

THE ‘MOST DARING RAID’? THE ROYAL AIR FORCE, OPERATION BLACK BUCK AND THE FALKLANDS CONFLICT, 1982

By Dr David Jordan and
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Abstract: As part of the joint response to the Argentine invasion of the Falkland Islands on 2 April 1982, the RAF launched Operation Black Buck, a series of remarkable long-range bombing raids against Port Stanley airport. However, claims as to the significance of the raids have varied from denunciation of the attacks as a failure when judged against bombing accuracy to declarations that the sorties ‘changed the outcome of the war’. This article analyses what the raids were for and what they achieved, arguing that attacking Port Stanley airport was a key element of the joint planning for the recapture of the Falklands and that the Black Buck sorties merit consideration as being amongst the Falklands conflict’s ‘most daring raids’.

Disclaimer: The views expressed are those of the authors concerned, not necessarily the MOD.

'Argentine use of Port Stanley airfield and its surveillance radars constrains all our operations, enables redeployment and resupply of Argentine forces and maintains Argentine morale.'

Initial Plan for Operation SUTTON,
Presented to Chiefs of Staff,
2 April 1982.¹

INTRODUCTION

The Argentine invasion of the Falkland Islands on 2 April 1982 brought about one of the most remarkable contributions to any air campaign in the RAF's history, with the Black Buck series of air raids against Argentine positions at Port Stanley airport. The attacks required the use of the Avro Vulcan bomber a matter of weeks before the projected retirement of the type from RAF service. To reach the Falklands from the only viable airfield from which to launch the attacks required a complicated air-to-air refuelling plan which could only enable a single aircraft to attack the target. To add to the challenge, the Vulcan's air-to-air refuelling capability had fallen into disuse, requiring the rapid regeneration of the ability to receive fuel in flight. This was not the only difficulty, since the Black Buck missions saw the use of conventional bombs on three occasions and the AGM-45 Shrike anti-radar missile on two, despite the Vulcan force having stopped conventional weapons delivery training some years before, and never being trained in the Suppression of Enemy Air Defences (SEAD) role at all. The fact that the Vulcans, supported by a significant proportion of the RAF's Victor tanker force, managed to carry out five attacks on targets in the vicinity of Port Stanley airport was an impressive achievement by any standard.

Unfortunately, the historical record pertaining to the Black Buck sorties has been patchy at best. Analysis of the raids has been bedevilled by misunderstandings and a curious mixture of excessive condemnation and praise. The first attack – Black Buck One – has dominated the literature since 1982, with the four other sorties which reached the islands being largely ignored with the exception of Black Buck Six, which concluded with the forced landing of the Vulcan in Brazil after its refuelling probe broke. The actual strategic significance of the raids has been only hazily understood in many quarters, and Operation Black Buck remains something of an enigma beyond the understandable 'Boys Own' element in the coverage of an array of impressive feats of airmanship by both bomber and tanker crews. The concentration upon the tactical level means that the effect of the raids has tended to be regarded through the metric of how many bombs were dropped and how many hit their targets. It is an undeniable fact that of the 63 bombs dropped by the Vulcan, only one weapon cratered the runway. This has been taken as a sign of failure, or at best, a disappointing outcome – but by the same token, the bomb which struck the runway on the first Black Buck raid was the *only* weapon to crater the runway despite multiple attacks by Sea Harriers and later RAF Harrier GR3s. The Sea Harriers of 800 and 801 Naval Air Squadrons (NAS) and Harrier GR3s from

Number 1(Fighter) Squadron RAF operating from the Task Force's two aircraft carriers (HMS *Hermes* and *Invincible*) delivered more than twice as many weapons as the Vulcan against Stanley airport for little apparent discernible effect beyond scarring the runway surface and alarming the Argentine troops in the vicinity, but the main focus of historians has been upon the apparent tactical failure of the Vulcan sorties. It was not long before the government was responding to questions from MPs in a rather downbeat manner – as the Parliamentary Undersecretary of State for the Armed Forces observed in one exchange, 'it is true that the attacks [against the airfield] were not as successful as one would have wished, all the bombs dropped in its immediate vicinity and caused immense disruption and casualties to the Argentines.'² The suggestion that Operation Black Buck was disappointing in its outcomes as a result of only a single bomb hitting the runway has generated some pointed remarks from a number of sources (often driven by service rivalry), but it is the contention of this article that such an approach to Black Buck is overly simplistic and adds more heat than light to the analysis of what the raids were for and what they in fact achieved.

This article seeks to offer a more nuanced appreciation of the role of the Vulcan during Operation Corporate, and to dispel some of what John Terraine would term the 'myths and anti-myths' about Black Buck. It demonstrates that rather than being nothing more than a pathetic attempt by the RAF to 'get in on the act', attacking Port Stanley airport was a central part of the joint planning for the recapture of the Falklands, and that the tactical outcomes of the raids need to be placed in the broader context of British planning and operational warfighting for Black Buck to be properly understood.³

WHY PORT STANLEY AIRPORT, AND WHY THE VULCAN?

Intelligence reports received in London on 31 March 1982 suggested that the Argentines were almost certain to invade the Falklands within the next 48 hours. To Prime Minister Margaret Thatcher's dismay, the consensus amongst her key advisers appeared to be that retaking the islands was an impossibility. This view was not shared by the First Sea Lord, Admiral Sir Henry Leach. Leach attempted to seek out the Secretary of State for Defence, John Nott, to offer his views, and on learning that Nott was in conference with the Prime Minister sought out the meeting and intervened. Mrs Thatcher was already uncomfortable with the suggestion that the Falklands could not be reoccupied, and Admiral Leach's advice that a Task Force could – and should – be assembled was met with Thatcher's approval and gratitude.⁴ What Thatcher described as 'feverish military preparations' began on 1 April, and it is significant to note that one of the first issues to be addressed by planning staffs was that of the possibility of air attack against Argentine targets. The initial assessment was pessimistic:

Air attacks on Argentine cities or ships in Argentinean waters would have to be launched from Ascension Island. Without air tanker support, because of the

distance involved in the approach, the aircraft would have to land on the South American continent, possibly Montevideo or Santiago. Thus, in the likely event of denial of use of airfields in South America, air attacks on Argentine targets are not feasible. Bombing or torpedo attacks could however be carried out on Argentine shipping in the South Atlantic within return range of Ascension.⁵

Even without the practical difficulties of carrying out bombing raids, attacking the mainland was not a particularly attractive option politically because of the risk of it appearing an excessive escalation. Nevertheless, press speculation that the RAF's Vulcan force might be used to attack Argentina was not actively discouraged by the newly-formed War Cabinet as it was appreciated that this would add a planning consideration for the Argentines to worry about. As discussions continued, consideration of the possible air effort against the Task Force was discussed. An analysis of the airfields available on the Falklands quickly concluded that only Port Stanley airport was capable of sustaining major operations, particularly in being able to 'take a large number of C-130 sorties' as well as receiving flights made by the lighter Fokker F-27 and F-28 transports in the Argentine inventory. It was estimated that at least a dozen flights bringing in some 200 tons of supplies per day for the Argentine garrison was possible.⁶ The prospect of using the airfield for combat operations was less clear.

Port Stanley airport was small, approximately a quarter of the size of a typical RAF runway and with limited parking. As a result, it was initially assessed as being unable to host Argentinean combat aircraft such as the Dassault Mirage III, Douglas A-4 Skyhawk, IAI Dagger and Dassault Super Etendard which might attack the British Task Force as it approached the islands. This assumed, however, that the Argentines did not undertake any attempts to extend the runway and the parking aprons, and the Chiefs of Staff had to assume that this would at least be given serious consideration. It was estimated that with some forward planning and work by Argentine engineers, it would be entirely possible to forward-base at least four combat aircraft at Stanley, giving some fighter defence capability to the islands. The only limiting factor was that of sortie rate, likely to be adversely affected by the availability of fuel for the aircraft.⁷ The airport could support the Argentines' Aermacchi MB-339, the Beech T-34 Mentor and the FMA Pucara, all of which could be used in the light attack role, and although these represented less of a threat to British naval units, they were still a concern, especially for the amphibious phase. A further factor regarding the airport then came into play when Defence Secretary John Nott raised concerns that it would provide the Argentines with a considerable propaganda coup were they to reveal that work had been undertaken to allow fast jet operations from Stanley.⁸ This concern was heightened by a worrying intelligence report:

There was positive intelligence that the Argentines intended to extend the Port Stanley airfield runway to 2,000m; work had probably started,

but the delayed arrival of heavy plant meant that concreting would not have been completed.⁹

It was clear that the runway at Port Stanley might present a considerable threat to British operations once the Task Force had arrived in the vicinity of the Falklands. Given that one of the key directives to be issued to the Commander-in-Chief-Fleet (Admiral Sir John Fieldhouse) for implementation by the Task Force Commander, Admiral John 'Sandy' Woodward, was to maintain control of the sea and air to enable the effective imposition of a Total Exclusion Zone around the islands, the airfield was becoming an increasing concern less than a week after the invasion.¹⁰ Attacking the airfield would support the need for sea control and control of the air; two prerequisites needed prior to an amphibious assault by British forces. Moreover, attacking the airfield would also compromise the Argentinean land force. Shutting the runway entirely would deny aerial resupply, while damaging it might create conditions in which the amount of materiel brought in by the Argentine air transport fleet was reduced. In such circumstances, the Argentine garrison would begin to suffer shortages, particularly if naval efforts reduced the amount of supplies brought in by ship. The question of how best to attack the airport was swiftly raised, and after consideration of Special Forces raids, the use of Naval Gunfire Support and air attack, the latter option was deemed the most likely to achieve the best effect.¹¹ The choice of platform to deliver the air attack was relatively straight-forward, being between the Sea Harriers aboard the Task Force's carriers, or the only available long-range attack aircraft, the ageing Avro Vulcan.

At the start of the Falklands Conflict, the Vulcan was in its last few months of military service. The Operational Conversion Unit, responsible for training Vulcan aircrew, had closed in August 1981 and three of the operational squadrons had retired since the beginning of the year.¹² The three remaining squadrons at RAF Waddington were due to disband in short order, with the last squadron disbandment planned for 30 June 1982.¹³ The fact that the Vulcan force was winding down did not dissuade the Chiefs of Staff and senior Royal Navy officers from considering that the Vulcan might fulfil a valuable role in the conflict, particularly when the importance of disrupting Argentine operations out of Port Stanley was fully appreciated.

Despite its age, dating back to requirement B35/46 from 1947, the Vulcan offered a number of capabilities not replicated by any other aircraft in the RAF inventory in 1982.¹⁴ For the vast majority of its career, the Vulcan's role was to deliver nuclear weapons. Its initial task was as part of the independent nuclear deterrent capability provided by the V-Force made up of Vulcan, Handley Page Victor and Vickers Valiant squadrons. In order to meet this task, a pre-determined number of Vulcan crews and their nuclear-armed aircraft were kept on a permanent very high readiness footing. The Vulcan B1 was soon joined in the front line by the more potent B2 variant initially armed with either Yellow Sun or Red Beard free-fall nuclear weapons.¹⁵ It was recognised from

an early stage, however, that greater stand-off capability was required to increase survivability against dense and sophisticated Soviet air defences. The Avro Blue Steel air-launched missile was therefore brought into service in early 1963 (although some were cleared for emergency use during the Cuban Missile crisis), but the weapon proved to be a disappointment to the Air Staff. The shooting down of Francis Gary Powers' U-2 in 1960 presaged a move to low-level attack, and this significantly reduced the range of Blue Steel. This was not regarded as a major setback to begin with, since it was planned to use the Vulcan to carry a pair of GAM-87 Skybolt ballistic missiles, one beneath each wing, giving the ability to launch weapons against the USSR outside the engagement envelope of Soviet air defence systems.¹⁶

The cancellation of Skybolt in 1962 caused consternation amongst the British government. The Kennedy administration had not understood the importance of Skybolt to British strategic planning, and in the aftermath of the cancellation, Prime Minister Harold Macmillan and President Kennedy met at Nassau and agreed that the United States would provide an alternative – but this was in the form of the submarine-launched Polaris ballistic missile system, which would render the airborne deterrence force redundant upon its service entry. Thus the Blue Steel-armed Vulcan's front line tenure was short-lived as the medium bomber force handed over the strategic deterrent role to the Royal Navy at midnight on 30 June 1969.¹⁷

While the drawdown of the V-Force in the aftermath of the Nassau agreement meant that the Victor bomber squadrons could be re-roled as air refuelling tankers (following the grounding of the Vickers Valiant, which had taken on the task as the number of Valiant squadrons employed in the bomber role reduced), the Vulcan's utility remained long after the strategic deterrent role had gone. The RAF's search for a long-range strike aircraft proved particularly painful. Cancellation of the TSR2 in April 1965 was mitigated by the decision to order 50 General Dynamics F-111s which would be joined in service by the result of an Anglo-French project, the AFVG (Anglo-French Variable Geometry). Unfortunately for the RAF, the financial crisis of the mid-1960s saw the F-111 order cancelled, while French interest in AFVG proved lukewarm, leading to cancellation. The RAF was forced to make use of the Blackburn Buccaneer, an aircraft which it had resisted buying for some years, partly because it lacked the assumed range of the TSR2, F-111 and AFVG. The Buccaneer turned out to be an effective servant for the RAF, but did not quite provide the long-range strike platform the Service desired. This gave the Vulcan a new lease of life.

With minor airframe modifications, a new weapon, minimal investment and change from high to low altitude operations, the Vulcan, in conjunction with the Buccaneers, could provide a cost-effective solution to the capability gap which would exist until the multi-national MRCA programme, which led to the Panavia Tornado, came to fruition in the 1970s. Consequently, until the Vulcan retired, it was envisaged that it would be a

low-level tactical nuclear bomber using the WE177C free-fall nuclear weapon. With the defence cuts of the 1960s removing Britain's so-called 'East of Suez' commitment, there was no requirement for the Vulcan to remain capable of mid-air refuelling nor, from 1976, the need to continue to train for the secondary conventional bombing role.¹⁸ Thus, in 1982, after nearly a quarter of a century dedicated to the nuclear attack role against a known Warsaw Pact threat, the Vulcan force was to be tasked to prepare for a long-range conventional attack against Argentinean-held territory. While this might make the choice of the Vulcan appear strange, when other factors are considered, the Vulcan in fact offered the only real option to deliver the effects that the Chiefs of Staff desired from an early air attack against Port Stanley airport.

As noted above, the only practical alternative to using the Vulcan was the employment of Sea Harriers from the two aircraft carriers, with the possibility of adding RAF Harriers to the attack once they had deployed to join the Task Force. This, in fact, was what initially transpired, with the joint effects of Vulcan raids and Sea Harrier/Harrier operations becoming a rather overlooked part of the air war. In mid-to late April 1982, the idea of Sea Harrier and Harrier attacks in addition to raids by Vulcans was not uppermost in the minds of senior naval officers. Their main concern was the thought of expending Sea Harriers on attacks against the airport. As shown below, this led to the interesting situation where the Chief of the Air Staff, concerned about the potential inaccuracy of an attack by a Vulcan and the risk of stray bombs causing civilian casualties, advocated the use of Sea Harriers to attack the airfield, while the Chief of the Naval Staff, supported by his colleagues, argued in favour of the Vulcan.

This led to the ironic situation that many members of the Royal Navy, unaware of the debate in London, saw Operation Black Buck as a wasteful effort to achieve doubtful results driven by a Chief of the Air Staff anxious to see his forces participate for reasons of Service politics, rather than driven by a Naval staff eager to take the opportunity to preserve their small and outnumbered Sea Harrier force for the vital defensive counter air role.¹⁹ This misperception continues, not least because after being persuaded that the Vulcan option was preferable by his naval colleagues, Sir Michael Beetham became an enthusiastic advocate for ensuring that Black Buck was properly supported.²⁰ As Beetham's biographer notes, his view was that the attack on Stanley airport was not an issue of Vulcan *versus* Sea Harrier, but a matter of ensuring that the full range of available air capabilities was used to support the recapture of the Falkland Islands.²¹ This nuance is frequently overlooked, and the narrative of an air force eager to get involved for the sake of it remains a depressingly simplistic feature of many accounts.

Beetham's argument that the Sea Harrier was a more accurate attack platform had a strong theoretical basis. David Castle, a Vulcan navigator who participated in two *Black Buck* missions, noted that the Circular Error Probable (CEP) of a Vulcan medium level radar attack was 1,900 feet, some 700 feet greater than the CEP for the Sea Harrier

stated by an RAF exchange officer flying the latter aircraft.²² Archival evidence also suggests that the Vulcan had a significantly poorer circular error of probability during low-level attacks than the Sea Harrier. During the Vulcan work-up training, a 750 foot circular error of probability was considered to be 'a reasonable estimate of delivery accuracy based on the trial results from Jurby and Garvie Island [bombing ranges] for low-level delivery.'²³ Yet, once again, the risk of attrition to the Sea Harrier force meant that the theoretically greater levels of accuracy which might be obtained by this type were considered less important than protecting critical assets. The difference between hitting the runway and actually closing it was not always appreciated in thinking about the raid, either before or since. The last experience that the RAF had of attempting to close a runway was during the 1956 Suez crisis, using Vickers Valiant bombers. The results had been disappointing, for although some bombs landed on the runways, Egyptian airfields were not closed altogether. Part of Beetham's considerations, even if not spelt out directly in the archives, lay in the fact that to shut the airfield and to keep it shut required continuous attacks. The Vulcans, operating from Ascension Island and consuming most of the available air-to-air refuelling effort in the process of reaching the islands, simply could not deliver the necessary sortie rate. Once in range of the islands, the Sea Harriers and later Harrier GR3s aboard the two aircraft carriers could keep up regular attacks with the aim of attempting to shut the runway completely. Thus using the Vulcan and the Harrier force in conjunction was a sensible means of at least disrupting Argentine use of the airfield, with the prospect of closing it to Argentine aircraft not being completely excluded.

Concern about the threat posed by Argentine air defences was well-founded. An eclectic and extensive array of Argentinean ground-based air defences had been assembled around Stanley airport. *Grupo de Artillería de Defensa Aérea 601* was the main anti-aircraft artillery unit, operating a single Roland 2 surface-to-air missile fire unit, a dozen Oerlikon twin 35mm anti-aircraft guns, three Oerlikon twin 20mm anti-aircraft guns and Tigercat surface-to-air missile launchers.²⁴ Although the majority of the fire units were used to protect Stanley, one 35mm anti-aircraft gun was deployed to protect Goose Green, where it proved a formidable – if ultimately unsuccessful – part of the Argentine defences, operating in the direct fire role against 2nd Battalion, the Parachute Regiment's troops.²⁵ A second, smaller army unit was also present at the airport and its environs, in the form of *Grupo de Artillería de Defensa Aérea 101* with eight Hispano HS-831 30mm cannons. They were supported by *Grupo 1 de Artillería Antiaérea* from the *Fuerza Aerea Argentina* which had nine Rheinmetall twin 20mm anti-aircraft guns and four Oerlikon twin 35mm anti-aircraft guns at its disposal.²⁶ Both services employed effective guidance systems; the army using the Skyguard fire control radar, and the *Fuerza Aerea Argentina* the Superfledermaus fire control radar to cue their guns.²⁷ As with *Grupo de Artillería de Defensa Aérea 601*, the focus of the *Fuerza Aerea Argentina* unit's efforts was the protection of Stanley, but six of the 20mm anti-aircraft guns were deployed to Goose Green.²⁸ No 1 Marine Air Defence Battalion provided the

naval contribution to the protection of Argentine key positions. The unit operated three Tigercat launchers and 12 Hispano HS-831 30mm cannons in and around Stanley.

The most modern and effective weapon system operated by the Argentineans was the Franco-German Roland 2 surface-to-air missile system. After initial British confusion regarding whether or not the Roland 2 system had been deployed to the Falkland Islands, a second and more fundamental question was raised – what was the engagement envelope of the system?²⁹ The Roland 2 was almost unknown to British operators, who found it, ‘difficult to obtain a definitive assessment of the engagement envelope of this missile.’³⁰ Indeed, the archives suggest that there was still considerable confusion over Roland’s envelope on the day after Black Buck One.³¹ The end result was a dangerous under-estimate of the Roland 2’s capability, which would lead to the loss of a Sea Harrier later in the campaign.³² Admiral Leach’s concern that the threat to attacking aircraft justified the use of the Vulcan rather than a formation of Sea Harriers (seven aircraft would have been required to deliver the same number of 1,000lb bombs as the Vulcan) was not unduly cautious. This highlighted the dilemma facing the Chiefs of Staff. Using the Vulcan could not guarantee to close the runway; indeed, experience suggested that while it might do so temporarily, re-attack would be needed. Yet to use Sea Harriers from the outset would dramatically increase the risk of attrition amongst the aircraft needed to protect the fleet from Argentine air attack.

The Chiefs of Staff also had to consider the views of the commander of TF317.8. Admiral Woodward was keen to see an attack launched against the airport even before the Task Force had come within range of the islands. On 11 April, he had requested plans for how to use his aircraft against targets on the islands and became an advocate for an early attack.³³

By 20 April 1982, planning for a landing on the Falklands (Operation Sutton) was well advanced. At the Chiefs of Staff meeting that morning, Sir Henry Leach reflected on the draft plan which had been submitted. He noted the importance of the airfield to the Argentine defences:

It would be vital to deny Port Stanley airfield to the Argentines as soon as possible, and certainly before the Carrier Battle Group arrived; only the Vulcans could do this, and in any case, the Sea Harriers should be conserved to support the landing.³⁴

ACM Beetham was still not entirely content, informing the meeting that he was of the view that the Sea Harriers would be most effective at putting the airfield out of action, and that while he was not denying that the Vulcans could also be successful, he remained concerned that an attack by a Vulcan would increase the risk of civilian casualties.³⁵ CAS was confident that the Vulcan could attack the airfield and other

targets on the islands, and of the potential effect of forcing some of the Argentine fighter force to be ready to defend the mainland against a possible attack, but there was still doubt in his mind as to the efficacy of the Vulcan vice Sea Harrier against the runway. Nevertheless, the Chiefs were unanimous in their view that it would 'be essential to neutralise the airfield and keep it neutralised', and this could only be achieved through air attack, although naval gunfire support would have a useful disruptive effect.³⁶ Quite what the Chiefs of Staff meant by neutralised – complete denial of the airfield or continuous, harassing attacks which would limit its ability to operate to full capacity, particularly if the runway were damaged – is not clear. References to 'denying' the use of the airfield either completely or just to fast jets, or rendering it 'inoperable' can also be located in the archives.³⁷ Whatever the exact intention, the importance of ensuring that the Argentines could not make unhindered use of Port Stanley airport was fully recognised. Beetham noted:

...if we were going to bomb the airfield with one thousand-pounders and put it out of action, I would have liked to have sent an absolute minimum of 25 and preferably 50, but it just wasn't a practical proposition.³⁸

Beetham's pessimism can be overstated. On 19 April, in a memorandum to John Nott, he outlined the benefits which might accrue from using the Vulcan:

With AAR support from Ascension [Vulcans] could be used to attack the airfield or other military targets on the Falklands. We could let it be known that we had a force of Vulcans on Ascension with the range to carry out attacks as far as the Argentine mainland posing a threat to their airfields and naval units in port. The Vulcans also have a MRR capability, and could give useful support to CTF. The Argentines would be aware of all these possibilities from published data on the Vulcan. Positioning some Vulcans at Ascension could also force the Argentines to maintain or deploy some of their fighters to the northern part of Argentina where they could not pose a threat to our TF in the area of the Falklands.³⁹

By 23 April, the die was cast: the Chiefs of Staff had agreed that it was essential to attack Stanley airport within a week to ten days to support the Task Force's efforts to create a Total Exclusion Zone by denying the airfield to fast jets (in fact, the Argentines had not given the extension of the runway proper thought, but this was unknown in London), and it would be attacked by Vulcans. Reports sent to Beetham between his slightly downbeat assessment on 20 April and the Chiefs of Staff meeting on 23rd had given him considerable encouragement, and he was described as 'an extremely hawkish proponent of the idea' of launching an early attack on the islands to support the Task Force. The Chiefs noted that the deployment of two Vulcans to Ascension Island could occur as early as 25 April if authorisation to deploy was granted on the 24th. A note to

John Nott sent on behalf of Admiral of the Fleet Sir Terence Lewin, the Chief of Defence Staff, informed him that a single Vulcan stood a 90% chance of causing one crater on the runway, with a 75% chance of a second bomb causing similar damage. An analysis of the proposed attack suggested that neither Port Stanley itself nor the outskirts of the town would be in the predicted impact area.⁴⁰ Although the Secretary of State for Defence was not being invited to authorise the attacks, he was asked to note that if an attack was conducted after 28/29 April, the air-to-air refuelling requirements for the raid would impinge upon the availability of tankers to support other operations, including the despatch of more Harriers from the United Kingdom to Ascension island.⁴¹

At this point, diplomatic considerations intruded. The airfield at Ascension Island was under American operational control, although there was no doubt that Britain had every right to use it to support the Falklands campaign. The problem lay in the fact that the US Secretary of State, General Alexander Haig, was attempting 'shuttle diplomacy' to prevent a war between two important allies of the United States. It was thought that launching a raid on the Falklands from Ascension while he was attempting to do this would be highly unhelpful to his cause, thus there was a delay in granting approval. On 27 April, Woodward lamented that any raid by the Vulcan would be 'too little, too late', and considered making use of his Sea Harriers if a raid were not authorised.⁴² With Haig's efforts at an end and the British government convinced that they would not bring about a satisfactory resolution, authorisation for the attack was granted. The first Black Buck sortie was launched on 1 May, coinciding with the arrival of the Task Force within range of the islands. The combined effect of the Vulcan raid and air combat between Sea Harriers and Argentine Mirage IIIs (the success of the Sea Harriers denting Argentine morale) marked the point at which a short, bitter conflict truly began.

BLACK BUCK

To meet the requirement for Vulcan attacks against the airfield at Stanley, a small cadre of crews from across the three remaining Vulcan squadrons was selected to undergo specific training in order to prepare for potential South Atlantic missions. The requirement for Vulcan air-to-air refuelling missions had lapsed in the post-Polaris era and with the ending of routine deployments 'East of Suez'. The crews had very limited experience in air-to-air refuelling and the aircraft required modification to refresh the lapsed capability.⁴⁴ Consequently, day and night tanking missions were conducted with the RAF Marham-based Victors from mid-April 1982, supported by experienced Victor Air-to-Air Refuelling Instructors flying on board the Vulcans.⁴⁵ Likewise, newly acquired conventional attack techniques were practised in a similar timeframe.⁴⁶

In addition to regenerating its air-to-air refuelling capability, other aircraft required attention. The long over-sea transit meant that the traditional method of radar navigation using ground features was not a viable option. Similarly, astro navigation was deemed to be too inaccurate to deliver the level of precision that navigation for the

mission required. However, Carousel navigation systems scavenged from former British Airways Vickers VC10s, held in storage at RAF Abingdon, provided the required solution.⁴⁷ Another equipment area that required immediate attention was the on-board jamming systems. Although the system was effective against legacy Soviet equipment, it was ineffective against emerging Soviet threats and the more modern Western systems such as those used by the Argentines. The solution was to borrow a more modern AN/ALQ-101D jamming pod, as used by the Buccaneer force, and then to integrate it onto the aircraft via the defunct Skybolt external hard points.⁴⁸

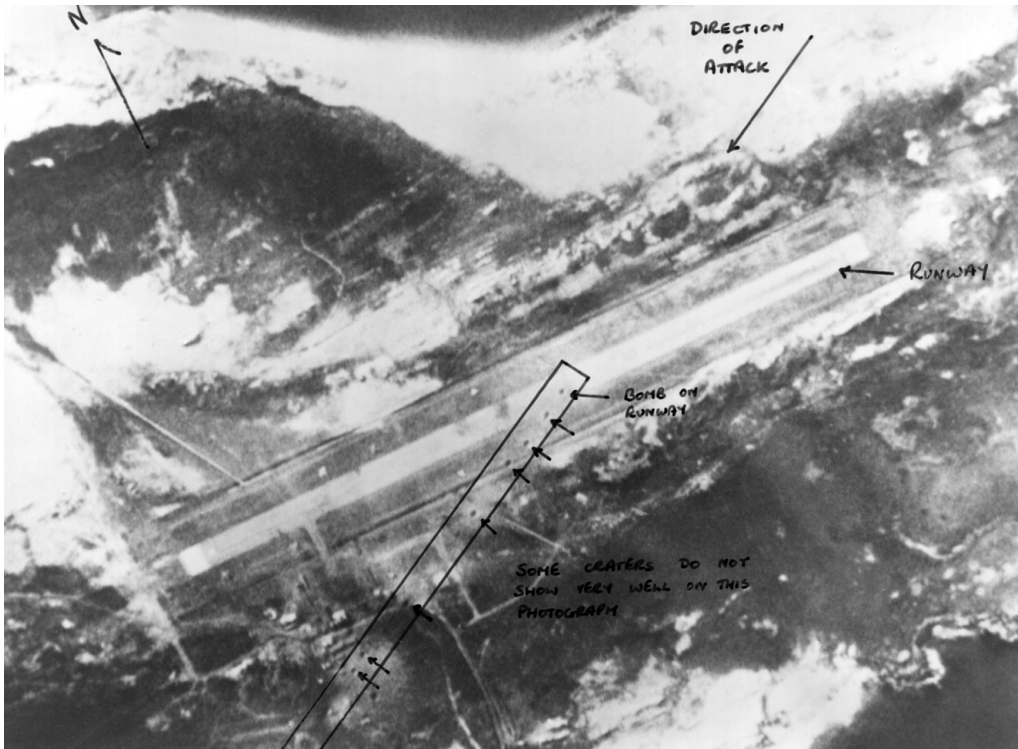
After an intensive training and engineering period, two Vulcans departed RAF Waddington and arrived at Wideawake Airfield on Ascension Island at 1800 on the evening of 29 April.⁴⁹ Aircraft parking space at the airfield was at a premium throughout the campaign.⁵⁰ Therefore, the number and type of aircraft held at Ascension Island had to be carefully orchestrated in order that the priority missions could always be delivered on time. As a result, the large Vulcans were not permanent residents at Ascension Island throughout Operation CORPORATE.⁵¹ When not in use, the aircraft would be flown north in order that Wideawake could be exploited by higher priority tasks such as Nimrod maritime radar reconnaissance missions and Hercules air drops, both of which required extensive use of the limited number of Victor air-to-air refuelling aircraft.⁵² Consequently, the Vulcan's participation was limited by two factors: available ramp space at Ascension and access to the required number



Vulcan B2, XM607, captained by Flight Lieutenant Martin Withers, crosses the threshold at Wideawake airfield on Ascension Island after successfully completing the Black Buck One mission.

of Victor air-to-air refuelling aircraft, which were heavily tasked supporting other aircraft and being used in a secondary radar reconnaissance role to supplement the efforts of the Nimrod force.

The full details of Black Buck One have been explored in considerable depth ever since the raid took place, and it is not necessary to offer a detailed narrative of events here.⁵³ The original plan to attack at low level was modified after consideration of the threat presented by Argentine GBAD, and after a low-level approach, the Vulcan climbed to 10,000 feet to release its weapons. A single 1,000lb bomb struck the runway, and caused a large crater. The Argentines filled the crater to allow the airfield to be used by transport aircraft, but the infill was of poor quality, and ensured that the runway's load-bearing capacity was reduced still further.⁵⁴ Two days later, a second sortie was launched, but with a slightly modified attack profile, with weapons release at 16,000 feet to avoid the threat from the Roland system. Frustratingly, the line of the stick of bombs was a few yards adrift of the runway, and while damage was caused to airfield facilities, the main aim of the raid of putting at least one more crater in the runway



This image taken by a Sea Harrier of the Fleet Air Arm on 1 May 1982 provided the first confirmation that the Black Buck One mission had successfully hit the runway at Stanley on the Falkland Islands. The craters left by the stick of twenty-one 1,000lb bombs can be seen running up from the bottom of the image.

was unfulfilled.⁵⁵ Frustration was further increased when Black Buck Three (13 May) and Black Buck Four (28 May) had to be cancelled as the result of excessively strong headwinds and a failure of a refuelling drogue on one of the Victor tankers respectively. Black Buck Four was notable for the fact that it was not aimed against the runway which was now being assailed by Sea Harriers and Harriers from the Task Force – but against the air defences around the airport.

DEFENCE SUPPRESSION

The threat posed by the Argentine radar systems had been a concern throughout the campaign, and by the middle of May, it was considered desirable for some attempt to deal with the airfield's defences to be made. This was not a straightforward proposition. In order to negate the Argentine surveillance radar systems, in particular the Westinghouse AN/TPS-43 radar that provided long-range detection and early warning of British air activity, the British required an effective suppression of enemy air defences capability.

Neither the Sea Harrier nor Harrier were cleared to use the one Anti-Radiation Missile (ARM) in the British inventory, the Martel. This was carried only by the Blackburn Buccaneer, and for primary use in suppressing the air defence systems of Soviet ships rather than land-based radar equipment. Integrating an ARM on the Sea Harrier or Harrier was not a priority given the clearance of other weapons and systems for both types. The Vulcan was deemed to be the most likely launch platform for the new mission. However, the weapon choice was more problematic. Consideration was given to equipping both the Vulcan (and, less obviously, the Victor) with Martel, and trials fits were carried out on both aircraft. In the case of the Vulcan, the missiles were fitted on improvised pylons mounted on the redundant hardpoints, Skybolt, and which had been used for the carriage of the hastily integrated electronic countermeasures pod on the first two Black Bucks.

Trials conducted in early May with the Martel proved to be unsuccessful.⁵⁶ Several concerns arose about Martel's suitability for use on the Vulcan, including the likely effect on weapon reliability after a 'cold soak' at altitude, and the realisation that there was no means of safely jettisoning the weapon in an emergency; in such circumstances, the only solution was to launch the Martel, which was considered highly undesirable, particularly if the need to clear the weapon from the aircraft arose overland and within range of a functioning radar site. A request was therefore made to the United States to access and use AGM-45A Shrike anti-radiation missiles. As each AGM-45A Shrike had a specific seeker that was capable of searching a defined band of the radar spectrum, there were a number of missile variants to choose from. The 'Dash 10' variant looked at the part of the spectrum where AN/TPS-43 early warning radar resided. In contrast, the 'Dash 9' variant of the AGM-45A Shrike specifically searched for the Skyguard and Superfledermaus radars that supported the anti-aircraft artillery.⁵⁷

As a result, the Vulcan had to carry a mix of 'Dash 9' and 'Dash 10' AGM-45A Shrikes in order that the full spectrum of Argentinean radars could be attacked.

The supply of missiles as well as aircrew and engineer training was supported by the visit to RAF Waddington of AGM-45A Shrike-equipped United States Air Force F-4G Phantoms from Spangdahlem Air Force Base in West Germany over the period 19-23 May.⁵⁸ Additionally, technicians from Naval Air Station China Lake, Nevada, assisted the endeavour.⁵⁹ The Vulcans were rapidly modified to carry a pair of AGM-45A Shrikes under each wing on the Skybolt wing pylons. However, due to the lack of time, aircrew training was minimal. David Castle suggests that his crew's training was limited to testing the missile seeker against the air traffic control radar at RAF St Mawgan in Cornwall as they flew from RAF Waddington to Ascension Island on 26 May.⁶⁰ Nevertheless, a second Vulcan crew were more fortunate as 'the Shrike ARM [anti-radiation missile] was test fired on 27 May after a rapid feasibility study, and deployed to Ascension Island on the same day.'⁶¹ The first attempt to attack the radars around the airfield on 28 May had to be aborted, and it was not until 31 May and Black Buck Five that the Vulcan's SEAD capability was tested. Two Shrikes were launched against the AN/TPS43 radar, but the Argentine operators switched off their radar while the Shrikes were in flight. The Shrike was a first generation ARM, and loss of radar signal meant that it was unlikely to hit its target; while the second missile failed to have any effect, the first of the two weapons landed some 10 yards away from the target and inflicted some minor damage to the system. This was not enough to prevent repairs being effected and the radar returning to use; it did have a salutary effect upon the Argentine radar crews who now had another challenge to deal with. On 3 June, Black Buck Six, again tasked in the SEAD role, attempted to locate the AN/TPS 43 system and spent a frustrating period attempting to detect signals; the operators, upon detecting the approach of the Vulcan, had wisely turned their radar off. Signals were then detected from a Skyguard radar, and two missiles were launched. The radar was hit and four of the operators killed. Despite this success, the mission is best remembered for the Vulcan being required to make an emergency landing at Rio de Janeiro in Brazil after its refuelling probe was damaged, making the transfer of fuel impossible. Further concern was caused as a result of one Shrike failing to jettison, leading to the missile being gingerly removed by members of the Brazilian Air Force and the aircraft's crew, making use of the appropriate parts of the weapons manual which had been faxed to the British defence staff at the embassy. After some diplomatic negotiation – and protests from Argentina that the aircraft and crew had not been interned – the Vulcan was released and flew back to the United Kingdom.

The final sortie was also marked by disappointment. Black Buck Seven was directed against Argentine troop concentrations around the airfield, rather than the runway. The mission, launched on 12 June 1982 was carried out when it was clear that the war would soon be over, and as the airport would be required for use by the British

forces, there was no wish to damage it further. Thus Black Buck Seven was meant to deliver airburst weapons. Here, the lack of regular training in the delivery of conventional weapons became an issue, and an error was made in fusing the weapons. They exploded on impact, creating the impression that another attempt at cratering the runway had failed to achieve its objective. The post-mortem on the attack, instigated by the Air Commander for the Falklands, Air-Vice Marshal Sir John Curtiss, concluded that the sortie had been planned in great haste, and that the confusion caused as a result had been the primary factor in the error over fusing.⁶² Two days later, the Argentine garrison on the Falklands surrendered, ending the Vulcan's brief combat career.

ATTACKS BEYOND THE FALKLAND ISLANDS?

Before assessing the effects of Operation Black Buck, it is worth considering another often overlooked part of the Vulcan's role in the Falklands conflict. There is a common perception that Vulcan attacks against the Argentine mainland were initially considered but quickly discarded in order to keep the conflict limited in nature and maintain international support for the British cause. There is significant merit in this view, and a number of contributions in the House of Commons by the MPs Tony Benn and Tam Dalyell illustrated the level of concern that existed in some quarters as to the possible effects of attacking Argentina itself, even if Benn's views tended towards the more doom-laden and extreme.⁶³ This concern was shared by the government, but even as late as 25 May 1982, four days after the British amphibious assault at San Carlos, the possibility of an attack being ordered against the mainland had not been rejected.

As a result, RAF Strike Command through No. 1 Group (which 'owned' the Vulcan force) was considering Vulcan attacks on the mainland, in particular the southern Argentine airfields that contained enemy ground attack and anti-ship aircraft. The evidence is patchy, but it appears that a surge in Argentine combat air efforts against the British landings, coupled with clearance on 21 May for the Vulcan to be fitted with a weapons load of three Paveway 1,000lb laser-guided bombs (LGB), gave rise to interest in exploiting the Vulcan's potential if required.⁶⁴ Consequently, the Vice-Chief of the Air Staff, Air Marshal Sir David Craig,⁶⁵ requested a paper updating the staff appreciation of using Vulcans against Argentine mainland airfields. The resulting report suggested that, 'attacks by Vulcan aircraft on the airfields at San Julian, Rio Gallegos and Rio Grande are feasible, and that attacking aircraft could recover to Ascension if a reduced 1,000lb bomb load or three laser-guided bombs were carried.'⁶⁶

Although the appreciation was clear that the standard Vulcan payload of twenty-one 1,000lb bombs would cause the maximum damage and would thus be preferable to the three laser-guided bombs, there was a major limitation. A Vulcan carrying a full load of bombs would require 20 tankers to support the mission, significantly more than the assumed 13 Victor air-to-air refuelling aircraft that would be available and

serviceable at Ascension Island. However, by reducing the bomb load to seven 1,000lb bombs or three laser-guided bombs, then a more viable 11 tankers would be required.⁶⁷

The presence of GBAD systems in the vicinity of the Argentine airfields, meant that bomb runs below 8,000 feet would be inadvisable.⁶⁸ Beyond the ground defences, there was also concern regarding the capability of Argentinean fighters. An intelligence assessment, drawing upon information from United States Air Force officers familiar with the Argentine Air Force suggested that the more experienced combat pilots were posted to Mirage squadrons and that their instrument and night flying standards were good.⁶⁹ Consequently, the report warned that the possibility of a Vulcan aircraft encountering fighter activity during the attack could not be ruled out. The effectiveness of fighter air defence at night was not easy to gauge as the report concluded that Argentine radar control and intercept capability was limited.⁷⁰ After considering all the factors involved, the recommendation offered by Air Commodore John Price, Director of Operations (RAF) in the Ministry of Defence, to Air Marshal Craig was to attack from, 'about 2,000 feet after a low-level penetration.' The preference was for the use of unguided weapons at that point, as suitable 'critical' targets for attack with LGBs had not yet been identified.⁷¹ Craig's assessment of the plan is not recorded. However, with Operation Sutton about to culminate and Argentine combat air power waning, but not yet defeated, the risks at the tactical, operational and strategic levels associated with a Vulcan raid against the Argentine mainland appeared to significantly outweigh the benefits. Nevertheless, the Vulcan's broader potential as a means of conducting the war was understood and considered even if it was not exploited.

EFFECTS & OUTCOMES

As noted at the beginning of this article, the effectiveness of Operation Black Buck has been subject to variable coverage in the historiography to date, ranging from condemnation of the attacks as little more than a pointless waste of fuel, through to 'the most daring raid' which 'changed the outcome of the war'.⁷² The truth almost certainly lies somewhere between the two.

There is little doubt that the raids, particularly the first, had important psychological effects on the enemy. The Argentine assumption that the British would not respond with force to the occupation of the islands was shattered by the first Black Buck raid, coupled with the air combats which occurred on 1 May, demonstrating that the British intended to fight for the islands; were there any doubts about this, the sinking of the ARA *Belgrano* on 2 May 1982 laid them to rest. The use of the Vulcan may have had a further psychological element, since the Argentines had attempted to procure a number of Vulcans from Britain a year before the war. It is not widely recognised that the Argentine air force had a heritage of operating bombers, beginning with the provision of fifteen Avro Lancasters and thirty Avro Lincolns which served with the *Fuerza Aerea Argentina*

until the late 1960s in the bomber, maritime reconnaissance, Antarctic exploration, target-towing, aerial photography and transport roles.⁷³

The role of the bomber in Argentine air power thought and practice was clear. While the procurement of the English Electric Canberra marked a step down from the 'traditional' heavy bomber, the heritage of possessing a bomber capability remained, offering a means of deterring and, if necessary, striking an enemy's homeland. In February 1982, as the retirement of the Vulcan was gathering pace – and while planning for the invasion of the Falklands was underway – the *Fuerza Aerea Argentina* expressed an interest in obtaining between six and twelve ex-RAF Vulcans during the course of 1983 to form a new squadron.⁷⁴ Remarkably, the British Defence Attaché in Buenos Aires reported that he had 'been unable to identify a specific role for these aircraft' but was 'convinced that they would be inappropriate for use in any adventure against the Falkland Islands'.⁷⁵ The reason for acquiring the Vulcan was assumed to be for deterrence purposes or possible use against Chile, with which Argentina had an ongoing territorial dispute over the Beagle Channel.⁷⁶ While this assumption was viewed with some scepticism elsewhere within both the Ministry of Defence and the Foreign and Commonwealth Office, the proposed sale foundered on the fact that British Aerospace decided that they had no desire to engage in the modernisation or ongoing support of the Vulcan, making it impossible for the Argentines to make use of the aircraft.⁷⁷ While it would be easy to make too much of this, it does not seem unreasonable to suggest that the fact that the Argentines had a healthy respect for the Vulcan and an understanding of its capabilities gave Black Buck an additional – if slight – level of psychological effect beyond that experienced by the Argentine troops during the Black Buck raids.⁷⁸

A further question concerns the suggestion that the greatest value of Operation Black Buck was that it compelled the Argentines to withdraw their Mirage III force from the fighting to provide air defence of Buenos Aires, thus giving the British a critical edge in the struggle for control of the air around the Falklands. This view is promoted by some sources, and dismissed by others who regard the Operation as a failure and a waste of fuel.⁷⁹ Certainly, Sir John Curtiss, the RAF's Air Component Commander, felt that the raid had achieved some sort of effect on the Argentine fighter force, given the paucity of Mirage III sorties over the islands.⁸⁰ Again, the truth appears to be more complex than the entrenched views on either side of the debate, since the aim of Black Buck was about far more than compelling the withdrawal of the Argentine Mirage III force, and any effect here was an added bonus, as Admiral Woodward observed:

'My dark blue aviators said "Oh, it's the air force just trying to get in on the act", but I said, hang on a minute, there will be two things. If they do hit the runway, that can't be bad, they can disrupt it... but also it will have exactly that effect of causing them [the junta] to think they could come at us on the mainland. It is showing reach and therefore it is deterrent. And I suspect it made them hold

back some of their Mirages, which could have acted as top cover for their A-4 raids. So I signed up for it and told my aviators to shut up.⁸¹

Admiral Woodward's view that the raids might force the Argentines to think about risks of an attack on the mainland – and as demonstrated above, this had not been completely ruled out of British planning – and take precautions was not unreasonable. While what may have appeared to have been Argentine fighters heading north to defend the capital was a misreading of the way in which their air forces were deployed, there is evidence that the raids had exactly this effect, with a small number of Mirage IIIs and Dagger fighter bombers being tasked with maintaining an air defence commitment.⁸² In addition to misunderstanding the way in which the Argentines apportioned their aircraft, criticism that Black Buck One saw the diversion of 'just four Mirages for defence of the capital' rather overlooks the fact that this was 25 per cent of the available force (and more after the losses of 1 May).⁸³ This perhaps demonstrates the difficulties of attempting to measure success purely through statistics, a problem which has affected analysis of air power effects from the First World War onwards.

The question of Operation Black Buck's efficacy during the war is perhaps best considered through the lens of its place within the overall construct of operations. As noted earlier, Black Buck was conceived as the result of concerns about the value of Stanley airport to the Argentines and the risks which it posed. It was not a vainglorious bid by the RAF to 'get involved', but part of an overall plan to reduce the possible threat from Argentine use of the airport. The advice from the Chief of the Air Staff as to the difficulties of guaranteeing success at closing the airfield were absolutely clear, but the Chiefs of Staff as a whole concluded that the potential outcomes were worth the effort. Yet they were sanguine about the possibilities, and never sought to convince themselves that there would be a decisive effect against the airfield with either the Vulcans or raids by carrier-borne aircraft. They were wise to do so. Despite Black Buck, raids by both Sea Harriers and Harriers and naval gunfire 'inspection of Port Stanley airfield by RAF LO [Liaison Officer] indicate[d] full runway length of 4,100 feet to be serviceable but fuel handling equipment, ATC [Air Traffic Control] tower and hangars badly damaged.'⁸⁴ Despite the damage, the airport remained operational, albeit in a much more limited manner.

In truth, the prospects of spectacular success from Black Buck were never particularly high in the absence of either a specialised anti-runway weapon or a precision strike capability. Measuring the extent of their effect on the campaign remains difficult, with the fixation upon only the first of the five sorties to attack the islands clouding the issue further. There is little doubt that Black Buck One was a clear demonstration of British intent. There is some evidence to suggest that Black Bucks One and Two confirmed Argentine fears that the mainland might be vulnerable to attack, reinforcing the requirement for maintaining a small cadre of aircraft for defence of the homeland

rather than using them over the islands, but not to support Air Marshal Curtiss' view that the entire Mirage III force was kept back as a result; other factors such as a lack of time on station also played a part in their absence from much of the fray. Taken as a whole, there is also evidence to suggest that the Black Buck sorties met their task of impeding and disrupting Argentine operations from the airport, but without achieving any significant effect beyond this – rather as the downbeat assessment of the Chief of the Air Staff when first debating the use of the Vulcan suggested might be the case. This obscures an important point, though, which lies in Beetham's memorandum of 19 April to John Nott. This highlighted the possible effects that might be achieved beyond just the 95% chance of hitting the runway with a single bomb. It has been slightly fashionable in some circles ever since 1982 to disregard the notion of Black Buck fitting into an early construct of effects-based operations. It appears that the Chiefs of Staff in 1982 (and Admiral Woodward) were thinking of air power for strategic effect in a manner which is not normally associated with air power thought at the time. The fact that the Argentines were not only unnerved by the Vulcan raid but also found that the crater from Black Buck One impinged upon their air operations is borne out by an Argentine report captured by the British which suggested that only 70 tonnes of cargo and 340 personnel were flown into the islands after Black Buck.⁸⁵ If this was correct, it suggests that the attacks (and those by the Sea Harriers and Harriers) meant that the regular flights by Argentine transport aircraft were far more heavily constrained than has often been assumed, demonstrating that effect may not always be obvious.

It may be that the greatest points of significance of Operation Black Buck lay beyond the Falkland Islands. Consideration of the use of precision weapons for attacks against the mainland, coupled with the actual use of LGBs in the dying stages of the conflict pointed to the future for the RAF, but this was but dimly understood. While it is interesting to speculate upon the effects of Black Buck had the Vulcans carried LGBs (and a means to designate them been supplied) rather than unguided weapons, the more important point was the demonstration of the need to ensure that key capabilities to achieve desired effects are funded appropriately, both in terms of equipment and training. Perhaps the final point of note was that Black Buck highlighted the adaptability and resourcefulness of the Royal Air Force and its personnel. While the claim made by media sources that Black Buck 'changed the war' are unsustainable, there is little doubt that all five Black Buck sorties merit consideration as being amongst the Falklands conflict's 'most daring raids'.

NOTES

¹ The National Archives (hereafter TNA), FCO 7/4472, Falkland Islands Conflict: Minutes of Chiefs of Staff Meetings. The Foreign and Commonwealth Office files covering the Chiefs of Staff Meetings in 1982 were declassified some time before those from the Chiefs of Staff Committee entered the public domain.

² TNA, AIR 20/13113, Operation Corporate, Falklands Conflict: bombing raids on Port

Stanley airfield.

³ John Terraine, *The Smoke and the Fire: Myths and Anti-Myths of War 1861-1945* (London: Sidgwick and Jackson, 1980).

⁴ Margaret Thatcher Foundation, 'Argentina Invades the Falklands' <https://www.margaretthatcher.org/document/109110> (accessed 2 April 2018). Different accounts regarding the meeting vary on a number of details, but all agree that Admiral Leach's intervention convinced Mrs Thatcher that her response – that the islands must be retaken by force if diplomatic efforts did not compel a complete Argentine withdrawal – was correct. The doubts amongst her cabinet and various officials were swept aside.

⁵ TNA FCO 7/4472, Minutes of meeting of Defence Operations Executive 31 March 1982

⁶ TNA FCO 7/4472, 'Airfields in the Falkland Islands' no date.

⁷ Ibid.

⁸ TNA FCO 7/4472, COS 12th Meeting 9 April 1982.

⁹ Ibid.

¹⁰ TNA FCO 7/4472, Draft Operational Directive.

¹¹ TNA FCO 7/4472, *passim*.

¹² Andrew Brookes, *Vulcan Units of the Cold War* (Oxford: Osprey, 2009), 66.

¹³ TNA AIR 20/13113, Operation Corporate, Falklands Conflict: bombing raids on Port Stanley airfield.

¹⁴ TNA AVIA 54/95, Design Branch Specification B35/46: medium range bomber.

¹⁵ CG Jefford, 'The View from the Back – The Vulcan Nav/Attack System' *Royal Air Force Historical Society – The Vulcan* (2014), 57.

¹⁶ Brookes, *Vulcan Units*, 25. Jefford. 'View from the Back' 57.

¹⁷ Nigel Baldwin, "The Post-QRA Era, 1969-1984" *Royal Air Force Historical Society – The Vulcan* (2014), 65; RAF Historical Society, *RAF Historical Society Journal 11 – Air Force Policy in the 1950s and 1960s* <http://www.rafmuseum.org.uk/documents/Research/RAF-Historical-Society-Journals/Journal-11-Sir%20Frank-Cooper-on-Air-Force-Policy-in-the-1950s-1960s.pdf> (accessed 17 January 2016).

¹⁸ TNA AIR 27/3577, No 44 (Rhodesia) Squadron (Falklands Conflict).

¹⁹ Lawrence Freedman, *The Official History of the Falklands Campaign, Volume 2*, (New York: St Martin's Press, 1992), 282.

²⁰ Freedman, *Official History, Volume 2*, 281.

²¹ Peter Jacobs, *Stay The Distance* (London: Frontline books, 2011), 235.

²² Tony Blackman, *Vulcan Boys* (London: Grub Street, 2014), 175.

²³ TNA, AIR 20/13047, Operation Corporate (Falklands Conflict): Vulcan aircraft operations, including Black Buck operations, 'Analysis of Vulcan Low Level Bombing Results', Dr J Moffat, Science (2) RAF, 29 April 1982

²⁴ Chris Hobson and Andrew Noble, *Falklands Air War* (Hinkley: Midland, 2002), 43.

²⁵ R.O. Moro, *The History of the South Atlantic Conflict* (New York: Praeger Publishers, 1989), 99.

²⁶ Hobson & Noble, *Falklands Air War*, 43.

²⁷ Ibid.

²⁸ Moro, *History of the South Atlantic Conflict*, 99.

²⁹ TNA, AIR 20/13046, Operation Corporate (Falklands Conflict): Vulcan aircraft operations, including Black Buck operations, 'Vulnerability of the Vulcan to AAA when Attacking Port Stanley Airfield', 30 April 1982.

³⁰ Wing Commander CG Jefford, 'Vulcan Operations in the Falklands,' in *RAF Historical Society Journal 20 – Training in Peace for War*, 37 (<http://www.rafmuseum.org.uk/documents/Research/RAF-Historical-Society-Journals/Journal-20-Seminar-Training-in-Peace-for-War.pdf> (accessed 27 September 2016)).

³¹ TNA, AIR 20/13046, Operation Corporate (Falklands Conflict): Vulcan aircraft operations, including Black Buck operations, handwritten note to Strike Command from AFOR (RAFO 2 May 1982).

³² Ward, *Sea Harrier over the Falklands*, 310; TNA, AIR 20/13046. Operation Corporate (Falklands Conflict): Vulcan aircraft operations, including Black Buck operations; Hobson & Noble, *Falklands Air War*, 113.

³³ Freedman, *Official History, Volume 2*, 277.

³⁴ TNA, FCO 7/4473, Minutes, Chief of Staffs Meeting, 20 April 1982.

³⁵ *Ibid.*

³⁶ *Ibid.*

³⁷ See, for example, TNA FCO 7/4609, A Military Appreciation of the use of Vulcans for an Attack on Stanley Airfield, no date, but between 20-23 April 1982.

³⁸ MRAF Sir Michael Beetham, in 'The Falklands War', seminar held 5 June 2002 at JSCSC Shrivenham (Transcript in Andrew Dorman, Michael D. Kandiah and Gillian Staerck (eds), *The Falklands War*, CCBH, 2005) 39.

³⁹ TNA AIR 41/95, *Air Historical Branch Narrative of RAF Operations during the Falklands Conflict, 1982*, D of S Pol/38/2/5.A, Encl 14, CAS 90885 19 April 1982, CAS to Secretary of State for Defence.

⁴⁰ TNA FCO 7/4609, note to Secretary of State, 'Deployment of Vulcans to Ascension Island', 23 April 1982.

⁴¹ *Ibid.*

⁴² Freedman, *Official History, Volume 2*, 277.

⁴³ *Ibid.*

⁴⁴ Only one of the chosen Vulcan aircrew had previous air-to-air refueling experience but this dated back to 1962, a 20-year sabbatical. Rowland White, *Vulcan 607* (London: Corgi Books, 2007) 101.

⁴⁵ The experience and knowledge of the instructors was deemed so beneficial that it was decided that they would join the 5-man Vulcan crew on the Black Buck missions. Martin Withers. "The Vulcan Bomber in Action – Operation Black Buck", *Royal Air Force Historical Society – The Vulcan* (2014), 107.

⁴⁶ TNA, AIR 27/3577, No 44 (Rhodesia) Squadron (Falklands Conflict), F540 Record of Events, April 1982.

⁴⁷ R.A. Burden et al, *Falklands – The Air War* (London: Arms and Armour Press, 1986), 363.

⁴⁸ Hobson & Noble, *Falklands Air War*, 41.

⁴⁹ Burden et al, *Falklands – The Air War*, 363.

⁵⁰ RAF Historical Society, *RAF Historical Society Journal 30 – The Falklands Campaign*, <http://www.rafmuseum.org.uk/documents/Research/RAF-Historical-Society-Journals/Journal-30-Seminar-The-Falklands-Campaign.pdf> (accessed 20 November 2015).

⁵¹ For example, following the Black Buck 2 mission, both Vulcans returned to RAF Waddington on 7 May with two Vulcans returning to Ascension Island on 14 and 15 May in time to meet the Black Buck 3 task. Burden et al, *Falklands – The Air War*, 365.

⁵² Extended range Nimrod missions using Victor air-to-air refueling commenced on 9 May. *Ibid*, 395. Long-range Hercules air-drop missions started on 16 May. Hobson & Noble, *Falklands Air War*, 70.

⁵³ See, amongst others, White, *Vulcan 607*; Alfred Price, 'Black Buck to the Falklands', *RAF Air Power Review* 5:2 (2002), 1-11; Malcolm English, 'Operation Black Buck: the RAF Vulcan Raids on Port Stanley airfield', *Air Pictorial*, July 1982, 248-252, and 'The Falklands' Most Daring Raid', a Channel 4 documentary based upon White's book (first shown in the United Kingdom on 18 March 2012).

⁵⁴ See Major D I Reid, 'Stanley Airport – Airfield Damage Repair', *The Royal Engineers Journal*, Vol 97 No.1 (March 1983), 6-15 and Lt Col P R Ievers, 'The Airfield', *Royal Engineers Journal*, Vol 97 No.2 (June 1983), 80-88.

⁵⁵ Freedman, *Official History, Volume 2*, 301.

⁵⁶ *Ibid*, 365.

⁵⁷ TNA, DEFE 58/282, Operation *Corporate* (Falklands Conflict): Air Commander's Report; Report of Proceedings.

⁵⁸ Hobson & Noble, *Falklands Air War*. 101.

⁵⁹ Blackman, *Vulcan Boys*, 134.

⁶⁰ *Ibid.*, 179.

⁶¹ TNA. DEFE 58/282. Operation *Corporate* (Falklands Conflict): Air Commander's Report; Report of Proceedings.

⁶² TNA, DEFE 58/278, Memo Senior Air Staff Officer, No.1 Group RAF to AOC No 1 Group RAF, 23 June 1982.

⁶³ See, for example, *Parliamentary Debates* (hereafter 'Hansard'), 29 April 1982, Col. 1021; *Hansard*, 20 May 1982, Col. 497 for Benn's concerns.

⁶⁴ TNA, AIR 20/13048. Operation *Corporate* (Falklands Conflict): Vulcan aircraft operations, including Black Buck operations.

⁶⁵ Craig was a former Vulcan squadron commander and would go on to become Chief of the Air Staff (1985-88) and then Chief of the Defence Staff (1988-91).

⁶⁶ TNA, AIR 20/13048. Operation *Corporate* (Falklands Conflict): Vulcan aircraft operations, including Black Buck operations, Military Appreciation of the Use of Vulcans to carry out Attacks on the Argentine airfields at St Julian, Rio Gallegos and Rio Grande, 24 May 1982.

⁶⁷ *Ibid*.

⁶⁸ *Ibid*.

⁶⁹ *Ibid*, 'Intelligence Input to an Appreciation on the use [of] Vulcans to carry out attacks

on Rio Gallegos and Rio Grande Airfields, 14 May 1982.

⁷⁰ Ibid.

⁷¹ Ibid, Price to VCAS, 'Vulcans against Argentine mainland airfields', 25 May 1982.

⁷² Ward, *Sea Harrier Over the Falklands*, 247-48; Channel 4 'The Falklands Most Daring Raid'.

⁷³ S. Rivas. *Wings of the Malvinas*. (Buenos Aires: Hikoki Publications, 2010), 32.M. Atilo, V. Celleto and J. Mosquera. "Argentina's 'Heavies': Avro Lancaster, Lincoln and Lancastrian in Military Service: Part Two." *Air Enthusiast* (No. 97, January/February 2002), 39.

⁷⁴ TNA, FCO 7/4088. Sale of Defence equipment to Argentina.

⁷⁵ Ibid.

⁷⁶ Ibid

⁷⁷ Ibid.

⁷⁸ <https://www.pprune.org/military-aviation/479504-falklands-most-daring-raid-7.html>, post #139. Although anonymous, the poster suggesting that the raids had a 'heavy moral effect' [sic] was serving in the Argentine forces at Stanley during the Conflict; See also Martin Middlebrook, *The Argentine Fight for the Falklands* (Barnsley: Pen & Sword, 2009), 76-78; 120.

⁷⁹ Price, 'Black Buck to the Falklands'; Philp D Grove, 'The Air War: A New Appraisal', Stephen Badsey, Rob Havers & Mark Grove, *The Falklands Conflict Twenty Years On: Lessons for the Future* (Abingdon: Frank Cass, 2005), 276; Ward, *Sea Harrier over the Falklands*, 206-207.

⁸⁰ TNA DEFE 58/262, 18 Group: Operation Corporate (Falklands Conflict) Lessons Learned, comments by Air Commander.

⁸¹ Institute of Contemporary British History Witness Seminar *The Falklands War* (5 June 2002).

⁸² Rivas, *Wings Of the Malvinas*, 206.

⁸³ Grove, 'New Appraisal', 276.

⁸⁴ TNA, AIR 20/13113, Operation Corporate, Falklands Conflict: bombing raids on Port Stanley airfield.

⁸⁵ Freedman, *Official History, Volume 2*, 421.

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