germany communicates this proposal also to the government of the German Democratic Republic) that exploratory talks on

mutual and balanced force reductions (MBFR) in Central Europe should be held, beginning on 31 January 1973.

21 November The second phase of the Strategic Arms Limitation Talks (SALT between the USA and the USSR opens in Geneva.

22 November Multilateral consultations on the question of the Conference on Security and Cooperation in Europe open in Helsinki.

29 November The UN General Assembly adopts resolutions concerning the renunciation of the use or threat of force in international relations and the permanent prohibition of the use of nuclear weapons, the convening of a world disarmament conference, the use of napalm and other incendiary weapons in armed conflicts, the qualitative limitations and substantial reductions of offensive and defensive strategic nuclear-weapon systems, the prohibition of the development, production and stockpiling of chemical weapons and their destruction, the cessation of all atmospheric tests of nuclear weapons in the Pacific, the suspension or reduction of underground nuclear-weapon tests, pending a comprehensive ban, and the signing and ratification of Additional Protocol II of the Treaty of Tlatelolco. (For the summaries of the resolutions, see pp. 414–420.)

30 November In a speech during his visit to Hungary, the General Secretary of the Communist Party of the Soviet Union states that the improvement of the political climate in Europe opens the possibility to deal with the reduction of armed forces and armaments in Europe.

8 December In a communiqué, issued by the North Atlantic Council (ministerial session), a welcome is expressed for the US reaffirmation that, given a similar approach by other countries of the NATO alliance, the USA would maintain and improve its forces in Europe and not reduce them unless there is reciprocal action by the other side.

15 December The UN General Assembly adopts a resolution calling for support of the concept that the Indian Ocean should be a zone of peace.

21 December The Treaty on the Basis of Relations between the Federal Republic of Germany and the German Democratic Republic is signed in Berlin. The parties undertake to settle any disputes between them exclusively by peaceful means and to refrain from the threat or use of force; they confirm the inviolability of the border existing between them, and express support for the efforts to reduce armed forces and armaments in Europe.

21 December The USA and the USSR sign a Memorandum of understanding establishing a standing consultative commission pursuant to Article 13 of the Treaty on the limitation of anti-ballistic missile systems.

21 December In a speech on the occasion of the 50th anniversary of the USSR, the General Secretary of the Communist Party of the Soviet Union, referring to the SALT agreements, indicates the advisability of moving from limiting armaments to gradually reducing them, and also to establishing some kind of limits to their qualitative development. He also declares the readiness of the USSR to come to terms, and appropriately formalize reciprocal commitments, with any of the nuclear powers on the non-application of force, including the banning of the use of nuclear weapons against one another.

Errata

World Armaments and Disarmament, SIPRI Yearbook 1972

Page 4, Table 1.2. The correct dimensions of the Minuteman III missile are: maximum length, 58.7 ft; body diameter, 6.1 ft; launch weight, 75 900 lbs; and number of stages, 3.

Page 185, Table 6.8. The number of new combat ships (H4 column) under development by France should read 5, rather than 55.

Page 260, Table 7.2. In the Comments column, the comment "In general 20–30 warships (excluding support ships) in the area. [See table 7.10.]" should be read opposite the Host country (territory) "Mediterranean (Anchorages only)", rather than by Tanzania.

Page 260, Table 7.2. The bold-type heading "Other areas" should be inserted above the People's Republic of Mongolia in the Host country column, to include under that heading all the subsequent countries.

Page 345, line 32. For "the Italian Peace Treaty of 1945" read "the Italian Peace Treaty of 1947".

Page 351, line 29. For "the 1948 NATO agreement" read "the 1949 NATO agreement".

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World Armaments and Disarmament

SIPRI Yearbook 1973

This is the fourth SIPRI Yearbook. The aim is to bring together information on world armaments and military expenditure and developments in efforts made to limit or reduce them. The first three Yearbooks attracted worldwide attention and were used extensively in the United Nations, the Geneva disarmament negotiations and in national political circles as an authoritative source of information.

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International Defense Review (Switzerland)

Almqvist & Wiksell Stockholm

Humanities Press New York

Paul Elek Ltd London

ISBN 91-85114-19-7