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PRIME MINISTER

NATIONAL DEFENCE TECHNOLOGICAL CAPABILITIES

When we discussed the choice of a defence suppression weapon for the RAF in Cabinet in July I was invited to arrange for officials to produce a comprehensive report on the areas of defence technology where it is essential that a national capability should be retained. An official working party consisting of representatives from the MOD, the Cabinet Office, the Treasury, the Department of Trade and Industry and the No 10 Policy Unit has now considered this question. A copy of the working party's report is attached.

2. As you will see the working party, in line with its remit, has taken a narrow view of the technologies which are essential. The report sets out those advanced technologies where an indigenous capability must be preserved, either on national security grounds or to maintain our ability to react quickly to changes in the threat in an emergency. The report does not address the much broader range of technologies which are also essential to the maintenance of our defence capability but which could, in theory, be supplied from foreign sources.

3. To get a more rounded picture I therefore felt that it would be helpful for colleagues to be aware of some of the technologies which are not covered in the report. These are at Annex C. It will be seen that the list includes virtually all the main systems and sub-systems for our maritime, land and air defence roles. A strict interpretation of the report would be that indigenous technological capacity for these systems is not essential and that it would be acceptable to rely on our allies for the future supply of our ships, submarines, aircraft, tanks and their associated systems. This is clearly not practical politics. Nor; I believe, would it be in the interests of our Forces and the national economy.

4. My conclusion is that decisions on major defence equipment projects will continue to be taken in the light of a broad range of defence, industrial and political considerations. While the report is a useful statement of the technologies we could in no circumstances do without, it should not be taken in any sense to be a complete statement of the technologies which, in the real world, we need to retain.

Ministry of Defence
6th January 1984

ANNEX A

ESSENTIAL DEFENCE TECHNOLOGIES

INTRODUCTION

1. At their discussion on 28 July 1983 on the choice between the United States HARM anti-radiation missile and the British ALARM missile, the Cabinet invited the Secretary of State for Defence to arrange for officials to consider and report on the areas of defence technology in which an indigenous capability should be maintained. Summing up their discussion, the Prime Minister indicated that, before Ministers were faced with further decisions of the same kind on major defence equipment projects, officials should produce a comprehensive report on the areas of defence technology which it was essential to retain in the United Kingdom. In accordance with these conclusions, a Working Party of officials from the Ministry of Defence, the Treasury, the Department of Trade and Industry, the Cabinet Office and the Prime Minister's Office, was set up, and this paper comprises its report. It should be noted that in accordance with its instructions the Working Party considered only those technologies where an indigenous capability is judged strictly essential from the military viewpoint; no attempt has been made to cover the future of the defence industrial base, or the broader range of technologies where in the MOD view, an indigenous capability offers substantial benefits for defence but where these are insufficient in themselves to merit such a capability being categorised as essential.

Technologies Required to Support Military Capabilities

2. Judgements made in this paper on what technologies are essential for defence purposes are based on the following broad statement of defence policy (Command 8288):

a. The UK will continue to maintain its four principal defence roles: an independent element of strategic and theatre nuclear forces committed to the Alliance; the direct defence of the UK Base; a major contribution to Allied Command Europe; and a major maritime effort in the Eastern Atlantic and Channel.

b. The UK will fulfil, without prejudice to prime defence tasks within the NATO area, Britain's special roles and responsibilities overseas.

3. On this basis, a number of military capabilities can be identified which could not be achieved or would be jeopardised to an unacceptable extent if certain systems capabilities, and the associated equipments and supporting technology, were not available from UK sources. Such systems capabilities fall into two categories:

a. those where acquisition from foreign sources is either impossible or cannot be contemplated;

b. those where procurement from overseas can be acceptable provided this does not prejudice national security or undermine the indigenous capability.

Capabilities in category b reflect in the main situations where rapid

response may be necessary to counter unexpected developments in the threat at a time of crisis when our allies may be unable or unwilling to provide adequate and timely support. Our electronic warfare capability was, for example, a vital asset in the Falklands conflict where it enabled us to devise quickly means of countering systems deployed by the Argentines, notably Exocet, anti-aircraft missiles and gun systems. While our allies should, in principle, be prepared to provide such support when we are operating within NATO, we cannot depend entirely on their so doing in these critical areas in situations where prompt action is required, where their specialists may well be stretched to the limit in meeting similar but different problems experienced by their own forces, and where their priorities may differ from ours. These arguments do not apply to the bulk of equipment purchases for the Armed Services. They are valid only in those limited areas where critical modifications to equipment are practicable within the timescale of a brief but intense conflict; in such circumstances overseas purchase is acceptable provided there is relevant indigenous knowledge on how the equipment functions. Special considerations apply to cryptographic equipment, some elements of which give rise to questions of national security. The essential requirement in Category b items is for expertise in research, equipment development and system integration. This will in general involve both Industry and Government R & D Establishments.

4. Annex A provides the list of system capabilities that need to be maintained in these two categories and relates them to essential military capabilities. Cross-references are included to a list in Annex B of technologies which are required indigenously to support them. It should be noted that the integration of systems is often, in itself, a demanding technological task, and that the ability to integrate the various classes of system listed in Annex A represents implicitly a further range of essential capabilities. The respective roles of Industry and the MOD Research Establishments are also indicated in Annex A.

5. The electronically orientated technologies included in the list of Annex B have wider applications in both civil and military markets and are being pursued, therefore, to a considerable extent by Industry for commercial reasons. While an increasing degree of self-sufficiency in Industry should be encouraged, the more demanding nature of the defence requirement is likely to result in a continuing need for Government funding of research and development.

6. The lists in the Annexes concentrate on technologies that are evolving fast and where retention of competence necessarily involves continuing research and development. They do not include the large and diverse range of mature supportive technologies in which it is reasonable to expect an adequate level of continuing expertise in British industry. For example, the Falklands Campaign demonstrated the need to retain nationally the ability to modify ships and aircraft to fulfil roles for which they have not been designed. While the ability to purchase such platforms indigenously cannot be argued to be essential purely from a defence viewpoint, it is obviously essential, nevertheless, to retain sufficient of the relevant design, development and engineering skills to be able to carry out such modification tasks quickly in a time of national crisis.

7. MOD officials have investigated the costs of maintaining these essential technologies in the UK. The only readily available figures relate to equipment procurement or to Government Establishment running costs. No costs are identifiable for the maintenance of the technologies as such. However, the following broad message has emerged. The minimum intramural cost of maintaining the nuclear warhead capability is of the order of £250M per annum. The cost of maintaining the strategic deterrent is documented elsewhere. Expenditure on maintaining technologies essential to chemical and biological defence, and to internal security and counter-insurgence, is relatively small, the total annual spend in each of these areas covering research, development and procurement being only of the order of £20M per annum. The research and development spend on communications security is about £11M, although this depends in addition on technologies embedded amongst those required to maintain our electronic warfare capability. Electronic warfare techniques are themselves usually embodied in sophisticated equipments, and their cost is not separately identifiable. The procurement cost for all such equipments is likely to be of the order of hundreds of millions of pounds per annum within an annual equipment budget of more than £7Bn.

Conclusions

8. The conclusions to be drawn from this study are:

a. We have identified five areas of defence capability where for strategic or military reasons it is essential to maintain indigenous technology; the list may well require updating as technology develops further and as changes become apparent in the nature and extent of the threat;

b. in two of these areas - strategic nuclear deterrence and IS/COIN capabilities - procurement from foreign sources is either impossible or unacceptable;

c. in the remaining three areas - electronic warfare, cryptography, chemical and biological defence - overseas procurement can be acceptable provided that a UK technological capability is preserved;

d. the five capabilities depend on a number of supporting technologies, many of which have wider civil and military application;

e. no estimate can be provided for the premia that may be associated with procuring these capabilities and technologies indigenously; if however one excludes the strategic deterrent, the annual cost of the relevant procurements is small in relation to the total equipment budget.

SERIAL	ESSENTIAL MILITARY CAPABILITY	DERIVED SYSTEM CAPABILITY	CATEGORY (See Para 3)	RESULTANT ESSENTIAL TECHNOLOGY (See Annex B)	LOCATION (See key below)
(a)	(b)	(c)	(d)	(e)	(f)
1	Strategic Nuclear Deterrence Essential nuclear technology not available from abroad.	Nuclear Warhead Production	a	A D	AWRE and relevant ROF's
		Nuclear Submarines (power plants and vessel integration)	a	A B C D	DCW, AMTE, AUWE Firms - Vickers (Barrow), Rolls-Royce Associates
2	Electronic Warfare Quick response necessary and feasible to changes in threat. Rapidly advancing technology.	Electronic Intelligence (ELINT) - Collection and Assessment	b	D E F I	RSRE, GCHQ, ASWE, AUWE Principal Firms - MEL, Racal, Thorn-EMI
		Electronic Countermeasures (ECM) and Counter-Countermeasures (ECCM)	b	)	ASWE, RAE, RSRE Principal Firms - BAeD, Ferranti, GEC, Plessey, Racal, Thorn-EMI, STC, MEL
		ECM-resistant homing for guided weapons (radar, anti-radar and infra-red)		) D E F G H	
		ECM-resistant surveillance systems		)	
		Electronic Support Measures (ESM)		)	
3	Communications National security demands independent capability.	Cryptographic Equipment	b	D E F	CESG Principal Firms - Racal, MSDS (Portsmouth)
4	Chemical and Biological Defence Rapid response necessary to counter unexpected chemical and biological agents.	Development of techniques and equipment for threat detection and protection	b	J	CDE Principal Firms - Thorn-EMI, Avon Rubber, Remploy
5	Internal Security and Counter Insurgence (IS/COIN) Indigenous response essential to counter evolving terrorist threat (eg Northern Ireland).	Explosive Ordnance Disposal (EOD)	a	D F G J	RARDE, RAE, RSRE No major industrial support
		Counters to improvised explosive and nuclear devices	a		

Key to Government Establishments

AMTE	Admiralty Marine Technology Establishment
ASWE	Admiralty Surface Weapons Establishment
AUWE	Admiralty Underwater Weapons Establishment
AWRE	Atomic Weapons Research Establishment
CDE	Chemical Defence Establishment
CESG	Communications Electronic Security Group
DCW	Deputy Controllerate Warships
GCHQ	Government Communications Headquarters
RAE	Royal Aircraft Establishment
RARDE	Royal Armament Research and Development Establishment
ROFs	Royal Ordnance Factories
RSRE	Royal Signals and Radar Establishment

ANNEX B

TECHNOLOGIES THAT NEED TO BE MAINTAINED TO MEET DEFENCE NEEDS

A. Nuclear materials, refining and fabrication.

B. High strength, high temperature materials and precision fabrication techniques for high integrity pressure vessels.

C. Nuclear engineering including quiet high reliability pumps and pump motors.

D. High reliability electronic components including nuclear hardening.

E. Very High Performance and Very Large Scale Integrated Circuits (VHPIC/VLSI) including computer aided design tools and associated software, fabrication tools and techniques, and specialised materials.

F. Signal processing techniques for extraction of signals from background clutter/noise, and pattern recognition.

G. Millimetre wave and infra-red sensors and seekers and associated specialised materials, including techniques for protection against laser sensor damage weapons.

H. Precision navigation, guidance and control.

I. Advanced materials and techniques for reduction of radar, acoustic and infra-red signatures.

J. Materials and techniques for detection of chemical, nuclear and biological threats and for protection against them.

ANNEX C

LIST OF CAPABILITIES

a. Main Platform

1. V/STOL and Conventional Aircraft
2. Helicopters
3. Conventional Submarines
4. Surface Ships
5. Main Battle Tanks (MBT) and other armoured vehicles

b. Main Platform Systems Areas

6. Avionic systems design and integration
7. Submarine systems design and integration
8. Ship systems design and integration
9. MBT systems design and integration

c. Main Sub Systems Technologies

10. Guns and armour
11. Lasers
12. Guided weapons, including torpedoes
13. Ground, airborne and naval radar
14. Surface ship and submarine sonar
15. Aero engines
16. Conventional warheads
17. Ammunition

Note

(1) For items 6, 7, 8 and 9 the design and integration work includes Navigation, guidance and control, target acquisition, weapon systems management and control, and management of countermeasures systems.

(2) Some aspects of items 7, 12 and 13 are covered by the list of essential technologies.