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WORLD WAR III – The 1960's Version

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This article is based on a lecture to the Royal Institute of Navigation History of Air Navigation Group at Tangmere Museum on 12 May 2004. The author served as a navigator-radar – or a radar bomb aimer – within RAF Bomber Command during the mid-1960s. This article is based on his experience of this time in Bomber Command and describes how the Medium Bomber Force would have carried out their war operations had nuclear deterrence failed. In its day these plans were TOP SECRET.

KEY WORDS

1. V-Force. 2. Nuclear weapons. 3. Deterrence.

1. INTRODUCTION

Attention Attention
This is the Bomber Controller for Bomb List Delta
SCRAMBLE
Authentication WHISKEY NINE JULIET
E-Hour One Zero Zero Zero Zulu

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So would start the end of the Third World War in the 1960s. Forty years ago RAF Bomber Command was at the peak of its strength. The command had only recently returned the Thor missiles to the USA and the medium bomber force was still building up. There were three basic types of V-Bomber in 1964, the Vulcan, the Valiant and the Victor.

No 1 Group was equipped with the Avro Vulcan with the main force deployed in three wings, each with three squadrons of eight aircraft. The Waddington wing was equipped with the Vulcan Mark 1a. Vulcan Mark 2 with the Blue Steel missile formed the Scampton wing and Vulcan Mark 2 with free-fall weapons equipped the Coningsby wing. The latter, which was due to move to Cottesmore at the end of 1964, was still building up. The Coningsby wing had been destined to receive the stand-off Skybolt missiles but these had been cancelled in 1962. In addition, there was the Vulcan Mark 1, which, without the Electronic Counter Measures (ECM) contained in the characteristic ECM tail, was confined to No 230 Operational Conversion Unit at RAF Finningley.

No 3 Group was equipped with a mix of Vickers Valiants and Handley Page Victors. The 3 Group Victors were deployed in three wings but with just two squadrons and eight aircraft each. Victor Mark 1 aircraft were deployed at the Honnington and Cottesmore and the Mark 2, armed with the Blue Steel missile was entering service at Wittering. The Valiant, by 1964 was deployed at Gaydon, the operational conversion unit, Marham, the main force, and Wyton with the photographic reconnaissance version. The main force was assigned to SACEUR as the Tactical Bomber Force equipped with US weapons under US control. This force could however, be employed by Bomber Command with British weapons. Part of the Valiant force was converted to the air-to-air refuelling role. Their war role was to support Fighter Command.

2. POSTURE. The posture adopted by NATO was one of deterrence, but should war break out it was expected that there would be a short conventional war with early resort to nuclear weapons leading to massive nuclear retaliation, the so-called trip wire strategy. In peacetime the V-Force, or Medium Bomber Force, was concentrated at bases in the eastern counties between the Humber and East Anglia. One crew from each squadron was at fifteen minutes readiness to scramble on its war mission. In the event of increasing tension the force would be deployed in groups of two or four aircraft at airfields throughout the British Isles, from Ballykelly in Northern Ireland to Manston in Kent, from St Mawgan in Cornwall to Lossiemouth in Scotland. The whole force could hold this dispersed posture at 15 minutes readiness for 28 days. They would eat, sleep, and rest in accommodation close to their aircraft ready to launch at an instants notice.

The Bomber Controller was ensconced in the Second World War semi-under ground bunker at Bomber Command Headquarters in High Wycombe. His cabin overlooked the wing state boards. Behind him was the senior officers' gallery where the AOC-in-C could watch and, if necessary talk, to his controller. The Bomber Controller's message was addressed to Bomb List Delta, shorthand for all the V-Bombers at main bases and dispersal bases throughout the UK. He would authenticate the message with a simple tri-graph and the E-Hour – E for EXECUTION. The message was repeated three times, but after the first repetition he

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would be talking to himself as the aircraft started engines, surged forward and turned on to the runway from their Operational Readiness Platforms.

Although the crews could be scrambled from fifteen minutes readiness it was more likely that their readiness state would be increased by stages. Cockpit readiness was called Readiness 05 or 5 minutes. Crews could remain in their aircraft for about 5 hours. Next state was Readiness 02 where crews on Operational Readiness Platforms next to the runway would start engines. Aircraft in dispersals on the other hand would start engines and taxy on to the runway. As fuel was being burnt this state could be held only for a matter of minutes, perhaps as little as 30–45 minutes.

Once airborne all crews would use the E-Hour rather than their airborne time to calculate their time on target. There was still the chance of recalling the aircraft but, like a gun, it would take precious time to re-cock. One recall was a positive one where the Bomber Controller would, in the case of a false alarm issue a Scramble Cancellation order. The other recall was failure of Positive Release. The aircraft had to receive positive clearance to proceed. If this was not received by 8° East they would automatically turn back even if nuclear bursts could be seen over the UK. Clearly there was a risk here that the command authority or its communications transmitters could be destroyed before giving the order.

To minimise this risk, the precise procedures were a closely guarded secret at the time. We have since learnt that the command tree was from the Prime Minister directly to the AOC-in-C of Bomber Command. In emergency the AOC-in-C could launch his force. Orders would be relayed through every available means. Typically these were the Bomber Command Forward Relay, which were the very high power VHF and UHF transmitters of Fighter Command. They were backed up by airborne relay and the High Frequency transmitters controlled by Signals Command. The last ditch method however was more unusual! The BBC Light Programme would broadcast a simple message:

This is a special announcement, Plan A is now in force, Nourishment.

This taped message would be played continually. Simple, effective, powerful, very long range and redolent of messages broadcast during the Second World War.

There were two plans. Plan A was the Single Integrated Operations Plan, and the targets were all technically counter-force targets. Plan B was the UK's independent deterrent. In this case the plan was simple retaliation and the targets were counter-value: Leningrad for Birmingham!

3. THE MISSION. After the scramble, from about 50 bases throughout the country Vulcans, Victors and Valiants, in twos and fours, would get airborne within 15 minutes. In practice, it was normal to get airborne from cockpit readiness in less than two minutes. About one hour after the scramble, aircraft would be converging on southern Norway. Flying up the North Sea they would hope to avoid any enemy bombers crossing their tracks below them and also to avoid East German early warning radars. Just off the Norwegian coast the main force would swing east. A few tracks would have struck further north into the Norwegian Sea to attack Russia's arctic bases. Although the enemy would expect an attack, Bomber Command strove to maximise tactical surprise. The low level approach to the targets had been adopted from 1964 because of the threat from the Russian surface to air missiles.

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4. THE WEAPONS. The force would employ three types of nuclear weapon. The Yellow Sun Mark 2 or Bomb Aircraft High Explosive 7,000 lb High Capacity equipped the free-fall Vulcans and Victors. The warhead was a small American physics package called Red Snow, which weighed about 1,200 lbs. The huge size of the YS2 was partly to reduce its speed in the air to increase aircraft safety but also to save time redesigning the bomb body used for the American physics package. Yellow Sun was 20 feet long and four feet in diameter. It weighed 6,250 lbs. The front was fibreglass and ringed with a GRAZE cable. This was a heavy, star-shaped metal rod, insulated and covered with a knitted steel sheath. Behind the cable were massive cable cutters. When the weapon hit the ground the cable cutters would cut the cable, short the system, and discharge the turbine-powered capacitors. The graze cable was the tertiary initiation system as the weapon had been designed as a high level, air-burst weapon. For low level delivery it still needed to be dropped from over 10,000 feet to give time for the turbine to charge the capacitors but the radar and barometric fuses were disabled. Published sources give the yield at about one Megaton.[1]

The Valiant could be armed with the British Blue Danube but most were assigned to SACEUR in the Tactical Bombing role armed with an American nuclear weapon the Mark 43 known as Big E and weighing about 2,000 lb. Although the Valiant was older and slower than the Vulcan and Victor, Big E was designed for release at low levels. This suggests that the Valiant might have had as good a survivability as the other aircraft. However the Valiant was withdrawn from service in 1965 because of metal fatigue in its main spars.

The final weapon type was the Blue Steel carried by the 16 Victor Mark 2 of the Wittering wing and the 24 Vulcan Mark 2 of the Scampton wing. The Blue Steel was a stand off missile equipped with an on-board inertial navigator that enabled it to be launched long before the aircraft reached the well defended target area. The Blue Steel carried the same Red Snow capsule as the Yellow Sun.

5. EN ROUTE. Well before the early warning line, which was at 240 miles from enemy territory and outside the range of the Tall King metric band radar, all aircraft would execute a rapid descent to low level. Air brakes out, power back, and a 10,000 feet per minute descent levelling out about 2,000 feet above ground level. It took about 30 miles. From Norway, the main force would descend to be at low level in the region of Linkoning in Sweden. At low level they would cross the Baltic using Gotland for cover eventually approaching Lithuania and Latvia. The main force would now be concentrated on two or three routes with perhaps 20 minutes between the first and last aircraft. An indication of the outbound routes is shown in Figure 1.

At low altitude the main Soviet threat radar was the BARLOCK used both for early warning and fighter control with a low level coverage of about 30 miles. The Soviets would have needed a huge number of radars to give near continuous radar coverage against the penetrating bombers. The best they could have hoped for was to pick up the penetrating bomber as it approached its target and pass on the track to fighter or SAM. The principal high level threat was from the SA2 Guideline with a range of 27 miles. But this weapon had a poor low level performance; it was

[1] http://www.keme.co.uk/~defcon/history.htm accessed 31 Jan 05.

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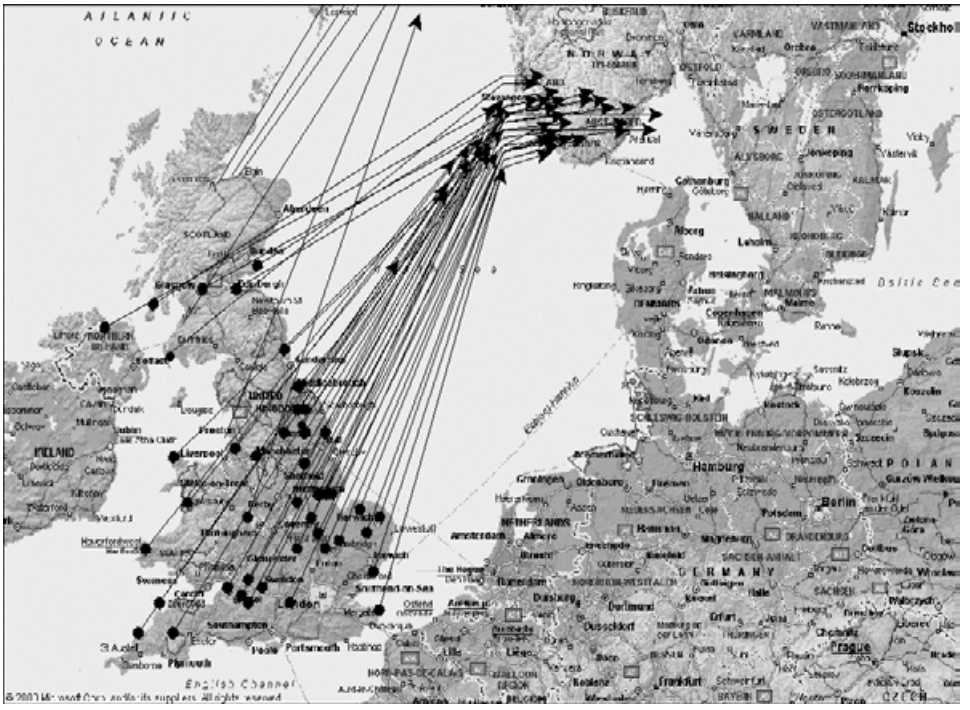


Figure 1. Bomber routes from dispersals with position at E-Hour +60. © Map base Microsoft

ineffective below 3,000 feet or within five and a half miles from the launcher. To plug this gap the Russians developed a low level missile, the SA 3 GOA. These were more capable and had a significant capability against a low level penetrator down to about 300 feet. It was hoped to defeat these by concentration of force and, hopefully, earlier strikes.

None of the aircraft, which had been designed for very high altitude penetration of Soviet airspace, had a good look out capability. The view from the Vulcan cockpit was probably the worst but this was even more limited when the anti-flash screens were in place. These screens were fitted to the side windows and the front windscreen. In daylight the non-flying pilot would have had one blind down and both pilots would be wearing an eye patch – this was to ensure that if exposed to a high intensity flash from a nuclear weapon detonation, the pilot would have only one eye exposed and would still have use of the other! Another blind would be drawn between front and rear cockpit and a blind below the pilots' seats would screen the visual bomber aimer's compartment. The visual bombing window would be covered with a white reflecting plate and the small windows in the rear cabin would also be drawn. The rear cabin blinds were always drawn when the radar was in use; the rear crew were used to working in perpetual gloom. As it was anticipated that the atmosphere would be severely contaminated, the aircraft would be flying with all cabin ventilation off and the crew breathing pure oxygen.

Because visibility at low level was so limited the crew would rely on the Navigation and Bombing System (NBS). This comprised two principal components, the British Thompson Houston H2S Mark 9 ground mapping radar and EMI Navigation and

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Bombing Computer. The two together were called the NBS and coded as Equipment 2. The Navigator Radar would operate the H2S in limited mode switching on for just a few seconds at each fix point. At the largest scale of a quarter million (1:250,000) on the nine-inch display the picture was just 36 miles across, or 18 miles from the screen centre. To enable the radar operator to look further out he was able to 'shift' the picture using a joystick, the Control Unit (CU) 626. This increased the distance out to which he could look to 45 miles on the quarter million, 90 on the half million and about 140 miles on the one million. However at low level the practical radar range was about 20 miles or 3–4 minutes flying time. Approaching each fix point, the radar operator would set the fix point position on the navigation panel using the CU626. This would slew the radar picture to the approximate position of the fix point. The operator would wait until the aircraft entered the 'fix box'; the time when the fix point was in view to the radar maybe no longer than one minute. As soon as the aircraft entered the fix box, the radar would be switched on, the fix point would be identified and small corrections to the range and bearing markers would be made using the CU626. Once the fix was taken the radar would be put to standby and the switch on the CU585 would be put to Normal. The position counters on the navigation panel reading would 'normalise' or return to the present position. On free-fall aircraft the Navigator Plotter could update the Ground Position Indicator Mk 6 (GPI6) manually or, as on the Blue Steel aircraft use the GPI6 electronics for a direct position update.

6. WEAPON DELIVERY. The target acquisition range could be increased by the use of offset aiming points. If a long range offset short of the target was used the bomb run could begin at about 40 miles from the target with a switch to the short range, or bombing offset later on. In addition to extending target acquisition range, the use of offsets also enabled precise aiming at a non-discrete target or one that was obscured by enemy jamming from the Brick or Tub series of jammers.

The principal attack profile for the Valiant was a radar laydown attack. This was called an Equipment 2 Foxtrot where the Foxtrot designated the type of delivery which would be a low altitude release in level flight. The aircraft would remain below SAM cover but would be vulnerable to air defence artillery. This profile was assessed to be the safest for the crew bettered only by the stand off attack offered by Blue Steel equipped aircraft which would fire their missile about 30 miles from their target if the missile was serviceable.

The Vulcan and Victor aircraft equipped with the Yellow Sun would do one of two forms of pull-up or pop-up attack, either the 2 Echo or 2 Hotel. The 2E was a pop-up to 11,000 feet and a push over; it was replaced in 1965 with the 2H, which was a pull-up and release in the climb. If a Blue Steel missile failed to operate correctly, the attack could be converted to a pull-up using the same profile as the Yellow Sun delivery.

The 2H attack was designed by the Bomber Command Research Branch. The research branch had observed a number of practice attacks using the 2E technique and assessed that the enemy SAM operators could detect, acquire and track the bomber and get an SA2 kill before bomb release. The 2H profile was designed to allow the V-bomber to drop the Yellow Sun 2 bomb from the lowest safe altitude whilst exposing the bomber to the enemy missile systems for the shortest time. The

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precise profile was calculated by the boffins for each of the five different types of bombers. The following profile was for the most powerful of the five, the Mark 2 Vulcan.

The attack would begin about 30 miles out when the Initial Point (IP) would be detectable on radar. At the IP the aircraft would settle at its attack speed of 350 knots aiming to get to the Pop-Up Point, 18,350 yards short of the target and 103 seconds before the desired time on target. At the POP the navigator plotter would call the pop and count down 5 seconds. The pilot would rotate the aircraft smoothly into a 15° climb and follow the navigator radar's steering instructions. Passing 10,500 feet and climbing at about 10,000 feet per minute, the radar operator and co-pilot would both press their bomb release buttons. This would be about 82 seconds after the pop and 2 miles from the target. It was estimated that the weapon would explode 9 seconds before the SA2 could hit the bomber! Immediately after bomb release the co-pilot would close the bomb doors, the captain would bank the aircraft and pulling 1·8 g turn through 140° before levelling the wings and continuing the climb. The aircraft was now presenting its minimum profile to the target and the resultant light, heat, and shock waves. Crews were told that the blast overpressure would not exceed 0·98 pounds per square inch. Aircraft were expected to receive structural damage with over pressures of one pound or more!

After the escape turn the aircraft would continue climbing and weaving to avoid surface to air missiles en route to the recovery airfield. Climbing and turning the Vulcan would get to about 48,000 feet before the turns had to be moderated and the aircraft climbed for height. It would take about 120 miles to reach 50,000 to 55,000 feet. Crews would expect to be at 56,000 feet overhead the recovery base.

We expected to survive but we did not plan to go home.

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