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29th March 1983

*Line*

*Mr John,*

PRESIDENT REAGAN'S SPEECH ON DEFENSIVE TECHNOLOGY

In your letter of 25th March, you asked for a more considered account of the implications of President Reagan's speech on 23rd March on defensive technologies.

/ I attach a note by officials. President Reagan's speech raised issues of potentially crucial importance which the Defence Secretary will himself be considering in depth, and the attachment is very much an interim assessment. Mr Heseltine believes that we must take a cautious and non-committal line in public, which is reflected in the line to take which I have already sent to you with my earlier letter of today's date.

I am copying this letter and the attachment to Roger Bone (FCO) and Richard Hatfield (Cabinet Office).

*Yours etc,*

*Richard Mottram*

(R C MOTTRAM)

A J Coles Esq

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PRESIDENT REAGAN'S SPEECH ON DEFENSIVE TECHNOLOGY

1. The change of emphasis in the President's televised address may on closer examination prove to be more rhetorical than substantial. Indeed his speech, by concentrating on the increasing quantitative, qualitative and geographically dispersed threat from the Soviet Union, together with a shift of emphasis away from offensive strategic nuclear systems to defensive measures, holding out the promise of the eventual elimination of strategic missiles, appears primarily to be an attempt to take the edge off the current pressure in the House of Representatives on both defence spending generally and the nuclear 'freeze' resolution in particular. The US Administration has been notably more cautious in its assessment of the scope for the early introduction of comprehensive anti-ballistic missile systems than is readily apparent from the text of the President's speech, and there has been repeated confirmation that the present level of investment in new generation strategic systems (such as MX, Trident D5 and the B1 bomber) will continue unchanged. However, there was a strong personal commitment evident in the President's private message to the Prime Minister. The initiative may also reflect US assessments of Soviet advances both in high technology defensive systems and in the pre-launch survivability of their new generation ICBMs. It therefore deserves to be taken entirely seriously.

2. President Reagan's speech has been carefully drafted to take account of possible European sensitivities on the degree of American commitment to the defence of Europe and on the sincerity of US arms control policies. However, it provokes a number of questions which are likely to prove less than helpful in the context of maintaining public support for national and NATO nuclear policies, such as:

- a. the questionable validity of the technical assumptions underlying the President's proposals, together with the suggestion that if implemented they would represent another twist to the arms race;

- b. the shift of emphasis from deterrence to defence, with the possibility that any nuclear exchange would be confined exclusively to Europe while both superpowers remained immune behind the shield of their improved ABM defence;
- c. the credibility of the United States' commitment to arms control, particularly in relation to the 1972 ABM Treaty;
- d. the future of the British independent strategic nuclear deterrent.

These areas are explored in greater detail below.

#### Technical Feasibility/Risks of Escalation

3. The United States has invested considerable amounts of money in research and development for high technology ABM systems since the early 1970s. The FY 1984 defence budget now before Congress contains an allocation of \$1 billion for research into new strategic defence technologies. The Administration has indicated that there will be no significant increases in this expenditure in the near term. The President has not committed the United States to any one particular technological solution; and indeed the Administration has been careful to say that any new systems could only result from a number of parallel advances in diverse areas of high technology.

4. As the note at Annex A from the Defence Scientific Staff makes clear there is nothing in the laws of physics to prevent the deployment of space-based directed energy weapons of the type probably envisaged by the United States. But it would probably take at least 10 years to define the requirements for such a system and at least another 20 to develop and deploy it. It would require considerable investment in an enhanced 'shuttle' programme to enable the weapons to be deployed and maintained in space. Once deployed, the weapons would be extremely vulnerable to Soviet

anti-satellite activity, and <sup>it</sup>would require considerable further investment to provide them with self-protection. They would also pose considerable command and control difficulties. Finally, countermeasures to protect ballistic missiles against the effects of directed energy weapons are already under development and are likely to be considerably cheaper than the weapons themselves.

5. The Soviet Union has always invested heavily in all aspects of strategic defence, and their progress in the application of advanced technologies is probably roughly equivalent to that of the United States. They are assessed as having the capability to respond in kind to any US developments.

6. Although the President has stated that the United States seeks 'neither military superiority nor political advantage', the fact that the United States is proceeding with a high investment defensive programme in addition to its investment in new offensive strategic systems is bound to lead to accusations of another twist in the arms race spiral. Indeed the Soviet Union could become vulnerable to a US 'first strike' unless they respond in kind to any US development.

#### Deterrence/Defence

7. Although the President clearly envisaged an ABM system which would defend Europe as well as North America from attack by ballistic missiles, his speech did not offer any promise of an effective defence against theatre nuclear weapons or atmospheric systems (i.e. nuclear artillery, nuclear capable aircraft and cruise missiles.) If a completely effective defence against strategic ballistic missile defences could be achieved, it would no longer be possible to deter exchanges within the European theatre by the threat of escalation to the strategic level. There is therefore a prospect of a nuclear exchange limited to Europe, with the territory of both the Soviet Union and the United States remaining immune from attack. Despite the President's assertions to the contrary, there is therefore likely to be considerable speculation that the United States is retreating into a 'Fortress America' mentality.

Arms Control

8. The President's speech contained a commitment to 'continue to pursue real reductions in nuclear arms, negotiating from a position of strength', and indicated that the successful development of defensive systems would enable arms control measures which would entirely eliminate strategic missiles. His speech also contained a promise of a further indication of Presidential thinking on the INF negotiations on Thursday, 31st March. The negative aspect of his proposals in arms control terms relates to the Anti-Ballistic Missile Treaty of 1972. Although this Treaty is open to a number of alternative interpretations (and a note by officials covering these and the related provisions of the 1967 Outer Space Treaty is attached at Annex B), and although the President has indicated that his proposals are consistent with US obligations under the ABM Treaty, it is clear that the US Administration recognise that if their proposals are to be taken beyond the research and initial development stage, there will be a need to negotiate a new treaty with the Soviet Union. The initial Soviet response to these proposals has been predictably hostile.

Trident

9. Any liberal interpretation of the existing Treaty by the Soviet Union, matching US advances, or renegotiation of the Treaty, could have profound consequences for the credibility of the British independent strategic nuclear deterrent. The effectiveness of the independent nuclear force depends on a policy shared by the two superpowers of deterrence rather than defence. Even a modest increase in Soviet ABM defences over levels permitted in the Treaty could degrade the effectiveness of the Trident force as currently envisaged and a comprehensive defence would negate its value entirely. But within the currently expected life of the Trident system (i.e. from the mid-1990s to the 2020s) Trident is unlikely to be rendered completely ineffective, for the following reasons:

- a. high technology defensive systems are unlikely to be available to either side until 2010 onwards;
- b. relatively low cost countermeasures to such defensive systems may be possible (and here the commonality of the Trident system with the US will be a distinct advantage).

However, the President's proposals place us in the awkward position of either refuting their feasibility or admitting that Trident will become redundant once comprehensive defensive systems are available. It remains in our interest to ensure that deterrence can be achieved at a minimum cost and we would therefore wish to oppose strongly any change in the current status of operational ABM systems.

10. In summary, President Reagan's proposals will be portrayed with some justice by the opponents of NATO's nuclear strategies as an attempt to provide a technological diversion from an essentially political problem. It presents particular difficulties for the United Kingdom as a European power maintaining an independent nuclear deterrent. Despite the careful drafting of the President's speech, it appears that the US Administration has taken insufficient account of our legitimate interests. The Prime Minister may therefore wish to consider whether a response should be made to Washington, either through diplomatic channels or by means of a reply to the President's personal message of 23rd March.

DEFENCE AGAINST STRATEGIC NUCLEAR MISSILES: A TECHNICAL ASSESSMENT

The purpose of this note is to examine in outline the nature, feasibility and technical implications of the systems which the President must have in mind.

2. The Americans have been undertaking research and development on fixed land-based anti-ballistic missile (ABM) defence for well over two decades and, since 1972, have been working within the terms of the ABM Treaty. In the 1970s they abandoned a programme for the deployment of an operational system to defend some of their Minuteman silos but they have demonstrated all of its sub-systems in an advanced engineering form.

3. It is clear that President Reagan was not referring to this type of defence, for protecting either cities, where it would be of very doubtful effectiveness, or missile silos, where it could have an operational value. He must have something else in mind to justify his rejection of "Fortress America" and his intention to defend those under 'NATO's nuclear umbrella' in his letter to the Prime Minister.

4. It is almost certain that the initiative is based on the exploitation of so-called "Directed Energy Weapons", on which the US have been working for some time, albeit primarily for tactical applications. These weapons fall broadly into two main classes; namely lasers and particle beam systems. The former generate high-powered electro-magnetic radiation usually in or near the visible spectrum which can be focussed very precisely. The latter generate beams of atomic or sub-atomic particles which are either electrically charged, eg electrons, protons, or electronically neutral, eg neutrons, hydrogen atoms. Charged particle beams are relatively easy to control but are deflected by the earth's magnetic field; neutral particles are much more difficult to control but suffer much smaller propagation distortions.

5. Directed energy weapons offer the great attraction of virtually zero flight time and hence promise to make possible the engagement of a large number of targets in a very short interval. This also means that more time is available to assess the situation before firing begins. However, the beams must be of very high power and, at least at the present time, cannot be propagated within the earth's atmosphere over more than a few kilometers. Thus, for large area strategic defence against ballistic missiles, they have to be stationed in space and consideration has to be given to orbiting satellites for the type of defence to which the President appeared to be referring.

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6. Strategic ballistic missiles are most vulnerable to directed energy weapons during or at the end of their boost phase, before the deployment of the re-entry vehicles carrying the nuclear warheads. By attacking missiles at this point, a defence capability would be achieved irrespective of eventual targets of the missiles. To achieve these interceptions early in the missile flight, it would be necessary to station a large number, perhaps about 50, defensive satellites in low earth orbits. Even so, they would still need to have intercept ranges of perhaps a few thousand kilometers and, given the requirement that they would have to be able to engage a large number of missiles, they would likely weigh at least several hundred tons. In theory they could be assembled in space from a relatively large number of smaller payloads.

7. There is nothing in the laws of science which says that a space based directed energy weapon system for ABM defence cannot be built. Many of the required technologies have already been demonstrated at small scale in the the laboratory and the US are seeking to demonstrate these small scale systems in satellites. However, to reach the scale required for an operational system there are very major hurdles to surmount, eg the prime power source, which would have to be either a massive amount of chemical fuel or a nuclear reactor; the laser or particle beam generator; the system for focussing and directing the beam to achieve the necessary damaging effect on the missile; the early warning and battle management sensors; the command and control arrangements. None of these are yet developed to a point where it would be possible to define the elements of a system. Indeed, it could take at least a decade merely to define a deployable system. Thereafter it is likely to take at least a further two decades to demonstrate engineering feasibility with perhaps deployment beginning towards the end of this period. It is almost impossible to estimate the possible cost of such a programme but it is clearly a greater challenge than the US project to land a man on the moon.

8. Apart from the question of engineering feasibility, there must be doubt about the operational viability of a space-based ABM system based on directed energy weapons. The command and control problems are formidable; the ABM satellites could be vulnerable to "pre-emptive" attack by anti-satellite systems; the energy beams could be degraded by the effects of nuclear explosions; ballistic missiles could be hardened to survive attack by directed energy weapons. Moreover the maintenance of serviceability of the satellites, including the need to boost them back into orbit to counter decay due to the tenuous atmosphere in which they would be flying, would pose yet further difficulties.

9. In conclusion, the President's initiative, far from leading to the impotence of offensive strategic nuclear ballistic missiles, is much more likely to stimulate the search for counter-measures to defensive directed energy weapons. As indicated above, such counter-measures are not difficult to seek and the signs are that the cost advantage will be heavily in favour of the offence. Furthermore, nothing has been said about countering other strategic nuclear delivery systems such as cruise missiles. Overall, the conclusion must be that this US announcement will simply initiate a new phase of technological competition between offence and defence in strategic systems to mirror that which has long existed in the conventional warfare field.



ARMS CONTROL IN SPACE

1. The deployment of weapons in space is constrained by the following treaties:

- a. 1963 Partial Test Ban Treaty prohibits nuclear explosions in space;
- b. the 1967 Outer Space Treaty prohibits the stationing of any kind of weapon on a celestial body and the stationing of any weapon of mass destruction, specifically including nuclear weapons, in outer space;
- c. 1972 SALT I and 1979 SALT II (unratified) prohibit the interference with satellites monitoring compliance with the agreements;
- d. 1972 ABM Treaty prohibits the development, testing or deployment of anti-ballistic missile (ABM) systems or components which are sea,-air,-space-or mobile land-based.

2. Reagan's proposals are not prohibited by a. b. or c above. However, the position as regards the ABM Treaty is less clear. Weinberger is reported to have said that research and development of a space-based laser defence is not in breach of the Treaty. "ABM systems" are defined in the text as comprising interceptor missiles, launchers and radars. Weinberger acknowledged however, that the Treaty "might have to be amended". There is a specific commitment in the associated "agreed statements" to discuss limitations on systems and components based on physical principles other than these defined as above which might be created in the future. Some consultation would therefore be obligatory before any intended deployment. It is important to note that Research activity which falls short of "development" is not covered by the Treaty, whatever principles might be employed.

3. UK Participation in arms control in space. The UK has aimed to resist any unrealistic, sweeping demilitarization of space, which could work against our interests and those of NATO in general (prejudicing C<sup>3</sup> satellites, intelligence-gathering etc). We have <sup>concerned</sup> declared that we are/at the development of anti-satellite (ASAT) technology and would like to see that restricted if possible. ABM matters are primarily for bilateral discussion US/USSR. The development of ABM systems in space could be highly detrimental to the effectiveness of the UK (and French) independent SLBM deterrents. We have continuously reminded the US of our concerns. The European position in general is one of hostility towards arms deployments in space. The UK's role has been to attempt to reconcile the divergence of US and European views.

4. Current negotiations. The US has long resisted any discussions of which will hamper their consideration/options for space-based weaponry. They have now however agreed to the establishment of a working group in the Committee on Disarmament in Geneva to discuss space arms control in general. They seek a restricted mandate which would avoid the commitment to negotiate. The UK, in its role as US/European mediator, has supported this approach, recognising that the first task of the Western Group is to define areas in which argument might be possible.