復興崗學報
民 95，87 期，359-392

Britain's Nuclear Command, Control and Operations

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Abstract

Nuclear command and control systems allow the execution of wartime missions in conformity with the given nuclear strategy and include strict measures to eliminate the possibility of unauthorised or accidental firing of weapons. This article aims to provide a comprehensive analysis by investigating the British case. As far as targeting and operations were concerned, Britain's nuclear targeting and operation plans of strategic weapons were at two levels: the joint NATO operation and national targeting. In terms of tactical nuclear weapons, all three of Britain's armed forces in the Cold War possessed tactical nuclear weapons. Most tactical nuclear weapons in Europe were provided by the Americans, but the British had their own tactical nuclear stockpile. The small number of Britain's tactical nuclear weapons could perhaps be insignificant militarily, but they formed an important political commitment to the Alliance.

Keywords：nuclear weapons, Britain, NATO, command and control, Moscow Criterion

* I must thank the precious comments from Dr Eric Grove, Professor John Simpson and Dr Thomas Kane.

1.Introduction

This article aims to provide a comprehensive analysis by investigating issues about how Britain's nuclear weapons were commanded and controlled, how they were operated in various military and political situations, and how targets were selected. Such discussions and analysis are vital to scrutinise Britain's nuclear strategies and force postures.

2.Nuclear Command, Control and Communications of Strategic Nuclear Weapons Command and Control (C2)

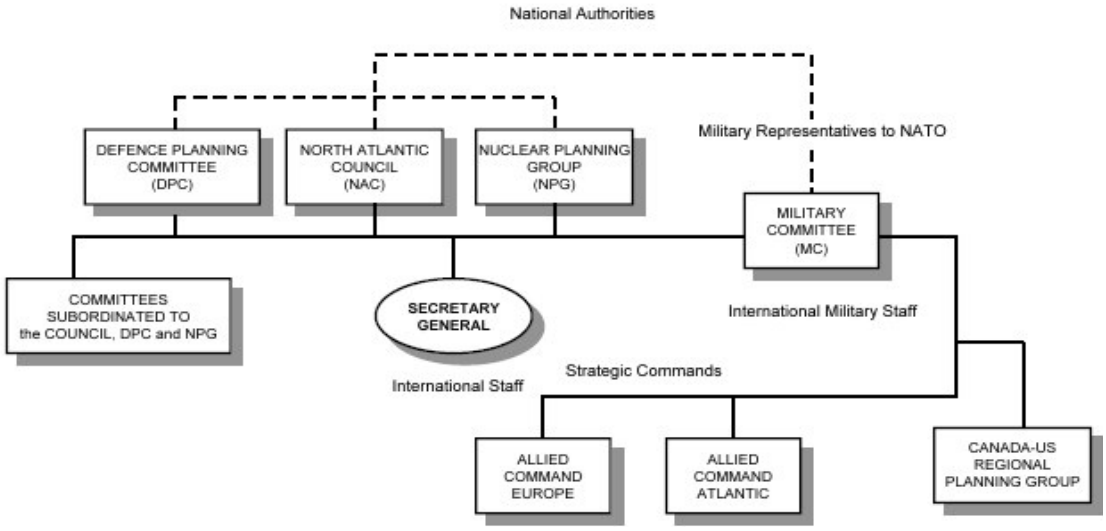
2-1 Command and Control

Ultimately, Britain's strategic nuclear weapons have always been under national political control. By assigning its nuclear forces to NATO, the UK Government agreed to follow NATO's political control systems, but also made it clear that the UK could use its nuclear weapons independently. In NATO, military forces were subordinated to the political North Atlantic Council (NAC) and Defence Planning Committee (DPC). From 1966, NATO established the Nuclear Planning Group (NPG), in which Britain was a permanent member, as a forum to discuss specific policy issues associated with nuclear forces. In 1977, the NPG High Level Group (HLG) was established as a senior advisory body to the NPG. Although nuclear threat is no longer an immediate danger after the end of the Cold War, the HLG still meets several times a year to discuss NATO's nuclear policy, planning and force posture, and matters, concerning the safety, security, and survivability of nuclear weapons.[1]

[1] The HLG is chaired by the US and is composed of national policy makers and experts from capitals. *NATO Handbook*, NATO, HB0801EN, 2001, p.152.

Figure 1

NATO's Civil and Military Structure



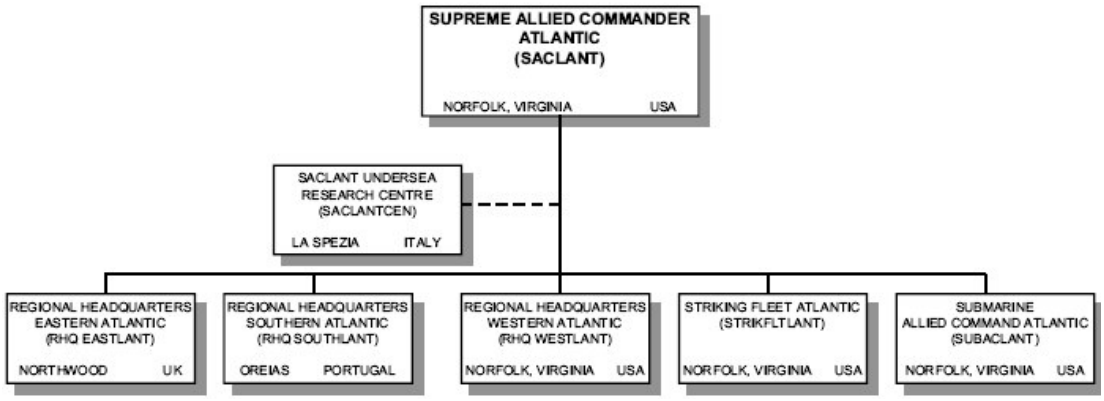
Source：*NATO Handbook*, NATO, HB0801EN, 2001, p.517.

In terms of military command, Britain traditionally held an important place in NATO's chain of command. The three most important NATO Commands during the Cold War were the Allied Command Europe (ACE), the Allied Command Atlantic (ACLANT) and the Allied Command Channel (ACCHAN). SACEUR and Supreme Allied Commander Atlantic (SACLANT) were senior American officers, but Commander-in-Chief Channel (CINCHAN), one of the two deputies to SACEUR and Deputy SACLANT were British. NATO's European and Atlantic Commands participated in the Joint Strategic Target Planning Staff (JSTPS) at Omaha, Nebraska, although there was no supreme NATO Command militarily responsible for all nuclear forces.

Figure 2

The Military Structure

ALLIED COMMAND ATLANTIC



Source: *NATO Handbook*, NATO, HB0801EN, 2001, p.524.

In the V-force era, RAF Bomber Command, with headquarters at High Wycombe, was given the strategic nuclear duties of the UK. Due to the limitation of Britain's nuclear capacity, the Americans played a very important role in the 1950s period.[2] In 1957, interchanges between RAF Bomber Command and US SAC expanded with the creation of some direct communication links.[3] On 22 February 1958, a US-UK Memorandum of Understanding regarding the deployment of the 60 Thor IRBMs at four main British bases, Driffield, Hemswell, Feltwell and North Luffenham, was signed. All Thor squadrons were fully manned by the RAF personnel, with the warheads under the control of American custodial officers.[4] However, US Permissive Action Links (PALs) were never installed on Thor.[5]

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[2] Although Britain tried to fasten its pace to build more V-bombers, it only had about 20-30 nuclear weapons at hand in the late 1950s. Robert S. Norris, Andrew S. Burrows and Richard W. Fieldhouse, *British, French and Chinese Nuclear Weapons*, Nuclear Weapons Databook, Vol. V, (Boulder: Westview Press, 1994), p.65.

[3] John Simpson, *The Independent Nuclear State: the United States, Britain and the military atom*, (London: Macmillan, 1986), pp.125-6.

[4] FAS, "Thor", in http://www.fas.org/nuke/guide/usa/theater/thor.htm (Last updated: 02 June 1997)

[5] Stephen Twigge and Len Scott, *Planning Armageddon: Britain, the United States and the Command*

Also from 1958, the Americans began to provide the V-bombers and Canberras with nuclear weapons under "Project E" as a part of the RAF-USAF collaboration. These weapons were viewed as "strategic" by the British, as there were not enough British bombs for the V-force, but such an arrangement was also in the US's interest to increase the number of weapons available for a co-ordinated attack. 72 Valiant bombers at RAF Marham, Waddington, and Honington were equipped with the US MK5 weapons (40-50 kilotons).[6] MK7 (9, 30, or 60 kilotons, depending on the core selected) was also provided for the Canberras operating within Bomber Command and RAF Germany.[7] However, these "E" weapons were under strict US custody, and limited the ability of Bomber Command to disperse its assets.[8] Even so, Project E continued to provide nuclear weapons for Bomber Command until 1963 and for RAF Germany until 1969.

As far as NATO was concerned, Britain formally committed its V-bombers to NATO on 23 May 1963, but in essence, such a commitment was established on the basis of the coordination with SAC. The V-bombers were only assigned to SACEUR in war, and were entirely under national control.[9] Bomber Command also retained a high autonomy to reinforce overseas Commands as required. Several V-bomber squadrons frequently undertook "Lone Ranger" flights to a variety of overseas locations as well as participating in numerous North American exercises with the US Air Force.[10]

By contrast, Britain's SSBNs had closer and more systematic relations with NATO. Nationally, the chain of command started from the Prime Minister, the Secretary of State for Defence,[11] to the First Sea Lord, to Commander-in Chief Fleet

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of Western Nuclear Forces, 1945-1964, (Amsterdam: Harwood, 2000), p.112.

6 Ibid., p.104.

7 PREM 11/1763, Brief for Macmillan, 20 March 1957. Christopher Finn and Paul D. Berg, "Anglo-American Strategic Air Power: co-operation in the Cold War and beyond", *Air & Space Power Journal*, Vol. XVIII, No. 4, Winter 2004, pp.11-2.

8 Humphrey Wynn, *RAF Nuclear Deterrent Forces: their origins, roles, and development 1946-1969*, (London: HMSO, 1994), p.262.

9 Stewart Menaul, *Countdown: Britain's Strategic Nuclear Forces*, (London: Robert Hale, 1980), pp.160-1.

10 RAF, "History of V-Bombers: Vickers Valiant-50th Anniversary" in http://www.raf.mod.uk/history/val1.html (Last updated: 7 April 2003)

11 The Secretary of State for Defence is the Cabinet Minister charged with making and executing Defence policy, and with providing the means by which it is executed, the Armed Forces. He is Chairman of the Defence Council and of its three Boards, (the Admiralty Board, the Army Board and the Air Force Board). MoD, "The Structure of the MoD", in http://www.mod.uk/publications/

(CINCFLEET) at Northwood,[12] and to the Flag Officer Submarines. In wartime, however, the chain of command would be shortened, and orders to use nuclear weapons would be passed to Northwood directly from the Prime Minister.[13] Within the NATO system, CINCFLEET held two combined NATO positions of CINCHAN and Commander-in-Chief Eastern Atlantic (CINCEASTLANT). Two separate staffs, one British, one NATO, served the Commander at Northwood.[14] The submarines were based on the Clyde, HMS Neptune, at Faslane.[15] Polaris and Trident were also linked to the US C2 and various NATO systems.

In response to the new strategic environment, NATO significantly modified its military structure in recent years. On 12 June 2003, NATO's Defence Ministers agreed on the design of a new streamlined military command structure. There is now only one Command with operational responsibilities, Allied Command Operations (ACO) commanded by SACEUR at the strategic level. SACEUR performs the operational duties previously undertaken by ACE and ACLANT. The operational levels beneath Supreme Headquarters, Allied Powers Europe (SHAPE) now consist of two standing Joint Force Commands (JFCs), Allied Forces North Europe (AFNORTH) in Brunssum, the Netherlands, and Allied Forces South Europe (AFSOUTH) in Naples, Italy.[16] Under the new structure, a British four-star Flag or General Officer takes turns at commanding JFC Brunssum.[17]

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expenditure2003/structure.htm (Last updated: 16 May 2003) FAS, "Ministry of Defence, UK", in http://www.fas.org/nuke/guide/uk/agency/mod.htm (Last updated: 9 July 1998)

[12] Since 1971, there has been only one operational fleet level command in the RN. During that year with the withdrawal from Singapore, the Eastern and Western fleets of the RN were unified into one command. It was initially based at Northwood in Middlesex. In April 2002, as a result of the 'Fleet First' initiative, most of CINCFLEET staff moved to Portsmouth, and the Northwood site became the tri-Service establishment. However, CINCFLEET himself and a small staff remain at Northwood. Wikipedia.org, "Royal Navy" in http://www.arthistoryclub.com/art_history/Royal_Navy (Last updated: 05 July 2005)

[13] Shaun R. Gregory, *Nuclear Command and Control in NATO*, (London: Macmillan Press, 1996), p.109.

[14] W. T. T. Pakenham, *Naval Command and Control*, (London: Brassey's Defence Publishers, 1989), pp.107-8.

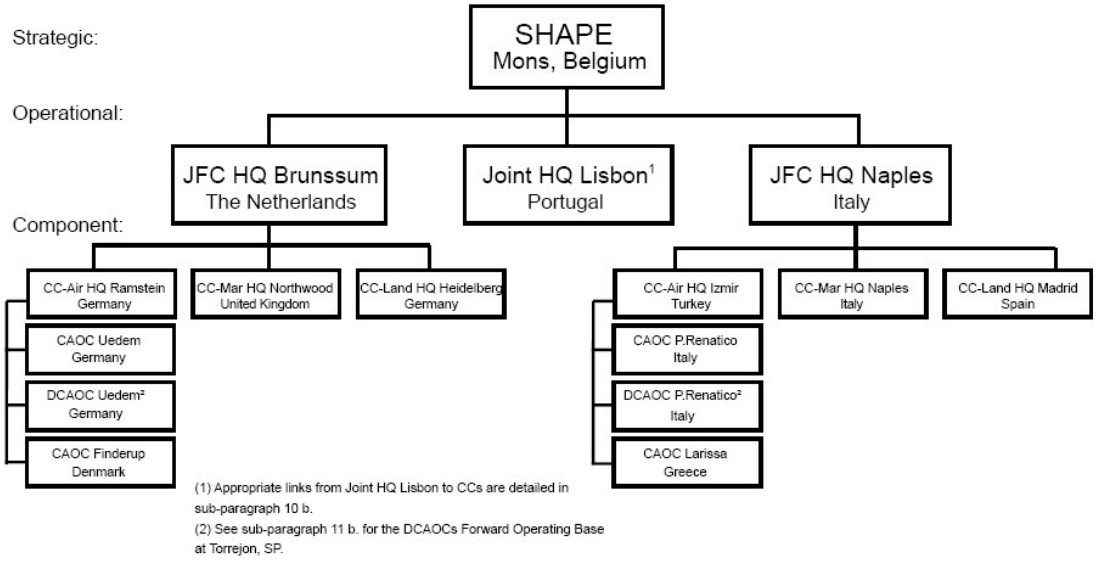
[15] Minutes of Evidence Taken Before Expenditure Committee, Appendix 19 Memorandum submitted by the Secretary of State for Defence, (London: HMSO, 19 October 1971), part 1, paragraph 2.

[16] *NATO Handbook*, NATO, HB0801EN, 2001, pp.260-1.

[17] NATO, "New NATO Command Structure" in http://www.nato.int/issues/military_structure/command/index-e.htm (Last updated: 18 February 2005)

Figure 3

Allied Command Operations



Source: http://www.nato.int/ims/docu/aco.pdf

The functionality of the Regional Headquarters, Eastern Atlantic (RHQ EASTLANT) was terminated at the end of 2003.[18] On 1 January 2004, the same staff at Northwood assumed the mantle as members of staff at Headquarters Allied Naval Forces Northern Europe (HQ NAVNORTH), in conjunction with Headquarters Allied Naval Forces Southern Europe (HQ NAVSOUTH), as the main joint force maritime advisers to SACEUR, via the Joint Force Commanders.[19] CINCFLEET himself was

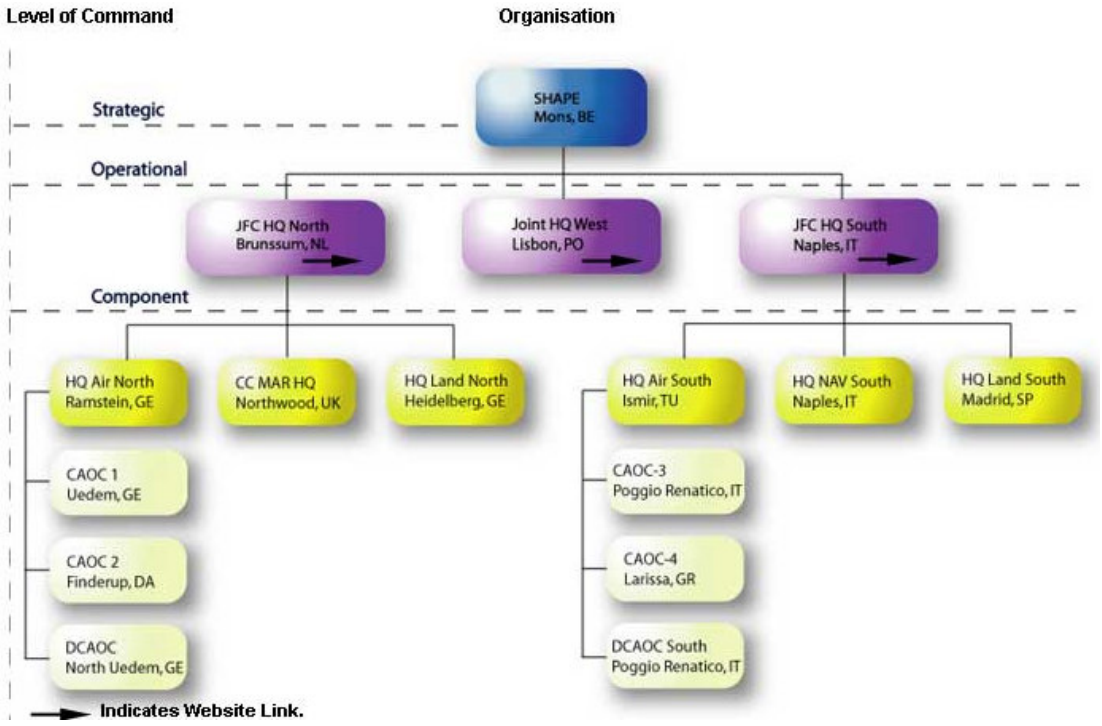
[18] Before 2003, RHQ EASTLANT was to contribute to preserving the peace, security and territorial integrity of Alliance member states throughout the ACLANT Area of Responsibility. CINCEASTLANT, a British four-star admiral, was dual-hatted, serving both as a regional commander within the Allied Command Europe (ACE) structure in his capacity as CINCEASTLANT, and as a component commander under CINCNORTH in his capacity as COMNAVNORTH. CINCEASTLANT was also responsible for the administration and operation of STANAVFORLANT, on behalf of the Supreme Allied Commander, Atlantic. *NATO Handbook*, NATO, HB0801EN, 2001, p.266.

[19] HQ NAVSOUTH was in Naples. NATO, "Maritime Expertise for Future Challenges", in http://www.manw.nato.int/manw/pages/update/envision_1_04/maritime_expertise.htm (Last updated: January 2004)

dual-hatted as the Commander Allied Naval Forces North (COMNAVNORTH).[20] HQ NAVNORTH, however, was deactivated on 30 June 2004. CINCFLEET subsequently assumed command of Allied Maritime Component Command Northwood (Allied MCC Northwood or Command Component Maritime Northwood, CC-Mar Northwood) on 1 July 2004, which is one of NATO's component/tactical level commands. Despite these organisational changes, however, CINCFLEET is still the man, who maintains an operational C2 capability for Britain's nuclear deterrent force.[21]

Figure 4

Allied Command Operations



Source: http://www.manw.nato.int/manw/pages/organisation/structure.htm

[20] Global Security Organization, "Standing Naval Forces Atlantic (STANAVFORLANT / SNFL)" in http://www.globalsecurity.org/military/agency/navy/stanavforlant.htm (Last updated: 26 April 2005)

[21] Current (2006) Commander is Admiral Sir James Burnell-Nugent.

2-2 Communications

Communications are the crux of the C2 system and they determine how the system will operate in an emergency. Communications in the V-force era, however, were not ideal by today's standard. In order to maintain a quick reaction ability in response to a threat, Bomber Command frequently undertook "no notice" alert and readiness exercises.[22] In May 1960, the UK Government claimed that the V-bombers could be airborne in less than 4 minutes from warning.[23]

In 1961, the V-bombers received a new set of procedures, counting down from Condition 5 (peace) to 1 (placing 25 per cent of the bomber force at 5 minutes' readiness), but there were always several aircraft on Quick Reaction Alert (QRA), armed and ready for take off. Before the end of the Cold War, a number of NATO aircraft were loaded with a total of approximately 150 nuclear weapons kept on QRA ready for take-off at short notice.[24] The real problem of communications, however, occurred after the bombers took off and when they were executing their missions. Electronic jamming and countermeasures over the battlefield areas could seriously damage bombers' communications. The absence of central control was therefore assumed to be a likely scenario, and the pilots reportedly were trained to deal with such situations.[25]

When the SSBNs replaced the V-bombers as the UK's primary deterrent force, effective communications became more important. To communicate from the ocean surface and deep underwater, Britain's SSBNs have onboard receivers and transmitters for several major categories of the frequency spectrum. Each pair of shipboard receivers and transmitters for these frequency categories have corresponding facilities on shore, on aircraft, or on satellites for the relaying of messages to and from command headquarters to submarines. Extremely Low Frequency (ELF), Very Low Frequency (VLF), and Low Frequency (LF) bandwidths allow messages to be sent through seawater. ELF is used principally as a "bell ringer", a simple alarm to tell submarines they need to change their communications posture

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[22] *Statement on the Defence Estimate 1966: part II Defence Estimate 1966-7*, Cmnd 2901, (London: HMSO, February 1966), paragraph 4.

[23] Robert S. Norris, Andrew S. Burrows and Richard W. Fieldhouse, op. cit., p.20.

[24] Kurt Gotfried and Bruce Blair, *Crisis Stability and Nuclear War*, (NY: Oxford University Press, 1988), p.243.

[25] Shaun R. Gregory, op. cit., p.122.

by ascending to VLF/LF depths or higher to receive more detailed messages. VLF/LF channels are still set aside primarily for reception of simple Emergency Action Messages (EAMs), such as launch orders for a nuclear war. The construction of an experimental ELF transmitter at Glen Garry in Scotland was considered by the MoD, but it appears to have been abandoned.[26] In addition to these communications, several systems, including the Defence Communications Network (DCN) provide links between central governmental headquarters and military bases.[27]

Currently, the NATO-wide cooperative military frequency management is achieved through the Frequency Management Sub-Committee (FMSC). This includes the establishment of overall policy for all parts of the radio frequency spectrum used by the military and the establishment of a specific policy for the military management of the 225400 MHz band, which is widely used for military aircraft, naval and satellite communications.[28] The RN also operates a hardened fibre-optic telephone system, which links Northwood and 10 Downing Street.[29] In wartime, communications with submarines could be disrupted. In view of this, although a Trident submarine is capable of receiving targeting information by radio, lists of target data are stored on board, in the Fire Control computers.[30] The transfer of the data from these computers into the missiles takes 3 to 10 minutes.[31]

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[26] FAS, "Special Weapons Command and Control", in http://www.fas.org/nuke/guide/uk/c3i/index.html (Last updated: 9 July 1998)

[27] Shaun R. Gregory, op. cit., p.109. The DCN was a network of high frequency radio, SATCOM, commercial cable and microwave/troposcatter communication systems linking to Britain's global military units.

[28] NATO, "NATO Handbook: Chapter 14: Frequency management cooperation in NATO" in http://www.nato.int/docu/handbook/2001/hb140805.htm (Last updated: 23 October 2001) According to *The Military Balance*, under a recent service contract with NATO, French, Italian and British military communications satellites will replace NATO's own ageing satellite and cover the Alliance's SHF and UHF requirements. But the UK also announced its intention to employ the US Advanced EHF satellites (AEHF), to be available from 2007, for its EHF-band communication requirements, which are important for secure broadband communications. *The Military Balance, 2004-5*, (London: IISS, 2004), p.258.

[29] Mark Urban, "Fibre Optics are Arteries of Information Network", *The Independent*, 12 January 1989, p.5.

[30] Trident's fire control system can provide a facility for rapid retargeting in addition to the main target sets. US Naval Surface Warfare Centre solicitation N00178-97-Q-0013.

[31] Bruce Blair, *Zero Alert for Global Nuclear Forces*, (Washington DC: Brookings, 1995), p.87. Bruce Blair says it took 10 minutes to insert the target data and to accelerate the gyroscopes in the guidance system on the missile.

3.C2 and communications of tactical nuclear weapons

During the Cold War, all three British armed forces had tactical nuclear weapons at hand. For global commitments, Britain had a history of deploying tactical nuclear weapons overseas, especially in Cyprus, Singapore and the North Atlantic. In spite of these overseas deployments, which were under strict national control, most of the UK's tactical nuclear weapons were committed to the NATO commands, but the C2 situations varied.

Strike Command and RAF Germany were the two major RAF departments with tactical nuclear missions. Both commanders simultaneously held NATO commands, which were assumed during wartime or crisis. The Air Officer Commanding Strike Command held the NATO position of Commander-in-Chief UK Air (CINCUKAIR), which was directly subordinate to SACEUR. UKAIR (No 1 Group) was based at High Wycombe, and was described as a major contribution to SACEUR's theatre nuclear strike force.[32] The RAF's maritime arm, No 18 Group was commanded by an officer, who held two NATO positions as Commander of the Air Channel (COMMAIRCHAN) and Commander of the Air East Atlantic (COMMAIREASTLANT), both of which were subordinate to SACLANT.[33] RAF Germany was a part of NATO's Second Allied Tactical Air Force (2ATAF).[34] Although 2ATAF was a multinational force,[35] it was always commanded by a British officer, who was subordinate to the Allied Air Force Central Europe (AAFCE), and ultimately to SACEUR.[36]

Like the RAF, the RN also had two parallel command structures during the Cold War. As mentioned, CINCFLEET was also CINCHAN and CINCEASTLANT. There were two operational commanders to support these commands: Flag Officer Plymouth and Flag Officer Scotland and Northern Ireland (FOSNI) at Pitreavie Castle.[37] Both Flag Officers held dual NATO posts, too. Flag Officer Plymouth was both the Commander of Plymouth Channel (COMPLYMCHAN), subordinate to CINCHAN, and Commander of the Central Atlantic (COMCENTLANT), subordinate to

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[32] Shaun R. Gregory, op. cit., p.121.

[33] Peter Jackson, *Strike Command*, (London: Ian Allen, 1984), p.12.

[34] RAF Germany was previously the Second Tactical Air Force (2TAF). In order to avoid confusion with 2ATAF, it was renamed RAF Germany in 1959.

[35] 2ATAF was to command air components of the British Dutch, Belgian and German troops.

[36] Terry Gander, *The Modern Royal Air Force*, (Cambridge: Patrick Stephen, 1984), p.29.

[37] In July 1994, it was announced that FOSNI would move his flag to Faslane.

CINCEASTLANT and SACLANT. FOSNI was both Commander of the North Channel (COMNORCHAN), subordinate to CINCHAN, and Commander of the North Atlantic (COMNORLANT), subordinate to CINCEASTLANT and SACLANT.[38] The British Army on the Rhine (BAOR) was deployed to defend the north area of West Germany as one of four national armies in NATO's North Army Group (NORTHAG),[39] which was one of the two army groups of the Allied Forces in Central Europe (AFCENT). AFCENT was one of the four major subordinate commands, which were directly responsible to SACEUR.

As far as communications were concerned, efforts were made by the RAF in the 1980s to integrate the C2 systems of both Strike Command and RAF Germany, revolving around the Uniter communications network and the RAF C2 information system (UKAIRCCIS), a logistic and management system.[40] The RAF's mobile satellites, such as the Skynet satellites,[41] provided direct communications between command headquarters in the UK and RAF operational units within NATO.[42] The RN's communications systems, including the Operational Control (OPCON) systems and the ICS3 integrated communications system in the 1980s, were used for high level and centralised control of nuclear operations within the NATO theatre.[43] Despite integration into the NATO network, BAOR retained a strong national identity. In addition to NATO's systems to co-ordinate BAOR operations, there were national communications via commercial, troposcatter, and SATCOM of the DCN between BAOR and its national authority.[44]

From 1991, NATO took a series of reduction measures on tactical nuclear weapons for the post-Cold War security environment. All nuclear artillery and ground launched short range nuclear missiles were removed. The readiness levels of dual-capable aircraft associated with them were reduced, and increased emphasis was given to their conventional roles. Tactical nuclear roles were replaced by

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[38] Rupert Pengelley, "OPCON 2- a strategic maritime C2 system", *Defence Attaché*, No. 6, 1981, p.9.

[39] NORTHAG consisted of the British, Dutch, Belgian and German corps.

[40] Shaun R. Gregory, op. cit., p.123.

[41] The UK has 3 Skynet-4 satellites. *The Military Balance, 2004-5*, p. 259.

[42] "British Developments in Satellite Communications", *International Defence Review*, No. 5, 1985, p.722.

[43] R. J. Raggett, "Naval Communications Experience" *Maritime Defence*, August 1979, pp.312-3.

[44] Shaun R. Gregory, op. cit., p.125.

"sub-strategic" missions, which are performed by dual capable aircraft and a small number of UK Trident warheads. According to NATO, however, sub-strategic nuclear weapons will not be deployed on surface vessels and attack submarines in normal circumstances.[45]

4.Nuclear Operations

In the UK, operations of strategic weapons were often all-planned in peacetime, but the use of tactical nuclear weapons, while pre-planned at a national or coalition level, had to be upgraded in real time during hostilities. The two types of targets were allocated by different committees within the MoD.[46]

4-1. Strategic Nuclear Weapons

The nuclear operations of Britain's strategic nuclear weapons are analysed in three scenarios: the NATO solution, standing alone for the homeland, and standing alone for overseas interests as discussed below.

4-1-1. The NATO Solution

During the Cold War, the Soviet military threat was expected to be in the form of massive conventional invasions, but NATO did not rule out the possibility that the Soviet Union could perhaps follow a policy of nuclear pre-emptive strike.[47] Whatever happened, any armed attack on the territory of the Allies, from whichever direction, would be covered by Articles 5 and 6 of the NATO Treaty. All member countries participating in the military aspect of the Alliance contributed forces and equipment, which together constituted the integrated military structure of NATO. These forces and assets remained under national C2 until a time when they were required by NATO a specific purpose. When the NATO defence mechanisms were initiated, Britain's nuclear targeting and operations had to cope with NATO's Nuclear Operation Plan (NOP, a.k.a. General Strike Plan), developed by the Nuclear Activities Branch at SHAPE.[48] SACEUR, who had always been the US Commander-in-Chief

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[45] *NATO's Strategic Concept 1999*, NATO, 1999, Article 64.

[46] A confidential paper provided by Eric Grove, dated 4 October 1994, p.4.

[47] A. J. R. Groom, *British Thinking about Nuclear Weapons*, (London: Frances Pinter, 1974), p.89.

[48] *Statement on the Defence Estimate 1969: part I the defence review*, Cmnd 3927, (London: HMSO, February 1969), paragraph 25.

Europe (CINCEUR), had operational control over the missiles once they were released by the US President.[49]

In December 1951, a set of principles was established to co-ordinate SAC operations in Europe with SACEUR's plan: SACEUR was responsible for target selection while SAC determined operational requirements and selection of weapons. The nuclear authority of SACEUR was later expanded due to the effort of General Dwight Eisenhower.[50] From the early 1960s, the full execution of the NOP would have to be in conjunction with the US SIOP.[51] The NOP included a Priority Strike Programme for urgent targets such as enemy nuclear forces and a Tactical Strike Programme, which aimed at targets of tactical relevance such as logistic support facilities.[52] Before the end of the Cold War, the NOP reportedly contained more than 18,500 targets, 10 per cent of which were priority targets.[53]

After the collapse of the Soviet Union, the concept of forward defence is no longer applied in the European continent, although regional differences remain with regard to the challenge, which the forces may be required to face and their respective needs for forward deployment. The flexibility and mobility of the current NATO defence posture are to ensure that NATO has the means to address challenges and risks posed by WMD and their means of delivery. The issues in dispute, however, are biological or chemical attacks. In June 2000, NATO approved MC 400/2. According to this document, the first use of nuclear weapons was said to be possible (not certain) against an enemy that is supposed to possess any sort of WMD.[54] In view of this, if attacked by a state or a non-state actor with massive stocks of biological or chemical weapons, or even other newly-invented conventional weapons with tremendous

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[49] Paul Bracken, *The Command and Control of Nuclear Forces*, (New Heaven: Yale University Press, 1983), p.155.

[50] Stephen Twigge and Len Scott, *Planning Armageddon*, p.34.

[51] Lawrence Freedman, "British Nuclear Targeting", in Desmond Ball and Jeffery Richelson (eds.), *Strategic Nuclear Targeting*, (Ithaca: Cornell University Press, 1986), p.119.

[52] Desmond Ball, "Targeting for Strategic Deterrence", Adelphi Paper, No. 185, IISS, Summer 1983, p.16

[53] Catherine Kelleher, "NATO Nuclear Operations", in Ashton Carter, John Steinbruner and Charles Zracket (eds.) *Managing Nuclear Operations*, (Washington DC: Brookings, 1987), p.450.

[54] Otfried Nassauer, "The NPT and Alliance Nuclear Policy", *Non-Proliferation and NATO Nuclear Policy*, Seminar Report, the Netherlands Parliamentarians for Global Action, Hague, 3 November 2000.

destructive power, nuclear retaliation could be an available option for NATO, although such a decision could conflict with Britain's current NSA commitment.

4-1-2. Standing Alone: the homeland

Considering the collective nature of NATO, it was unlikely that the UK would have to respond to a nuclear attack on its homeland without the involvement of NATO. Regardless of this, Britain still prepared a set of national nuclear targeting plans, which reflected Britain's unique national interests,[55] even when the British had not enough nuclear weapons.[56] Thanks to Britain's limited nuclear arsenal, the ability to launch a successful attack on Moscow, which was the most important political centre in the USSR, was regarded as the crucial requirement in Britain's nuclear operations.[57] The validity of the "Moscow Criterion" was justified not only by the Government, but also by the military. As Field Marshall Nigel Bagnall argued, the Moscow Criterion was "more than just the destruction of Moscow, it was the destruction of their command and control system".[58] Admiral Lord Lewin also echoed, "Moscow was at the core of the Russian psyche, if you wiped out Moscow you destroyed the Soviet Union's will to succeed."[59]

In the post-Cold War period, Britain's strategic nuclear warheads are no longer aimed at specific targets, but it is believed that Britain's nuclear weapons can still be used both independently and under the aegis of NATO against Russia. Trident is deployed in a multi-purpose role, including a sub-strategic mission, which will be discussed later. The SDR says that the Trident submarines "are routinely at a notice to fire measured in days".[60] This readiness state can, however, be quickly increased if

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[55] In fact, the coexistence of two operation plans was nothing new to the British. During WWII, there were differences of opinions between Bomber Command and the US Strategic Command as to the order of priorities. Oral Answers, Questions by A. Henderson, M.P. on Air Estimates, *Parliamentary Debates*, House of the Commons, Vol.524, (London: HMSO, 4 March 1954), 1538.

[56] For example, if the use of the American MK5 nuclear weapons stored in Waddington under Project E were not allowed, the British could be capable of transferring their own warheads from Faldingworth, which normally serviced Scampton. The transfer was to be by road and could include Yellow Sun MKI. Interview with Dr Eric Grove, University of Hull, 5 June 2005.

[57] Bruce Blair, *The Logic of Accidental Nuclear War*, (Washington DC: Brookings, 1993), p122f.

[58] BBC, "Moscow Criterion", BBC Broadcast, July 1995.

[59] Ibid.

[60] *UK, Strategic Defence Review: supporting essays*, London: Ministry of Defence, 1998, Essay 5,

required.[61] If a nuclear attack against the British homeland occurs, Britain will surely resort to NATO first as in the Cold War. But if NATO fails to respond in an acceptable way to the British, presumably, the UK will be tempted to adopt proportional counter measures by themselves. Such plans need to be flexible in order to accommodate changing situations (who the enemy is, what weapon it has, and how serious damage it causes).

4-1-3. Standing Alone: overseas interests

The British deployed nuclear-capable bombers with Red Beard in the Middle East and Southeast Asia in the 1960s and the early 1970s. These deployments, however, were limited to the tactical, not strategic level. Out of financial concerns, the British withdrew from East of Suez in 1971. The UK Government meanwhile made it clear that involvement in areas outside NATO, even with Britain's interests, was not willingly accepted.[62] The military solution would be the last option. In the light of the experience in the Falklands War, it was unlikely that the British would use strategic nuclear weapons to protect their overseas interests.

The withdrawal of Britain's tactical nuclear weapons in the post-Cold War period effectively enhanced its strategic weapons' role as a mobile and effective deterrent. Nuclear attacks on Britain's overseas territories may be an unlikely scenario, although Britain's forward policy of expeditionary coalition operations may create conditions where WMDs are threatened or used. Nuclear retaliation, limited or more general, is still an available choice to the UK Government, especially if British troops were involved.

4-2. Tactical Nuclear Weapons

4-2-1. NATO

In the 1940s and 1950s, the British war planners actually considered kiloton and sub-kiloton range nuclear weapons could be an effective operational means in

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paragraph 12.

[61] Written Answer of the Minister of State, Defence, Lord Gilbert, *Parliamentary Debates*, House of Lords, Vol. 592, (London: HMSO, 28 July 1998), WA 181.

[62] For example, see *Statement on the Defence Estimate 1976: part I Defence and Détente*, Cmnd 6432, (London: HMSO, March 1976), paragraph 1.

battle. In 1958, a short booklet, entitled The Corps Tactical Battle in Nuclear War appeared in Britain. It was nicknamed "The Purple Pamphlet" because of its garish cover. The Purple Pamphlet made some obvious assumptions about the British order of battle: The role of the tactical air force was to destroy the enemy's airfields and nuclear delivery capacity and to impede its forward movement and supplies. In the autumn of 1961, BAOR was reportedly trained to use nuclear weapons in Exercise Spearhead, despite the Government's pressure to limit military operations to a conventional kind.[63] The Purple Pamphlet's currency lasted ten years to 1968, the only period when the British Army had a genuine independent nuclear battle-fighting agenda.[64]

The Purple Pamphlet was later replaced by the flexible response documents. Under the guidance of flexible response, tactical nuclear weapons were massively produced by the Americans and deployed in Western Europe. The major functions of tactical nuclear weapons were to be "used against targets the destruction of which immediately relevant to the course of the actual fighting, as distinct from enemy cities or targets a long way behind the area where fighting is taking place."[65]

Compared with strategic nuclear weapons, nevertheless, Britain's interest in tactical nuclear weapons was limited and its intention to rely on the American provision was clear,[66] although the practical use of tactical nuclear weapons was not denied.[67] As early as 1957, Macmillan had stated in the Defence Committee that Britain would never use tactical nuclear weapons without the US and therefore could

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[63] Andrew J. Pierre, *Nuclear Politics: the British experience with an independent strategic force: 1939-1970*, (London: Oxford University Press, 1972), p.190.

[64] Hugh Beach and Nadine Gurr, *Flattering the Passions or, the Bomb and Britain's Bid for a World Role*, (London: I.B. Tauris, 1999), pp.80-2.

[65] Oral Answers, Answered by Defence Minister Denis Healey on Nuclear Weapons, *Parliamentary Debates*, House of Commons, Vol. 801, (London: HMSO, 6 May 1970), Q.14, 391-2.

[66] Ian Clark, *Nuclear Diplomacy and the Special Relationship: Britain's deterrent and America, 1957-1962*, (Oxford: Clarendon Press, 1994), p.111.

[67] Britain's 1976 Defence Estimate had provided a clear role for tactical nuclear weapons although there were other opinions previously. Tactical nuclear forces "are indispensable to NATO for two reasons. First, they deter the Warsaw Pact from using its own theatre nuclear forces. Secondly, they represent a link between NATO's conventional and strategic nuclear forces, and they increase the range of options open to the Alliance." *Statement on the Defence Estimate 1976: part I Defence and Détente*, Cmnd 6432, (London: HMSO, March 1976), paragraph 30.

rely entirely on American warheads for this purpose.[68] In 1961, the Government suspended the development of most tactical nuclear warheads, as "a weapon of this kind may produce exceptional difficulties of control without having proportionate deterrent value."[69] In 1962-1963, the Government decided to eliminate the requirements for atomic demolition munitions (ADMs), artillery shell warheads, and all requirements for over 10-kiloton yield in order to save more money and fissile material.[70] Only the WE177 programme survived.[71] In 1966, suggestions for future tactical nuclear weapons requirements were gathered by the Chiefs, but no such requirements were approved.[72] The Government's reluctance to spend money on tactical nuclear weapons was more than obvious.

In terms of operations, the British Government regarded tactical nuclear weapons as a part of NATO strategy, and independent national use in the NATO theatre was not particularly emphasised,[73] if Britain did not have to fight alone. Some British analysts, however, provided assumptions on national use of tactical nuclear weapons within the NATO theatre. A. J. R. Groom suggested Britain might initiate tactical nuclear weapons within Europe.[74] Lawrence Freedman surmised tactical nuclear weapons could be used to thwart a cross-channel

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[68] CAB 131/18 D(57) 2ed , 27 February 1962. The UK, however, still had some tactical nuclear programmes, such as Blue Water going on in this period.

[69] PREM 11/3724, Nuclear warhead programme, 13 March 1961.

[70] AVIA 65/1771, Brief for NRDC mtg, 31 May 1962; CAB 134/2239, Discussion in the NRDC mtg, 31 May 1962; CAB 134/2240, ND (62) 4 of 25 March 1963.

[71] By October 1962, only the Skybolt warhead and the Red Beard successor remained in the programmes. CAB 134/2239, ND (62) 3rd mtg of 3 October 1962.

[72] These options included a supersonic stand-off air ground weapon to replace the WE177; a retarded sub-kiloton very-low-level weapons; a field artillery rocket system, an advanced nuclear depth charge (NDC), a British warhead for Lance or an 8-inch shell; variable yield warheads; or high neutron flux devices. DCSA (P) (Cook) to CDS, 26 July 1966; DEFE 25/123, Reporting WDC (NS) mtg, 20 July 1966; CAB 134/2241, ND (66) 2ed mtg, 16 September 1966.

[73] As a part of NATO, however, Britain insisted that political consultation would be needed before operational employment either inside or outside of the NATO area. The 1968 Defence Statement also added that "all commanders in Europe and the Atlantic had at their disposal enough tactical nuclear weapons, but that the arrangements for their deployment and possible use should be kept continuously under review" of NPG and the Nuclear Defence Affairs Committee. *Statement on the Defence Estimate 1968: part I policy and organisation*, Cmnd 3540, (London: HMSO, February 1968), paragraphs 14, 15.

[74] A. J. R. Groom, op. cit., p. 513.

invasion if NATO's entire nuclear force failed to prevent Western Europe being overrun.[75] These were extreme scenarios, whose credibility could be doubted.[76] A joint coordination under NATO commands would be a more likely scenario for the use of tactical nuclear weapons.

As mentioned previously, all Britain's three armed forces in the Cold War possessed tactical nuclear weapons, which were almost totally committed to NATO, apart from a few, which were under national control for Britain's overseas deployment outside NATO. Britain's most important indigenous tactical nuclear warheads were Red Beard and the WE177.[77]

Red Beard was a relatively light weight tactical fission bomb. The smaller size made it possible for tactical aircraft to carry it. Red Beard was originally an unboosted all-plutonium design with a nominal yield of 14 kilotons, but later AWRE managed to increase its yield by using a tritium boosted plutonium/U-235 composite core.[78] Development began in 1954 and was substantially completed by 1958. Before its retirement in 1972, a maximum of 80 bombs was in the RAF inventory, and about 30 in the Fleet Air Arm stockpile.[79] Another source indicated there were 28 for the RN.[80] Red Beard was originally viewed as a weapon suitable for sinking ships in the North Atlantic, but by the time it entered service, its primary use was against ground targets out of area, which faced lower levels of nuclear threat. Red Beard was not intended for use in Europe after the early 1960s, as it could not be used in a laydown role.[81]

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[75] Lawrence Freedman, "The Role of Third-Country Nuclear Force" in J. D. Boutwell et. al. (eds.) op. cit., p.121.

[76] Shaun R. Gregory, op. cit., p.128.

[77] The name WE177 derives from the Weapon Engineering Division at Farnborough.

[78] WO 32/17087, DAWP to DWD, 11 July 1958. The RAF was more interested in a fairly high yield Red Beard for use by Canberras and V-bombers in a counterforce offensive. AIR 2/13728, 8 December 1955.

[79] Red Beard was about 3 feet in diameter, 12 feet long, and weighed 2000 lb. FAS, "Britain's Nuclear Weapons: history of the British nuclear arsenal" in http://gawain.membrane.com/hew/uk/ukarsenaldev.html (Last updated: 30 April 2002)

[80] A confidential paper provided by Eric Grove, dated 4 October 1994, p.1.

[81] Ibid., p.5. Laydown is a very low level bombing technique wherein delay fuses and/or devices are used to allow the attacker to escape the effects of the bomb.

The WE177 entered service in 1966, and the last one retired from RAF Marham on 31 March 1998. Three versions were generally known, although there were disagreements about their specifications.[82] The WE177A was a tactical fission bomb with a yield of approximately 10 kilotons. The WE177B and C were relatively high yield H-bombs with various yield designs, but they had maximum yields of 450 and 200 kilotons respectively. All could be used in diverse modes. The British produced about two hundred WE177s,[83] which were first deployed with Vulcan,[84] then with Buccaneer, followed by Jaguar, Sea Harrier, and various ASW helicopters, such as the RN's Lynx and Sea King. Unlike Red Beard, the WE177's major mission was battlefield support in Europe.[85] Accordingly, the RAF's WE177s were integrated into NATO's joint air and land battle plans, and the RN's were used for defending the NATO naval region around the UK.[86]

In terms of the US-supplied tactical nuclear weapons, the RAF used the American nuclear depth bombs (MK34 and B57), but the RAF was not allowed to use these weapons, stored at RAF bases at Machrihanish and St Mawgan, without American permission. It was assumed that the RAF could act jointly with the US ASW aircraft in the same region.[87] The RN, by contrast, used British-built tactical nuclear weapons only, and thus had no problems regarding American custody. The last US-supplied tactical nuclear weapons were returned to the US by July 1992.[88]

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[82] The data used here are provided by Eric Grove. Interview with Eric Grove, University of Hull, 5 June 2005.

[83] 175 for the RAF and 25 for the RN, Robert S. Norris, Andrew S. Burrows and Richard W. Fieldhouse, op. cit., p.65. Bulletin of Atomic Scientists, "Nuclear Notebook: nuclear weapons\at sea", *Bulletin of the Atomic Scientists*, September, 1988, p.64. François Heisbourg, "The British and French Nuclear Force", *Survival*, Vol. 31, No. 4, July/August 1989, p.307.

[84] The RAF's Vulcan was assigned as theatre bombers from 1970. Capability of Vulcan in low level role, however, was severely limited by its speed, which was only 420 kilotons maximum. Above this, it became unstable and then started to break up. A confidential paper provided by Eric Grove, dated 4 October 1994, p.1.

[85] Ibid., p.5.

[86] Written Answer by Bill Walker on Strike Duty *Parliamentary Debates*, House of Commons, Vol. 238, (London: HMSO, 2 March 1994), 787.

[87] Shaun R. Gregory, op. cit., pp.123-4.

[88] In September 1991, President Bush announced that all artillery shells, Lance warheads, and tactical naval weapons be returned to the US and dismantled. In 1992, the Pentagon declared that all had

In contrast to the RAF and RN, the Army did not have national tactical nuclear weapons. BAOR used only American nuclear weapons, but the whereabouts, conditions, and readiness of these weapons were all subject to the constant and complete custody and control of the US under bilateral agreements.[89] In peacetime, most of NATO's nuclear warheads were kept in protected storage sites known as "special ammunition sites."[90] These weapons, fitted with sophisticated PALs that guaranteed absolute positive control by the US and prevent unauthorised use,[91] were only provided during periods of crisis or conflict.

The practical function of such arrangements, however, was controversial. Some observers believed that these agreements were in favour of the US, and Britain effectively controlled none of these weapons, as they were subject to an American veto.[92] Some other analysts argued that in wartime the US custodial units were not intended to remain with the warheads once they were mated with the missiles. Therefore, BAOR in effect would have full operational control at that point.[93] Fortunately, the Cold War ended before this controversy was resolved.

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been returned. These weapons included the Nimrod anti-submarine warfare aircraft based in St. Mawgan, Cornwall, and in Kinloss, Grampian, Scotland; one army regiment with 12 Lance launchers; and four army artillery regiments with 120-155 millimetre (M109) artillery in Germany. The 50th Missile Regiment (Lance) and the 56th Special Weapons Battery Royal Artillery were disbanded in April 1993. Robert S. Norris and William M. Arkin, "British Nuclear Forces, 1993", in Bulletin of Atomic Scientists, "British Nuclear Forces, 1993", *Bulletin of the Atomic Scientists*, Vol. 49, Issue 7, September 1993, p.57 and p.65.

89 Shaun R. Gregory, op. cit., p.95.

90 Paul Bracken, op. cit., p.165.

91 NATO, "NATO's Positions Regarding Nuclear Non-Proliferation, Arms Control and Disarmament and Related Issues", *NATO Fact Sheet*, 27 April 2004 update, http://www.nato.int/issues/nuclear/position.htm. Positive control concerns the authorisation of nuclear operations. Its opposite, negative control, ensures that bogus or unauthorised instructions are ignored.

92 Lawrence Freedman, "British Nuclear Targeting", in Desmond Ball and Jeffery Richelson (eds.), op. cit., p.126. A. J. R. Groom, op. cit., pp.293-4.

93 Shaun R. Gregory, op. cit., pp.123-5.

Table 1. The US-supplied Tactical Nuclear Weapons to Britain during the Cold War

Weapon	Deployed UK forces	Number	Note
MK7 bomb	1958-1966	48	For Canberra in Germany, replaced by B28 and B43
B28/43/57 bomb	1960-1976	96	48 for Valiant (UK, 1960-1965), then 48 for Canberra and Phantom (Germany, 1972-1976)
MK34 (Lulu)	1965-1971	60	ASW depth bomb for Shackleton
B57	1970-1992	65	ASW depth bomb for Nimrod, replaced Shackleton in 1972
W7 Corporal	1958-1967	100	In Germany, replaced by Honest John
W31 Honest John	1960-1979	120	In Germany, replaced by Lance
W70 Lance	1976-1991	85	In Germany, withdrawn unilaterally
W33 8-inch	1960-1987	36	In Germany, mission eliminated
W48 155mm	1968-1991	36	In Germany, withdrawn unilaterally
B54/W45 ADMS	1971-1985	50	In Germany

Source: Robert S. Norris, Andrew S. Burrows and Richard W. Fieldhouse, *British, French and Chinese Nuclear Weapons*, Nuclear Weapons Databook, Vol. V, (Boulder: Westview Press, 1994), p.64.

In the UK, the distinction between strategic and tactical nuclear weapons had little to do with yield. For example, the tactical/sub-strategic WE177B at 450 kilotons was more powerful than Polaris at 200 kilotons or Trident at 100 kilotons. It was the function rather than yield that made a difference. Even at the peak, Britain's tactical nuclear arsenal comprised less than 200 weapons in NATO's stockpile of thousands.[94] The small number of these weapons could perhaps have little military significance in terms of overall NATO nuclear operations, but they could be seen as a very visible political sign of Britain's continued commitment of interdependence to NATO and European security: the glue that kept Britain and the European continent together.[95]

4-2-2. Overseas Deployment

Britain's global nuclear deployment beyond the NATO theatre was a traditional policy during the Cold War although such practices were kept highly confidential. The Government might have reservations about waging a small-scale nuclear war in

[94] Robert S. Norris, Andrew S. Burrows and Richard W. Fieldhouse, op. cit., p.65.

[95] PREM 11/3724, 13 March 1961. Bruno Tertrais, *Nuclear Politics in Europe*, Adelphi Paper 327, IISS, 1999, pp.12-3.

British overseas territories, but it did not oppose a view that a nuclear capability for this purpose should be provided in advance.[96] The political fear of expanding conventional forces for regional contingencies also played an important role to increase reliance on tactical nuclear weapons.

From 1956, there were discussions on deploying the nuclear-capable Canberras at Akrotiri in Cyprus. By 1960, the Akrotiri base had been prepared for 16 Red Beards, but in the following year, permanent storage facilities for 32 of these weapons were opened nearby at Cape Gata. From 1961 to 1975, a Canberra detachment was maintained in Cyprus in support of CENTO obligations,[97] and Britain was said to have a full low-altitude nuclear bombing capability in Cyprus by that stage.[98] In common with the V-bombers, the Canberras were also expected to disperse in times of hostilities with elements operating from the RAF bases in Muharraq (Bahrain) and Sharjah (United Arab Emirates).[99]

Apart from the Mediterranean area, Britain also showed interest in deploying nuclear weapons in the Far East. By 1960, the RAF was involved in nuclear planning for the region, drawing up targets and making plans to move 48 Red Beards to Tengah, an RAF base in Singapore. In August 1962, Prime Minister Harold Macmillan personally authorised the storage of nuclear weapons at Tengah.[100] The Vulcan squadrons began low-altitude nuclear bombing exercises at the end of 1963, and remained in the region until 1975.[101] There were two aspects of British nuclear striking planning in the Far East, which were concerned with "(Britain's) contribution to the strategic nuclear deterrent against China, and support to SEATO."[102] An account also suggested that there could be a co-ordinated tactical nuclear response in

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96 Julian Lider, *British Military Though after WWII*, (London: Gower, 1985), p.226.

97 These were withdrawn after the Turkish invasion of 1974.

98 Tom Rhodes, "Britain Kept Secret Nuclear Weapons in Singapore and Cyprus", Rense Organisation, 31 December 2000, in http://www.sunday-times.co.uk/news/pages/sti/ 2000/12/31/ stinwenws02015. html. (Last updated: December 2000)

99 Stephen Twigge and Len Scott, *Planning Armageddon*, p.62.

100 Agence France Presse, "Britain hid Nuclear Arms Abroad during Cold War: report", Indian Express Newspapers, Bombay, 3 January 2001.

101 Tom Rhodes, op. cit.

102 AIR 20/10056, Macmillan minute, 13 November 1962. SEATO Plan 4 was designed to meet a direct attack from China from member states.

support of SEATO agreed between the UK and US Governments.[103] These nuclear-capable aircraft were viewed as an effective deterrent by the British during the confrontation between Malaysia and Indonesia.[104]

The RN had a role in supporting global nuclear deployments, too. The first Red Beards were carried by Scimitar aboard HMS Hermes in November 1960.[105] The RN continued deploying nuclear-capable, carrier-borne strike aircraft for 30 years until they were withdrawn in 1992, bar a two-year gap at the end of the 1970s.[106]

4-3. Sub-strategic Weapons

From 1989, the word "tactical" was almost replaced by a new term "sub-strategic".[107] NATO's Strategic Concepts, published in November 1991, made it clear that the Alliance continued to require sub-strategic forces, albeit at a significantly reduced level, as an essential link between conventional and strategic nuclear forces.[108] Between 1991 and 1993, NATO reduced its available sub-strategic weapons in Europe by 80 per cent.[109]

To clarify the concept of the sub-strategic role from the British perspective, Defence Minister Geoffrey Hoon explained that, "a sub-strategic element is an essential component of a nuclear deterrence policy. In extreme circumstances of

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[103] Stephen Twigge and Len Scott, *Planning Armageddon*, p.108.

[104] However, neither Malaysia's Prime Minister Tunku Abdul Rahman, nor Cyprus's leader at the time, Archbishop Makarios III, were aware of the deployment. Singapore was briefly a part of the Malaysian Federation. Agence France Presse, op. cit.

[105] DEFE 32/6, COS (60) 66th , Statement by FSL 26 October 1960.

[106] Paul Rogers, "Bomb Culture", *New Statesman & Society*, Vol. 8, Issue 357, 16 June 1995, p18. According to an account, the RN was never to admit the presence of the WE177 aboard ships but also never to take them where discovery could cause embarrassment. A confidential paper provided by Eric Grove, dated 4 October 1994, p.6.

[107] The term "sub-strategic" has been used in NATO documents with reference to intermediate and short range (less than 5,500 kilometres) nuclear weapons and now refers primarily to air-delivered weapons for NATO's dual-capable aircraft and to a small number of the UK Trident warheads in a new sub-strategic role." NATO, "NATO Handbook: Chapter 7 Policy and Decision-making, NATO", In http://www.nato.int/docu/handbook/2001/hb0705.htm (Last updated: 15 October 2002)

[108] Written Answer by Minister of State for Armed Forces, Archie Hamilton on Nuclear Weapons, *Parliamentary Debates*, House of Commons, Vol. 224, (London: HMSO, 4 May 1993), 19.

[109] *House of Commons Commission Reports*, Third Report, Select Committee on Defence, (London: HMSO, 31 March 1999), paragraph 70.

self-defence, a capability for more limited use of nuclear weapons would allow us to signal to an aggressor that he has miscalculated our resolve, without using the full destructive power that Trident offers."[110] Another British official also added that "a sub-strategic strike would be the limited and highly selective use of nuclear weapons in a manner that fell demonstrably short of a strategic strike, but with a sufficient level of violence to convince an aggressor, who had already miscalculated our resolve and attacked us that he should halt his aggression and withdraw or face the prospect of a devastating strategic strike."[111]

In 1993, when the air-launched tactical nuclear missile project was cancelled, the Government announced that in the long run, Britain would use the flexibility of Trident to undertake the sub-strategic as well as the strategic roles by 1998.[112] For a sub-strategic role, a proportion of the missiles on a Trident submarine, perhaps 2, 4 or 6 out of 16, are equipped with small warheads with a destructive power of about 0.3 or 5-10 kilotons, compared with the standard Trident strategic warhead of about 100 kilotons.[113] The number of warheads per missile can be flexible, too.[114] For its sub-strategic mission, a Trident missile carrying a single warhead would have a range of more than 9,600 kilometres (6,000 miles).[115] In view of this, not only does

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[110] Select Committee on Defence, Third Special Report, House of Commons Commission Report, 19 May 1999. paragraph 13.

[111] Bruno Tertrais, op. cit., p.14.

[112] Michael Clark, "Does My Bomb Look Big in This? Britain's nuclear choices after Trident", *International Affairs*, Vol. 80, No. 1, 2004, p.58.

[113] Select Committee Report, Select Committee on Foreign Affairs, Memorandum submitted by Paul Rogers, 25 July 2000.

[114] Ibid. Bruno Tertrais, op. cit., p.19. Nuclear Weapon Archive Organization, "Britain's Nuclear Weapons: the current arsenal", in http://nuclearweaponarchive.org/Uk/UKArsenalRecent.html (Last updated: 30 April 2001) There is some flexibility in the yield choice of the Trident warhead. With dual missions, an SSBN would have approximately 36-44 warheads on board during patrol. (For instance, choosing to detonate only the unboosted primary could produce a yield of 1 kiloton or less. Or choosing to detonate the boosted primary could produce a yield of a few kilotons". Bulletin of the Atomic Scientists, "British Nuclear Force 2001", *Bulletin of the Atomic Scientists*, November/ December 2001, p.79.

[115] François Heisbourg, "Brussels's Burden", *The Washington Quarterly*, Summer, 2000, p.129. Reducing the number of warhead can extend the range of a missile. A source believed that Britain's Trident with an average 3 warheads per missile now can be readily built up to 8 warheads per missile if needed. *Bulletin of the Atomic Scientists*, "British Nuclear Force 2001", November/ December 2001, p.79.

Britain's political commitment to interdependence continue, but also its sub-strategic missiles can make genuine military contributions to NATO or other coalition operations.

5. Strategic Targeting and Operations

Structuring a targeting list is imperative for a practical realisation of nuclear strategy. Two concepts, "counterforce" and "countervalue", are helpful for comparison of targeting plans. By definition, "counterforce" means the employment of strategic forces in order to destroy, or render impotent, selected military capabilities of an enemy force under any of the circumstances in which hostilities may be initiated. It aims at reaching a victory while seeking to spare cities and population. "Countervalue", by contrast, targets an enemy's civilian population centres or places with high concentrations of non-combatants. The targets sometime include industries located in urban areas. Essentially, it is equal to a countercity or "city-busting" policy.

Britain's strategic nuclear forces were assigned to two sets of operations, for national and NATO purposes. The national targets were decided by the British Chiefs of Staff on the basis of a recommendation of a special committee in the MoD.[116] In this aspect, the state of readiness of Britain's strategic forces and those of the US were matters for the separate respective Governments.[117] For joint NATO targeting plans, Britain's strategic force maintained close coordination with the Americans. In the V-bomber era, Britain's bombing plans cooperated with SAC's in order that each made the maximum use of the other's knowledge and obtained the maximum coverage of, and concentration on, priority targets.[118] When Britain committed its SSBNs to NATO, targets were assigned from the US SIOP, rather than from the NOP.[119] In view of this, NATO's strategic targeting had always been an exclusive

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[116] Lawrence Freedman, "British Nuclear Targeting", in Desmond Ball and Jeffery Richelson (eds.) op. cit., p.115.

[117] Oral Answers by Prime Minister Macmillan to Shinwell MP: aircraft patrols, *Parliamentary Debates*, House of Commons, Vol. 579, (London: HMSO, 12 December 1957), 1418.

[118] Lawrence Freedman, "British Nuclear Targeting", in Desmond Ball and Jeffery Richelson (eds.) op. cit., p.115.

[119] Shaun R. Gregory, op. cit., p.68.

Anglo-American business, although according to the 1962 Athens Guidelines, the US and UK had to consult with allies before using nuclear weapons.[120]

By contrast, Britain's tactical nuclear forces consistently played an interdependent role within the NATO theatre, except for a few under national control for overseas deployments. The use and operation of these weapons would depend as much on foreign policy as on military considerations.[121] The tactical level targeting of NATO was determined by the NPG, US European Command, the International Military Staff and three Major NATO Commands (MNCs).[122] Britain did not emphasise independent use for its tactical nuclear forces, but there was no doubt that it had such a capacity.[123] Joint tactical targeting plans were materialised as the NOP. The task of de-conflicting the NOP and SIOP was the responsibility of the European Liaison Group and the JSTPS.[124]

In this section, the evolution of Britain's national strategic targeting plans is the central concern, as this article is about the UK, not NATO. During WWII, strategic bombing directly aimed at the German civilian population was justified, and this experience had led to the countervalue targeting after the war. In July 1946, a mixed theme emerged in the UK planning documents, which gave a major role to attack cities, but also emphasised the advantage to attack naval and air bases and other military concentrations.[125] Thanks to the influence of the Air Staff, the Joint

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[120] NATO adopted the "Athens Guidelines" for the use of nuclear weapons in 1962. Ministry of Defence Doc. Fu B III 8, Az 31-08-50, Tgb. Nr. 567/62, Bonn, 6 November 1962, Nuclear History Programme Doc. 111. After meetings in Hague in April 1968 and in London in May 1969, the resultant Provisional Political Guidelines (PPGs) reaffirmed the Athens commitment. *NATO Final Communiqués 1949-1974*, NATO, 1975, p.144. *US Security Issues in Europe: burden sharing and offset, MFBR and Nuclear Weapons*, Committee on Foreign Affairs, US Senate, 2 December 1973, pp.19-20.

[121] PREM 11/3724, 13 March 1961.

[122] Shaun R. Gregory, op. cit., p.68. From 2003, there is only one MNC operating.

[123] Ibid., pp.121-2

[124] Lawrence Freedman, "British Nuclear Targeting", *Defense Analysis*, Vol. 1, No. 2, 1985, pp.81-99. J. M. Legge, *Theatre Nuclear Forces and the NATO Strategy of Flexible Response*, (Santa Monica: RAND, 1983), p.14.

[125] M. Gowing, *Independence and Deterrence: Britain and Atomic Energy 1945-52*, Vol. 1, (London: Macmillan, 1974), p.174.

Intelligence Committee (JIC) concluded that in future conflict with the USSR, primary attacks should aim at cities by using atomic bombs.[126]

When the Russians became a nuclear power in 1949, the Air Staff were forced to reassess the bombing strategy.[127] Attacks upon the Soviet Union's war-making, and particularly atomic war-making capacity became a major concern. Bomber Command would need to target "the atomic plants and bases of the enemy, as this is the only way of ensuring that this country remains sufficiently undamaged to continue prosecution of the war".[128] The strategy was also related to the retention of overseas bases from which offensive attacks upon the Soviet Union's arsenal might be launched.[129] In this period, due to the lack of national nuclear weapons, Britain's targeting and operational plans were based on the assumption of US assistance, although the British admitted they did not know how, when or even whether that assistance might be forthcoming.[130]

After Britain became nuclear-capable, it was widely accepted that the raison d'etre of the British nuclear force was to destroy Soviet capabilities that most threatened the UK at the outset of war.[131] According to a 1953 document, the V-bomber should reduce Soviet atomic threat to the UK to what was termed "manageable proportions."[132] There were, too, some suggestions in Parliament to use the atomic bombs only on the battlefield and not in the obliteration of cities behind the lines.[133] On 1 March 1955, Prime Minister Winston Churchill presented a list of target priorities in his parliamentary speech: the launch bases, airfields, large

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126 DEFE 7/1889, JIC (50)89, Confidential Annex to COS (50) 169th, 16 October 1950.

127 Stephen Twigge and Len Scott, *Planning Armageddon*, p.23.

128 DEFE 4/25, COS (49) 143rd, 28 September 1949.

129 Ian Clark and Nicholas J. Wheeler, *The British Origin of Nuclear Strategy 1945-1955*, (Oxford: Claredon Press, 1989), p.91.

130 Ibid., p.113. Also see DEFE 4/1, Confidential Annex to COS (47) 1st mtg, 1 January 1947. In plan Fairfax in 1952, it was said that "the mounting of the strategic air defensive is a United States commitment, and we have no knowledge of her detailed plan." DEFE 6/22, JP (52) 108 (Final), 27 November 1952.

131 Ibid., pp.127-8.

132 DEFE 4/64, COS (53) 24th mtg, 17 July 1953. In this document, the Chief of the Air Staff agreed the V-force should be required to blunt the enemy's atomic offensive.

133 Oral Answers, Questions by R. T. Paget, M.P. on Air Estimates, *Parliamentary Debates*, House of the Commons, Vol.524, (London: HMSO, 4 March 1954), 1467-8.

administrative and industrial targets, oil targets and communications. The launch bases and airfields were accorded the highest priority, which had to be destroyed in the first few hours of the war,[134] but the announced attacks on administrative and industrial targets also demonstrated no clear distinction between counterforce and countervalue.

In May 1958, a coordination agreement between SAC and Bomber Command was reached.[135] The British were able to establish a closer nuclear relationship, including plans on targeting, routeing and timing with the US.[136] Under the agreed arrangement, Bomber Command was allocated 106 targets. 69 were cities, 17 were bomber bases forming part of the nuclear threat, and 20 were parts of the Soviet air defence.[137] On 1 October 1958, this first fully co-ordinated strike plan between the two air forces came into operation. Also in October, the first nuclear weapons under Project E were transferring to RAF bases.[138] In June 1959, Bomber Command declared an initial operational capability (IOC) for Project E with full-scale deployment completed in April 1960.[139] In a renewed combined plan issued in mid-1961, excluding Thor, Bomber Command was given responsibility to attack 48 cities, 6 air defence targets, and 3 long range airbases.[140] In the 1962 Plan, the overall

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[134] Speech by the Prime Minister Wilson Churchill, *Parliamentary Debates*, House of Commons, Vol. 537, (London: HMSO, 1 March 1955), 1895-6.

[135] There were signs of a move back in this direction previously. DEFE 7/1111 Note enclosed with Melville to Chilver, 24 May 1957; AIR 8/2057, Maintaining the Deterrent, 8 July 1957. AIR 8/2201, Tuttle to Broadhurst, 21 October 1957.These reports argued targets are to be 98 or 131 major cities with a population exceeding 100,000. CAB 131/18 D (57) 14, 27 July 1957 even concluded "we shall eventually need about 100 megaton weapons for strategic use". In view of Britain's nuclear capacity at that time, these could be only expectations.

[136] Bomber Command/ Strategic Air Command Coordination Conference Report and Recommendations 19-22 May 1958 in ID9/240/16, Pt 3 US/UK Strike Plan. According to Ian Clark, the coordination process was initiated by an exchange letter dated in early 1957 between Sandys and US Defence Secretary Wilson. Ian Clark, op. cit., 138. AIR 8/2201, COS (57) 224, 16 October 1957.

[137] AIR 8/2201, Coordination of Anglo-American Nuclear Strike Plan, COS (58) 148 5 June 1958. Also see an earlier document AIR 8/2201, Lees to PS to CAS, 30 April 1958, which emphasised Bomber's geographic advantage of attacking the Soviet air defence network in the first strike to open the way for the follow-up strikes proceeding to deeper penetration targets.

[138] Stephen Twigge and Len Scott, *Planning Armageddon*, p.105.

[139] Ibid., 109.

[140] AIR 20/10056, ACAS (Ops) to CAS, Strategic Planning by Bomber Command, 5 October 1962.

target allocation of Bomber Command was increased to 98, with combined attacks of the V-force and Thor. Bomber Command's main task in this new plan was counterforce attacking: 44 airfields, 28 IRBM sites, 10 air defence bases, as well as 16 cities.[141]

Despite the details in these joint striking plans, which emphasised both counterforce and countervalue targets, joint coordination provided Britain operational flexibility whilst its national targeting priority would be preserved in independent actions, if necessary. Specifically speaking, if SAC-RAF were planning a counterforce strike with substantial reserve nuclear weapons able to attack the centres of Soviet population, Bomber Command, in addition to its city-attacking missions, might use its nuclear weapons concentrating on the Soviet medium-range aircraft and missile bases, to which Britain attached a greater military value.[142] Nevertheless, if the British were expected to act alone, a countervalue posture to destroy Russia as a viable country would be adopted.[143]

Britain's national countervalue strategy could be attributed to the re-establishment of the joint Anglo-American nuclear targeting, but equally importantly, the introduction of high yield bombs made city-busting technologically and financially feasible.[144] Britain's first megaton range bomb, Yellow Sun MKI, entered service in 1958 and served with the RAF until 1962, although only a few were deployed.[145] Yellow Sun MKII with the Red Snow device saw service with the RAF from 1961 to 1972. Blue Steel, Britain's first service nuclear missile, was in service also with Red Snow from 1962 to 1969. After flexible response was accepted as an official NATO doctrine, Britain's two sets of nuclear targets remained little changed,

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[141] Ibid.

[142] Lawrence Freedman, "British Nuclear Targeting", in Desmond Ball and Jeffery Richelson op. cit., p.116.

[143] Ian Clark, op. cit., p.131.

[144] David Hawkings, *Keeping the Peace: the Aldermaston story*, (Barnsley: Pen and Sword Books, 2000), p.46. John Baylis, "The Development of Britain's Thermonuclear Capability 1954-61: myth or reality", *Contemporary Record*, Summer 1994, p.8. CAB 128/27, CC 48(54), 8 July 1954.

[145] Humphrey Wynn, op. cit., pp.246-7. Eric Grove suggested the actual yield of Yellow Sun MK1 was 400 kilotons. It was actually an unboosted, high yield fission weapons. Interview with Dr Eric Grove, University of Hull, 12 August 2005. According to an official report, it was said Britain's H-Bomb in-service date was 1960. This could refer to Yellow Sun MKII/ Red Snow. David Hawkings, op. cit., p.30.

although technological progress provided Britain with more accurate and lower yield nuclear weapons. Documents released in 1998 revealed that the British SSBN targeting plan was to aim at 48 cities in the Soviet Union.[146]

Obviously, the Moscow Criterion, which aimed at penetrating Moscow's ABM system, was the most important targeting concern for British nuclear strategists. Chevaline was not a MIRVed system, but it included advanced penetration aids and the ability to manoeuvre the payload in space.[147] Its targeting plan was to launch all 16 Chevaline-tipped missiles at Moscow from the submarines on patrol.[148] The missile trajectories were adjusted, so that all warheads and decoys would land at around the same time and swamp the ABM defences. Technologically, the MIRVed Trident missile, with higher than 94 per cent probability of destroying a hardened missile silo,[149] was believed to have a superior capability to meet the Moscow Criterion.

In 1994, an agreement was reached that the UK and Russia would no longer target each other.[150] As Michael Clarke argued, however, "the ABM defences around Moscow remain the logical yardstick against which British strategic nuclear weapons are judged, since this represents the only defensive screen they might be required to penetrate in the foreseeable future."[151] If an order to attack Moscow had been issued,

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[146] Scottish CND, *Trident: Britain's Weapons of Mass Destruction*, (Glasgow: Scottish CND, 1999), Paragraph 3-1 in http://dspace.dial.pipex.com/town/pipexdsl/d/adhb32/wmd/ch3targ.htm (Last updated: unknown), paragraph 3-1.

[147] John Baylis and Kristan Stoddart, "Chevaline: Britain's hidden nuclear programme, 1967-1982", a report to the House of Commons, 2003, p.1.

[148] FAS, "Britain's Nuclear Weapons: history of the British nuclear arsenal" in http://gawain.membrane.com/hew/uk/ukarsenaldev.html (Last updated: 30 April 2002)

[149] Scottish CND, op. cit., Paragraph 4-1. According to this report, a 94 % probability could be reached without NAVSTAR but with improved stellar navigation. Malcolm Chalmers also argued each Trident warhead has at least 95 per cent probability of destroying a hardened Soviet silo. Malcolm Chalmers, *Trident: Britain's independent arms race*, (London: CND, 1984), p.24.

[150] Answer by Minister of State, FCO, Peter Hain, *Parliamentary Debates*, House of Commons, Vol. 349, (London: HMSO, 3 May 2000), 84WH.

[151] Michael Clarke, *Britain's Strategic Vision of its Security Environment: de-alerting and the UK nuclear deterrent*, Centre for Defence Studies Bulletin, King's College London, October 1998, p.8. Currently, no specific targets are being mentioned. Defence Minister George Robertson said "decisions about our force structures and postures should take into account what has proved hitherto to be successful in maintaining stability in the presence of Russia's military strength." UK Defence Strategy, "A Continuing Role for Nuclear Weapons", Malcolm Rifkind, speech at Centre

the Vanguard-class submarine on patrol would exhaust all its missiles and nuclear warheads at Moscow. Clearly, the Moscow Criterion remains regardless of the demise of the Soviet Union.

6. Conclusions

This article acts as a major analysis of British nuclear postures by discussing the topics of nuclear command, control (C2), targeting, and operations. Britain's strategic nuclear forces were assigned to two sets of operations, for national and NATO purposes. The national targets were decided by the British Chiefs of Staff on the basis of a recommendation of a special committee in the MoD. In this aspect, the state of readiness of Britain's strategic forces and those of the US were matters for the separate respective Governments.[152] For joint NATO targeting plans, Britain's strategic force maintained close coordination with the Americans. In the V-bomber era, Britain's bombing plans cooperated with SAC's in order that each made the maximum use of the other's knowledge and obtained the maximum coverage of, and concentration on, priority targets. When Britain committed its SSBNs to NATO, targets were assigned from the US SIOP, rather than from the NOP. In view of this, NATO's strategic targeting had always been an exclusive Anglo-American business.

Admittedly, Britain's political succession of nuclear C2 during the wartime is not clear, although the strategic force has procedures to use nuclear weapons on its own authority in extreme circumstances. Meanwhile, the UK has to rely on the American intelligence heavily. Such dependence would cause problems of delay or insufficiency for strategic responses.

In terms of tactical nuclear weapons, all three of Britain's armed forces in the Cold War possessed tactical nuclear weapons, which were almost totally committed to NATO, apart from a few, which were under national control for overseas deployment outside NATO. Britain's use and operation of these weapons would depend as much

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for Defence Studies, 16 November 1993, paragraph 13. Several submissions were made to the SDR advocating that warheads and missiles should be removed from the submarines and stored on land. However, the MoD has rejected these proposals. The Government have said that normally three Trident submarines will be fully armed at all times. Written Answer by George Robertson, *Parliamentary Debates*, House of Commons, Vol. 317, (London: HMSO, 28 July 1998), 201.

[152] Oral Answers by Prime Minister Macmillan to Shinwell MP: aircraft patrols, *Parliamentary Debates*, House of Commons, Vol. 579, (London: HMSO, 12 December 1957), 1418.

on foreign policy as on military considerations. Most tactical nuclear weapons in Europe were provided by the Americans, but the British had their own tactical nuclear stockpile and operational plans in case the American weapons were not available. The tactical level targeting of NATO was determined by the NPG, US European Command, the International Military Staff and three MNCs. Britain did not emphasise independent use for its tactical nuclear forces, but there was no doubt that it had such a capacity. Joint tactical targeting plans were materialised as the NOP. In essence, the small number of Britain's tactical nuclear weapons could perhaps be insignificant militarily, but they formed an important political commitment to the Alliance.

A final word will be given to underscore one point: the value of nuclear weapons studies. Nuclear strategy or posture is not viewed by many as a live strategic issue in the post-Cold War period where the Revolution in Military Affairs (RMA) has led to the "Transformation" of conventional weapons systems. Even so, the fact cannot be denied that all existing nuclear powers still retain their nuclear stockpiles and refuse to scrap them in the foreseeable future. This article aims to provide not only the most comprehensive investigation, but also an original assessment on the third nuclear weapons state in the world, Britain. By analysing its nuclear command, control, and operations, I expect a better understanding of Britain's nuclear strategy and posture can be achieved.

（投稿日期：95 年 5 月 29 日；採用日期：95 年 8 月 2 日）