SECRET AND PERSONAL

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Weekend Box.

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PRIME MINISTER

POLARIS SUCCESSOR: MEMORANDUM

I propose that, as we earlier agreed, a Departmental memorandum should be published on the day of the announcement of a Polaris successor, giving a full account of the options considered for replacement, and the reasons for our choice.

2. I now attach a draft of this memorandum which aims to present the arguments, and tackle likely criticisms, as fully and frankly as possible. I should be glad to know whether you, and our MISC 7 colleagues, are content with it, preferably by the end of this week so that it can (subject to a report from the British officials currently in Washington) be shown in confidence to the appropriate American authorities in reasonable time for them to have a look at it.

3. I suggest that in addition to this Departmental memorandum a White Paper should be published giving the exchange of letters you plan to have with the US President.

4. I am sending copies of the draft, with this minute, to the Home Secretary, the Foreign and Commonwealth Secretary and the Chancellor of the Exchequer; and to Sir Robert Armstrong. I hope that they will forgive me for adding a rider about the extreme sensitivity of the draft.

Ministry of Defence

10th June 1980

SECRET AND PERSONAL

DRAFT

BRITAIN'S STRATEGIC NUCLEAR FORCE: THE CHOICE OF A SYSTEM TO SUCCEED POLARIS

1. On 1980 the Government published the texts of letters exchanged between the Prime Minister and President Carter providing for the United Kingdom to buy from the United States the Trident weapon system, comprising Trident I ballistic missiles and supporting components for a force of British missile-launching submarines to replace the present Polaris-equipped force.

2. The new agreement is broadly similar to the 1962 Nassau Agreement (Cmnd 1915). Following that Agreement and the 1963 Polaris Sales Agreement the United States sold to the United Kingdom Polaris A.3 missiles and related equipment, together with continuing spares supply and maintenance support. The four nuclear-propelled submarines and the nuclear warheads for the missiles were designed and built in Britain. The Polaris force as a whole is entirely owned by the United Kingdom, and final decisions on its operational use rest with Her Majesty's Government alone; but it is committed to NATO and targetted in accordance with Alliance policy and strategic concepts under plans made by the Supreme Allied Commander Europe (SACEUR), save where Britain's supreme national interests otherwise require. The new Trident force will be acquired, committed and operated on the same basis.

3. The Government has already shown that it attaches much importance to helping wider understanding and more informed public discussion of major defence issues. The present issue is certainly a major one, one

of the biggest that can face any British Government in the defence field. I undertook to Parliament on 28 April 1980 that when the Government's decision was taken I would publish as full an account as security would allow of the reasons for the choice of system. This memorandum makes good that undertaking. A few of the relevant factors cannot be published, and certain detailed information is not ours to disclose. Most of the factors can however be given, and the Government believes they show clearly that the Trident system is the right choice for Britain.

SECRETARY OF STATE FOR DEFENCE

I - THE POLICY BACKGROUND

4. The basic policy case for Britain's continuing to contribute to NATO an independent strategic nuclear force was explained by the Secretary of State for Defence on 24 January 1980 to the House of Commons, which after debate backed the Government's policy by 308 votes to 52. A further account was given in paragraphs 201-204 of the Statement on the Defence Estimates 1980 (Cmnd 7826-I). The principal features are set out below.

5. NATO's strategy is above all one of deterrence, in which the possession of nuclear weapons plays a key part. If we ever have to face using them, the strategy will have failed in its prime purpose. That purpose is to influence the calculations of a potential aggressor decisively before he embarks at all - even with non-nuclear weapons - on aggression against any NATO country. The prime test of defence measures, above all in the nuclear field, is whether they help to make it less likely that aggressive war might be launched. How they might affect the course of such a war if it once started is essentially secondary. In the world of modern technology nothing can make major war anything other than appallingly destructive, whether or not nuclear weapons are used. The overriding objective must be to continue to prevent its outbreak. The best way to ensure this is to put plainly before any possible aggressor a clear chain of immense risk, outweighing any advantage he could hope to gain. The possession of nuclear weapons is cardinal to this. They cannot be disinvented; the only realistic course now available is to harness their existence to the service of peace in freedom, as NATO has done successfully for over thirty years.

6. Britain was a wartime partner with the United States in the development of nuclear weapons. We conducted our first independent test in 1952, and have had a full operational capability with our own delivery systems since the first V-bombers entered service in 1955. Since the late 1960s the main capability has been provided by the Polaris force, the effectiveness of which for the second half of its life is about to be heightened by the improvement known as Chevaline, which was described to the House of Commons by the Secretary of State for Defence on 24 January 1980. The long term policy issue therefore is not whether to acquire a strategic nuclear deterrent capability, but whether to give it up in the 1990s after having possessed it, through the decisions of both Conservative and Labour Governments, for nearly forty years. This issue falls to be settled in circumstances much less favourable for Western security than when the V-force and Nassau decisions were taken - there is for example strategic nuclear parity between the superpowers and much stronger and more versatile Soviet non-nuclear capability than before, wielded moreover with the growing adventurism highlighted in Afghanistan. It would be strange to regard the curtailment of our deterrent insurance as timely and appropriate now.

7. Britain commits all its nuclear capability to NATO in conformity with concepts of collective deterrence worked out in the joint forum of the Nuclear Planning Group. The decisive consideration in favour of a British capability that is ultimately independent is the contribution it makes to NATO's strategy of deterrence and thus to our own national security.

8. The United States has massive nuclear striking power. It has repeatedly made clear its total commitment to help defend the integrity of its European Allies by whatever means are necessary, without exception. The Government has great confidence in the depth of resolve underlying the United States commitment. But deterrence is a matter of perception, and perception by a potential adversary. The central consideration is what that adversary may believe, not what we or our Allies believe; our deterrence has to influence possible calculations made by leaders whose attitudes and values may differ sharply from those of the West. The decision to use United States nuclear weapons in defence of Europe, with all the risk to the United States homeland this would entail, would be enormously grave. Particularly now that there is inter-continental nuclear parity, a Soviet leadership - perhaps much changed in character from today's, perhaps also operating amid the pressures of turbulent internal or external circumstances - might believe that at some point as a conflict developed the determination of the United States could waver. The presence of enormous destructive power in independent European hands is an important insurance against any such misconception. A nuclear decision would of course be no less agonising for the United Kingdom than for the United States. But it would be the decision of a separate and independent power, and a power whose survival in freedom might be more directly and immediately threatened than that of the United States by aggression in Europe. The nuclear strengths of Britain or France may seem modest by comparison with the superpower armouries, but the damage they could inflict is in absolute terms immense. (A single Polaris submarine carries more explosive power than all the munitions used in World War II). An adversary assessing the consequences of possible aggression in Europe would have to regard a NATO defence containing these powerful independent elements as a harder one to predict, and a more dangerous one to assail,

than one in which nuclear retaliatory power rested in United States hands alone.

9. Our contribution to the Alliance in this field is unique. France, like Britain, has powerful nuclear forces under independent national control; but her distinctive policy - well understood, long established and firmly held - debars her from undertaking the clear commitment to collective Alliance deterrence concepts, planning and strategy which we have made. No other European member of NATO is even remotely a potential candidate to contribute independent nuclear forces. The Government regards this distinctive British contribution to NATO as of great importance. Our Allies recognise its significance, as they made clear for example in the 1974 Ottawa Declaration of the North Atlantic Council.

10. British nuclear forces include both strategic and lower-level components. If we had only the latter they could not serve the key deterrent purpose, since the threat of their use would not be credible. An aggressor faced with an armoury comprising only non-strategic nuclear weapons would know that he could if necessary use strategic nuclear weapons to overbear it without risking strategic retaliation upon himself; and since he would know that his opponent too must realise this, he could be confident that the non-strategic weapons were most unlikely to be used. The harsh logic of deterrence requires that the nuclear decision-maker should have evident power to take his resistance all the way to the strategic level if the aggressor will not desist. If Britain's distinctive nuclear contribution to NATO is to have meaning, it must include an effective strategic element.

II - GENERAL CONSIDERATIONS ON SYSTEM CHOICE

11. The particular features and comparative merits of individual candidate systems need to be seen against the background of various general considerations which bear upon any choice of system for this task.

The "Second-Centre" Role

12. As paragraphs 8-10 have shown, the particular importance of the British strategic force lies less in its value as a quantitative addition to the Alliance's armoury than in its independent national control, providing a second centre of nuclear decision-making committed to NATO. Paradoxically, if it is to meet this Alliance purpose effectively the British force has to be visibly capable of posing a massive deterrent threat on its own. A force which could strike tellingly only if the United States also did so - which plainly relied, for example, on US assent to its use, or on attenuation or distraction of Soviet defences by United States forces - would not achieve the purpose. We need to convince Soviet leaders that even if they thought that at some critical point as a conflict developed the US would hold back, the British force could still inflict a blow, so destructive that the penalty for aggression would have proved too high.

13. There is no way of calculating exactly how much destruction in prospect would suffice to deter. Clearly Britain need not have as much power as the United States. Overwhelming Britain would be a much smaller prize to an aggressor than overwhelming the United States, and a smaller prospective penalty could therefore suffice to tilt his assessment against starting aggression that would risk incurring the penalty. Indeed, one practical approach to judging how much deterrent

power Britain needs is to consider what type and scale of damage Sovet leaders might think likely to leave them critically handicapped afterwards in continuing confrontation with a relatively unscathed United States.

14. The Soviet Union is a very large and powerful state, which has in the past demonstrated great national resilience and resolve. Its history, outlook, political doctrines and planning all suggest that its view of what level of destruction would constitute intolerable disaster might differ widely from that of most NATO countries. Appalling though any nuclear strike would be, the Government does not believe that our deterrent aim would be adequately met by a capability which offered only a low likelihood of striking home to key targets; or which posed the prospect of only a very small number of strikes; or which Soviet leaders could expect to ward off successfully from large areas of key importance to them. They might even be tempted to judge that if an opponent equipped himself with a force which had only a modest chance of inflicting intolerable damage there might be only a modest chance that he would have the resolve to use it at all.

15. Successive United Kingdom Governments have always declined to make public their nuclear targetting policy and plans, or to define precisely what minimum level of destructive capability they judged necessary for deterrence. The Government think it right now to make clear that their concept of deterrence does not rest upon threatening maximum loss of life among the population at large; it is concerned essentially with posing a potential threat to key aspects of Soviet state power. There might with changing conditions be more than one way of doing this, and some flexibility in contingency planning is appropriate. It would not be helpful to deterrence to define particular

options further. The Government however regards the considerations noted in paragraphs 13 and 14 above as important factors in deciding the scale of capability we need.

Readiness and Invulnerability

16. Since 1969 there has never been a moment when our Polaris force did not have at least one submarine on patrol, effectively invulnerable to pre-emptive attack and at high readiness to launch its missiles if required.

17. Most of our own and our Allies' non-strategic forces are not maintained permanently in this special combination of readiness and invulnerability; they are not generally deployed so as to survive "bolt-from-the-blue" attack - that is, attack without any political or military warning. NATO regards such attack as a remote hypothesis, and even such elements as the planned long-range theatre nuclear force of cruise missiles and Pershing IIs announced by NATO last December are not designed to cater for it. It may be asked therefore why strategic forces should meet so demanding a standard.

18. The answer is twofold. First, the potential consequences of any East/West war in the nuclear age are so immense that some deterrent insurance against even remote possibilities for its outbreak is warranted; and exceptional readiness in the strategic nuclear forces is the most effective and least costly form of insurance against massive surprise attack. Second, it is in part precisely because this insurance is maintained that we can frame most of our force plans on the assumption that "bolt-from-the-blue" is very unlikely; it might not remain so if changed NATO dispositions seemed to offer an adversary a real chance of disarming us by a sudden strike. The

Government believes therefore that we must maintain in a new force the standards of immunity to surprise and pre-emptive attack which the Polaris force has achieved, so successfully since the 1960s.

Timescales

19. No-one can define now exactly when the Polaris force will have to be phased out. There are complex operational and technical factors, some of them hard to predict, and the likely prospect in several respects is of gradually declining effectiveness and mounting cost and risk rather than abrupt cut-off points or failures, though the possibility of these cannot always be ruled out.

20. Though the Chevaline programme will keep our Polaris missiles able to penetrate anti-ballistic-missile (ABM) defences into the 1990s, continuing Soviet effort in research and development, allowed by the 1972 ABM Treaty, might in time reduce our assurance of this, and growing Soviet competence in anti-submarine warfare (ASW), backed by a huge investment of resources, must tend in time to erode our current advantage and eventually make our submarines - built to designs now twenty years old, and not capable of being further modernised - less immune from detection and attack. It is clear from our own and US experience that hull life can last beyond the twenty years originally envisaged; but it is not extensible indefinitely, and in any event the on-board equipment - propulsion machinery, missile support systems and the like - is ageing and must at best pose a heavier maintenance load, with a growing risk that refit periods may be so prolonged or unexpected defects at other times so serious that continous patrol would be lost. In addition, the age of the systems, and the prospect that the phasing-out of Polaris from United States service in 1981 will leave the costs of maintaining support capability for it to be

borne entirely by the United Kingdom, will make the force increasingly expensive to keep going.

21. Amid these uncertainties and risks the setting of a particular date for retiring the Polaris force must be a matter for judgement. This judgement must take into account the fact that the British force, unlike its United States counterpart, is not part of a powerful triad of complementary strategic forces (land-based ballistic missiles in silos; long-range bombers, soon to carry cruise missiles; and submarine-launched ballistic missiles) and that it is moreover of modest size with little insurance margin to spare - for example, the premature withdrawal of a single boat from service would eventually make it impossible to guarantee continuous patrol. We must consider how long the force would last not only if matters went well but also if they did not. Against all this background, the Government has concluded that responsible planning must look to progressive replacement of the present force beginning in the early 1990s.

22. In the 1960s, special efforts made it possible to have the first Polaris boat operational less than six years after the Nassau Agreement was signed. Systems are now more complex, and several critical lead-times are now much longer. If we are to bring a new missile submarine force into service on time, design work for the boats themselves and other key force components must begin soon. This has set the timetable for studying all the system options.

23. Paragraphs 18-21 have discussed when a new force should enter service. But we have to consider also how long it should last. Re-equipment is very costly, and we cannot afford to undertake it as often as the super-powers. Ideally, we should like any new force to remain effective, as the Polaris force will have done, for at least twenty-five years - well into the second decade of the next century.

To give high probability of this we need to choose a system which represents a big enough advance in capability to provide some margin to meet the greater operational demands which continuing efforts on the Soviet side must be expected to impose. Re-equipment providing only a small advance in capability could before long prove a false economy, and our experience with Chevaline - costing about a billion pounds to modernise one aspect of the total force - shows that mid-life improvement can be a heavy task.

Cooperation with the United States in Procurement

24. For all its operational and technical merits, our successful Chevaline programme underlines a further consideration for the future - that in the immensely demanding technology of strategic missile systems the provision of features unique to Britain is very costly, even where access to United States information and industry can be acquired. This applies both to initial research, development and production and to subsequent support (which includes not just repair and spares supply but also such needs as testing, quality assurance, reliability data and trial firings). Given that, as with Polaris, our operational independence can remain unimpaired, there is great advantage to economy in the maximum possible commonality with the United States, especially in view of their high technology, their wide industrial base, the massive scale of their own Service purchases and our long experience of working efficiently together. In addition, adopting a United States system already developed and tested makes it easier to assess likely cost than with systems requiring much further work. The cost of the original Polaris programme, based on a proven missile, turned out very close to the estimate made at the time of the Sales Agreement. Finally, choice of a proven system reduces the risk of unexpected delay.

III - SYSTEM OPTIONS

The Field of Study

25. The work leading up to the Government's decision has looked at a wide variety of system options which might at least in theory be available. It considered different launch platforms - seaborne (by various types of submarines or by surface vessels), airborne and ground-based - and the possibilities of using ships or aircraft for both strategic and other roles. Among delivery vehicles both ballistic and cruise missiles were examined, including several different ballistic missile options such as retaining Chevaline-improved Polaris, varying degrees of further improvements to it, Poseidon, the Trident system and its possible development. A number of approaches to procurement were considered - entirely national development and production, continued collaboration with the United States, or collaboration with France. Different force sizes, and the possibilities of mixed forces of more than one system type, were also considered.

26. The terms of SALT I and SALT II, and the possibility of a comprehensive treaty ban on nuclear explosive tests, were taken into account. In practice they do not significantly narrow Britain's main system options. Arms control implications are discussed further in paragraphs 62-65.

27. Not all the possible combinations of system features (launch platform, missile type, procurement approach, force size) were studied to an equal degree of detail. Many clearly had to be ruled out on basic considerations, including some of those reviewed in Part II. The rest of this memorandum outlines so far as is possible the key factors bearing on the main options.

Launch Platforms

28. Britain abandoned the idea of launch platforms on the ground for strategic purposes (the position on theatre systems is different, for the reasons noted in paragraphs 17-18) as long ago as 1960, when the technically-promising Blue Streak silo-based ballistic missile was cancelled as likely to be too vulnerable to surprise attack. Soviet developments since then, including the SS20 missile systems, greatly reinforce this conclusion, and the use of mobile launchers would not change it in Britain's circumstances of a small territory within a very short flight time of Soviet land-based and sea-based missiles. No ground-launched force based in Britain could achieve the special standard of invulnerability to surprise attack appropriate for our ultimate strategic capability.

29. Missile launch from aircraft was clearly a possibility. We have successful experience of aircraft as a strategic deterrence force, and airborne systems offer much flexibility and ease of command and control. But vulnerability considerations like those in paragraph 28 still apply. Aircraft capable of launching strategic missiles need major airfields. The number of such airfields in Britain is limited, their positions are known and Soviet missiles could rapidly destroy them. To survive full-scale nuclear missile attack aircraft would need to be airborne and well clear of their airfields within a very few minutes. Our V-bomber force was able to maintain a substantial strike capability on runway alert for limited periods, but developments in Soviet capability would make reliance on this even more precarious in the future than when we decided in the 1960s to move to the surer system of Polaris submarines.

30. Maintaining launch aircraft permanently airborne might seem to solve the problem of airfield vulnerability. But this is very expensive. In addition, it cannot be sustained long if the support airfields are destroyed; and we would not wish to have no alternative but to regard strikes on such airfields as compelling the final launch of our ultimate capability, with all that this would imply. Moreover, no British Government would want to have numerous nuclear-weapon carriers constantly airborne, year in and year out, in crowded airspace over and around our small country.

31. We considered fitting long-range missiles to aircraft already planned for other roles - such as our substantial Tornado force now in production - so that they could also provide a strategic force. But reliance on this for our main strategic capability had to be ruled out. The problem of airfield vulnerability would remain; moreover, the appearance of a low-cost bonus to an existing investment is illusory. Quite aside from the burdens of equipment modification, support and training for a very different additional role, an aircraft cannot be held in reserve for last-resort strategic strike and at the same time used (and hazarded) on other tasks. The clash of priorities could be very acute: it is precisely at the dangerous stages when we would most want to pose a clear and formidable strategic threat that our limited air power might need to be most fully committed in order to give the maximum chance of holding aggression at lower levels of conflict.

32. There is another limitation if aircraft are chosen as launch platforms. No air-launched ballistic missile has been developed since the United States abandoned Skybolt in 1962, and though they continue to give some thought to the possibilities there is no likelihood that such a missile could be available to us in the early 1990s, whether by purchase from the United States or by our own developments. A

British decision in favour of an air-launched system would therefore be also a decision in favour of a cruise missile system. The implications of that are reviewed in paragraphs 38-46 below.

33. Among options for sea launch, surface ships compare poorly with submarines. They are not markedly cheaper for a given missile-carrying capacity, speed or endurance, they are much easier for an enemy to find and track; and any attempt to combine the strategic task with others in present or planned ships would pose the problem of conflicting operational demands on much the lines already noted in paragraphs 31.

34. This leaves submarines as clearly the best platforms for Britain's future strategic force. We have much expertise and highly satisfactory experience in operating them. Soviet investment in anti-submarine warfare is massive and their skills will continue to grow; but the Western technical and operational advantage remains substantial, and much effort is given to maintaining it. The sea is vast and opaque, and only a dramatic breakthrough on a large scale could give the Soviet Union realistic hope of being able to count on destroying our submarines on patrol at a time of Soviet choosing. The likelihood of this is remote.

35. Our studies did not take for granted that we should continue to use large nuclear-propelled submarines. We looked at the possibilities of diesel propulsion, of small size (like the two-missile submersibles suggested by some non-official studies in the United States) and of in-shore patterns of operation. But though diesel submarines can be quieter than nuclear-propelled ones and so harder to detect when fully submerged, they must periodically expose themselves

to recharge batteries; it may not be easy to build diesel submarines big enough, or with enough electrical power, to carry a substantial number of missiles; a large number of relatively small submarines would demand much scarce manpower; and diesel submarines have not the sustained speed and endurance to exploit so fully the wide ocean areas and long patrol times away from base which nuclear propulsion provides. As to small submersibles (which would still have to be big enough to house complex fire control, navigation and communications equipment) it is far from clear that these would cost us less than nuclear-propelled submarines for a given degree of assurance of a given level of striking power; they would require much system development work unique to Britain, since the United States shows no sign of adopting them; and it would be at best hazardous for Britain, which cannot afford several kinds of strategic force, to rely on pioneering so untried a concept. Operation around our own shores could make direct protection by our own forces against air or submarine attack easier, but it would also be more vulnerable to mining. Britain's coastal waters are moreover heavily used for a wide variety of purposes.

36. For all these reasons, nuclear-propelled ocean-going submarines remain the best launch platforms for a British missile force.

DELIVERY VEHICLES

37. Candidate delivery vehicles to equip new submarines fall into two categories - cruise missiles (CMs) and ballistic missiles (BMs).

Cruise Missiles

38. The CM concept goes back to the wartime V.1, and several types were produced by both the United States and the Soviet Union in the 1950s and 1960s. In recent years, however, the convergence of several advanced technologies - new fuels; highly efficient small jet engines; microelectronics, including miniaturised digital computers for control and for navigation by terrain contour mapping using data derived from satellites; and smaller nuclear warheads - has enabled the United States to develop CMs representing a step change in capability. These can fly for long distances - typically over 1500 miles - at very low altitudes (around one hundred feet) and navigate accurately to an aim point, while presenting an exceptionally small target for enemy air defences to detect, locate and attack. The systems now in prospect are the Boeing air-launched CM and the General Dynamics Tomahawk for ground and sea launch. They do not travel at very high speed - around 400-500 knots - but rely for protection mainly on low altitude, small radar cross-section, and evasive routing to avoid known defence concentrations. The initial cost of the Tomahawk missile - excluding warhead, support, spares and overheads - is estimated at around one million dollars each.

39. The United States intend to deploy some 3,000 Boeing air-launched CMs on B52s in their strategic force, and 464 ground-launched Tomahawks as part of the programme to modernise their NATO-committed long-range theatre nuclear capability in Europe. The ALCMs are likely to enter service in 1982 and the GLCMs in 1983. In addition, Tomahawk is also to

be deployed from surface ships or submarines, for attacking either enemy ships or land targets. No production programme for these maritime applications have been settled.

40. Our studies gave much attention to the possibility of using CMs as our strategic nuclear delivery vehicles. This attention concentrated mainly upon a possible purchase of Tomahawk from the United States. Satellite mapping apart, none of the technology is inherently beyond the capability of British industry; but to embark upon a duplication of the United States research and development effort, especially for the relatively small numbers which we would want, would inescapably take longer and cost more per missile.

41. CMs have many attractions. They cost much less each than Trident missiles; they are even more accurate; they are a good deal smaller and easier to store. The fact that they would take hours rather than minutes to reach targets in the Soviet Union is not important for our strategic purposes, since these do not include any concept of catching Soviet missiles in their silos.

42. There are however important factors on the other side. Though the United States judges that present Soviet air defences have little chance against their CMs, the defence problem is not insuperable given time and effort. Moreover, Soviet defences against CMs, unlike their ABM defences, are not limited by Treaty. It is impossible to put precise figures on what proportion of CMs Soviet air defences in the two decades from the early 1990s - roughly the timeframe we want for our new strategic system - might succeed in shooting down; but we must reckon with the possibility that it could progressively become very substantial, especially since we probably could not afford to re-equip

with new and better CMs as often as the United States may well do to keep pace with defences. We have to take into account also that whereas the United States ALCM force can plan to saturate the defences of key strategic targets, we could not operate on the same scale. In addition, the apparent advantage of CMs over BMs in cost per missile is misleading. Trident can carry up to eight separately-targettable warheads; current CMs carry only one (and SALT II would prohibit CMs carrying more).

43. There are also considerations affecting the submarine. We, like the United States, have always judged it important that a strategic missile submarine should be able to fire its weapons within a short space of tiem, to avoid the risk that enemy action - by ASW forces or by "counter-battery" fire from ICBMs, after the launch of our own missiles had perhaps revealed the submarine's position - might be brought to bear before all the missiles had been fired. Our Polaris boats accordingly can fire their full complement within a very few minutes. But this is much more difficult with CMs. With torpedo tubes - the only submarine-launch mode so far developed - repeated re-load would be necessary to launch a number of CMs anywhere near equivalent in striking power to be boatload of Trident BMs. The process would take hours, during which the submarine would be at increasingly severe risk, and it might well not survive to complete the task. Alternative launch modes, such as vertical launch on the SLBM pattern, would require extensive new system development and submarine design. There is no sign that the United States contemplates such work, and the burden of it would therefore be likely to fall entirely on us if we wanted such a solution.

44. There is a further operational point. Current CMs have much less range than BMs; moreover, at least with systems now in prospect there is a limit on how far off-shore a land-attack CM can be launched, since beyond a certain distance cumulative inertial-navigation errors may mean too high a risk that the missile will fail to make its landfall accurately enough to initiate the over-land navigation phase successfully. The effective range of a CM launched from the North Atlantic would be significantly less than that of Polaris. The sea-room available to the submarines, and their scope for evading improved Soviet ASW forces, would be restricted accordingly. Further technical development might well ease this restriction, but since it is not important to the major United States applications of CMs we cannot tell when or at what cost.

45. The factors in paragraph 43 relate essentially to a CM-launching submarine devoted entirely to the strategic role. We also considered the possibility of equipping each of our hunter-killer submarines with a small number of CMs, for launch through the torpedo tubes. But there are two difficulties about this. Firstly there is the problem of conflicting tasks, of the general kind already noted in paragraphs 31 and 33. Our non-strategic submarine force is already smaller than would be desirable for its existing tasks, and the patterns of deployment and operation for the last-resort strategic role are very different from those for seeking out and attacking other submarines and surface ships. Secondly, it would not be possible to build up enough strike capability for strategic deterrence in "penny-packet" numbers of CMs on non-strategic submarines.

46. All this means that CMs are not in fact a cheaper option than BMs. For a given weight of striking power and a given level of probability of delivering it successfully, CM-based forces are in fact much more expensive. For example, eleven boats each with eighty CMs would give less assured deterrent capability than a force of five boats each with sixteen Trident BMs; and it would cost at least a third as much again to acquire and about twice as much to run. One of the major reasons for this, important to bear in mind in all evaluation of delivery system options, is that for almost any submarine force the boats are a much more costly element than the missiles.

Ballistic Missiles

47. It would not be impossible for Britain industry to develop and build ballistic missiles for strategic use. We have however had no major capability in this field since the 1960s, and to re-acquire it now would be very expensive, take a long time and involve much uncertainty. This cannot be an attractive option.

48. The present Polaris missiles could be kept and fitted into new submarines. They would need new motors, produced from restarted production lines; this may be necessary anyway to match present force life, but not so certainly or on so large a scale as would be needed if the missiles were kept beyond the early 1990s. Much of the missile support equipment would need to be replaced at the outset, and this would be costly and difficult, particularly as much of it would have been long out of production. Removing equipment from the present boats and fitting it into the new ones might not be cheap or easy, and would entail major problems in maintaining continuous operational capability during the transition; the alternative of new manufacture for all the equipment would be very costly, especially as most of it is already long out of production. The missiles and the related equipment, afloat and

ashore, would be costly to maintain, both because of age and because spares and replacements would increasingly have to be specially manufactured to technological standards long since abandoned in industry. It would be necessary to buy extra missiles - long out of production - and extra Chevaline elements to support the force for longer. Moreover, unless we were to make the very bold assumption that Polaris missiles would remain satisfactory until beyond 2010, we should have to build submarines capable at some point in their life of accommodating a different missile of a type which (since Trident production will not continue indefinitely) we could not easily predict now.

49. For all these reasons, a force based on the existing missiles in new submarines would not be cheap and perhaps not highly reliable. Nevertheless, it would be cheaper initially than an entirely new force in capital cost - in very broad terms, possibly by around forty per cent - though subsequent running costs would tend to be higher. Such a saving would in itself be highly valuable. The difficulty is that the resulting force would be of uncertain value and short life. For operational reasons a force based on Polaris - even with the Chevaline improvement, designed essentially for the forecast environment of the 1980s and early 1990s - would be able to maintain a high deterrent assurance in the later 1990s, let alone beyond that, only if the advances in Soviet ability to counter it proved unexpectedly modest. If such a hope were disappointed we should be faced with a choice between keeping a force of much reduced deterrent credibility and effectiveness, and changing our plans at short notice. Such a change would certainly have to be made at high cost and probably in haste, wastefully and with difficulty. It would be seriously irresponsible to undertake on such a basis what would still be, by any standards, a major investment.

50. We considered also various possibilities for acquiring new versions of the basic Polaris missile, improved mainly by the use of more modern and powerful rocket fuels to give more range and payload (though short of Trident standards) as an insurance against improved Soviet capabilities. Any of these possibilites would entail a substantial R&D programme covering the missiles themselves, the altered interface with Chevaline, and related equipment. The procurement costs - which cannot be assessed as firmly as those for the already operational Trident system, and carry greater risk of escalating - would have fallen entirely on Britain, as would all the costs of setting up and sustaining support arrangements for a system that had never been in United States service. The amount would depend on how big an improvement over the present Polaris capability was sought, but missile system costs could well be twice those of Trident, for a smaller and less assured capability. Moreover, concerns like those in paragraph 49 would arise about effective operational life, though perhaps less quickly.

51. Another possibility might have been the projected M.4 missile being developed by France and due to come into service in 1985. Collaboration with the only other European power could have been of considerable political significance. France has developed an impressive capability in the ballistic missile field, and the M.4 will undoubtedly be a formidable system. Even however if it were the equal of Trident in operational capability, considerations of cost tell decisively against our seeking to base our own force upon it. There is no likelihood that it would have been available to us at a cost, either in initial investment or in subsequent support, which could compare with that for the already-proven Trident system, especially

when account is taken of the economic advantages of our long-established arrangements for collaboration with the United States in nuclear forces. To adopt M.4, even if the French Government had proved willing, would therefore have meant cutting deeper into defence resources at the expense of our effort elsewhere.

52. We considered also the adoption of the Poseidon system, which the US would have been willing to make available when it phases out of US service by about 1990. Poseidon entered service in 1971, is of the same size as the present Trident missile, and is a MIRVed* system capable of carrying up to fourteen warheads of substantially smaller size and yield than Trident or our own Polaris. Range varies with payload, but with a reduced number of warheads it is about 300 nautical miles more than that of Polaris A.3.

53. Poseidon would be an effective system, but particularly because of its shorter range it would offer less long-term insurance than Trident against improved Soviet capabilities. The initial purchase price would be lower, but several other factors offset this. The age of the missiles and related equipment would mean higher maintenance costs, and almost certainly a major re-motoring programme before long. We should have to bear all the continuing support costs for a system no longer in United States service. We should also have to undertake a very extensive British warhead development and testing programme and perhaps further work to adapt the missile system to our warheads. In all, it is unlikely that the cost would be lower, and the system would be less good.

*MIRV: multiple independently-targettable re-entry vehicles.

54. Trident I is a three-stage ballistic rocket designed to carry up to eight independently-targettable warheads. The maximum range is from about 4,000 to 6,000 nm, depending on the number of warheads. The first missiles went to sea on operational service with the United States Navy in 1979. They are initially replacing Poseidon missiles in some existing submarines and they will later be fitted in the new OHIO-class submarines. MIRV capability and long-range give excellent margins of long-term insurance against further advances in Soviet anti-missile and anti-submarine capability; and improved guidance techniques give better accuracy than earlier systems have offered. The Trident system is likely to remain in United States service for many years to come, and the economies of commonality will therefore be available to us.

55. We considered whether there would be any advantages in a "non-MIRV" Trident. MIRV capability is however integral to the system design, and deliberately to remove it and substitute MRV capability would entail a major re-design and re-testing programme, leading to a missile degraded in performance and unique to Britain. Missile System costs would probably be at least double those of Trident, for a greatly reduced capability.

56. We also considered the larger SLBM concept known as Trident II, which is in preliminary development in the United States. It would give still greater range and payload than the present Trident system, at higher cost. The OHIO-class submarines will be big enough to take such a missile if it is proceeded with. It is however undecided, and likely to remain so for another two or three years, whether the US Government's preferred course for the next long-term step in SLBMs will be to bring Trident II into operational service or perhaps adopt

instead some further improvement of the present Trident system. Our own choice now could not be made dependent on uncertain possibilities of this kind, especially as additional range and payload beyond present Trident standards are not of crucial importance for Britain.

Force Size

57. There are two main variables to force size: the number of missiles per submarines, and the number of submarines. They interact in some degree.

58. The optimum number of missiles per submarine involves a compromise between conflicting factors. For a given total complement of missiles, the fewer the boats the lower the cost but also the greater the risk of too many eggs in one basket - this last being a particularly important consideration for a relatively small force like ours. We considered eight, twelve, sixteen and twenty-four missiles per boat. Of these options twenty-four, as in the very large Unted States OHIO submarines is more than we need (given that we have to have at least four boats anyway, as paragraph 59 explains). At the other extreme, eight missiles would lead to a much larger number of boats for a given total capability, and this drives up costs and manpower demands. The choice between twelve and sixteen is less clear cut, but on balance we believe it best to plan for sixteen - the number used in our present force, the French SLBM force, and the United States Polaris and Poseidon forces.

59. Deciding the number of boats is more difficult. Four is the minimum needed to sustain without fail at least one always on patrol. System improvements may improve the ratio of operational to non-operational time, but there is no likelihood of reaching the point

at which a force of three submarines could sustain continouus patrol for more than a few years. A force of five can maintain two on continuous patrol, yet because force overheads do not rise proportionately with numbers the extra cost is only about fifteen per cent. The operational advantage of five goes further, in two ways. Even if relative Soviet ASW capabilities improved to the point where they might hope occasionally to locate one submarine on patrol the prospect of their being able to locate and track two simultaneously is negligible; and a fifth boat also offers a margin of insurance against other risks which though very low are not wholly non-existent, such as losing a boat by accident or having one out of action for a long time through unforeseen defect. But the skill and dedication of our personnel have enabled us to manage successfully with four boats for over a decade, and the extra capital cost of a fifth in the Trident era, though modest in proportionate terms, is still very large in absolute terms - perhaps in the order of six hundred million pounds.

60. No immediate decision is needed on the choice between four and five since major expenditure related only to a fifth boat would not arise for two or three years from now. The Government intends therefore to keep the option open and to take a final decision in 1982 or 1983 in the light of the latest information and judgements on relevant operational, international and resource factors, including the defence budget situation.

Arms Control

61. Throughout its consideration of Polaris replacement the Government has kept in mind the relationship between its prospective decision and arms control considerations. Strong support for practical and balanced collective arms control measures remains a key element in our approach to ensuring peace and security. The Government, like all its allies in NATO, much prefers arms control to arms expenditure whenever the circumstances, and the will on both sides of a potential agreement, make this an effective alternative.

62. The Government believes that the implementation of the bilateral US/Soviet SALT II agreements signed last year in Vienna is in the interest of international security, and keenly hopes that conditions in which ratification can go ahead will soon be restored. The decision to modernise our own strategic forces in the 1990s is entirely compatible with this view. The continued Anglo-American cooperation provided for in the exchange of letters on Trident is fully consistent with the terms of the SALT II Treaty, and the scale of our new capability will in no way disturb existing and prospective East/West relativities. For example, even if we eventually choose to go to the higher figure of five boats, this represents a smaller proportion of Soviet strategic forces now than four or even the originally planned five Polaris boats represented of Soviet strategic forces at the time of the Nassau Agreement; and a five-boat Trident capability in the mid-1990s would represent in relation to Soviet forces at that time (assuming these to be developed to but not beyond SALT II levels) about the same proportion of delivery systems as - and a rather lower proportion of warheads than - the Polaris force did in relation to Soviet forces when it was completed in 1970.

63. The Government continues to support the conclusion of a Comprehensive Test Ban Treaty, and we are participating fully in the Geneva negotiations with the United States and the Soviet Union. Nothing in our requirements for the new force need or will lead us to modify, in relation to either substance or timing, our support for a successful outcome to these negotiations as soon as practicable.

64. Similarly, the Government strongly supports the regime established by the Non-Proliferation Treaty of 1967, and hopes to see it extended by the accession of more countries and the wider establishment of matching international control arrangements. Nothing in the Treaty requires the existing nuclear powers to abandon or let decay their main capability, which is inescapably a key part of the established structure of global and particularly East/West security, whose collapse would bring grave dangers for all nations. Moreover, the Government sees no realistic ground for supposing that unilateral gestures of renunciation by Britain - gestures which there is not the slightest likelihood that any other nuclear power would emulate - would make any marked or lasting difference to the prospects of accession to the Treaty by those comparatively few nations which might be capable within a reasonable time of acquiring some nuclear weapons capability, but whose assessment of their own national interest has so far led them to decide against accession.

65. Finally, Britain's strategic SLBM force lies clearly outside the category of long-range land-based theatre nuclear forces about whose limitation NATO countries last December invited the Soviet Union to negotiate. The Government notes with continued regret the repeated Soviet refusal so far to enter into such negotiations save on pre-conditions which would require the United States to cancel its deployment programme before it had even begun while the USSR maintained unchecked its own far-advanced build up.

Costs

66. The costs of the proposed Trident force cannot be estimated in close detail at this stage - further discussions are needed with the United States authorities, and in several respects such as submarine design and numbers the costs will depend upon decisions which have yet to be taken. In broad terms, however, we assess the likely order of capital cost, at today's prices, to be around four to four-and-a-half billion pounds for a four-boat force. This would cover submarines, missiles, warheads and support equipment and facilities, including new construction required at the Coulport armament depot, the Faslane operating base and elsewhere.

67. Of the total capital cost over seventy per cent will be spent with British establishments and industry. The Government will seek to bring this already high proportion to the maximum that is operationally and economically sensible, but to increase it markedly would be likely to mean substantial extra cost.

68. There has rightly been widespread public interest in the effect which the replacement of the Polaris force will have upon other aspects of the defence programme. As / with any project, small or large, money spent on this is money not spent on other things. Given an assumption that future total allocations to defence would be no lower without Polaris replacement than with it, foregoing Polaris replacement would obviously make it possible to fund additional or earlier force improvements somewhere else.

69. It is however important to keep in view the scale and significance of this, from several standpoints. The capital cost of the Trident force will be spread over about fifteen years. The Government's expenditure plans provide for defence spending to rise by 3% a year in

real terms over each of the next three years. By 1983/84 the budget is planned to be some 13% higher in real terms than in 1979/80. No-one can be sure exactly what the size of the budget will be in the ten years thereafter, but the capital cost of the Trident force is unlikely to absorb on average more than 3% of the total budget, or around 7% of the equipment component, between 1980 and 1995. It will probably absorb some 1½% of the total during the build-up in the first half of the 1980s, some 5% (or 12% of the equipment component) in the main spending period from 1985 to 1990, and then 1-2% between 1990 and 1995. Even after spending on the Trident force, the Government is still planning to spend more on conventional forces than it does now. The accommodation of large re-equipment programmes is a normal part of defence planning and budgetting. As to size, Tornado procurement costs more than the Trident force is estimated to, and is currently absorbing some 7% of the defence budget without distorting the rest of the defence programme. Once capital investment is past, the Trident force should be notably inexpensive - probably well below 2% of the defence budget from the mid-1990s. In terms of manpower, which may increasingly become a key constraint upon our defence effort, the Trident force should be broadly as economical as Polaris, which requires only 2500 servicemen - under 1% of Service manpower.

70. There are accordingly no easy comparisons to be made with other defence capabilities. There would be little point, for example, in diverting the full capital sum to buying more ships, tanks or aircraft which in the long term we could not afford to run and could not hope to man. The rising real cost of defence equipment is a general cause for concern, but this problem is not specific to the Polaris successor. For all these reasons, impressions that we could sustain much larger conventional forces without Polaris replacement than with it are well wide of the mark.

71. The Government is convinced and determined that the provision of the new Trident force should not prevent or emasculate continued improvement in other areas of our contribution to NATO. It believes moreover that the modernisation of the independent British element in NATO's strategic nuclear forces is a central element of that contribution, not a luxury or a diversion. No alternative use of British resources would provide a comparable strengthening of collaborative Alliance deterrence to aggression.