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Future of the Burma Dilemma

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 dated ... 7. December ... for your information and for
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I am sending copies to:

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PRIME MINISTER

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Future of the British Deterrent

You will recall that Ministers approved in February this year terms of reference for a study of factors relating to further consideration of the future of the United Kingdom deterrent (of which I attach a copy). This study is now nearing completion. It is divided into three parts:

- | | |
|----------|--|
| Part I | The Politico-Military Requirement |
| Part II | Criteria for Deterrence |
| Part III | System options and their implications. |

You have asked that the study should be submitted to Ministers for an initial discussion before Christmas.

2. Meetings have been arranged on 13th and 20th December for this purpose. It is proposed that the first meeting should be devoted to Parts I and II of the study and I attach copies of these. Part III is not quite so far advanced, but will be ready for submission in time for discussion at the meeting arranged for 20th December.

3. I am sending copies of this minute and the enclosures to the Chancellor of the Exchequer, the Foreign and Commonwealth Secretary and the Secretary of State for Defence.

JOHN HUNT

(John Hunt)

7th December, 1978

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TERMS OF REFERENCE FOR A STUDY OF FACTORS RELATING TO FURTHER
CONSIDERATION OF THE FUTURE OF THE UNITED KINGDOM NUCLEAR
DETERRENT

1. Purpose and Timing. No decision on the future of the deterrent is needed during the lifetime of the present Parliament. The purpose of this study is to examine and report on all the factors which the next Government, of whichever political Party, will need to take into account when reaching that decision. Its purpose is solely to provide the basis on which a fully informed decision can be taken by the next Government. It should not make recommendations but should put forward balanced arguments on which Ministerial decisions could be taken. It should be completed within a period of one year.
2. Content. The study should cover the following areas:
 - (1) The politico-military requirement.
 - (2) Criteria for deterrence.
 - (3) Operational and Technical characteristics.
 - (4) International Developments.
 - (5) Options.
 - (6) Resources and comparative costs.
3. The Politico-Military Requirement. This section should set out the case for and against a United Kingdom nuclear deterrent in the context of the wider strategic problems which the country is likely to face in the future. It should take full account of the national security and international political and military aspects, but should not deal with domestic political considerations.
4. Criteria for Deterrence. The criteria are already being studied by a separate group set up, in accordance with Ministers' instructions, to examine the continuing validity of the Moscow criterion for the effectiveness of the British deterrent. The group is due to report by May 1978. The conclusions which Ministers reach on this group's report should form the basis for this section of the main study.
5. Operational and Technical Characteristics. This section should cover the strategic environment in the 1990s and beyond including the threat from Soviet systems, and the operational and technical characteristics required by any system to be effective within it.
6. International Developments. This section should examine the implications for the United Kingdom of the intentions and development programmes of the Soviet Union, United States, France and China, as well as other international developments including especially those relating to arms control (SALT, CTB, MBFR) and the extent to which they are likely to constrain our choice or influence our decision.

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7. Options This section should examine the principal options open to us if the next Government should decide that a successor system should be introduced and the timing which would be appropriate for the development and introduction of each possible successor system, given the estimated future life of the present force, and any further development of it. The option of a wholly British ballistic missile system should not be studied. Options to be covered should be:

- a. A ballistic missile system in collaboration with the United States or France.
- b. Purchase of a ballistic missile system from the United States.
- c. Cruise Missiles:
 - (1) a wholly British development
 - (2) cooperation with the United States
 - (3) purchase from the United States
 - (4) collaboration with France
 - (5) some combination of (2) or (3) and (4).

The examination of the cruise missile option should cover all launch modes and applications, including possible Alliance requirements for deployment of cruise missiles in conventional and non-strategic roles. Account should be taken of the study already in hand on a technical assessment of cruise missile characteristics and of the work which has already been commissioned by the Chiefs of Staff on potential cruise missile applications.

8. Resources. This section should cover the industrial implication and provide comparative estimates of the resource implications, including both capital and running costs, of the strategic options. It should assess the budgetary implications, in terms of the proportion which expenditure on a future deterrent might take of the defence budget. This will require certain assumptions to be made about expenditure on the non-nuclear part of the defence budget.

9. Method. The study should be undertaken entirely within Government. Any contacts with other Governments which would reveal the existence of this study should be specifically approved by Ministers. The study would be undertaken under the control of a steering group chaired by the Secretary of the Cabinet which would also make the eventual report to Ministers. During the preliminary work the lead Department would be the Ministry of Defence, but the Foreign and Commonwealth Office, Treasury and Cabinet Office will be closely associated throughout.

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Factors Relating to Further Consideration of the Future
of the United Kingdom Nuclear Deterrent

Part I: The Politico-Military Requirement

Summary of Report

1. For deterrence to be achieved a potential aggressor must believe that his opponent has the capability to inflict unacceptable damage on him and that there is a real possibility that this capability might be used. NATO's deterrent strategy depends on the link between conventional, theatre nuclear and strategic nuclear forces being maintained and the Soviet Union being convinced that, in response to aggression, the Alliance would if necessary be prepared to escalate the conflict to a level at which the consequences to the Soviet Union would outweigh any possible gains (paragraphs 1-7).
2. As the gains to the Soviet Union from eliminating the United Kingdom would clearly be less than those from eliminating the United States, the United Kingdom can expect to deter aggression by posing a smaller deterrent threat than that posed by the United States. There can be no absolute certainty that, following a massive nuclear attack on the United Kingdom a Government would take a deliberate decision to order a retaliatory strike by the British deterrent. But the essential thing is that the Soviet Government should believe that there is a real possibility of their doing so. Provided our deterrent was perceived to have the capability, the Russians could not rule out this possibility. This is sufficient for deterrence (paragraphs 8-15).
3. Over the next 30-40 years, our planning need not be geared to any nuclear threat beyond that posed by the Soviet Union. We can assume that European links with the United States in the North Atlantic Alliance will continue, though the credibility of American nuclear retaliation in defence of European interests could be weakened (paragraph 16).
4. The case for and against a British strategic nuclear force can best be discussed in terms of the purposes which such a force would serve:

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(i) A numerical contribution to NATO's assigned nuclear forces.

The British deterrent represents a significant proportion of NATO's assigned nuclear forces. The importance of this should not be exaggerated since our deterrent represents only a very small proportion of the total nuclear forces of the Alliance, including the American strategic forces (paragraphs 17-20).

(ii) A second centre of decision making

This is the distinctive nature of our contribution. It complicates Soviet calculations and means that not all nuclear decisions in the Alliance are left exclusively to the United States President. Two situations are envisaged. First, a decline in the credibility of the American nuclear guarantee to Europe. A British nuclear force could provide, with the French, the nucleus of a European deterrent and thus reduce the risk that Germany might seek to develop a nuclear capability. Second, hesitation by the United States to use her nuclear weapons in support of NATO. Neither super-power could exclude the possibility that, in this situation, a British Government might act to make good the weakness of American resolve. On the other hand, it might be argued that the existence of a second centre could imply lack of confidence in the American guarantee and thus undermine its credibility. Moreover the Russians might not believe that the United Kingdom would ever act independently of the United States, especially over an issue not directly affecting United Kingdom territory (paragraphs 21-27).

(iii) A capability for independent defence of national interests.

The British deterrent provides an ultimate option for national defence should collective security fail, which would assist us to counter politico-military pressures or to deter aggression itself. The question is whether it is necessary or credible for us to seek to provide against such a contingency (paragraphs 28-29).

(iv) Political status and influence

To give up our status as a Nuclear Weapon State would be a momentous step in British history. It gives us access to and the possibility of influencing American thinking on defence and arms control policy and has enabled us

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to play a leading role in international arms control and non-proliferation negotiations. But a decision to embark on a new generation of the British deterrent might be seen by many Non Nuclear Weapon States as inconsistent with our declared arms control and non-proliferation aims and thus reduce our capacity to exercise influence in these fields (paragraphs 30-35).

5. The cost of a successor system would be high and funds spent on the deterrent would not be available for our conventional forces. But we would be buying a unique capability which could not be provided by our European allies. On the other hand, it could be argued that, from the Alliance point of view, conventional forces had a higher priority than the maintenance of the British deterrent as a means of ensuring a continuing American commitment to the defence of Europe (paragraphs 36-37).

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FACTORS RELATING TO FURTHER CONSIDERATION
OF THE FUTURE OF THE UNITED KINGDOM
NUCLEAR DETERRENT
PART I: THE POLITICO-MILITARY REQUIREMENT

1. Paragraph 3 of the Terms of Reference for the study directs that a section on the politico-military requirement should set out the case for and against a UK nuclear deterrent in the context of the wider strategic problems which the country is likely to face in the future. It should take full account of the national security and international political and military aspects, but should not deal with domestic political considerations. Paragraph 1 of the Terms of Reference provides that the study should not make recommendations but should put forward balanced arguments on which Ministerial decisions could be taken.

2. In this section, we look first at the general concept of deterrence, and at any aspects which may raise particular difficulties for medium nuclear powers, then briefly at the possible politico-strategic setting in the timescale of any UK successor system, and finally at the politico-military requirement itself.

I. THE CONCEPT OF DETERRENCE

3. For deterrence to be achieved a potential aggressor has to perceive that:

- a. there is some level of damage which his opponent might inflict in the course of a conflict which would be unacceptable; high in relation to the benefits from aggression;
- b. his opponent has the capability to inflict this unacceptable damage, and the potential aggressor cannot count on being able to neutralise this capability;
- c. it is credible that his opponent might use his capability if put to the test.

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The potential aggressor can make an objective assessment of the capabilities of his opponent (although he may tend to err on the side of caution and exaggerate their likely effects). While he can seek to influence his opponent's resolve by threatening him with the dire consequences which would follow from resolute action, he can never be certain how his opponent would act if the issue were to be put to test. Equally his opponent cannot be certain how the potential aggressor will perceive the balance between the gains from aggression and the level of damage threatened. Both sides operate under conditions of uncertainty.

DETERRENT STRATEGY

4. As United States nuclear superiority over the Soviet Union has given way to strategic parity, Western thinking about the deterrent contribution of strategic nuclear weapons has had to be modified. It is now generally recognised that it is not credible that Western strategic nuclear forces would be used in response to Warsaw Pact aggression involving a markedly lower level of force, since such use would be deterred by the threat of strategic nuclear retaliation by the Soviet Union. Strategic nuclear forces therefore cannot in themselves directly deter Warsaw Pact aggression at substantially lower levels. Their full deterrent potential against such aggression on any scale can only be realised if they form part of a chain of closely linked military capabilities, each of which must be strong enough to face an aggressor with a decision that he would need to pitch his action, initially or later, at a scale or level so severe as to risk progressively involving higher levels of Western capability right up to the strategic nuclear level.

5. Thus the essence of NATO's defence strategy is to respond to an aggressor on a scale which would deny him any rapid or easy victory, while posing a risk that the conflict will escalate to a level at which the consequences would outweigh any possible gains from aggression. The credibility of this concept depends

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on the Soviet Union being convinced that NATO would be prepared to go to the next stage. To induce this conviction, NATO needs not only to demonstrate that it has the necessary measure of resolve but also to possess a continuous chain of capabilities for response linking front line conventional forces with strategic nuclear forces; and the elements in the NATO triad of conventional, theatre nuclear, and strategic forces must not be decoupled.

6. The UK's national nuclear capabilities, both strategic and other, are assigned to NATO as part of the theatre nuclear forces which, depending upon the nature and scale of Warsaw Pact aggression, would be used in selective or large scale strikes in an area extending into Soviet territory. Behind these, the United States provides strategic nuclear forces targetted against enemy political controls, industrial, economic, and other resources (thereby including population centres), and against military forces. The ultimate deterrent has always been the threat of massive retaliation with simultaneous attacks against the full range of targets. But since growing Soviet capability made this threat seem increasingly incredible in response to anything less than an attack on United States cities, in recent years United States policy has placed increased emphasis on the need for flexibility in the targetting of strategic forces: and options for selective strikes on military and industrial targets have been developed as possible alternatives to the ultimate option of massive and widespread strikes on the Soviet industrial and economic base.

Soviet Strategic Philosophy

7. There is no sure evidence that the Soviet Union has any counterpart to this approach, with its emphasis on avoiding the use of nuclear weapons if possible and, should this prove impossible, on their limited and selective use; and it cannot be assumed that any limitations imposed by NATO on the use of nuclear weapons would be matched by a similar Soviet concern for restraint. Indeed Soviet strategic philosophy places the emphasis

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on pre-emption, survival, and war-winning strategies using whatever weapons are necessary. The difficulty in interpreting this philosophy is that, with its emphasis on Soviet invincibility, it has obvious domestic political attractions; and there is a clear Soviet interest in adopting this declaratory policy to deter even a limited nuclear escalation by NATO. Soviet behaviour in a crisis could be a good deal more circumspect, provided that the Soviet leadership maintains its present general orientation.

Deterrence by Medium Powers

8. It may be asked whether these general principles of deterrence, developed in the context of super-power rivalry, would apply to a medium power attempting to deter a super-power. We believe the two cases are certainly dissimilar in one important respect: a super-power aggressor confronting a medium power could never afford to ignore the consequences of the confrontation for its more important rivalry with its potential super-power opponent. This concern would apply regardless of whether the medium power was allied with the opposing super-power. Where the two were allied, the potential aggressor would obviously need to consider ^{also} the risk that the opposing super-power would bring its nuclear armoury to bear in support of its ally; and where there was no alliance or an alliance was breaking down, there would be the risk that nuclear threats would act as a catalyst to create or restore a nuclear-backed alliance. Even where the potential aggressor could safely conclude that the immediate consequences of a conflict would be limited to the amount of damage which the medium power could itself inflict, the acceptability of this damage would need to be assessed in terms of its effects on the super-power relationship; and even comparatively modest levels of damage might be unacceptable in these terms when the capabilities of two super-powers were closely matched.

9. We have considered how far a medium power can hope to deter a super-power, in terms of each of the requirements for deterrence

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identified in paragraph 3 above. As to posing a threat of unacceptable damage, the concept remains valid that the likely damage will be weighed against the likely gains from aggression in the particular circumstances. As the gains from eliminating the United Kingdom would clearly be less than those from eliminating the United States, it follows that the United Kingdom can expect to deter aggression by the Soviet Union by posing a smaller deterrent threat than that posed by the United States. The scale of damage which would need to be threatened is discussed in Part II of the study, on criteria for deterrence. The implications of the second requirement - for an effective capability which an aggressor cannot count on neutralising - are also discussed in Parts II and III of the study; at this stage, the only point to note is that this requirement need not be assumed to present insuperable problems for a medium power.

10. Finally, we need to consider the credibility of a British deterrent threat against the Soviet Union. This might be looked at in two ways. First, would the British Government in desperate circumstances use its nuclear capability, if necessary independently of the United States? And, secondly, would Soviet leaders believe that the Government might do so? It must be emphasised that, for deterrence, the essential question is the second.

11. The purpose of our military capability, whether as part of NATO's or otherwise, is to deter any military attack on our interests, from minor conventional inroads right up to nuclear strikes against the United Kingdom; and, if deterrence fails, to resist such attack. With our strategic nuclear force we seek to deter the highest levels of aggression by posing the threat of unacceptable damage in the Soviet Union itself. If this threat failed to deter and if the Soviet Union had mounted massive nuclear strikes against our cities, the use of our strategic nuclear force would not ward off further damage, and indeed there might be little of value left undamaged. In these circumstances the actual use of our strategic nuclear force in retaliation against the Soviet Union would represent a reaction of rage and revenge. If this

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ultimate stage were reached, there can be no certainty that a Government would take a deliberate decision to launch this act involving the killing of large numbers of enemy civilians but serving no rational purpose for their own country.

12. But what is essential, as indicated in paragraph 10 above, is that the Soviet Government should believe that there is a real possibility of a British Government ordering such retaliation. Provided that our strategic nuclear force was perceived to have the capability for swift retaliation and for causing unacceptable damage, we judge that they could not rule out this possibility. Ultimate deterrence is perceived to work, because no nuclear weapons state (NWS) can feel confident enough to act on a judgement that an adversary, seeing the painful destruction of all that he most valued, would withhold retaliation on account of some cool calculation of ethics and utility. In such a scenario, there is no more reason to doubt the UK's response than that of the USA or USSR.

13. We have also considered how far a UK strategic nuclear force could act, with other UK capabilities, to deter other levels of aggression, on the lines discussed in paragraph 4 above. While we retain a contribution to NATO's theatre nuclear forces on present lines, we have a capability for limited nuclear action reaching into the Soviet Union, while holding back our strategic nuclear force. Would the Soviet Union believe we would be willing to envisage the limited use of our theatre nuclear capabilities independently of any US and/or French use, and thus to pose a risk of escalation to the strategic nuclear level involving unacceptable damage to the Soviet Union (and, of course, in the process also to the United Kingdom)?

14. We do not believe it possible to engender in a potential adversary certainty that the process of escalation will inexorably occur at every point unless he backs off. But, for deterrence, the risk of escalation, provided it is not so small that it can be discounted, will suffice. Were deterrence to fail and escalation to begin, it might be that doubts about our resolve would grow as

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the final level of conflict was approached, since the stakes would be becoming very high. But the stakes would also be high for the aggressor, and the prospect of unacceptable damage would continue to have its effect unless there was near certainty that it would not be suffered. We believe that, provided there were not wide gaps in our spectrum of capability such as would encourage an adversary to think he might have a chance of defeating us at lower levels of capability without eventually triggering our highest one, he could not safely assume that at some point our resolve would fail and leave him in sure possession of a gain worth the price and the risk. Uncertainty lies at the heart of nuclear deterrence: and this applies to medium nuclear powers no less than to super-powers.

15. Although, as we pointed out in paragraph 10, the key issue for deterrence is how an adversary believes we would behave, we have had to adopt a rather theoretical approach since we cannot be sure how the Soviet Union views our deterrent posture. We can, however, turn the problem round. In assessing the Soviet deterrent, we observe Soviet capabilities and make suppositions about how they might be used, drawing on our knowledge of Soviet history and present Soviet military doctrine and posture. If the Soviet Government looked at our capability in this way, they might conclude that our past history suggested we would be resolute in a crisis, they would note our effort to maintain and keep up to date our strategic nuclear force, and they would observe that we also maintained other nuclear forces under our own control. If we for our part were considering a deterrent threat in these terms, it seems unlikely that we would discount its credibility; and there is no obvious reason why the Soviet Union should conclude otherwise.

II. THE POLITICO-STRATEGIC BACKGROUND

16. We have considered how political and strategic relationships may develop in the next 30-40 years. There is no way of predicting with any certainty what changes may occur, and we can therefore only look at aspects of those relationships of major importance for our strategic deterrent and consider what plausible assumptions

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might be made. Our conclusions are set out briefly in the Annex. They can be summarised as follows:

- a. In this timescale UK deterrent planning need not be geared to any nuclear threat beyond that posed by the Soviet Union.
- b. We should base our policies on the assumption that much the same adversary relationship will continue with the Soviet Union as we have today.
- c. The interdependence between the United States and Western Europe is such that the close institutional links, including that in the North Atlantic Alliance, are very unlikely to be broken; but it cannot be safely assumed that the threat by the United States to use its nuclear weapons in defence of European interests will be credible to the Soviet Union in all circumstances.
- d. We see the principal risk to continued transatlantic co-operation arising from possible developments within Western European states and within the European Community as an institution. If such developments appeared to threaten European and transatlantic solidarity, they could lead to strong pressures for new departures in West German policy, including the acquisition of an independent nuclear capability.

III. THE POLITICO-MILITARY REQUIREMENT

17. As we deploy other nuclear capabilities under our own control, a decision not to proceed with a further strategic force would not necessarily mean that we ceased to be a NWS. But in practice we judge it likely that we should be led progressively to abandon our nuclear weapon programmes, and to deploy any theatre nuclear capabilities with American warheads provided under "dual key" arrangements. This is because a UK theatre nuclear capability would be of reduced credibility if it was not underpinned by a strategic nuclear force (see paragraph 24 below); it is doubtful whether there would be a viable programme of work for our nuclear weapons research and manufacturing facilities without a strategic

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programme; and political benefits from giving up our strategic capability would be lost if we did not cease to be a NWS (see paragraph 35 below). Accordingly where it is relevant to the discussion which follows, we have assumed for the purposes of this paper that if we decided not to proceed with a further strategic force, we would also eventually cease to be a NWS.

18. The decision taken on a successor strategic system might also have implications for our plans for the present Polaris force. These would need further study, but we do not believe they should affect the basic issue.

THE CASE FOR AND AGAINST A BRITISH STRATEGIC NUCLEAR FORCE

19. The case for and against a British strategic nuclear force can best be discussed in terms of the four interrelated purposes which it might be held to serve:

- a. a numerical contribution to the assigned nuclear forces of NATO;
- b. the contribution of a second centre of nuclear decision-making to Alliance deterrence of the Soviet Union;
- c. a capability for the independent defence of national interests;
- d. political status and influence.

These are discussed in turn below, and we then touch on the question of costs. In accordance with our Terms of Reference, we do not attempt to weigh the pro and con arguments against each other or to reach any conclusions.

A numerical contribution to NATO's assigned nuclear forces

20. Our contribution to NATO's deep-strike theatre nuclear capability, which currently consists of Vulcan and Buccaneer aircraft and the Polaris force, represents a significant proportion of NATO's assigned forces. The loss of this contribution to the

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coverage of SACEUR's deep-strike targets would be unwelcome to the NATO military authorities. It is however important not to exaggerate the significance of our strategic force in terms of this purpose since it is a clear, if necessarily implicit, assumption in our planning that the Polaris force would not be released for use in its NATO role short of a general war involving the United States strategic forces. We assume that any successor system would be assigned to NATO on the same basis. Moreover, our assigned nuclear forces represent a very small proportion of the total nuclear forces of the Alliance, including those United States strategic forces which are not assigned. We assume that the size of any successor system is unlikely materially to alter this proportion.

The contribution of a second centre of decision making

21. The significance of our contribution to NATO's nuclear armoury does not, however, arise from the additional military capability it provides. The distinctive nature of our contribution is that our assigned nuclear forces are under our own separate national control, and thus entail a second centre of nuclear decision-making within the Alliance. If it could be assumed that the United States nuclear guarantee to Europe was immutable and would always remain credible to the Soviet Union, this would not be of such importance. But doubts about the United States nuclear guarantee are harboured in Europe more or less actively at all times. The value to the Alliance of Britain's role as a separate centre of nuclear decision-making is not that our European Allies see the British nuclear force as a second, separate, guarantee of their security; it can never be large enough for that. The real value is two-fold. First, it would complicate Soviet calculations about the consequences of aggression against NATO and the risk of nuclear escalation. Secondly, it means that not all nuclear decisions which would affect the supreme interests of members of the Alliance are exclusively in the hands of the United States President (a situation which would be much less acceptable to European members). Because

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of France's equivocal attitude to NATO, the French nuclear forces would not be regarded as a totally reliable substitute for this contribution which British nuclear forces make to NATO.

22. There are two broad situations for which, for our European Allies as well as for ourselves, the British nuclear forces and separate decision-making role constitute something of a hedge. The first is a general long-run decline in the strength of the ties linking the United States with Europe and in the credibility of the United States nuclear guarantee. It is not of course envisaged that a British nuclear force could possibly replace on its own the deterrent role of United States forces. But it might, together with the French strategic force, provide the nucleus of an alternative European deterrent. Although it is difficult to see how such an arrangement would be brought about, the possibility (which has been talked about before at times of strain in United States/European relations) at least leaves the Germans with an option other than the acquisition of a nuclear capability of their own. This would reduce the risk that Germany might seek to develop an independent nuclear weapons capability, which would carry grave dangers for world peace.

23. The second scenario involves United States hesitation, in a crisis or war, about the use of her nuclear weapons in support of NATO forces. This hesitation might arise over crossing the nuclear threshold at all, over using nuclear weapons beyond the immediate battlefield, or over attacking targets within the Soviet Union itself. It cannot be assumed (given our much greater vulnerability than the United States to nuclear attack) that a British Government would be readier than the United States President to engage in nuclear escalation that might provoke Soviet retaliation against our territory, even in circumstances in which British forces (like United States forces) might be facing defeat in combat. The idea that British nuclear forces might be used to "recouple" the United States nuclear deterrent thus needs to be treated with caution. At the same time,

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neither super-power could altogether exclude the possibility that a British Government might take action to make good a weakness of United States resolve, either through actually carrying out a limited strike at the next level of escalation, or through indicating a possible intention to use our independent capability. The immediate aims in either case would be to stop the Soviet Union short of a decisive success, and to restore deterrence by raising the conflict to a level from which the US could less readily stand aside. The ability to execute limited strikes would be likely to be sufficient for the immediate purpose. But, to give credibility to the threat of independent action, a UK strategic retaliatory capability held in reserve as a deterrent to any escalatory response by the Soviet Union would also be necessary.

24. The value of a British capability as described would of course be felt - for example in reinforcing Allied confidence and creating Soviet doubts - well before the circumstances suggested became actual. Indeed the aim is to prevent them from becoming so.

25. Moreover, we know that the value of our role as a second centre of nuclear decision-making is recognised by our major Allies, and by the NATO military authorities. The present United States Administration have confirmed their continuing self-interest in the maintenance of the United Kingdom's nuclear capacity, and SACEUR has strongly endorsed this view. There has also been support from German and French Ministers for the maintenance of a British deterrent.

26. On the other hand, it might be argued that in certain circumstances second centres of decision-making might act to weaken rather than strengthen Alliance deterrence. The deterrent posture of the Alliance as a whole rests on the credibility of the US nuclear guarantee; but two members, the UK and France, have also taken out an extra insurance policy against the weakening of this credibility. France's public stance already in effect declares that her policy rests on misgivings about

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US resolve, not just about the possible perception of that resolve by others. If the USSR came to believe that the UK assessment was the same as the French, this might reinforce any doubts of her own about the credibility of the US position. The significance of this consideration would be enhanced if we were contemplating, in the procurement of any successor system, moving significantly away from the present close US/UK co-operation.

27. It should also be noted that a second centre of decision-making complicates Soviet calculations about the consequences of aggression only if it is credible that, in the Alliance context, we might act differently from the United States (see paragraphs 10-15 above). Moreover, the conclusions drawn from both of the scenarios in paragraphs 22-3 might be questioned. The case for a long-term hedge against the weakening of the US nuclear guarantee primarily arises from doubt that one nation would risk its existence for another. But, on this argument, a British or Anglo-French guarantee to Europe would be no more credible than one from the United States. The credibility of the concept in paragraph 22 therefore ultimately rests on scenarios for a federal or quasi-federal Europe in which national deterrents were pooled and expanded to provide deterrence for the new political entity as a whole. It is open to question what price we should pay to leave open a long-term option on these lines, particularly as it might be argued that, should the option ever be exercised, it might provoke the Soviet aggression it was intended to deter. As to the scenario in paragraph 23, the Soviet Union might judge that, if the US decided to stand aside, it would bring pressure to bear to ensure that the UK did not itself take independent action. Such a judgement might seem to the Soviet Union not unreasonable given our close ties with the US. If they felt confident enough to rely on it, they might discount the risk of recoupling and its deterrent effect would thus be lost.

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A capability for the independent defence of national interests

28. It is suggested above that the concept of our role as a second centre of decision-making rests upon our capability for the independent use of our strategic nuclear forces. This independent nuclear capability also serves our national defence needs more directly in that it seeks to provide an insurance against the break-up of the North Atlantic Alliance. Our strategic capability might be important in any conflict between the Warsaw Pact and NATO in encouraging the Soviet Union to minimise its direct attacks on United Kingdom territory in order to reduce the risk of escalation involving United Kingdom nuclear weapons. Beyond this it provides options for national defence should collective security arrangements fail. The ability to pose an ultimate threat of unacceptable damage would assist us to counter politico-military pressure, to quarantine ourselves from the spread of Soviet influence in Europe, or to deter aggression itself. Without it, the United Kingdom has no means of its own of deterring nuclear attack or large-scale conventional aggression by a nuclear power, and of countering nuclear blackmail.

29. The contrary view is that the circumstances outlined in the preceding paragraph are so unlikely to occur that they do not in themselves justify a strategic capability. In our discussion of the politico-strategic background we suggested that the North Atlantic Alliance was very unlikely to break up. Given reliance on the US nuclear guarantee, there would be no obvious need to retain options for national nuclear defence. The validity of the protection afforded by a strategic nuclear capability can also be questioned on the argument that nuclear weapons are relevant to the deterrence of military aggression only; that, were Soviet influence to have spread in Europe, the USSR might be able to achieve almost any objectives against us (short of occupation) without the use of force; and that, even if force were required, the Soviet Union could afford to rely on its overwhelming conventional strength only. To achieve an effective national defence in these circumstances, we should need to pose

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a threat of nuclear escalation. The credibility of this concept in the solely national context is discussed in paragraphs 10-15 above.

Political Status and influence

30. The essential point to be made about the effect on our status is that this cannot be judged in the abstract. While it might be argued that if we were now contemplating becoming a nuclear power this would add little to our status, it cannot be assumed that abandonment of our capability would have a similarly limited effect. We were the first state to perceive the implications of atomic power, and the third state to become an effective nuclear power. If we were to turn our back on this history and abandon our role as an NWS, this would be regarded internationally as a momentous step in British history.

31. Our possession of nuclear weapons gives us a standing in world affairs which we would not otherwise have. It gives the United Kingdom a special place in the Alliance as the only NWS besides the United States which contributes nuclear forces to the military organisation. Through our close association and shared expertise and interests with the United States in this vital area, we have access to and the opportunity to influence American thinking on defence and arms control policy, and this association also helps to forge links on a wider range of international topics. Moreover, our status as a NWS has enabled us to play a leading role in all the major multilateral arms control negotiations since the war. The abandonment of our nuclear weapon status would immediately deprive us of the ability to play this role.

32. Finally, our status as a nuclear power is important for our relationship to other medium powers, since we have lagged behind them in other indicators of prestige. This stands to be especially significant in relation to West Germany (which we must assume can never become a NWS) and to France (which is certain to remain one). Abandoning our nuclear capability would

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leave France as the only NWS in Western Europe. This would reduce our influence over the evolution of defence relations within Europe and between European members of the Alliance and the United States. Any movement towards an increasing European role in nuclear affairs would have to be centred on France's nuclear capability; and we should have little control over it.

33. But it may be argued that our status as a NWS has little effect on our current and future influence on politico-military matters, given the relative insignificance of our nuclear capability in comparison with that of the super-powers. Major arms control questions are now centred on SALT, in which we play no direct part. While we are participating in negotiations on a CTBT, this must inevitably be very much as a junior partner, since we are entirely dependent on the US for test facilities and in the final analysis must be governed by their decisions. As to the general correlation between international status and a nuclear capability, the examples of Japan and West Germany suggest that economic indicators are nowadays more important for influence than strategic ones, and that our efforts and resources might better be concentrated on the former.

34. A positive decision to continue the British nuclear deterrent, in a new generation to come into operation in the 1990s, may also be seen as conflicting with the Government's commitment to work for the reduction of nuclear weapons in parallel with reciprocal reductions in conventional forces and, in the context of general and complete disarmament, for the eventual elimination of nuclear weapons. As a Western nuclear deterrent against the Soviet Union is provided by the United States it may be difficult to justify such a decision in terms of a clear military requirement for Alliance purposes. However convincing the justification on security grounds, there would still be many NWS who would see this decision as inconsistent with our declared arms control objectives; and this could damage our credibility in disarmament negotiations.

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35. Our efforts to prevent the proliferation of nuclear weapons could also be prejudiced. Looking ahead to the 1990s, there is a real danger that several more countries may decide to manufacture such weapons. The prospects of persuading them not to do so may be enhanced if they can be convinced that the existing NWS are genuinely trying to fulfil their obligations under Article VI of the NPT ("to pursue negotiations on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament"). While our work in the field of non-proliferation has been substantial, the regime we have helped to construct and maintain is, correctly and inevitably, regarded by the NWS as discriminatory and any influence we might exercise is limited accordingly. While it would be naive to assume that decisions by states on whether to become nuclear powers will ultimately be governed by anything other than their perception of their national security interests, a decision by the United Kingdom to abandon its own weapons could have a striking impact on such perceptions, since it could cast doubt on many of the prevailing assumptions about the benefits of being a NWS.

Costs

36. The costs of options for a successor system are discussed in Part III of the study. The implications will be difficult to judge, since we cannot predict the level of the defence budget in the long term and how it may be affected by any requirement for a successor system. It will, however, be important to look at the costs in relation to the possible total defence budget over the life of the system and to the costs of other defence capabilities. As to the opportunity cost if defence funds were to be spent on a successor system rather than on our conventional capabilities, we would be buying a capability which, in terms of the European military structure, was unique. Devoting the money to our conventional forces could lead to their significant augmentation; but the additional forces could conceivably have been provided by our Allies, and would present problems to the Soviet Union of degree rather than kind.

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37. On the other hand, the high cost of any successor system is likely to be seen as a major argument for not proceeding with it. If it involved an augmentation of the defence budget, this could be produced only at the expense of other public expenditure programmes. If it had to be found from defence funds, this would have to be at the expense of conventional forces, and it could be argued that, from the Alliance point of view, these had higher priority than the maintenance of the British nuclear deterrent as a means of ensuring a continuing United States commitment to the defence of Europe. Finally, we cannot be certain that assumptions made now about (for example) likely Anti-Ballistic Missile and other defences and the future Anti-Submarine Warfare threat will in the event hold good (see the discussion in Part III of the study). We should therefore be entering into commitments in a high-risk area in which, having once embarked on a new project, it might well prove difficult to change our plans or cut our losses should strategic requirements change rapidly.

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ANNEX

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THE POLITICO-STRATEGIC BACKGROUND

1. This Annex considers possible politico-strategic developments looking to the 1990s and beyond which might affect the case for and against, and the character of, our strategic deterrent.

The States to be deterred

2. Our existing strategic nuclear force has the unique purpose of deterring the Soviet Union. We have considered whether we should allow for any future requirement to deter other NWS. In the case of existing NWS, we believe that there will be insufficient interaction between British and Chinese interests to make it necessary to consider in the context of this paper a major Chinese military threat to our interests; and that if our Commonwealth partners needed the support of a nuclear power against a future expansionist China, they would have to look to the United States rather than to us. It is possible that there will be a significant increase in the number of NWS, given the spread of nuclear technology and of sophisticated military equipment. But we think it unlikely that any of the States which might plausibly become NWS would be likely to judge it advantageous to pose a direct nuclear threat against the United Kingdom itself, or that we would become engaged in defence of our assets outside Europe in a dispute of such intensity that it might escalate to a nuclear level. It is possible to conceive of regional conflicts outside Europe (eg the Middle East and the Indian sub-continent) in which the opponents might threaten the use of nuclear weapons and in which Western interests could be sufficiently engaged to justify political intervention backed by a nuclear sanction. But we have long since relinquished the role of world policeman to the United States, and while we would be expected to give political backing to the United States in such a crisis, a British nuclear contribution would not be required.

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3. We believe that this general conclusion, that the Soviet Union is the only state which may pose a nuclear threat to the United Kingdom, would remain valid in the light of any progress towards a higher degree of unity within the European Community and an increasing interventionist role for the Community in world affairs.

Relations with the Soviet Union

4. There are two major factors which might influence the Soviet Union towards maintaining, and even possibly extending, a relationship with the West on the lines of the present phase of detente. First, the scale of the problems involved in effectively governing the Soviet Union itself and maintaining control in Eastern Europe are such that the primary Soviet interest in Europe may be to maintain stability. Secondly, the threat from China could encourage co-operation to safeguard the Soviet Union's Western flank. On the other hand, these factors have not in the past had a noticeable moderating effect on Soviet behaviour. And it is clear that the Soviet Union will have the economic basis for continued growth in military power and could have the confidence to attempt to exploit this power. In view of these conflicting possibilities, we believe that we should base our calculations on much the same adversary relationship as we have with the Soviet Union today.

Relations within NATO

5. We believe that the interdependence between the United States and Western Europe in economic and other terms is such that the close institutional links, including that in the North Atlantic Alliance, are very unlikely to be broken. On this assumption, a British strategic force would not need to make a more significant numerical contribution to the nuclear force levels of the Alliance than at present. But we do not believe that it can safely be assumed that the threat by the United States to use its nuclear weapons in defence of European interests

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will be credible to the Soviet Union in all circumstances when such support may be needed.

6. We see the principal risk to this assumption of continued transatlantic co-operation arising from possible developments within Western European States and within the European Community as an institution. For example, it is possible to postulate scenarios of major political change within European States (particularly Italy and possibly France) and, at the other extreme, of a dramatic movement towards European integration, which could prove incompatible with a defence arrangement on existing lines. While there may be increased defence collaboration and co-operation, we have assumed this will stop short of integration of defence forces under a single command; and it would, therefore, be appropriate to maintain any further deterrent under sole national control. But the possibility of major political change could have more far-reaching consequences if it appeared to threaten European and transatlantic solidarity. It could lead to strong pressures for new departures in West German policy, including the acquisition of an independent nuclear capability.

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Factors Relating to Further Consideration of the Future
of the United Kingdom Nuclear Deterrent

Part II: Criteria for Deterrence

Summary of Report

1. Of the purposes discussed in Part I, the key ones are the second centre of decision making and a capability for independent defence of our national interests. We should need to deploy a capability which the Soviet Union would regard as being able to inflict unacceptable damage and to be used independently (paragraphs 1-5).
2. "Unacceptable damage" is essentially a matter of judgment. It is suggested that it could be achieved either by the disruption of the main government organs of the Soviet State or by causing grave damage to a number of major cities involving destruction of buildings, heavy loss of life, general disruption and serious consequences for industrial and other assets. An attempt is made (in Annex A) to quantify this judgment (paragraphs 6-10).

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4. Other criteria include the retention of sole national control over the order to fire our nuclear weapons, ability of our deterrent to survive a pre-emptive attack, continuous deployment at early readiness to fire and a substantial probability that the damage threatened would be achieved. Moreover, if our strategic deterrent is to be credible, it should be seen as complementing other levels of defensive capability, i.e. there should not be any major gaps in our spectrum of response (paragraphs 15-17).

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FACTORS RELATING TO FURTHER CONSIDERATION
OF THE FUTURE OF OUR UNITED KINGDOM
NUCLEAR DETERRENT

PART II : CRITERIA FOR DETERRENCE

1. In this report, we consider criteria for the effectiveness of the British strategic nuclear deterrent, looking to the 1990s and beyond. We discuss those aspects of possible strategic systems which bear directly on whether or not they will effectively deter; other aspects relevant to eventual decisions, such as the effect of the strategic environment on the choice between delivery vehicles and launch platforms, and the cost implications of alternative criteria, are considered in Part III of the study.

2. Criteria need to be considered in the context of how deterrence works, the politico-strategic setting for a UK strategic nuclear capability, and the purposes which such a capability might serve. These are discussed in Part I of the study, on which we draw where appropriate in the discussion which follows.

The purposes served by a UK deterrent

3. In Part I of the study, four interrelated purposes were identified which a UK strategic nuclear force might be held to serve:

- a. a numerical contribution to the assigned nuclear forces of NATO;
- b. the contribution of a second centre of nuclear decision-making to Alliance deterrence of the Soviet Union;
- c. a capability for the independent defence of national interests;
- d. political status and influence.

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4. Of these four purposes, we believe the key ones, in the longer term as at present, will be those at b. and c. - that is, providing a second centre of NATO decision-making and a capability for the independent defence of our national interests. If a British strategic nuclear capability is to be maintained, it is essentially with these purposes in mind that criteria for the force should be established. A capability adequate for them should suffice also for the less important and less precise purposes at a. and d.

5. For both of our selected key purposes, the objective would be to deploy a capability which the Soviet Union judges:

- a. has a high probability of inflicting damage that would be unacceptable in relation to the potential gains from aggression against the United Kingdom;
- b. could be used independently - if necessary in a conflict with the Soviet Union in which neither the United States nor France were involved.

Unacceptable damage

6. As we pointed out in Part I of the study, in attempting to define an effective deterrent, we must make assessments of probable Soviet attitudes which cannot be founded on precise data. The judgements made by the super-powers about the scale of damage which they need to threaten against each other are no guide to our own requirements, since the scale of deterrence is related to the gains foreseen by the potential aggressor, and the gains from eliminating the United Kingdom would clearly be less than those from eliminating the United States. There is in our view no unique answer as to what would probably constitute unacceptable damage. Some of the options may be preferred as being more likely than others to make the Soviet Government reappraise its intentions. But the choice must weigh cost and other aspects.

7. It has been UK policy not to say exactly how we would use our nuclear capability: the Soviet Union itself is left to draw its own conclusions from what it can see of the capability. We assume that this policy will be maintained. There is little practical risk of the Soviet Union's so misreading the scope and character of the capability that deterrent value would be lost;

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and our target options need not therefore be constrained by the problems which would arise if we had to make our intentions public.

8. We believe that a deterrent threat of unacceptable damage might be posed in one or both of two potentially overlapping but distinct ways:

- a. if the general level of destruction likely to be suffered by the Soviet Union was such as to outweigh the benefits from removing the UK from the international scene and/or appropriating her resources;
- b. if the damage were likely to undermine, at least for a considerable period, the Soviet Union's ability to compete across the whole range of her capabilities as a super power with both the United States and China.

9. Broadly, our deterrent might be designed to threaten capabilities of key importance to the Soviet state; or cities as a whole; or a combination of the two. The extent to which threatened damage against particular capabilities and/or against cities might be perceived as unacceptable by the Soviet leaders is discussed in detail in Annex A; our judgement is that they would find unacceptable:

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Independence

15. We believe that to satisfy the key purposes identified in paragraph 4, we must retain sole national control over the order to fire our nuclear weapons. (This would be qualified only to the extent of our present arrangements for consultation with other members of the Alliance if time permits). This view carries implications for possible co-operation with another state or states in the procurement and maintenance of a strategic capability. We must be able to sustain our capability nationally for a period of time, to guard against the risk that a partner might seek to neutralise our capability for independent action by cutting off his support during a crisis. [redacted]
be reached in iso [redacted]

Other Criteria

16. We have also considered other major criteria for the characteristics of a strategic nuclear capability. These are discussed in Annex C. For the reasons stated there, we believe a UK capability should:

- a. offer a high assurance that it will survive a pre-emptive attack;
- b. preferably be continuously deployed at early readiness to fire;
- c. offer a substantial probability that the full damage threatened would be achieved. [redacted]

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CONCLUSIONS

18. Our main conclusions are as follows:

- a. A UK strategic force should be designed essentially to meet the criteria necessary for the purposes of providing a second centre of decision-making and a capability for the independent defence of national interests (paragraph 4).
- b. The assessment of the level of damage which the Soviet Union would find unacceptable in relation to aggression against the United Kingdom must ultimately be a matter of judgement. There is no unique answer.

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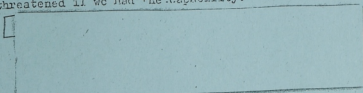
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We believe that such unacceptable damage would be threatened if we had the capability:



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- c. Of these three options, Option 1 would provide greater certainty of deterrence; but we believe that any one of them would be adequate (paragraphs 12-14);
- d. We must retain sole national control over the order to fire our nuclear weapons.

(paragraph 17);

- e. a UK strategic capability should offer a high assurance that it will survive a pre-emptive attack; preferably be continuously deployed at early readiness to fire;

(paragraph 16 and Annex C);

(paragraph 17)

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ANNEX C: OTHER CRITERIA

An Assured Second Strike Capability

1. If a credible deterrent threat is to be posed, a potential aggressor must perceive that he cannot count on being able to neutralise the threat by pre-emptive attack. We therefore believe that the strategic force, and its systems of control, must offer a high probability that they will be able to remain effective in the face of such an attack.
2. We have considered whether, to satisfy this requirement, the force needs to be continuously deployed in the form which minimises the risk of pre-emption. It is unlikely that the Soviet Union would ever launch "a bolt from the blue" attack and advantage might therefore be taken of a warning period to bring the capability to full readiness (for example, by sailing a submarine from port or by putting aircraft on airborne alert). On the other hand, Soviet doctrine certainly requires the maximum use of surprise in launching an attack, so that the worst case possibility of an attack without warning cannot be ruled out; and indications of impending hostilities might prove ambiguous so that warning time was not in the event used to good effect.
3. Even if an adequate period of warning time could be assumed in all circumstances, there could be important objections to relying on it. First, we could not conceal from the Soviet Government the measures taken to enhance readiness and we might face an awkward decision in a period of heightened tension between adopting what they might regard and designate as a provocative act or denying ourselves our full capability. Secondly, a deterrent posture which could be sustained at full readiness for only a limited period would be vulnerable in any crisis which lasted longer than this period. These possibilities could weaken the deterrent effect of our force both to the Soviet Union and in our own eyes.
4. We conclude that there is a strong case for continuous deployment of a strategic force to minimise the risk of pre-emption and to maintain to the full the credibility of the threat we are posing. But the extent, if any, to which risks might be run in this area must ultimately be a matter of judgement, taking account of such factors as cost.

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5. We have also considered whether, if the strategic launch platform was continuously deployed, its delivery vehicles must also be at constant readiness to fire. For example, on vulnerability grounds there might be attraction in allowing ballistic missile submarines as wide an operating area as possible to increase the problems of a potential enemy in trying to find them and this area might take the submarines outside the range of their delivery vehicles. When a retaliatory attack was ordered, they would therefore first close to within the range of their missiles and then launch their attack. While this could be attractive in helping to cut the costs of the deterrent, it could have serious consequences for the credibility of a retaliatory second strike. Such a strike might seem most credible, both to us and a potential enemy, as a spasmodic response blindly hitting back against a similar attack, and least credible as a response following some time afterwards when a rational Government might conclude that further senseless killing could not be justified. While a delay of a few hours in executing a decision to launch our nuclear attack would not be significant in these terms, we believe that any approach which built in a longer delay would weaken deterrence. We conclude that a strategic capability when deployed should be at early readiness to fire.

6. We have considered whether the interval between detection of launch and weapon detonation is significant. This would be a matter of minutes for a ballistic missile but some hours for a cruise missile. In theory, this longer gap might provide time for the Soviet Union to implement measures to protect key personnel and might weaken the deterrent effect of a threat of retaliatory strikes. We doubt, however, whether this distinction is important in practice. As we would launch our missiles only in response to Soviet aggression, the timing of our attack is determined by the timing of the Soviet action and is thus in their hands. In these circumstances, we consider that the Soviet leadership would implement appropriate measures before launching their own attack, rather than when they detected retaliatory strikes.

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Mission Success Probability

7. We use the term mission success probability to cover the combined probability that a missile would be launched successfully and follow an accurate flight path, that it or its re entry bodies would penetrate any defences, and that the warheads would detonate over the target with the estimated accuracy and yield. Each of these aspects of a system is subject to uncertainty and we need to consider what probability of success to aim for. ☐

8. The probability figure to apply to a future system must be a matter of judgement. The key factor for deterrence is the way a potential aggressor perceives the threat. ☐

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FUTURE OF THE UK NUCLEAR DETERRENT

PART III - SYSTEM OPTIONS

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INTRODUCTION

1. This Part of the study considers four groups of factors:
 - a. the operational and technical characteristics required by any successor system in the strategic environment of the 1990s and beyond;
 - b. US and French programmes, and other international factors (including those relating to arms control) which may constrain our choice and influence our decision;
 - c. ballistic missile (BM) and cruise missile (CM) options and their timing, given the estimated life of the present force;
 - d. resource implications.
2. We consider here only the capability needed to inflict "unacceptable damage" in a strategic attack; we do not examine nuclear forces below the strategic level.

The Present Strategic Force

3. Annex A reviews the framework in which the Polaris force was procured; the extent of our dependence on the US under present arrangements; and the likely effective life of the present force. We cannot specify a single date when it will cease to be effective, but by the early 1990s there will be an increasing risk of equipment failure (which might prevent the maintenance of one boat on patrol continuously), reductions in capability to penetrate anti-ballistic missile (ABM) defences and increasing vulnerability to Soviet anti-submarine warfare (ASW). These factors point firmly towards starting to replace the force soon after 1990.

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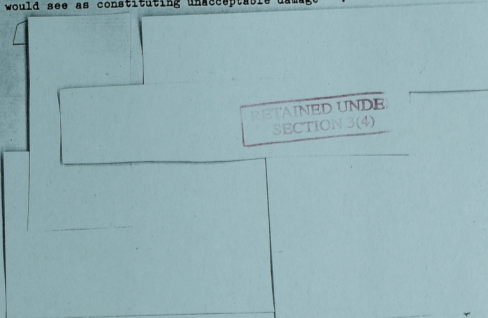
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DETERRENT CRITERIA AND THEIR IMPLICATIONS

4. The following sets of targets have been put forward as alternative illustrative criteria for what the Soviet leadership would see as constituting unacceptable damage⁽¹⁾:



The Assessment of Candidate Successor Systems

6. To assess whether and at what cost each candidate system might meet the criteria for unacceptable damage set out in Part II, we need to consider:

- a. The number of detonations needed to achieve the damage levels set. This depends on the chosen targets and on warhead yields and delivery accuracy.
- b. The number of missiles to be launched to ensure that the required number of warheads detonate over the targets. This depends on the defences which have to be penetrated; the ability one missile may have to present multiple targets to the defences; the flexibility one missile may have to attack several targets, perhaps widely spaced; and system reliability.

(1) Part II paragraphs 11-14 and 16

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- c. The ways in which the required number of missiles might be deployed. The survivability of the system against pre-emptive attack is of key importance.
7. We have assessed the number of successful detonations required to satisfy these deterrence criteria, on alternative assumptions about warhead accuracy and yield; the result is at Annex B, Table 1.

THE STRATEGIC ENVIRONMENT IN THE 1990s

8. We cannot be sure of the strategic environment in the 1990s and later; we try instead to identify solutions that are least 'scenario-sensitive'.

We can also expect the Soviet Union to continue to deploy active countermeasures; their aims will include capability for pre-emptive attack on strategic bases, command and control facilities, and launch platforms.

The Threat to Alternative Delivery Vehicles

9. Annex C reviews prospective Soviet defences against EMs and CMs. Paragraphs 10-13 below summarise the position.

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12. Present Soviet anti-aircraft defences have very little capability against CMs. But there are no overriding technical obstacles to the development of defences against CMs, particularly since currently-planned US CMs are fairly slow; and Soviet systems with a potent anti-CM capability are feasible in the 1990s. Arms control constraints on CM defences cannot be assumed. Soviet deployments are likely to be related to the size and likely tactics of the US force

US ALCMs will moreover be only one element of the US strategic triad, the other two elements of which might be used at the same time as cruise missiles, also knocking out some defences. Thus the US expect that a large proportion of their cruise missiles will be able to reach their targets despite enhanced Soviet defences. But this conclusion cannot be simply read across to the UK case, where the numbers would be much smaller and defence suppression less extensive.

13. We assess that if the Soviet Union deployed large numbers of modern surface-to-air missiles, fighters with the ability to shoot down CMs, and airborne early warning (all of which are within their capability by 1990) a UK CM force might suffer losses of over 80%. Table 2 of Annex B shows that on this basis at least 400 CMs would be needed to satisfy the least demanding damage criterion. Estimates based on so many uncertain factors cannot be precise; but the key point is that for the UK a CM is a much more defence-sensitive system than a BM.

The Threat to Alternative Launch Platforms

14. Annex D assesses possible launch platforms in terms of their ability to satisfy the criterion⁽²⁾ that a UK strategic capability should offer a high assurance that it will survive a pre-emptive attack. Briefly, we consider that all the alternatives to nuclear-powered submarines must be ruled out, and that even these may become rather more vulnerable to Soviet ASW in the next 30-40 years.

(2) Part II, paragraph 16a and Annex C

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15. To provide a high assurance of survivability:
- a. new submarines should incorporate the latest noise reduction, sonar and propulsion technology from our attack submarine (SSN) programme, consistent with meeting an in-service date of the early 1990s;
 - b. submarine operating areas should be extended by adopting missiles of longer range than Polaris. A range of not less than 3000 nautical miles would provide good operating flexibility;
 - c. the minimum force level required to inflict unacceptable damage should be continuously deployed at sea; this would require at least a four-boat force (Annex D). But to provide high long-term assurance of survivability against a growing Soviet ASW threat, there is a strong case for having more than one boat on patrol so that the deterrent threat could still be posed if one was lost to enemy action or accident. To provide an insurance margin for a deterrent criterion which required one boat-load of missiles, a five-boat force would give at least two on patrol continuously. Similarly, if the deterrent criterion required two boat-loads of missiles, an eight-boat force would give at least three on patrol.

INTERNATIONAL POLITICAL FACTORS

16. Political factors will have an important influence on the attitudes of our Allies and on our own assessment of our interests. Annex E considers the attitudes of possible partners to collaboration on a successor system and also likely arms control constraints, as well as our own broad politico-military interests. The main points are these:

- a. Continuing Anglo-American cooperation would involve least risk to the US commitment to the defence of Europe. The US has made clear that it has a continuing interest in the maintenance of our nuclear capacity, and that it does

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not regard non-circumvention obligations in SALT II as imposing any general restriction on future assistance. The US will however continue to be concerned for the strategic relationship with the Soviet Union and the future of SALT, and thus with the relative strength and capability of the UK deterrent force, for example in terms of the number of independently targettable warheads, as preliminary discussions with US officials show.

b. France might welcome collaboration with us; this could save them (though not us) a lot of money. It could however involve risks for NATO cohesion. Our ability to collaborate with France on nuclear aspects of a successor system would in any case be constrained by our obligations to the United States; and we do not know what the US attitude might be. In brief, an Anglo-French project could be attractive to us only if satisfactory arrangements could not be made with the US, and even then would present grave difficulty save in a narrow conjunction of circumstances in which the US, while unwilling to give us the help we wanted, was nevertheless prepared to agree to our collaborating with France.

c. There is no reason to assume that any particular submarine-launched option must be ruled out by a future SALT. A Comprehensive Test Ban Treaty could pose problems for some options, as paragraph 20 below indicates.

SYSTEM OPTIONS

17. Annex F summarises what we know of US and French programmes for submarine-launched BMs and CMs. We rule out purely UK development of strategic missile systems. The UK gave up in the early 1960s its national capability for BMs of this class, and cost, timescale and technical considerations rule out re-acquiring it now. As to CMs, nothing in the technology is plainly beyond our reasonable reach, but to undertake a programme of our own would entail a very large effort of uncertain cost and timescale, with an outcome unlikely to match contemporary US standards. In addition, we could make ourselves independent of the US for navigation and targetting data only with great difficulty, if at all.

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Ballistic Missile Options

18. Against this background, we have examined seven main options for ballistic missiles and "front-ends". The latter is the missile's payload from which the re-entry vehicles (each containing a warhead) and any decoys or other penetration aids are dispensed in flight. Apart from ballistic missiles carrying only a single warhead, there are basically two types of "front-ends":

- a. Multiple Re-entry Vehicle (MRV) Systems. These systems, which deliver several warheads to a single target area, were originally devised to increase the damage caused by a single missile to an extended target.

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- b. Multiple Independently Targetable Re-entry Vehicle (MIRV) Systems. The limitations of an MRV system can be overcome by an MIRV system, which additionally has the advantage of being able to deliver warheads accurately

to targets up to a few hundred miles apart. This is achieved by including a final propulsion stage which can be guided in space whilst it sequentially dispenses its warheads to the separate targets.

There is a spectrum of system concepts ranging from simple MRV types like Polaris A3 to the fully MIRVed systems like Trident C4. Chevaline lies between these extremes.

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19. Only a MIRV system offers the possibility of meeting damage criteria Option I from any reasonable number of SSBNs. Its higher accuracy (compared with widely spaced MRV system) also reduces the number of missiles required to meet the other Options.

20. The main EM system options are these:

a. The Chevaline (Polaris A3TK) MRV system. This would involve acquiring new equipment of existing designs (some elements of which are long out of production). There would be major disadvantages in long-term system reliability and support cost uncertainty; a total loss of commonality with the US, since their Polaris fleet is due to phase out by 1981; limited range and thus growing vulnerability to ASW;

New warhead development would not be needed.

b. An upgraded Polaris MRV system (A4). This would be specially developed for the UK, though there would be some commonality with the US Trident system. Range would be increased to 2800 nm, and there would be more reliable propulsion and control systems. The "front-end" could be similar in concept to Chevaline, but even for this a major redesign (though not necessarily new warhead development) would be needed.

Since the system has not undergone initial conceptual design study, it is impossible to say accurately what its optimum characteristics would be in terms of the performance trade-offs reviewed in paragraph 18a.

c. The Poseidon MIRV system (C3). This has a range varying from

We would have to buy the missiles second-hand and our procurement would be linked to the US phasing-out (1988-1992). There would be some compatibility with our existing facilities, but long-term system reliability and support costs are uncertain, since the system would be

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unique to the UK throughout its life. We should need a UK warhead development and a new series of nuclear tests.

d. The Trident I (C4) MIRV system. This will form the major element of the US SLEM programme until at least the year 2000. We should need a

UK warhead development, but currently-planned tests might suffice if successful.

e. Trident C4, but without MIRV. This would require a major UK "front-end" development. For reasons explained in paragraph 21 below, this would have to be a MRV system with a reduced nuclear warhead and power accuracy. Even then a high-risk development on at least the scale of Chevaline would be required. Range would be reduced to about 2500 nm. Again, it is impossible to say what would be the optimum trade-off among performance characteristics (paragraph 18a). Much would depend on how completely the US insisted on "de-MIRVing" the system by removing the ability to manoeuvre in space.

f. The Trident II (D5) system. This system is under early development in the US, though no decision has yet been taken on completion and deployment. It involves a much bigger missile than Trident C4 with a longer range and probably higher delivery accuracies. The extra range, while helpful, is not of great importance for UK deployment needs; programme costs would be much more than for C4. A UK warhead development would be necessary.

g. The French M4 system. This system will be essentially a MRV with some capability, albeit well below US MIRV standards, for engaging spaced targets. Missile range is estimated at 2200 nm. A UK warhead development would be needed but we cannot now assess its scale or test requirements.

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21. We believe that UK development of a full MIRV system is virtually out of the question. The technical task would be formidable - exceeding even the complexity, cost and demands on scarce manpower resources of Chevaline, for example. It could scarcely be feasible at all without US goodwill, and this could not be assumed in a situation where they had declined to sell us their own MIRV system.

22. The position can be summarised as follows, in the light of paragraphs 19-21 above and Table 2 in Annex B. Trident D5 would exceed our needs, at high cost. Trident C4 with MIRV has a clear advantage over the other US and French ballistic missiles, in range (so reducing ASW vulnerability), [redacted] and in ability to deliver the number of warheads required. As a system in service with the US Navy it would bring great technical, operational and logistic advantages. There would be no need to develop a UK "front-end", apart from warheads. Fall-back options, if the US refused to sell us a MIRV system, are much inferior and far less certain; it is not possible without further study and exploration to say which would be best as between A4, C4 with MEV, and the French M4.

23. As regards submarine platforms for BMs, the main options are:

a. The missile section could be the mid-body of the latest Poseidon submarine, which can take missiles up to the size of C4, or the larger mid-body of the new Ohio-class submarine specially designed to take either type of Trident (C4 or D5). Either section could have 8, 12 or 16 launch tubes; the Poseidon hull is normally designed for 16 and the Ohio for 24. The Ohio section would provide flexibility to adopt larger missiles in the future; would be an insurance against UK uniqueness should the US move on from the C4 to a force structure entirely based on larger missiles in large submarines; and is likely to be available earlier than the Poseidon section. Against this, the submarine would be considerably larger, more difficult to support and more costly; present evidence moreover is that the US is unlikely to move to an entirely Ohio force. Feasibility studies with US agencies, possibly lasting a year, would be necessary before a final choice was made.

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b. As to the choice of the "front" and "back" sections of the SSBN, commonality with those designed for UK SSNs would be essential, and the choice therefore lies between the SSN OY class (in service 1983) and SSN OZ (in service 1994). For the front section (sensors and self-defence weapons) SSNOY could best provide the overall design, though some features from SSN OZ could be incorporated. The "back section" design for SSN OZ will incorporate a more advanced and powerful propulsion system than SSN OY as well as having the latest quietening technology, but will not have proved at sea before the mid 1990s. Unless therefore the risk of delaying introduction of a new SLEM system until at least 1994 were accepted, the SSN OY "back section" would probably be the best choice. Again, however, further study would be needed.

24. In summary, and subject to further studies on the preferred submarine options, the integration of the MIMV-C4 missile system with an Ohio or Poseidon launch system and prospective UK SSN elements appears to offer the best RM solution in the required timescale. Deployment of submarines could not begin before 1991, with follow-on submarines at 18 month intervals.

Cruise Missile Options

25. As Annex F explains, French CMs, even if developed, are likely to be inferior to US ones, and much later in timescale. The only realistic CM procurement option for the UK is purchase from the US. The US has however not yet funded production of a submarine-launched land-attack nuclear CM programme, and 'UK-unique' system procurement might therefore be necessary.

26. The UK would produce its own submarines and warheads. A variant of the Chevaline warhead should be compatible with a sea-launched CM (SLCM), though development work would be needed.

27. To route a CM to its target and to evade defences as far as possible, a vast amount of detailed data on terrain is required. We should need to:

- a. obtain access to the US data base (which, on some indications, they may be reluctant to provide as fully as we should like); or

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- b. procure defined routes from the US, with some loss of flexibility and independence; or
- c. try to establish our own data base. This would be very expensive, if possible at all.

28. In order to achieve the required accuracy of landfall the SLCM should be launched not more than [] from the coast. The limited effective range of prospective US CMs (a maximum of even before allowance is made for evasive routing) would in any event reduce available launch area. This entails operational constraints and vulnerability to Soviet ASW for all the options described below.

29. A purpose-built nuclear-powered CM carrier about as big as the UK's present SSBNs might carry about 80 CMs. This would almost certainly require a major UK system development programme, since even if the US do develop a land-attack SLCM they are unlikely to develop the vertical submerged-launch mode than an 80 missile strategic carrier would need. Broadly, if the basic submarine concept was settled in 1981, it is unlikely that the first submarine could be deployed until at best 1992 or 1993, one or two years later than for a EM solution.

30. As alternatives to a purpose-built CM carrier, we have considered two options for deploying CMs in our nuclear-powered attack submarines (SSN):

- a. Dedicated (SSCN). A next generation SSN could carry 24-30 SLCMs if all its other weapons were removed. SLCMs would be fired through the torpedo tubes in salvoes of four or five, with 30-40 minutes between salvoes. This would be less cost-effective than the approach described in paragraph 29 above, since SSNs are not significantly cheaper than purpose-built SSCNs would be. Moreover, the long time required to fire all the CMs would render the submarine vulnerable to detection and counter attack.

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b. Non-Dedicated. SLCMs could be deployed in small numbers (say 6-8) in each SSN without removing existing ASW and anti-ship roles; but if submarines were to be on patrol at readiness to fire, their operational readiness and value in other roles could be severely reduced. Moreover, the UK's submarine building and maintenance resources are unlikely to allow a total force of more than 24 SSNs; this might allow about 12 boats continuously on patrol, giving a total availability of under 100 CM. Such a capability would fall far short of meeting any of the damage options. There would also be severe command and control problems in coordinating the force.

Our conclusion is that neither of these options would meet the operational requirement nor would they be more cost-effective than a purpose-built SSCN. We do not therefore consider them further.

A Combined Ballistic and Cruise Missile Force

31. The foregoing discussion has concentrated on ways of satisfying the damage criteria using either BMs or CMs. Relying on a single type of delivery vehicle entails at least a theoretical risk that unexpected developments in one area of an adversary's capability might render our whole capability ineffective; and a mix of capabilities might be attractive as providing some insurance against such a risk. We believe however that it would be beyond the UK's resources to procure two types of strategic system on a major scale.

RESOURCE IMPLICATIONS

32. Costs. We have sought to estimate the cost of acquiring various system combinations and operating them over 20 years. Annex G sets out the position. Many elements are inevitably uncertain particularly for missile systems which would require new UK development. The costings cannot therefore give more than a general indication of rough order of magnitude, and of approximate relativities between options. We believe however that they are broadly a valid guide in these terms.

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33. Support Facilities. Many of the existing facilities at Faslane and Coulport could continue to be used for a new force. Because of larger size and power, however, C4 and D5, and possibly M4 (though A4 would be less of a problem) would require extensive new construction to meet explosive safety distance requirements. Preliminary studies on the basis of the C4 system have shown that it should be possible to accommodate these in the Coulport area, but the terrain is very difficult and further on-site studies are required to assess the costs more closely. Other new facilities on a more modest scale would be required at Faslane submarine base and Rosyth dockyard. Annex G makes broad allowance for all these requirements.

34. Manpower. Provision of the highly skilled Service and civilian manpower to man, support and maintain a successor to Polaris is likely to be a continuing problem. Special measures may be needed.

35. Budgetary Effect. It is impossible to forecast the precise implications for the defence budget in the late 1980s and early 1990s of a decision to purchase a system to replace Polaris. The running cost of the present force is about 2% of the current defence budget; this will gradually increase during the 1980s as the force becomes more difficult to maintain. Assuming slight overall growth in the real value of the defence budget, the capital cost of a 5-SSBN system with 16 C4 (MIRV) might represent an average of 2½% over the fifteen-year span in which it would arise, with a peak of about 4½% in 1987/88, and a long-term running cost of under 2%.

SURVEY OF OPTIONS

36. The table on page 15 shows how various combinations of numbers of submarines and missiles would meet the deterrence criteria discussed earlier. It sets out the capability provided by the basic level of submarines maintained on continuous patrol (1 for a 4-boat force, 2 for a 5-boat force, 3 for an 8-boat force). It shows the effect of losing one boat at sea (through accident or enemy attack).

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These are arguably somewhat pessimistic

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assumptions. Often in peacetime (

) another boat would be at sea; the Soviet Union might not increase the number or capability of their ABM systems; and their relative ASW capability might well not improve to the point where there was a significant risk of their being able to destroy one of our SSENs. Nonetheless, for a force which could still be in service in 30-40 years time, we have thought it prudent to reflect all these possibilities.

37. The following are among the conclusions on EM options that might be drawn from the table:

- a. A 4-boat force offers no insurance against the loss of a submarine.
- b. Reducing the number of missiles per boat from 16 to 12 has a significant effect on force capability for little saving in cost.
- c. To meet in full Option 1 (the minimum force required is 5 SSENs with 16 C4 (MIRV). This assured capability is lost if one boat at sea is lost, but the other damage criteria can still be met by the remaining boat.
- d. If the missile is A4, a force of 8 SSENs is needed to meet Option 2.
- e. An 8-SSEN force equipped with MIRVed C4 can meet all criteria even in the worst case envisaged, but at very high cost.

38. The number of CMs required to meet the damage criteria options (Table 2 of Annex B) is less certain, but on our present assessments a minimum of 400 would be needed at sea to meet the least demanding Option (3b). This would require a dedicated force of 11 submarines to ensure that 5 each carrying 80 CMs were at sea continuously (even without any insurance against loss). The cost of acquiring such a force and operating it over 20 years is estimated at £12500M.

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ANNEX A

THE PRESENT STRATEGIC FORCE AND ITS FUTURE LIFE

1. The present UK strategic nuclear force consists of four nuclear-powered ballistic missile submarines (SSBNs) armed with 16 Polaris A3 missiles each with three multiple re-entry vehicles (MRVs). Under the Polaris Sales Agreement 1963, the USA provided Polaris missiles (excluding warheads), guidance systems, launching and handling systems, fire control systems and the submarine's navigation system. The nuclear propulsion system also used US technology. The UK was responsible for the design and manufacture of the warheads and of the SSBNs, which were completed between 1967 and 1969. A new operating base for the force was constructed at Faslane, support facilities at Coulport and a refit capability at HM Dockyard Rosyth.
2. A new "front-end" for the missile is currently being developed (Project Chevaline) to improve the system's capability to penetrate the Moscow ABM defences.
3. The maintenance of the Polaris force, both now and after conversion to Chevaline, depends upon the continuing availability of US assistance covering:
 - a. Technical advice and design-authority consultancy service for the weapon system.
 - b. Equipment support, including spares supply and repair facilities, for the weapon system.
 - c. Facilities for missile-firing trials and demonstrations.
 - d. [REDACTED]
 - e. Exchange of information on operational matters.
 - f. [REDACTED]
 - g. Supply of nuclear materials for warheads and reactors.

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4. This dependence does not affect our ability to operate the force under sole national control. If however all US support were cut off there would be very serious problems in keeping the weapon system serviceable. It could become unserviceable after about six months, though substantial further time might have to elapse before an adversary could be sure of a decisive decline in our capability.

5. The main life-limiting factors are these:-

a. Submarines. The ship system was designed for an operational life of at least 20 years. Recent assessments have shown that, barring unforeseen circumstances, and depending upon the results of a reactor pressure vessel survey, the hulls should remain sound until the mid-1990s. At least two will require fourth refits, which can be expected to be extensive owing to age and obsolescence of equipment. There will be an increased risk of patrol-aborting defects and a greater maintenance effort will be needed if these are to be avoided. Refits and maintenance work will take longer, reducing the availability of submarines for operations.

b. Polaris Missiles. Polaris is a two-stage missile with first and second stage solid-fuel rocket motors. It is these motors, unless they are replaced with new production, which are most likely to determine the ultimate life of the missile. Present evidence on the life of the first and second stage motors, whose average date of build was 1966, is that enough serviceable motors will be available until 1988, but there can be no assurance that they will remain serviceable beyond then.

c. Missile Re-entry System. When converted to Chevaline, the missile re-entry system will provide an effective capability against Soviet exo-atmospheric defences into the 1990s. It will have a reduced capability against any endo-atmospheric defences (see Annex C) which could (on the worst assumption) be introduced in the later 1980s.

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- d. Launcher and Fire-Control Sub-systems. The launcher sub-system can be expected to last the life of the submarines, although, after the phasing out of the US Polaris submarines, the equipment will be to some extent unique and more expensive to maintain. Support costs for the fire-control sub-system will also rise, but we expect to be able to keep it operational into the 1990s.
6. In addition to technical factors, careful consideration must be given to the operational survivability of an ageing force. The SSBNs, built to 1960s technology, are noisier than newer types and therefore more susceptible to detection by modern Soviet submarines. There is increasing evidence of Soviet advances in anti-submarine warfare (ASW), and by the 1990s there will be a limit to the improvements which can be incorporated in existing SSBNs to counter these advances.
7. In sum, there is no specific cut-off point now foreseen when the present force must cease to be operational. It may be maintainable into the early 1990s, but with increasing costs and increasing doubt about survivability and reliability. By the mid-1990s it will certainly cease to be sensible to spend large sums to buy further limited extensions of operational life.

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ANNEX D

THE CHOICE BETWEEN ALTERNATIVE STRATEGIC LAUNCH PLATFORMS

1. We have assessed the suitability of possible launch platforms in terms of two main factors:

- a. Pre-release survivability, given the Soviet Union's extensive attack capabilities.
- b. Command and control arrangements: these need to be in continuous operation and to be proof against pre-emptive strike.

2. We believe that the following launch platforms can be rejected as unsuitable for a strategic nuclear force (which does not mean they would necessarily be unsuitable for other roles, for example as theatre nuclear platforms):

a. Land-based: fixed site

Fixed sites have command and control advantages, but cannot be concealed from modern means of surveillance. Even in silos missiles are vulnerable to attack. High survivability could be achieved only by deployment on a massive scale.

b. Land-based: mobile platforms

The US concept for a mobile ground-launched cruise missile (GLCM) force for theatre use envisages locating GLCM launchers in peacetime in hardened shelters. In wartime they would disperse to pre-planned sites within 100 nm of their main bases. This concept is valid for theatre weapons, but it has serious shortcomings for a strategic system, particularly in the UK's limited area. GLCMs in shelters could be destroyed in a "bolt from the blue" attack, and even when dispersed they would be vulnerable to a "blanket" nuclear attack. They would not therefore meet pre-launch survivability standards for a strategic system.

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c. Air Launch

We know of no air-launched ballistic missile in active development. Free-fall bombing depends on a degree of penetration by the attacking aircraft which we believe is out of the question against future Soviet defences in the strategic context. The only realistic air-launched option is aircraft carrying air-launched cruise missiles (ALCM). Survivability on the ground could be increased by quick-reaction alert or dispersal, but the force would still be vulnerable to nuclear attack. To achieve in the UK the level of pre-release survivability appropriate to strategic criteria, aircraft would have to be maintained on airborne alert. This is very expensive, since it requires large numbers of aircraft and base facilities. Even then attacks on airfields could reduce, perhaps to a matter of hours, the time for which a force could be kept operational. In addition, large numbers of nuclear warheads would be continuously airborne over or near the UK in peacetime.

d. Surface ships

Surface ships are relatively easy to track by the Soviet Ocean Surveillance System.

e. Sub-surface fixed and bottom-mobile platforms

Mobile sea-bottom launchers would be less vulnerable than land-based mobile platforms. They would however be more easily detected than a true submarine, and therefore more vulnerable. Legal problems would arise from the 1971 Sea Bed Treaty.

f. Conventional submarines

A conventional submarine is powered by electric batteries which make it very quiet in normal running. These are re-charged (about once a day) by diesel generators which are noisy and need large amounts of air. This requires the submarine to draw in air through a tube

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- up to the surface. During this operation there would be a significant risk of detection by Soviet ASW forces.
3. This leaves nuclear submarines, as in the present force. It is not possible to reach any simple conclusion about the Soviet ASW threat to them in the 1990's and beyond. We cannot exactly predict the characteristics and scale of deployment of Soviet forces up to 30-40 years ahead, nor precisely how they might be brought to bear against our SSBNs or how our own maritime forces might react. The Soviet Union attaches high priority to operations against SSBNs; in a period of tension, they would attempt to trail our SSBNs from port exits and to mine the Clyde approaches and the exits from the Irish Sea and English Channel. Although the ASW task in the open-ocean is much more difficult, they will attempt to achieve an open-ocean surveillance system. This could include a seabed sensor system which might, despite technical and geographical difficulties, be capable of providing some pointers to our submarine dispositions. Formidable maritime forces would be deployed to attempt to classify, localise, track and destroy our submarines although the ASW task is not easy even when initial detection has been achieved. A submarine actually launching its missiles is however likely to be detected and identified, and might then be subject to "counter-battery" fire before all its missiles had been launched.
4. Our conclusion is that only a nuclear submarine offers adequate pre-launch survivability. In view of the improving Soviet ASW capability we believe that:
- a. we should incorporate in new SSBNs the latest technology from our attack submarine (SSN) programme. This will help maintain our tactical advantage over Soviet ASW forces and will also complicate the Soviet anti-SSBN task, since any isolated detection might or might not be one of our strategic submarines.
 - b. There would be advantage in extending our submarine operating area by adopting a longer-range missile. A

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range of not less than 3,000 nm would provide good sea room, without imposing undue communications difficulties.

c. Our strategic submarines should be able to fire their missile load quickly, so that "counter-battery" fire would not prevent full missile launch.

5. Even with these measures, careful consideration is needed of the minimum force level. The relationship between the number of submarines in the patrol cycle at any time and total force size is complex. In general terms, however, a 4-boat force is the minimum which allows at least 2 always in the patrol cycle and thus at least 1 continuously on station.

In practice, for much of the time a third boat will always be available so that two can be on patrol; but, for the remainder, two boats will be on patrol for only 25% of the time. A force of 5 or more gives at least 2 always on patrol and a third at notice; and a force of 8 gives at least 3 always on patrol and a fourth at notice. Again, in these cases, additional boats will be available for some of the time.

6. Given the threat to port exits, and the other considerations discussed in Annex C to Part II, we should aim for continuous deployment of our deterrent. At least 4 boats are therefore required. Studies have however shown that the Soviet open-ocean ASW detection task is dramatically complicated if they have simultaneously to detect, classify and attack at least 2 SSBNs on patrol. As the Soviet Union could predict when patrol levels would be at a minimum and could time a pre-emptive attack accordingly, there would be advantage in maintaining 2 SSBNs on patrol continuously in order to provide a high assurance of survivability. This would require 5 boats which would be sufficient confidently to sustain a deterrent threat which required one boat-load of missiles. This higher force level would also offer insurance against accident and support problems. On the same argument, if the combined missile loads of two submarines were needed to satisfy

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the damage criterion, our objective might be to provide three continuously on patrol.

7. Against this, it could be argued that the minimum numbers on patrol for a given force level are exceeded for a significant proportion of the time; that the Soviet Union would not launch a "bolt from the blue" attack; that when contemplating the risks of aggression they would tend to allow for the possibility of facing the larger ASW task; and that we might therefore make no special provision for higher patrol levels but instead plan on getting extra boats out in a period of tension. On this approach, a 4-boat force might be sufficient for a one-boat-load damage criterion even after allowing for the ASW risk, and a 5-boat force for a two-boat-load damage criterion.

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ANNEX E

INTERNATIONAL POLITICAL FACTORS

1. This Annex looks at the political aspects of collaboration with the US and/or France on a UK strategic force, taking account of their likely attitudes and those of our other major Allies. We also consider how our own foreign policy interests might affect our choice between collaborative partners.

ANGLO-US CO-OPERATION

2. There is a long history of US/UK agreements in the nuclear field, stretching back to the wartime days of collaboration in the development of the first nuclear weapon. At present, co-operation is almost wholly determined by the Agreement for Co-operation on the Uses of Atomic Energy for Mutual Defence Purposes (the 1958 Defence Agreement), and by the 1963 Polaris Sales Agreement (see Annex A).

3. The present US Administration has re-emphasised, at the highest level, the continuing self-interest of the United States in the maintenance of the United Kingdom's nuclear capacity. We have no grounds for expecting that any succeeding US Administration would adopt a different attitude. Congress would be unlikely to dissent, although moods could change, for example if the dangers of nuclear proliferation became a dominant concern.

4. A possible limiting factor on US assistance is SALT. The US Administration has made a unilateral interpretative statement on the non-circumvention provisions of SALT II, to the effect that the Treaty will not interfere with existing patterns of co-operation and collaboration on nuclear weapons with the Alliance nor preclude co-operation in modernisation. More specifically, in evidence to the Senate during the ratification process Dr Harold Brown, the Secretary of Defense, said that "the US was allowed under the interpretative statement to provide the Allies with modernised forces along the lines of the Cruise Missile and Trident submarines".

In response to direct questions, Ambassador Ralph Earle (the leader of the SALT II negotiating team) said that the US would not consider the transfer of cruise missile technology to the Allies to be a violation of Article XII; asked if transfer of the

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Trident I missile to the UK would be a violation of Article XII, he replied "No".

5. It is more difficult to judge the possible implications of SALT III. The Soviet Union is likely to press again for a ban on the transfer of US systems to her Allies and/or for UK and French systems to be included in overall ceilings. We expect the US to resist both pressures. To achieve this, however, against the background that the US and USSR are committed to seeking in SALT II "significant and substantial reductions" in strategic system numbers, the US may have to argue that the UK deployment is insignificant numerically compared with US and Soviet systems. Against this background, they may be concerned about the number of systems we deploy, particularly in terms of warheads.

European Attitudes

6. New arrangements for US assistance for a UK successor system would be welcome to most of our European Allies, as helping to maintain the existing general structure of NATO deterrence. France could be an exception to this; but in present circumstances a decision which essentially continued the status quo in Anglo-US defence nuclear collaboration would be unlikely to damage Anglo-French relations, though it would require careful presentation.

Our Own Interests

7. As to our own interests, we believe our primary politico-military objective is the maintenance of the US commitment to the defence of Europe, and of the cohesion of the NATO Alliance. Continued Anglo-US nuclear co-operation would involve the least risk to this primary interest.

Comprehensive Test Ban Treaty

8. Once a CTBT entered into force, further major UK warhead development would be ruled out during its duration. We have therefore assumed the availability only of warhead designs based on knowledge acquired before mid-1980. We might obtain additional warhead information from the US during a CTBT regime, particularly if we were co-operating with them on our successor system. This would be valuable for validating our designs; but it is unlikely to allow us to adopt any radically different warhead.

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ANGLO-FRENCH COLLABORATION

9. Belief in the need for a nuclear capability in Europe independent of the US is a key element in French defence policy. The French doubt whether the US would be prepared to use their strategic nuclear forces, and so invite direct Soviet retaliation, to resist aggression against Western Europe; and the French have never been willing to become beholden to the US for major assistance in the difficult task of developing and maintaining their force de frappe. If Britain were willing (and able) to become less dependent on the US, the French would probably be attracted by the possibility of Anglo-French military nuclear collaboration, provided it did not infringe the independence of the French capability. The UK would then represent the natural European partner in providing a stronger nuclear capability in European hands. There would also be a forceful economic incentive for the French in co-operating on strategic system procurement.

The US Attitude to Anglo-French Nuclear Collaboration

10. Our ability to collaborate with France in the nuclear aspects of a successor system would however be completely constrained by our obligations to the US. Under both the 1958 Defence Agreement and the 1963 Polaris Sales Agreement we are prohibited from making classified information and equipment derived from the US available to third parties without US agreement. There is no way under these agreements in which we could collaborate with France without prior US agreement. Both our weapon and our propulsion technology are so inextricably mixed with technology of US origin that some degree of transfer of the latter to the French would be involved under any form of Anglo-French nuclear collaboration. The US attitude would therefore be crucial.

11. In assessing the political (rather than technical or security) case for permitting, and perhaps assisting in, some form of Anglo-French nuclear collaboration, the US Administration might give particular weight to the general improvement of France's relations with her NATO Allies while President Giscard has been in office. They might conclude that a degree of Anglo-French nuclear collaboration

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would generally strengthen military co-operation between France and the rest of NATO, and would represent a potentially important influence on the future course of French (and European) nuclear strategy. On the other hand, no US Administration could be expected to support a collaborative agreement which was plainly and explicitly motivated (as French nuclear doctrine to some degree is) by doubts about the reliability of the US nuclear guarantee to Europe. The French attitude to arms control agreements would also raise difficult issues. Finally, there could be doubts about permitting collaboration with a country in which a Government with Communist participation could not be wholly excluded. Even if these drawbacks were considered by the US Administration to be outweighed by the advantages, there could still be difficulty with Congress, whose agreement would be needed for the transfer of US nuclear information.

The Attitude of the FRG

12. The FRG might see some general "Europe-building" merit in Anglo-French nuclear collaboration. But they would be concerned lest it should lead to the diminution or withdrawal of the US commitment to the defence of Europe, or a situation in which the FRG was expected to bear the brunt of conventional defence whilst the UK and France provided the nuclear deterrent forces, without the FRG having any ultimate say over their use.

Our Own Interests

13. The political case for the development of Anglo-French defence nuclear collaboration derives basically from the orientation of UK foreign policy towards Europe and our increasingly close links with our European partners. Anglo-French nuclear collaboration would however be in our interests only if compatible with maintaining the US commitment to Europe and the cohesion of the Alliance. If these conditions could be fulfilled, there could be political attractions in adopting an Anglo-French solution to the procurement of a UK successor system. Nonetheless, there would still be major problems in relation both to US attitudes (paragraph 11 above) and to the fact that France remains outside the nuclear planning structure of NATO and certain international nuclear arrangements.

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14. If the decision is taken to seek US support in the procurement of the system we might still work towards US acceptance of Anglo-French contacts over non-procurement aspects such as the operation and maintenance of SSBNs, though it is not clear that this would bring us any military or technical as distinct from political advantages.

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ANNEX F

US AND FRENCH PROGRAMMES FOR SUBMARINE-LAUNCHED STRATEGIC MISSILES

US Programmes

1. The US ballistic missile fleet now consists of 41 submarines of about 8000 tons displacement, each deploying 16 Polaris or Poseidon missiles with a range of up to 2500-2800 nm. In 1971 the US decided to build longer-range missiles to counter developments in Soviet ASW and to lessen dependence on overseas bases. The first stage of this programme consists of the Trident I (C4) missile with a range of up to 5800 nm, to be retrofitted in 12 Poseidon submarines and fitted in the new Ohio-class SSBN currently being built. Trident C4 will begin deployment in 1979 and is expected to remain in service until at least 2000. The second stage of the programme, not yet firmly decided upon, is Trident II (D5) with a planned range of 6500 nm. Its greater size and the decision to carry 24 make the Ohio-class submarine very large, displacing nearly 19,000 tons.

2. US cruise missiles are well advanced in development and due in service in 1982-3. Both conventional and nuclear roles are envisaged. US strategic CMs would be air-launched, but a ground-launched version (GLCM) is planned for the long-range theatre nuclear role in Europe. The US are developing a submarine-launched nuclear CM, but for the anti-ship role; production for a land-attack role (which requires markedly different characteristics) is not at present planned. Work is beginning on concepts for second-generation CMs, which may have increased range and electronic counter-measures to assist in penetrating defences.

French Programmes

3. France is developing a new BM - M4 - for the present 5 SSBNs and at least one further submarine. The first test firings are planned for the early 1980s and the missile is due to enter service in the mid-1980s. It will have multiple warheads. We believe that it may have a limited capability to attack separate targets but not a full MIRV capability by US standards of target spread.

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We do not know the prospective accuracy, but again this is unlikely to reach US standards. The re-entry bodies would be spread widely in space and time to present separate targets to ABM missiles. We cannot assess just how effective M4 would be against present or future Moscow ABM defences.

4. France is studying subsonic CMs as a possible complement to BMs in the 1990s when Mirage strike aircraft are withdrawn; the launch platform envisaged is not known. The project is linked to one for observation satellites which could provide terrain mapping information. Although France could master the technical problems of CMs, their performance would probably be below US standards; they are likely to be more easily detectable and to fly higher. There is no firm development programme.

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COSTS OF ILLUSTRATIVE SUBMARINE/MISSILE COMBINATIONS

A table of broadly calculated costs for illustrative options is attached. The figures are at current (September 1979) prices and the exchange rate is that assumed for the time of peak spending (£1 = \$1.85 in 1987/8). Foreign exchange expenditure is about one third of the capital cost of a C4 MIRV system, and somewhat less for the other options.

Warhead Costs

These assume	A4 MRV	-	4 REB
	C4 MRV	-	6 REB
	C4 MIRV	-	8 REB
	SLCM	-	1 REB

The unit production cost is assumed to be £0.5M per operational REB, to which are added development costs, the cost of additional production facilities, and the costs of REBs for training and proof firing.

Fissile Material

The material is recoverable and reusable and therefore this cost would not be written off over the life of the project. Additional facilities at a cost of £300M for processing the material are also included although these facilities would not be unique to the successor system and would be required for any nuclear weapon programme.

Missile Costs

Unit costs of operational missiles, including spares, R & D surcharge, VAT and overheads are assumed to be:

A4	-	£4.48M
C4 MRV	-	£7.25M
C4 MIRV	-	£5.32M
SLCM	-	£1.15M

The A4 and C4 MRV costs also include an extremely speculative estimate of development cost. A4 development includes £420M for US development of the missile, plus £500M for UK work on the front end. This work could however be very considerable and a much more substantial development programme could well be involved. C4 MRV includes £700 for front-end development; this also might

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be considerably too low. The costs of C4 MIRV assume the purchase of a system, less warheads but including REBs, from the US. The development of a UK MIRV would be, even if possible without extensive US assistance, extremely costly.

Submarine

The figures shown in the table are for the cheapest option - OY/Poseidon/OY - and include "first of class" costs and the setting up of a stock of parts for upkeep by exchange. The additional costs for the most expensive configuration of submarine (OZ/OHIO/OZ), are shown on the bottom line. No judgment can be made on the optimum submarine configuration until feasibility studies have been conducted with the US.

Additional Facilities

This includes conversion of facilities at Coulport and Faslane and additional shipbuilding yard facilities, including a second yard. The implications of accommodating missiles with a larger explosive content in the Coulport area have been given preliminary in-house study and the figures quoted here assume, in accordance with initial conclusions, that this would be feasible. CM's could probably be accommodated largely in the existing facilities. A new school would be required at Faslane and has been costed accordingly.

Running Costs

These are based on the running costs of the present force. It is assumed that the increased complexity of a successor system is offset by increased intervals between refits. No allowance is made for any mid-life improvement programme, and it is also assumed that missile motor life will be at least 20 years.

For the purpose of these tables, no allowance is made for items displaced from elsewhere in the defence programme, on the assumption that any such displacement will be postponement only. If 2 SSNs are displaced, this will defer the expenditure of some £300M in the period 1982-3 to 1992-3.

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TYPE OF MISSILE	4 BOAT SLEM FORCE EACH WITH 16 TUBES				5 BOAT SLEM FORCE EACH WITH 16 TUBES				5 BOAT SLEM FORCE - EACH WITH 12 TUBES				8 BOAT SLEM FORCE EACH WITH 16 TUBES				11 BOAT SLEM FORCE EACH WITH 80 TUBES			
	A4 MEV	C4 MEV	C4 MIRV	A4 MEV	C4 MEV	C4 MIRV	A4 MEV	C4 MEV	A4 MEV	C4 MEV	C4 MIRV	A4 MEV	C4 MEV	A4 MEV	C4 MEV	C4 MIRV	A4 MEV	C4 MEV	C4 MIRV	CH
Warhead	325	400	400	350	475	475	475	475	325	400	400	450	475	450	475	700	450	1050	1100	3000
Missile Material	675	725	750	700	800	855	855	800	675	725	750	725	900	725	900	1050	1050	1100	3000	300
Missile	1300	1150	450	1400	1300	550	550	1300	1325	1175	475	1600	1700	1600	1700	3000	3000	3000	3000	3000
Submarine	1500	1500	1500	1850	1850	1850	1850	1850	1650	1650	1650	1650	800	600	850	900	300	300	300	300
Additional Facilities	500	750	800	550	800	850	850	800	500	750	750	750	800	600	850	900	300	300	300	300
Sub Total	(4300)	(4525)	(3900)	(4850)	(5225)	(4580)	(4580)	(5225)	(4475)	(4700)	(4075)	(6375)	(6925)	(6375)	(6925)	(6500)	(5900)	(5900)	(5900)	(5900)
Burning Costs (20 yrs)	3200	3200	2800	3700	3700	3300	3300	3700	3700	3700	3700	3700	3700	3700	3700	4800	6500	6500	6500	6500
TOTAL	7500	7725	6700	8550	8925	7880	7880	8925	8175	8400	7375	11575	12125	11575	12125	11300	12400	12400	12400	12400
SCUMED TOTAL	7500	8000	7000	9000	9000	8000	8000	9000	8500	8500	7500	12000	12500	12000	12500	11500	12500	12500	12500	12500
ADDITION FOR 02/0810/02	+600	+600	+600	+750	+750	+750	+750	+750	+700	+700	+700	+700	+1100	+1100	+1100	+1100	-	-	-	-

TABLE. Programme costs (£m) for illustrative systems

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