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Attachment 1 to 25 October 1967

from "R.A.T. Quarterly," November 1967.

AIR POWER AND OUR FUTURE WORLD ROLE

BY AIR COMMODORE NEIL CAMERON, C.B.E., D.S.O., D.F.C.

THE interested observer of the international scene need not be privy to the confidential and secret documents of Whitehall to realise that Britain's world role is now changing, and to a degree seldom equalled in our history. He will, however, find it a great deal more difficult to decide exactly what the eventual outcome of this era of change might be. The wide variety of imponderable factors likely to affect the future could tender even an intelligent guess wildly off target. This change process is certain to go on for at least the next decade, and such important matters as our possible membership of the European Economic Community, our future role in the Far and Middle East and others, will have to be settled before our ultimate position becomes clear. Unfortunately one cannot nowadays exactly shape one's own destiny in the world. The development of a fully operational Anti-Ballistic Missile system in the Soviet Union, coupled with the deployment of a multiple warhead for their ICBMs and both supporting a counter-force strategy, could so upset the nuclear balance as to make present strategies, concepts and force deployments a subject for historians. There is also, of course, China's bomb.

The one-time American Secretary of State for Foreign Affairs, Dean Acheson, has recently commented that, in his opinion, "Britain has lost an Empire but still not found a role." Both aspects of this comment could, of course, be argued to be true, the second one painfully so. The more astute would qualify Acheson's all-embracing statement to the extent that the British Empire was not lost but most of it brought to independence by a progressive programme of development. All would agree, however, that our future role is not immediately clear, though in fairness, and as has been mentioned above, many of the transitional factors affecting the situation are quite beyond our power to control or even to influence.

This, then, is the highly complicated situation facing the planners as they attempt to devise some sort of strategy and associated force levels for the years ahead. It is an unenviable task, and not helped by a serious national financial position. It is the purpose of this article to discuss some of the factors affecting our world role and to see what part air power might play within our overall defence posture.

THE ECONOMIC POSITION

"On taking office in October 1964 the Government decided to carry out a far-reaching examination of the nation's defence needs during the next decade, with two objects in mind: to relax the strain imposed on the British economy by the defence programme and to shape a new posture for the 1970s, believing that the defence plans of the previous Government would have imposed an excessive burden both

in resources and foreign exchange" (Cmmd 2901). The National Plan pointed out that, if 7% of the Gross National Product continued to be spent on defence, this would have a limiting effect on the much needed increase in production and the development of the social services. We had to export more and import less, and industry had to be re-equipped and modernised. The defence target specified a reduction to 6% of the Gross National Product by 1969-70. This reduction inevitably must have a significant effect on commitments, strategy, force deployment and equipment.

In addition, the balance of payments deficits of 1964 and 1965 led to a large volume of debt, and required that a substantial surplus be achieved by the early 1970s. In July 1966 the Government resolved to decrease overseas expenditure, which, as far as defence was concerned, stood at £287 million per year.

So these two factors, a reduction to 6% of the Gross National Product for defence plus a substantial decrease required in overseas spending, have meant that a full reappraisal of our defence role worldwide had to be made. In passing, it should be mentioned that although the United States currently spends 8.4% of her G.N.P. on defence, the main nations of Europe—France and Germany—spend 6.6% and 5.1% respectively. So if we consider our role in future to be mainly a European one, and taking into account France's ambitious defence plans, we do not really compare too badly.

A CHANGING WORLD

It is doubtful if history can or will provide a period of equivalent change such as the world is going through now. This embraces a conceivable upset in the nuclear balance, the Sino-Soviet dispute and the current convulsions going on in China; the disruptive tribal confusion and large-scale slaughter in parts of Africa; the re-emergence of Japan as soon to be the third industrial power in the world; to mention just a few. But there are also the changing attitudes of individual powers to be taken into account; will the United States ever again get involved on the mainland of Asia to the extent they are at present, or indeed to any extent at all, and if this happens what will take the place of western physical power in Asia? How much longer will the USA be prepared to be the major NATO partner in an era of possible nuclear uncertainties? Will Japan emerge from her post-war pacifistic tendencies to play her part in the stability of Asia? Will the Chinese in fact attempt to dominate in this area and beyond? American Defence Secretary Robert McNamara, in his recent Montreal speech, has stated categorically that America does not intend to continue the role of world policeman, and Mr. Walt Rostow, special White House Assistant to President Johnson, in a recent lecture at Leeds University, has said that "History will show in South-East Asia, as it has displayed in many other parts of the world, that the international status quo cannot be altered by the use of external force," and he went on to add that "the struggle in Vietnam might be the last great confrontation of the post-war era."

It is against this sort of background that Britain is planning her future world role.

The decisions which may be reached will not be easy ones to implement. There will be many pressures from Commonwealth countries and from areas of previous involvement to influence the decision makers one way or another. There will be threats and ultimatums, and there may be misunderstanding and possibly bloodshed. But the fact remains that this country, in the light of the financial circumstances and the changing world picture, must determine its role for the rest of the century.

THE NUCLEAR BALANCE

For years now we have been forced to shelter under the so-called East-West nuclear balance of power in which Britain continues to play a part — however much some people may choose to discount it. This balance has now been rudely interrupted by the threatened full-scale deployment of Soviet ABMs. In addition, it is widely believed that the Russians have developed the multiple individually guided re-entry vehicle, known as MIRV, which could revolutionise nuclear strategy. It would mean that each Soviet missile despatched could carry ten or more individually guided warheads in the megaton class, which could neutralise the Americans' numerical lead in this field and make a counter-force strategy as far as the Soviets are concerned a realistic possibility. The mere existence of an efficient Soviet ABM system (including an antidote to Polaris), coupled with a counter-force strategy, could exert a significant psychological influence on both superpowers. In this situation it is not impossible to imagine a suddenly belligerent Soviet attitude towards Western Europe, coupled with a reduced US interest in tempting providence by widespread nuclear guarantees.

CHINA'S BOMB AND ASIA

The first two Chinese hydrogen bombs have now been detonated, and informed commentators believe that they were dropped from aircraft. This is, of course, a far cry from an operational thermo nuclear capability, but if the speed of the development of the weapon is any guide, the delivery capability will not be very far behind. Certainly Russia and the United States are already thinking in terms of ABM systems to combat possible Chinese aggression; but even the present state of the art in China is quite sufficient for some nuclear "sabre rattling" in the East. The question is, what effect will the Chinese bomb have upon the other nations of Asia, and how do Asians themselves view the problem of living with China in the nuclear years ahead. Does China indeed wish to dominate the rest of Asia? Alastair Buchan, Director of the Institute of Strategic Studies, has suggested in a recent article that there are three possibilities: the development of an Asian nationalism coupled with external assurance of action by the great powers in the event of Chinese blackmail; a possible entente among the stronger non-communist powers—India, Japan, Indonesia and perhaps Australia; and finally a polycentric Asia in which Peking, Delhi, Tokyo, Djakarta and Canberra seek their own alignments and guarantees. The answer is anyone's guess, but as far as this country is concerned the tendency will be towards a full-scale effort in the defence of Australia, New Zealand and our other dependencies in the area, but great reluctance to get involved again on the mainland of Asia.

THE MIDDLE EAST

The events of the past month, both in Southern Arabia and in and around Sinai and the Gulf of Aqaba, indicate that a new page of history is about to be written in this theatre. Our intentions in Southern Arabia are to try to leave behind a stable situation and to act as guardians to the Sheikdoms, at least for the time being. It is likely that we will be completely out of this area by the mid-1970s, apart from a toe hold on Masirah Island, where a good airfield exists. It is to be hoped that without delay H.M.G. will look for oil supplies from elsewhere, and also alternative sources of power, otherwise we are in for intermittent periods of trouble with a good chance of some sort of involvement. Whilst Mr. Christopher Mayhew is right in his argument that the Arabs have got to sell their oil, recent events show that they are prepared to forego revenue for short periods, and certainly the oil "have-nots" can make it difficult for the producers to get it to market.

As far as the rest of the Middle East is concerned, King Hussein made a very relevant speech at the United Nations in June to the effect that the so-called Israeli aggression was but the first round of a very long war. Already the Soviets are reported to have largely repaired the ravages of the Israeli attacks, certainly as far as Egypt's aircraft order of battle is concerned, and all could be ready for the next round. Goodness knows what was evolved during the Nasser-Podgorny talks in Cairo earlier this year, and by gaining the increasing dependence of the Arabs it may be that it is the Soviet Union and not the Israelis who have won the victory.

It is perhaps still a little too close to the events to draw any useful lessons as regards any British part in the dispute, but there is no doubt that, had we achieved sufficient international backing, we would have tried to play some part in opening the Straits of Tiran to shipping. The general coolness of the American reaction was notable.

The question is what may be the next step in the area. Professor Laurence Martin, writing in the *Spectator*, has put forward the view that the Middle East may now be enjoying the last fling of conventional youth before nuclear arthritis sets in. Certainly it seems only a matter of time before nuclears are introduced to this area, and there would seem to be a message for British defence planners here. There is a view which says that if Egypt and Israel had nuclear weapons they would effectively deter each other. This may be so, but it would be a very uneasy balance of terror, knowing the national characteristics of at least one of the contenders.

Clearly during 1966-67 there has been a determined Western effort to shift the balance of power in the Middle East from Egypt towards Saudi Arabia. Unfortunately it is not Cairo or Riyadh where the power now lies, but in Moscow. There can thus be some justified apprehension about the future stability of the area.

EUROPE AND NATO

As has been indicated in previous paragraphs, the future policy of H.M.G. is towards non-involvement in Asia (unless where Australia and New Zealand are concerned); disengagement from Southern Arabia; and a reluctance to do anything in the Middle East (this may be easier said than achieved) unless possibly under a

UNO flag. What is left? Obviously the defence of the United Kingdom remains top priority, but, unlike the past, it now becomes easily the main *raison d'être* for our defence forces. Inevitably this means full and wholehearted support for NATO, taking our membership more seriously militarily than we have in the past. Though the Army (as a result of the Eden agreements) has taken up fairly permanent residence in the North German plain, our Navy and Air Force have, usually for good reason, been "double counting" elsewhere for contingencies and actual operations. When discussing NATO it is suggested that too little account is now being taken of the Mediterranean; the Royal Navy made an over-hasty departure from it some years ago to satisfy their "presence" fixation in the Far East. They will probably come to regret it. The Air Force has held on in Malta and Cyprus against some pressure to withdraw, though as our future strategy becomes clear our influence in the Mediterranean should be increased—a situation likely to be welcomed by our NATO allies.

Our application for membership of the EEC will once more raise the question of a European Defence Force and the possibility of creating a consolidated organisation, even to the point of unbalancing to some extent national defence forces. It certainly seems nonsensical for most of the NATO nations to carry out their own flying training schemes — to take but one example.

It will not be easy to change military thought towards a NATO-aligned Navy, Army and Air Force and apart from that largely a UK-based force. It has big implications for strategy, tactics and equipment, and the sooner we learn to live with it the better. What it will amount to is that a very large percentage of our armed forces will be declared to NATO — perhaps then we will stop being so sensitive about filling some of the high appointments in the organisation.

AN INTERVENTION CAPABILITY?

Having suggested that the main defence role for the UK is centred firmly on NATO, is there now a requirement for this country to maintain an intervention capability and what might it be used for? Whilst it is impossible to forecast precisely the types and circumstances of intervention operations in which the country could become involved, it is nevertheless believed that the Government would wish to be able, in certain circumstances, to offer military assistance to allied and friendly nations or to operate under the UN flag.

Intervention operations are often classed under three headings — limited war, counter-insurgency and internal security. The term limited war is an unfortunate one; the limitation is seldom specified but implies a scale of warfare that many believe unlikely to recur, and certainly if it does we would try to avoid getting involved in it. The upper level of operations, then, is likely to be sub-limited but at the same time still a degree above counter-insurgency.

It is an unattractive feature of our times that sophisticated arms (as yet, as far as we know, only conventional) are being supplied to countries with unstable governments or rulers who may take irrational actions, and present trends suggest that the

Soviets are prepared to increase the range of advanced weapons available to non-bloc countries. Whilst it is true that there is a tendency now for this country to be withdrawing slowly from Asia, and perhaps more quickly from Arabia, there is a strong case for a mobile, flexible, adaptable intervention force to be held in the United Kingdom — as a contribution to operations with allies, to go to the help of our Commonwealth friends and dependencies if requested, to operate with UNO in peace-keeping, and to fulfil present defence commitments.

The force could be made up of Navy, Army and Air units. It could provide a degree of insurance against the unforeseen; it could increase the political and military options open to Ministers, and perhaps more important the knowledge of its existence could provide a deterrent to irresponsible action against our nationals or overseas investments.

We still have a significant garrison in Hong Kong; we must indicate to Australia and New Zealand that we are prepared to go to their help (as they have so willingly done for us in two world wars), and we have commitments to Fiji and other islands in the area. It is quite possible to indicate that we are never again going to get involved in the Middle East, Far East and Africa; but if we are to remain in the big power league as the Prime Minister has suggested, we cannot at this stage dispense with our intervention capability or run it down to the extent of killing its operational potential.

A PERIPHERAL STRATEGY

A glance at the world on a Mercator's projection shows that our future main strategic interests are in the truest sense of the phrase "poles apart." Whilst it is likely that we will continue to have some base facilities in Malaysia/Singapore until the mid-seventies our possible reactivation of these bases from then on must be in doubt. It would thus seem sensible to make use of Australian facilities if that country is willing. It is the strategic future of Australia and New Zealand which in the 1970s and beyond is the main reason for our continued interest in the area, and though it might not be necessary to station forces permanently there, we should certainly have the capability to deploy, land, sea and air units regularly as an earnest of our intention to go to their aid should the need arise.

The peripheral aspect of the strategy applies with a firm base in Australia, but with mounting and staging facilities in the British Indian Ocean Territories and other islands in conjunction with Australia. The list includes Cocos, Gan, Masirah and the Seychelles, whilst the potentialities of Aldabra (as an addition to this list) are currently being evaluated. This group of islands could give us a useful strategic toehold on the periphery of Africa, Southern Arabia, India and other parts of Asia. It would also mean that our aircraft (after the demise of the carrier) could support naval forces and our own mercantile marine in the Indian Ocean, and in general keep open a useful range of options should intervention be necessary for one reason or another.

Obviously air transport will play a vital part in this type of strategy during a

period when overflying rights for military aircraft get more difficult, and this particularly applies to the Middle East. The speed and carrying capability of some present and planned military air transport would allow us to support the peripheral strategy using the west-about route through the United States, and the addition of Aldabra to our island staging posts could make possible a route across and if necessary around Africa to Australia which is considerably shorter than the west-about route, with complementary financial savings from a cost-effectiveness point of view. Certainly, we should now be planning an insurance against the possible closure of the Middle East route for one reason or another.

Whether our intervention is with allies, under a UN flag or in support of our own nationals, the peripheral strategy will require a totally new approach from the three Services and an interdependence never before achieved.

THE PART FOR AIR POWER

This year's Defence White Paper quite rightly suggests that the chance of general war has greatly diminished. Sir John Slessor, in an article in *The Times*, adds a postscript "but no-one in their senses would suggest that we can afford to ignore the possibility altogether." This is surely particularly apposite with a certain amount of hiccupping likely soon in a previously stable nuclear balance. Our nuclear effort is at present in the hands of the Royal Navy with Polaris (and this missile will need hardening), but the time has come to consider how and if we intend to stay in this field after Polaris goes. It may be that an aircraft system will be the successor, though perhaps directed more at China and the several other nations who may by then have gone nuclear than against the Soviets.

There will undoubtedly now be a strong lobby, by those who do not understand air power, as a result of the demise of the AFVG, to abandon any idea of a further strike/reconnaissance aircraft after the F-111 or at least to decide on a much simpler, cheaper, less sophisticated subsonic aircraft with limited range. They will argue that Britain's strategic posture has changed (as indeed it has) and that there is little chance of strike aircraft being used again, and anyway strike operations would be out of the question politically.

This lobby seems entirely to miss the point that all operations (with the possible exception of jungle guerilla type) rely on a favourable air situation. In a changing world, with bombers, Mach 2 fighters and anti-aircraft missiles being freely distributed by the Soviets and others, if our forces are to "live" at all when engaged, they must be covered by the deterrent effect of a first-class flexible strike force. This was admirably demonstrated by the limitation of the operations of the Indonesian Air Force (and there is another lesson to be learnt from Sinai). Now, it can be argued that H.M.G. will never again get involved in Indonesia confrontation type operations and this may be so. But it would be a brave forecaster who would suggest that with a power struggle tugging apart both the Middle and Far East, we will never again be called on to play some part by land, sea or air — or all working together. We can only play our part under the deterrent umbrella of an efficient, all-weather

force of strike aircraft. It need not be a large one, but big enough and sophisticated enough to persuade the opposition air force that we can do them a damage. In the next decade or two this will not be achieved by a subsonic, fairly simple aircraft of short range, and the other two Services must appreciate this. Until they can be certain of having the backing of this air strike force, they cannot attempt intervention. The Navy and Army should be the most vociferous supporters of a new strike aircraft to replace a percentage of the V bombers—to supplement the F-111s and eventually take over from them when they phase out of the inventory. The Secretary of State has referred to the AFVG as the “core of our aircraft programme.” It could equally well be stated that strike aviation is more than ever the core of any responsible defence programme, and in sufficient strength to be credible to possible adversaries.

As has already been suggested, a peripheral strategy is only supportable with an adequate air transport force, coupled with an intervention army, highly trained and equipped for this particular type of mobility. In the 1970s and beyond the work horses of our strategic and tactical airlift will be the VC10 and the Hercules. But a breakthrough in air transport is just around the corner with the American C5. This remarkable aircraft not only has a huge airlift capability but it can also carry its load into the tactical area with a good short landing performance. It can accommodate all the reasonable intervention equipment of the British Army, and if the C5 had been operating during the Berlin airlift, twelve of these aircraft could have done the job of 225 tactical freighters of the day. This is the sort of degree of airlift we must have if we are to adopt the peripheral strategy of mobility, and the first cost-effectiveness figures on this aircraft are extremely encouraging. It is to be hoped that we can afford the dollars to pay for it — there is no doubt that it would give the Army an undreamt-of degree of mobility and speed of reaction.

Whether on the North German plain or in intervention, the Army will require a high degree of offensive air support, particularly if operating in a theatre where some sophisticated ex-Soviet or Chinese equipment is deployed. Vietnam has once more proved that air support of armies is vital to the success of operations — a dictum which is inclined to be forgotten by both sides in times of peace. The scientific effort which is now part and parcel of the defence establishment should be applied as a matter of urgency to ensure that this type of operation is carried out to best effect. The Americans have had to relearn many of the air support lessons of the last war. Let us put our house in order by the closest possible analytical and operational study of how this can best be achieved, now and in the years ahead. The departure of the aircraft carrier from the scene by the early 1970s throws an added responsibility on to land-based air power for support of the Royal Navy, though this is no new experience. This includes responsibility for strike, air defence and anti-submarine support, and every naval operation now becomes a joint one in the truest sense of the word. To make this a success, an entirely new relationship between the Air Force and Navy has got to come about, with all the bitterness of the carrier battle forgotten. Perhaps a percentage of executive naval officers could be seconded to the Royal Air Force for a period of flying duties, so that the potential and techniques of air power are fully understood and not forgotten within the Navy as they proceed to higher ranks.

The Royal Air Force is now shaking itself out of the traumatic experience of having several major projects dropped from their programme with the advent of the Labour Government in 1964. It would generally be admitted within the Service, with one or two regrets of a conceptual nature, that we have come out of it all quite well. It is true that we have far too many types in our inventory, for one reason or another, and this generates both technical and logistical problems. But if a successor to the AFVG is satisfactorily agreed, and with F-111, Phantom, Harrier, Jaguar, Nimrod, Hercules, the VC10, possibly the C5 and some new helicopters — we have some first-class aircraft just around the corner. The Canberra, Hunter and the V bombers have served us well, but the Service will welcome the challenge of these new types and not before time.

If we are to fulfil the sort of strategy suggested in this article we require long range, both in hitting power and transportation, and generally speaking this is being provided. But we also require a state of interdependence between the three Services — the like of which has not been achieved even during the successful days of the last war. This will require a new approach to training and to devising equipment for the three Services.

Dr. Harold Brown, formerly one of McNamara's young defence intellectuals, now Secretary of the US Air Force and the biggest current operational user of air power, has in a recent lecture in America commented that the Vietnam war could not be conducted without air power in all its various aspects, and he particularly paid tribute to the great success of the deep penetration interdiction programme. Vietnam has again confirmed the true capability of air power, and in a changing world situation and with the sort of British strategy contemplated, it comes into its own in a big way. The air power characteristics of flexibility, adaptability and strategic and tactical mobility must provide the basis of our insurance policy in the days ahead.

DELIVERY OF ARTICLES TO EDITOR

The *final dates* upon which articles must reach the Editor for inclusion in the Spring, Summer, Autumn and Winter numbers are: —

SPRING (MARCH)	22nd DECEMBER
SUMMER (JUNE)	25th MARCH
AUTUMN (SEPTEMBER)	24th JUNE
WINTER (DECEMBER)	23rd SEPTEMBER

It is sincerely hoped that contributors will not wait until the very last day before dispatching their articles to the Editor, as this can seriously disorganize the works schedule for getting the "Quarterly" to press and could delay its date of issue.

The early delivery of copy would be greatly appreciated.

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TO:

Attachment No 2 to

25 October 1967

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guided to a separate target. He said this could neutralize America's lead in the number of missiles.

Air Commander Neil Cameron described the new weapon in the Royal Air Force Quarterly.

"It would mean that each Soviet missile dispatched could carry 10 or more individually guided warheads in the megaton class. This could neutralize the Americans numerical lead in this field."

Reports in the RAF journal are not necessarily official but they are generally regarded as authoritative.

**British Export (sic?)
Sees Soviet Gain**

LONDON, Sept. 14 (AP)—A British Defense Ministry expert says the Russians are believed to have developed a giant rocket warhead which releases a shower of hydrogen bombs, each capable of being

ATTACHMENT 2

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TO:

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Attachment No 3 to

[Redacted]

25 October 1967

FORTUNE
June 1, 1967

Defense Secretary McNamara's management techniques have set an admirable new style and standard for all of government, as FORTUNE has reported. Some of his policy decisions are by no means as clear cut. In this and the following article FORTUNE reports on two highly controversial cases in point.

THE SHIFTING EQUATION OF NUCLEAR DEFENSE

by Richard J. Whalen

A swift Soviet buildup is forcing the U.S. to new decisions.

From a vantage point in space above the Soviet Union, the drawing at the left provides a satellite's-eye view of a hypothetical future encounter between U.S. missiles and aircraft and defending Soviet antiballistic missiles. The dotted lines indicate the approximate location of Soviet defenses detected so far. Those arrayed along the "Tallinn line" on the northwestern border cover the main corridor of land-based Minuteman missiles launched over the North Pole; those around Moscow defend an area of several thousand square miles; those on the southern flank presumably are directed against Polaris submarines based in the Mediterranean; and those east of the Urals point toward Red China. At the center of the drawing, a missile on the Tallinn line is soaring to intercept an ICBM, from which three individually guided warheads have just separated. At the same time high-megatonnage warheads have been set off by still other Soviet defensive missiles inside the earth's magnetic field, creating sunlike energy bursts and dispersing enormous pulses of thermal radiation in the near vacuum of space. The "hot x-rays" flash across space at the speed of light to disarm incoming warheads that are not adequately shielded. The charged particles released by these explosions travel along the lines of the earth's magnetic field (in the drawing a window has been cut in this field to make the geography visible). U.S. scientific experts are convinced that the particles would "leak" from the magnetic belt before they could achieve a density lethal to warheads, but speculation persists that the Soviets count on some kind of "shield" antiballistic-missile defense. The bombers shown streaking into Russia from the northwest and south are coming in under the radars used in the antiballistic-missile defenses to launch their nuclear-tipped missiles at great distances from their targets.

On his desk in the Kremlin, Nikita Khrushchev used to keep a laser-scarred piece of steel, a reminder to himself and visitors of the potential for Soviet superiority in advanced military technology. He often dreamed aloud of the terrible wonders of the future, as when he said in 1960: "The armament which is being created and which is to be found in the folders of the scientists and designers is truly unbelievable." In his bold Cuban missile adventure, Khrushchev impatiently ran ahead of his strategic weaponry, and the retreat from the brink led to his overthrow. But the promise symbolized by the prized piece of steel also fascinates his dour, methodical successors. Under their more efficient management, Soviet scientists, engineers, and technicians are turning ideas into hardware at an accelerating rate. The current swift buildup of Soviet strategic offensive and defensive systems reflects Moscow's evident determination to forge ahead in a new technological arms race.

The U.S., preoccupied with Vietnam and anxious to preserve the hope of détente, has made a studied effort so far not to over-react. Addressing the Russians early this year, President Johnson spoke of the common "duty" to slow down the race and warned that a renewed arms spiral "would impose on our peoples, and on all mankind, an additional waste of resources with no gain in security to either side." He proposed negotiations to halt the Soviet deployment of antiballistic-missile (ABM) defenses, receiving in return Soviet Premier Aleksei Kosygin's unenthusiastic consent "to discuss the problem of averting a new arms race, both in offensive and defensive weapons." While negotiations have not even begun, Soviet ICBM and antiballistic-missile deployments are continuing.

The one-sidedness of concern is increasingly apparent and puts U.S. leaders under rising pressure. Secretary of Defense Robert McNamara, overriding for the second

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time the unanimous recommendation of the Joint Chiefs of Staff, has further deferred the crucial decision on whether to begin production of the U.S.'s own Nike-X antiballistic-missile system. McNamara argued his position at length before Congress last January, and later circulated a confidential memorandum among his staff, the military, and defense contractors, urging the widest possible dissemination of the message contained in his Congressional Posture Statement.

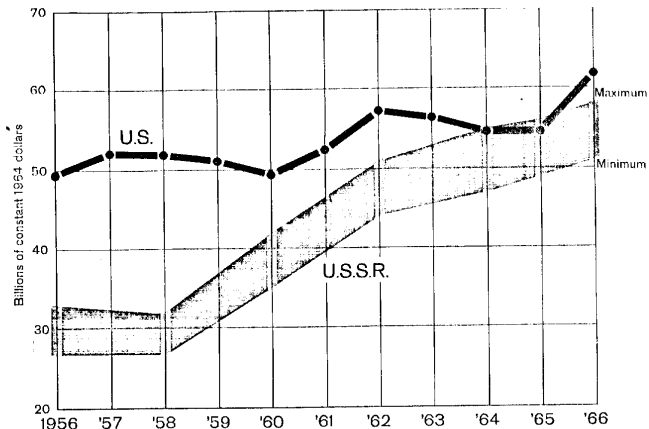
"The foundation of our security," McNamara declared in his statement, "is the deterrence of a Soviet nuclear attack. We believe such an attack can be prevented if it is understood by the Soviets that we possess strategic nuclear forces so powerful as to be capable of absorbing a Soviet first strike and surviving with sufficient strength to impose unacceptable damage on them." McNamara conceded that the kind and amount of damage the U.S. would have to be able to inflict to provide this deterrent "cannot be answered precisely," but he ventured the "reasonable" assumption that the destruction of one-fifth to one-fourth of the Soviet Union's population and one-half to two-thirds of its industrial capacity "would certainly represent intolerable punishment." The U.S. ability to inflict such punishment, regardless of Soviet defensive countermeasures, is the key to the deterrence philosophy of "Assured Destruction."

But McNamara went further in his remarkable document, which may deserve a place among the most important state papers of our time. The Secretary gave the Russians cost-effectiveness advice on their own best defense interests. "If our assumption that the Soviets are also striving to achieve an Assured Destruction capability is correct, and I am convinced that it is," said McNamara, "then in all probability all we would accomplish by deploying ABM systems against one another would be to increase greatly our respective defense expenditures, without any gain in real security for either side." This line of reasoning was clearly intended to reinforce the President's plea to the Soviet leaders for negotiations on arms limitation. But it fell on some ears in Washington, particularly those of well-informed members of Congress, as disturbing evidence of the amount of faith that U.S. defense policy was putting into a hypothetical equation under rapidly shifting circumstances.

The uneasy environment of surprise

The experts who read the intelligence reports on Soviet activity are aware, as the public is not, that the enormous U.S. advantage in weaponry and technology of the 1950's and early 1960's is steadily being narrowed. Not only has the Soviet Union run harder; the U.S., wishing to avoid leading an arms race, has also deliberately limited production and deferred deployment of major new offensive and defensive weapon systems. The Russians, in effect, have been told: "We won't build it if you won't." The appealing notion has prevailed that weapon technology stands on a "plateau." As former White House scientific adviser Jerome B. Wiesner declared in 1963, the "scientific military revolution" has "stabilized."

The limited nuclear test-ban treaty, which ushered in the present period of search for a détente, has been widely interpreted as a joint U.S.-Soviet admission that further arms competition was pointless. A "stalemate psychology" has spread, which takes for granted and even discounts the military superiority the U.S. has enjoyed throughout the trials of the cold war. Reductions have been made in



The expenditure record shows clearly that the U.S.S.R. has, for all practical purposes, overtaken the U.S. in defense and space spending. U.S. figures are actual expenditures as published in the national-income and product accounts; Soviet figures are estimated within the range indicated by the wide line by Stanford Research Institute on the basis of published budget data and production statistics. Practically all the Soviet increase since 1958 is believed to be in the area of space and strategic weapons—perhaps as much as \$25 billion. This is almost double comparable U.S. spending. Even with the inclusion of the space budget in U.S. strategic expenditures, these have been declining (in constant dollars) while Soviet expenditures have been increasing.

"soft" first-strike weapons such as bombers, and the U.S. missile deterrent force, after rising rapidly throughout the early Sixties, is now leveling off. It consists of 1,000 Minutemen, 54 Titan II's (to be phased out in 1970), 656 missiles aboard 41 Polaris submarines (about half of which are on station at any given moment), and 680 strategic bombers, which will be cut back to 465 in 1972. From a peak of \$11.2 billion in fiscal 1962, U.S. outlays for strategic forces declined to a low of \$6.8 billion in fiscal 1966 and stood at \$7.1 billion in fiscal 1967.

The relatively stable level of R. and D. spending over this period conceals a significant shift in emphasis, away from innovation and toward refinement of existing weapon systems. The U.S. has chosen not to maintain the initiative, while the U.S.S.R. has visibly bent every effort toward seizing it.

Now a new era is opening in which the U.S. and the U.S.S.R. can be expected to possess increasingly comparable military technology. Far from being an omen of "stability," that elusive nirvana of the thermonuclear age, the environment of near parity promises to be extremely unpredictable and therefore marked by much apprehension. The U.S., to be sure, has carefully hedged against foreseeable Soviet capabilities; over the past few years, for example, more than \$1 billion has been spent to prepare advanced warheads and sophisticated penetration aids to defeat the newly installed Soviet ABM defenses. However, this kind of hedging leaves the U.S. vulnerable to surprise in the form of an unforeseen or successfully concealed weapon advance on the Soviet side.

In a congressional hearing more than a year ago, General John P. McConnell, Air Force Chief of Staff, warned: "We know . . . the Soviets today are engaged in a massive program of research and development in military weapons systems of all types. In a program of such great scope, the possibility of technological surprises or dramatic

breakthroughs cannot be overlooked, particularly when such surprises could erase the margin of strategic superiority which we currently enjoy." In spite of improved U.S. satellite surveillance, the Russians have simultaneously improved their skill in the arts of concealment, and they are now capable of deploying weapons that the West has never seen tested.

Close observers of the unfolding Soviet R. and D. enterprise worry because the adversary has a dynamic view of military capability and strategy, as contrasted with the static conception of technology and strategy implicit in the U.S. posture. Deterrence depends not only on existing forces; it also depends on the adversary's state of mind. The very rationality of Soviet leaders, which the U.S. relies upon to restrain attack, could find in advancing technology the incentive to consider the gamble of a first strike. A veteran analyst of the nuclear balance observes: "Never has fundamental strategy been so sensitive to a few—a *very* few—technical parameters."

The intentions of the uncommunicative Soviet leaders are a mystery, perhaps even to themselves, but it requires a minimum of theorizing to grasp the point of what they are currently doing. They are altering the existing balance of strategic forces that favors the U.S., and they are doing it at a pace that startles the most knowledgeable American students of Soviet military capability. Just two years ago McNamara said the Soviet leaders "have decided that they have lost the quantitative race, and they are not seeking to engage us in that contest." Now Pentagon authorities are no longer sure. In contrast to the earlier false alarms of the bomber and missile "gaps," based on projections of potential that went unfulfilled, the present rate of confirmed Soviet hardware deployment is forcing upward revisions of Russia's potential.

"Now we see the threat"

Soviet production of intercontinental missiles has surged ahead, from an annual rate of 30 to 40 in 1962 to 110 to 120 last year, and this rate appears to be accelerating. Since Khrushchev backed down in the missile confrontation of the fall of 1962—and the date is relevant because of the long lead times involved—the operational Soviet ICBM force based on land and sea has grown from fewer than 75 to an officially estimated 470 (as of October, 1966) and a likely current figure of close to 600. By mid-1968, according to informed estimates, land- and sea-based Soviet ICBM's could leap to between 800 and 900, or more than half the U.S. force. And there is no reason to assume the Soviets will halt there.

The rapid growth in numbers, however, is less significant than the *qualitative* improvements, apparent and suspected, between the first and second generation of Soviet ICBM's. Two new missiles—the SS-9 and the SS-11—have been identified as entering the operational inventory in dispersed and hardened silos. The SS-9 is a large three-stage missile propelled by storable liquid fuel, which is not necessarily a sign of inferiority when compared to solid-fueled U.S. missiles. Storable liquid and semi-liquid fuels provide greater thrust than solids. The SS-9 is roughly comparable in size to the U.S. solid-fuel Titan II, but it carries a warhead twice as heavy, estimated at over twenty megatons. The SS-11 is a small single-stage missile, propelled by either solid or storable liquid fuel. It resembles the early Minuteman in range and ability to carry a similar one-megaton warhead.

The Russians, well ahead of the buildup schedule as-

sumed until recently by American defense planners, are fast approaching a critical point in the development of their ICBM force. If their missiles are equipped with the advanced warheads and the more accurate guidance systems known to be within their technical ability, their force could quickly become a real threat to the hardened Minuteman missiles that are the backbone of the U.S. deterrent. In designing the U.S. deterrent forces, Pentagon planners have weighed the alternatives open to an aggressor: a strike against our cities; a "counterforce" strike against our retaliatory missile sites; or a combination strike aimed at some key population centers and some portion of the land-based ICBM's. The U.S. has sought to deny an aggressor the "counterforce" option by building and deploying a thousand Minutemen, presumably a large enough number of targets to be safely beyond the productive and economic capacity of the Russians. This estimate of their capabilities has now been rudely shaken.

"As recently as a year ago," says a high-ranking officer in the Pentagon, "we didn't think the Soviets could get a counterforce capability. Now we see the threat." It could materialize by the mid-1970's.

The "new math" of MIRV

The U.S. itself has discovered how to use a single ICBM launcher to carry several individually propelled warheads, which can be guided accurately to different targets hundreds of miles apart. The multiple individually guided re-entry vehicle, known as MIRV, could revolutionize nuclear strategy if the Soviet capability should match our own.

The strong side of Secretary McNamara's philosophy of deterrence is apparent in the improvement of U.S. striking power. The entire front end of new missiles is being redesigned. The land-based Minuteman III, scheduled to replace the Minuteman I, and the submarine-launched Poseidon, the successor of the Polaris A-3, will be equipped with MIRV, decoys, and penetration aids. When they are in place within the next three years, McNamara declares that these formidable missiles will surely be capable of penetrating the Soviet anti-missile defenses currently being deployed. And so they doubtless will—if they are ever fired in anger.

By preparing to meet a changing offensive threat and defensive capability with an improved offense only, however, McNamara displays the weak side of his strategic philosophy. The development of MIRV in missiles means that a new way of calculating striking power is needed, and therefore a new way of appraising the U.S. deterrent. The long-vaunted U.S. lead in ICBM boosters, currently estimated at three to one, no longer provides the reassurance it once did, and Pentagon officials now quietly downgrade such rough numerical comparisons. As McNamara himself said in his Posture Statement, "It is not the number of missiles which is important, but rather the character of the payloads they carry; the missile is simply the delivery vehicle."

He did *not* add that, with all the additional payload weight resulting from multiple warheads and penetration aids, the thrust of the delivery vehicle also becomes a critical factor—and in the case of the U.S. at the present, a sharply limiting factor. Except for the relative handful of Titan II's, which are scheduled to be phased out, the lift capacity of U.S. missiles averages about one megaton for each booster. Soviet boosters, in contrast, can carry an average warhead load of more than seven megatons. If these missiles are, in addition, capable of being fitted with

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multiple warheads, the U.S. booster advantage of three to one over the Russians could quickly become a fiction. The new SS-9 could be fitted, at least in theory, with ten or more individually guided warheads. In one fashion or another, MIRV introduces a new kind of missile math—a relatively inexpensive means for the U.S.S.R. swiftly to achieve parity or better with the U.S. in terms of deliverable megatonnage. They are known to have tested the components of a multiple-warhead system. Therefore, U.S. watchers on the outside, peering through the cracks in a closed society, are anxiously anticipating an operational capability because of the short lead time involved. As little as eighteen months could separate our discovery of a MIRV development program and the operational deployment of Soviet missiles carrying multiple warheads. Those who would know whether such a development program has been detected are quite properly silent.

The implicit and explicit threat

The memory of the nonexistent ICBM "gap" debated during the 1960 presidential campaign may prompt a certain skepticism toward the potential new danger implicit in a Soviet resort to multiple warheads. This time, however, the Soviet missiles that might be fitted with such warheads *already* exist; the numbers *are* growing rapidly; and the new missile math suggests the advantages of their going the route of MIRV if they can. The kind of targeting problem that the U.S. poses for Soviet war planners provides the logic for traveling that route. The major U.S. cities, in which population and industry are concentrated, have long been the presumed targets of a relatively few Soviet ICBM's fitted with high-yield warheads. So long as an ICBM could deliver only one warhead to one target, the small Soviet missile force was believed to be checkmated by the sheer number of U.S. Minuteman and Titan missiles in their dispersed and hardened silos. But the problem of multiple targets could be brought temptingly near "solution," however Soviet planners may define it, through the use of multiple warheads on their growing missile force.

Until last year MIRV was considered so secret that even members of the congressional defense committees had not heard about it in executive session. Reports of multiple-warhead contracts were published in the technical press late last year, and discussion began in earnest last November when McNamara announced the accelerated program to produce and deploy the Poseidon in the Polaris fleet. Oddly enough, within four months after MIRV came into public view, it was abruptly covered up again by the Secretary's order. No longer a secret, it has become an un-word scarcely

ever uttered in the Pentagon. "It's ridiculous, this trying to stuff the genie back in the bottle," comments a dissenting official. "Apparently we're concerned that the Soviets might be alerted to their own capability. It's part of trying not to be provocative."

The move to ABM

The mounting uncertainties facing decision makers in the White House and the Pentagon center on the Soviet construction of extensive new ABM defenses. Reconnaissance satellites and monitoring radars alerted the Joint Chiefs of Staff to this activity in 1965. In January, 1966, McNamara secretly briefed the members of the congressional defense committees, and last November he publicly disclosed that the U.S. had "considerable evidence" of the Soviet ABM deployments without being specific about their nature and location. However, he declared: "I think it is important that we assume [the Soviet ABM system] is effective, and, of course, that will be the assumption on which we base the development and deployment of our own ICBM's." This prudent assumption leaves unanswered the urgent question: *how* effective are the Soviet defenses?

The U.S. possesses a good deal of intelligence data, but it does not support definitive judgments. If experience counts for anything, as it surely does in this esoteric realm of weaponry, the U.S.S.R.'s capabilities should be taken very seriously. It is known that the Russians, heeding their doctrinal imperative of balance between offensive and defensive military forces, began concurrent development of missiles and anti-missiles as early as 1948. By the early 1960's they had built what was apparently the prototype of a defense system aimed against medium- and intermediate-range missiles, and they deployed it at Leningrad. U.S. intelligence rated this system capable of handling as many as five targets simultaneously, but it was regarded as ineffective against ICBM's. In a rare secret session of the Senate in April, 1963, Senator Strom Thurmond, of South Carolina, a member of the Armed Services Committee, warned that Russia had an operational ABM system, and he urged that the U.S. proceed at once with the Nike-Zeus, then ready to go into production. Soon afterward, the U.S. turned to the improved Nike-X system (see "Countdown for Nike-X," *FORTUNE*, November, 1965).

The Zeus ABM system, which grew out of the Nike-Hercules anti-aircraft defenses deployed in 1958, had a limited range and "kill radius," and its effectiveness against a large-scale attack was doubtful. The successor Nike-X (the X stood for "unknown") exploited major breakthroughs in radar technology, which greatly increased the number of targets the system could handle; and it also supplemented the Zeus missile with a new high-acceleration interceptor, Sprint, which was designed to provide last-ditch defense against ICBM's that got past Zeus. Even with the improvements, however, the Nike-X remained a "point" defense intended to protect a single target by engaging incoming ICBM's in a "bullet-to-bullet" duel in the atmosphere. An "area defense," which would protect several targets at once, would be much more effective, but this kind of ABM requires a long-range missile equipped with a large warhead that can intercept ICBM's above the atmosphere. In 1965 the U.S. began development of such a missile, named the Spartan, which will replace Zeus in the Nike-X system. But by this time the Russians had abandoned the Leningrad ABM and were well along in the development of more advanced concepts.

Incomplete and often contradictory information currently available on the Soviet antiballistic-missile defenses has caused some divergence of opinion within the U.S. intelligence

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community. There is no question that an "area defense" system has been deployed in the vicinity of Moscow. The command center, containing radar scanners and computers, is a multi-level structure built entirely underground. A large phased-array radar is located northwest of the city, and it is integrated with small tracking radars at several points.

The Tallinn ABM system

A quite different type of installation has appeared in an arc extending several hundred miles along the northwestern border of the country, and this is the focus of disagreement within the U.S. Known as the "Tallinn line" after the Estonian city where one of the defensive sites has been detected, this deployment has been subject to various interpretations: as an advanced anti-aircraft system, another type of ABM, or perhaps a combination of both. Existing Soviet SAM-2's and SAM-3's would seem to provide ample defense against aircraft, particularly in view of the declining U.S. reliance on bombers. Moreover, the line sits athwart the principal "threat corridor" of land-based missiles launched over the North Pole from the U.S. It is the unanimous judgment of the Joint Chiefs of Staff that the Tallinn line is an anti-missile system, but McNamara so far remains publicly unpersuaded.

In addition to the Moscow and Tallinn deployments, informed sources report a great deal of activity elsewhere in the Soviet Union at existing anti-aircraft installations and new sites as well. Some of these sites are in the South and may represent the early stages of defenses directed against Polaris missiles launched from U.S. submarines on station in the Mediterranean. Other sites spotted east of the Ural Mountains face Red China. The small tracking radars along the Tallinn line apparently are tied together with the phased-array radar at Moscow. As evidence of such links accumulates, the likely scope of Soviet ABM plans expands, confirming McNamara's statement to Congress last January: "... we must, for the time being, plan our forces on the assumption that they will have deployed some sort of an ABM system around their major cities by the early 1970's." Not only the cities, of course, would be defended, but also military installations, particularly hardened offensive missile silos within a vast territory.

Meeting MIRV in mid-course

Debate continues inside the Pentagon concerning the characteristics of the antiballistic missile (or missiles) that the Russians are deploying. In November, 1963, a missile was shown in a Moscow parade for which the Russians claimed an ABM capability. Western officials, who code-named the missile Griffon, were skeptical, and inclined toward the belief that it was primarily intended for interception of supersonic aircraft and their air-to-surface missiles; but they did not rule out the possibility that it had been developed originally to counter the medium-range Thor, Jupiter, and Polaris A-1. Griffon was not credited with an exoatmospheric (above the atmosphere) range, though some observers, reflecting now on the pace of subsequent Soviet advances, believe it should have been. An advanced model of Griffon, in fact, may be deployed on the Tallinn line; or the ABM missile there may be one the West has never seen.

The missile used in the Moscow ABM system was first shown a year later than Griffon, in 1964, when tractors dragged it through Red Square coyly concealed in its protec-

tive canister. Given the unglamorous code name Galosh, it is believed to be a solid-fueled, long-range interceptor carrying a high-yield warhead. Estimates of Galosh's range cluster around a few hundred miles, comparable to the Spartan missile the U.S. is now developing. But a minority opinion maintains it could have a much longer range, perhaps as much as 2,000 miles.

This minority view begins with the fact that the best antiballistic-missile system the U.S. has been able to devise uses *two* missiles and several types of radar. It is suggested that Galosh, the only missile deployed at Moscow, may combine the long range of Spartan with the high acceleration of Sprint, the companion short-range interceptor of the Nike-X system. If this is the case, or if the missile used in the Tallinn line has such a performance capability, the Soviet Union could engage incoming ICBM's far away from their territory and above the atmosphere where fallout would not be a problem—in mid-course of the missiles' trajectory, before multiple warheads and penetration aids could separate. An effective mid-course ABM would provide a formidable defense against multiple warheads.

An experienced defense scientist cautions against over-drawing Soviet capabilities from scant information ("generalizing from the heel of the dinosaur"), but he adds: "If you're honest, you can't say flatly that the Soviets *can't* do what some people say they are doing. We just don't know."

Weaponry in the void

Easily the most important area of uncertain knowledge, and one where secrets and doubts are kept most carefully guarded, concerns the effects of high-yield nuclear explosions in the thin upper atmosphere and above. This is the environment in which our own and Soviet ABM missiles would function. Questions about the precise "kill mechanism" of an ABM have aroused intense speculation and prompted official reassurance, with the result that the known facts often get lost in a welter of alarming or comforting words. Much of the confusion is penetrated by a scholarly, relentlessly factual new book, *The Test Ban Treaty: Military, Technological, and Political Implications*, by James H. McBride (Regnery), which draws together the highlights of eighteen months of hearings conducted by two Senate committees on the treaty that attempted to curb the fearful competition in nuclear-weapon technology.

"All witnesses agreed," McBride writes, "that at the current state of the art in nuclear technology the greatest need for nuclear testing is in the area of weapons effects. . . ." Again and again in the quoted testimony, the word "void" crops up, as when Dr. John S. Foster Jr., then director of the Lawrence Radiation Laboratory and now director of Defense Research and Engineering, told the Foreign Relations Committee: "The most serious void has to do with the effect that nuclear explosions have on the operation of the system, whether it is an offensive or defensive explosion or an offensive or defense system." This point is absolutely critical because the U.S. has adopted a second-strike posture, which means its weapons must survive the effects of a first strike and then penetrate enemy defenses to destroy their assigned targets.

The effects of nuclear weapons vary principally with their design and yield and the altitude at which they are exploded. (Other factors, including the time of day a weapon is exploded, also play a significant role.) The predominant effects of weapons designed to be detonated *in* the atmosphere are blast and heat; weapons for use *above* the atmosphere are designed to maximize the release of energy in the form of radiation, the most useful effect in this environment. Witnesses who

testified during the test-ban hearings generally assumed that the U.S. held a marked lead in the technology of smaller-yield (one megaton and below) weapons while the Russians were well ahead in the very-high-yield (twenty megaton and above) range.

The advantage in the intermediate range (one to twenty megatons) was open to debate, but there was no arguing the fact that the Russians, during their massive 1961-62 test series that broke the *de facto* moratorium, had exploded many more weapons than the U.S. in this intermediate range both in the atmosphere and above, providing them with the opportunity to learn more and apply their knowledge. The Soviet tests clearly had been planned years in advance. Among their seventy-one shots were proof tests, weapon-system tests, effects tests, and tests with missiles and radar. The Russians, obviously extending their ABM technology, on two occasions during the tests launched an ICBM, intercepted it with a nuclear blast, and then fired a *second* missile, presumably to determine whether its warhead was affected by the radiation resulting from the prior explosion. They also studied the blackout effects of the blasts on their radar.

Thoughts about an umbrella

Such sophisticated Soviet tests could not have been matched at the time by the U.S. In the summer of 1958 the U.S. had detonated its first high-altitude explosions, code-named "Teak" and "Orange." These megaton-range explosions produced astonishing results that clearly heralded the dawn of a new era in weapon effects. Communication links in the Central Pacific were blacked out for several hours, and satellites detected charged particles trapped in the earth's magnetic field. In the Argus series that quickly followed, the U.S. exploded three kiloton bursts, which disrupted shortwave radio and radar and again produced man-made belts of charged particles. The creation of these belts suggested, at least in theory, the possibility of a transient "shield" or "umbrella" ABM defense, provided the particles could be created in sufficient density. However, U.S. scientists concluded that the belts formed by the Argus shots were too weak to injure a warhead passing through them at five miles per second. Even so, the U.S. at least discovered that the obvious ABM problems of early warning, discrimination, and precision tracking could be greatly compounded by the mysterious effects of high-altitude nuclear explosions.

Following the Soviet tests, the U.S. staged a hastily prepared and politically restricted series in 1962-63, which provided valuable data but also disclosed great gaps in our scientific knowledge. Dr. Edward Teller, testifying on the test-ban treaty, revealed that the U.S. had not even completed theoretical studies of some of the high-yield effects the Russians had actually tested. Impressed by recurrent descriptions of the "void" in U.S. nuclear technology, the Senate Preparedness Subcommittee concluded that the treaty "will affect adversely the future quality of this Nation's arms, and . . . will result in serious, and perhaps formidable, military and technical disadvantages."

With the signing of the treaty banning atmospheric testing, the U.S. put its ingenuity to work underground and discovered that more could be learned there than its experts had believed. Under a top-priority program, the Atomic Energy Commission has been staging low-yield, directional explosions in deep, instrument-crammed tunnels from which the air has

been pumped to simulate as nearly as possible the vacuum of space. But the apprehensions brought to light almost four years ago in the test-ban hearings have scarcely been buried. At bottom, the present controversy over the Soviet ABM capability revolves around whether these half-forgotten fears of technological surprise are now being realized.

Recent uninformed speculation has suggested the possibility that the Russians, by exploding very-high-yield weapons above the atmosphere at the proper altitude and latitude, might be able to create dense belts of charged particles and so establish a "shield" type of ABM defense. U.S. scientists, extrapolating from data provided by tests of much-smaller-yield explosions, are reported to have erred by a factor of 1,000 in estimating the number of such particles that would be caused by a 100-megaton blast. The AEC isn't saying what its latest calculations have disclosed, but a high-ranking AEC official emphatically declares: "Right now, we don't see how the effects of any radiation belt could be made to persist." An impressive body of scientific opinion, within and outside the government, says there is no technical foundation for theorizing about what a Pentagon R. and D. official calls the "ping," or residual umbrella defense. Before the man-made radiation belts could achieve a particle density lethal to warheads the earth's magnetic field would prove too weak to support them, and the umbrella would "leak."

The anti-missile that goes "zapp!"

The improbability of a "shield" form of defense does not rule out other possible defenses using radiation effects. Quite the contrary; the U.S. intends to use such effects in the improved Nike-X system now under development. The Spartan missile carrying a warhead of more than one megaton will rely upon what is believed to be the most efficient anti-missile defense above the atmosphere—the so-called "zapp effect," that is, the tremendous surge of thermal or "hot" x-rays produced by a high-yield explosion. As Dr. Foster has explained to the Senate Armed Services Committee: "Nuclear explosives have a very small surface area to them . . . When they release [their] energy, they get very, very hot. A small surface that has to release enormous energies in a very short time cannot do so without getting so hot that it radiates its energy away. This radiation [is] . . . of such a temperature that it is in the x-ray region."

As much as 75 percent of the total energy of the detonated ABM warhead would escape in the form of such x-rays and flash over thousands of miles in the near-vacuum of space. Within the much smaller "kill radius," which would vary with the yield and design of the warhead and the altitude at which it was exploded, the thermal x-rays would deposit their immense energy within any unshielded object, such as a missile warhead, causing its components to explode internally. An ABM system using the x-ray effect can provide an "area defense" covering thousands of square miles with relatively few installations. Moreover, the requirements for guidance accuracy are greatly reduced, a factor worth bearing in mind when the Soviet radars are described as somewhat "crude."

The U.S. takes the x-ray threat from Soviet ABM defenses seriously enough to be engaged in costly modification of missiles whose components are vulnerable. For example, the fine gold wires (which readily absorb x-rays) are being replaced in the guidance computer circuitry of the Minuteman II, and the change is being incorporated into the design of Poseidon and

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Minuteman III. Because reflective coatings used to protect a missile nose cone from the heat of re-entry are ineffective against thermal x-rays, new hardening techniques and shielding materials are being sought. The test ban makes it impossible to expose such materials to actual thermal x-rays and underground explosions are no substitute, so experimenters are using newly created electron beams of comparable energy

beams capable of depositing energies inside a test material a thousand times greater than the pulse from the most powerful production laser.

U.S. missiles have been modified more than once to counteract an unforeseen or newly arising hazard. During the test-ban hearings, many military officers, nuclear scientists, and informed Senators dared not give publicly a major reason for their opposition to the treaty. They feared that the Russians, through their high-yield testing, had discovered a kind of "ultimate ABM," and might be able to use nuclear-weapon effects to turn much of the U.S. missile force into a Maginot Line. An offensive first strike would simultaneously achieve a defensive objective, not only destroying American cities with blast and heat, but also creating electromagnetic pulse (EMP) effects extending well beyond the radius of destruction that might deactivate the electronic systems of missiles in their silos. The U.S. has since revised the electrical circuits in the Minuteman silos, and has modified and shielded missiles, warheads, computers, and guidance systems to protect them against electromagnetic pulse. These countermeasures, of course, can be only as effective as our grasp of such phenomena.

Growing doubts, brave certainties

Last fall, an extraordinary study known as "Strat-X" (for "Strategic Exercise") was launched by Secretary McNamara's order to lay out the full range of alternatives for improving the posture of U.S. offensive forces through the mid-1970's. Strat-X will evaluate offensive missile and warhead designs in terms of different sea and land basing options, and it will weigh the resulting force "mixes" against various levels of threat from the Soviet Union and Red China. In this study the Nike-X is being considered only for the defense of U.S. offensive missile forces—not cities. This shift of emphasis is striking because up to this point the whole debate about Nike-X has concentrated on its use in city defense. This new turn in the thinking of key officials is a clear indication of the changing Soviet threat. A preliminary report will go to the Secretary in a few weeks and a final report is due in September. Little has been said about this highly secret study, and an official in the Office of Defense Research and Engineering tersely summarizes the objective of Strat-X: "more survivable payload." Another high defense official, concerned about appearances, confides: "From the outside, it may look as though we're not sure of the deterrent. That's not so. We are sure."

The determined air of confidence in the upper reaches of the Pentagon does credit to earnest men performing difficult tasks. What worries informed observers on the outside is the apparent assumption that the U.S. can safely confine itself to reacting within familiar parameters to a changing threat. The perils of losing the initiative are coming plainly into view. In a recent speech Dr. Harold Agnew, the forty-six-

year-old head of the weapon division at the AEC's Los Alamos Scientific Laboratory, said the "apparent drift in national policy on the concept of balance of power and stability is resulting in a stifling of innovation." Because U.S. scientists are authorized to build or consider only those systems that respond to a clearly defined threat, "We are continually in danger of coming up with answers to threats which have changed." The prevailing official attitude of certainty may not take account of a steadily widening range of uncertainty.

The ultimate unbalancing factor

It is Secretary McNamara's firmly held conviction that the possession of secure "second-strike" (retaliatory) missile forces by both the U.S. and the Soviet Union creates a stable condition of mutual deterrence. As he told a British television interviewer earlier this year, "... technically it's a relationship that's very difficult for either of us to move out of unless the other simply fails to act in a rational fashion." By deploying antiballistic-missile defenses, the Russians, according to McNamara's logic, are behaving irrationally. The U.S. has reacted by making preparations to upgrade its offensive missile forces to the point where the effect of the Soviet defenses will be negated and the prospect of "Assured Destruction" by a U.S. second strike will be maintained. However, the hoped-for maintenance of stability depends not only on the U.S.'s estimate of the situation, but also on the Soviet Union's, and the Russians are clearly moved by their own judgments and not McNamara's. Their belief that they have upset the U.S. deterrent would be, as McNamara himself has declared, "the ultimate unbalancing factor."

In the radically altered strategic circumstances that may lie just ahead, the Russians could begin to doubt the U.S.'s capacity and willingness to inflict unacceptable damage upon them. As General Earle G. Wheeler, Chairman of the Joint Chiefs of Staff, testified earlier this year: "Should the Soviets come to believe that their ballistic-missile defense, coupled with a nuclear attack on the United States, would limit damage to the Soviet Union to a level acceptable to them, *whatever that level is* [italics FORTUNE's], our forces would no longer deter, and the first principle of our security policy is gone."

It should always be remembered that the vast U.S. deterrent force exists solely to influence Soviet behavior. If it ever must be used, deterrence has failed and catastrophe looms. The threat of its use was a rational instrument of national policy during the days of overwhelming U.S. preponderance under Eisenhower and Dulles, and even as recently as the Kennedy Administration's eyeball-to-eyeball confrontation with Khrushchev. Now, however, such a U.S. threat made in the face of the Soviet offensive buildup would amount to an irrational summons to mutual suicide. The Russians soon may be able to use *their* deterrent to inhibit the U.S. and gain for themselves greater freedom of maneuver. Short of an all-out Soviet attack, it is difficult to imagine a provocation sufficiently extreme to warrant U.S. resort to the means of assured self-destruction.

Though the emerging second-strike capability on both sides may satisfy the definition of "stability" favored by McNamara and the Pentagon's defense intellectuals, this symmetry of opposing offensive forces is upset by the Soviet commitment to ABM defenses. Add to this the possible first-strike, counterforce use of the proliferating Soviet ICBM's and "stability" vanishes. Though offensive capabilities may

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match up neatly, intentions and therefore uncertainties do not. The deterrent equation is in danger of becoming unbalanced by the one-sided shift of uncertainty to the U.S. side.

U.S. behavior is already being influenced by the Soviet deterrent. The likely failure of the diplomatic attempt to talk the Russians out of their "worthless" ABM defenses has forced the U.S. into offsetting offensive steps involving major spending—e.g., the \$3.3-billion accelerated development and deployment of Poseidon. And the anticipated Soviet counterforce capability is shifting all serious discussion of deploying Nike-X—at least within McNamara's sphere—from defense of cities to defense of "super-hardened" Minuteman silos.

Would the President push the button?

If present trends are allowed to continue and U.S.-Soviet forces grow more asymmetrical, the situation by the mid-1970's could become menacing. An ABM defense lends itself superbly to bluffing and blackmail. The mere existence of Soviet defenses would exert psychological influence on both sides. It is easy to imagine a suddenly belligerent Soviet attitude toward Western Europe. Would the undefended U.S. react strongly if the defended U.S.S.R. appeared willing to risk war? It is possible to imagine a threat aimed directly at the U.S. itself, perhaps even the execution of the threat by the obliteration of a selected city. Would the President choose automatically to avenge the limited number of dead Americans by ordering a response certain to end civilized life in this country? Soviet planners, as they "war game" with the forces of the 1970's surely ask themselves such questions.

The U.S. must soon recognize that a gradual but almost certainly irreversible change is occurring in the nature of deterrence. The Assured Destruction concept, founded on the superiority of the offense in modern warfare, has been challenged by technology and its application to defense. The technology of missile defense is now advancing more rapidly than the technology of offense. The relative costs and effectiveness of ballistic-missile defense are measured within the Pentagon through the "cost-exchange ratio." A few years ago, the high costs and ineffectiveness of defense were officially expressed in a cost-exchange ratio of between 10:1 and 100:1—that is, every \$100 spent on defense could be offset by spending from \$1 to \$10 on increased offense. Now, however, by Secretary McNamara's own reckoning, the ratio is between 4:1 and 1:1, or parity. Of course, such numerical comparisons take no account of the relative burdens imposed on the U.S. and Soviet economies by higher arms spending. If the technological trend continues over the next decade, defense could gain a margin of superiority.

The improving prospects for defense are welcomed by the Russians, as their respected military commentator, Major General Nikolai Talensky, has written: "The creation of an effective anti-missile missile system enables the state to make its defenses dependent chiefly on its own capabilities, not only on mutual deterrence, that is, on the good will of the other side." More is involved here than a Soviet state of mind that Secretary McNamara dismisses as "an absolute religious fanaticism on the subject of defense." Another Soviet military strategist has emphasized the balanced nature of the emerging Soviet offensive-defensive deterrent: "It must be remembered that victory in war is determined not merely by the character of weapons but by the *relationships of forces* of the combatant sides."

In future psycho-political conflict, which uses weapons as manipulative symbols, the decisive advantage could lie with the side that possesses defenses. Even though these may be ineffective, the undefended side cannot determine this without exposing itself to mortal risk. A situation in which *both* sides had defenses would balance uncertainties and might well produce greater stability than the previous state of anxious nakedness.

The case for a prompt U.S. commitment to a limited deployment of Nike-X is compelling. Though Secretary McNamara argues that an antiballistic-missile defense would not reduce American casualties "in any meaningful sense," a Nike-X system might save thirty to fifty million lives and as General Wheeler testified, this would be "meaningful, we believe, in every sense." There is little time to act if the President in the mid-1970's, whoever he may be, is to have available a full range of policy alternatives. Clearly the effect of the present policy is to foreclose options for the future President.

From the moment of a decision to proceed, five to seven years would be required to deploy Nike-X around twenty-five major cities and key defense installations. Lieutenant General Austin Betts, Chief of R. and D. for the Army, who has overseen the development of Nike-X, believes the "optimum" moment has arrived for a decision to begin production. Further delay could mean the breakup of contractor teams and the onset of obsolescence in important components.

The system that's ready

An argument can be made that it is better to postpone deployment of Nike-X if further R. and D. could produce a more advanced ABM—and it probably can. But Nike-X is the only defense system that can be deployed by the mid-1970's. Secretary McNamara's projected cost of \$40 billion for a full-scale deployment of Nike-X includes such "damage limiting" measures as interceptor aircraft and shelters. However, this forbidding figure would be spent over ten years. Senator Russell describes it as "a sort of congressional deterrent." Beyond the question of how many billions of dollars are involved lies the uncertainty about the performance of Nike-X systems in a nuclear environment. These questions cannot be resolved entirely in the laboratory. A decision to go ahead might stir demands for a resumption of nuclear testing, which would surely arouse a world outcry.

But every objection to the limited deployment of Nike-X can be met with soundly based apprehensions about the grave risks of *not* having at least a measure of defense in the next decade. A light attack ("thin") defense has been estimated to cost perhaps \$4 billion and could be modified or superseded by new technology. Such a defense would serve several purposes: it would at once restore strategic balance and reassure the Russians that the U.S. is not obsessed with the offense and tempted to strike first; it would cope with the accidental firing of a missile; it would counter the threat expected from Red China until well into the late 1970's; and it could help check the recent estrangement from our European and Asian allies by enhancing the credibility of our promise to defend them. Should the Soviet threat become more extreme, NATO might be rebuilt around a sharing of defensive nuclear weapons.

Perhaps most significant of all, the deployment of a limited Nike-X defense system, combined with the vigorous pursuit of an improved ABM, would signal the Soviet Union that the U.S. has not, after all, misunderstood the dynamic force of technology. The American will to lead the technological race and to maintain superiority is the most enduring deterrent.

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