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Aerial Warfare and Maritime Expeditionary Operations: Naval Aviation Versus Land-Based Air Power in the 1982 Falklands War

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Introduction

> [W]e were going to war at the end of a 7 ½ thousand mile long logistic pipeline, outside the NATO area, with virtually none of the shore-based air we normally count on, against an enemy of which we knew little, in a part of the world for which we had no concept of operations.[1]
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> Major General Sir Jeremy Moore,

[1] Major General Sir Jeremy Moore KCB OBE MC, Rear Admiral Sir John Woodward KCB, and Admiral Sir James Eberle GCB, "The Falklands Experience," *The RUSI Journal* 128, no. 1 (1983): p. 25.

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former Commander Land Forces Falkland Islands.

What Major General Moore highlighted after the 1982 Falklands War were some of the key issues the United Kingdom (U.K.) faced as it prepared to launch a maritime expeditionary operation to liberate the Falkland Islands and South Georgia from Argentine occupation. In particular, a lack of shore-based aerial support for the coming expeditionary operation had to be surmounted by the Royal Navy's (RN) two small "Harrier Carriers," HMS' *Invincible* and *Hermes*, and their limited naval aviation capability[2] provided by vertical and/or short take-off and landing (V/STOL) Sea Harrier FRS.1s. Argentina's land-based Air Force South (*Fuerza Aérea Sur*, *FAS*), consisting of roughly 122 fixed-wing combat aircraft[3] from the Argentine Air Force (*Fuerza Aérea Argentina, FAA*) and Argentine Naval Aviation (*Comando de Aviación Naval Argentina, COAN*), opposed the "SHARs" and were tasked with supporting Argentine land and naval forces in their maritime venture to hold *Las Islas Malvinas*. The air war over the South Atlantic was a closely fought contest between Argentina and the U.K. The former lost many aircraft while the latter had several vessels damaged or sunk. Although Argentina's land-based air power held perceived advantages numerically, geographically, and logistically, it nevertheless was effectively countered by the U.K.'s limited naval aviation capability. The purpose and research question of this paper is to determine *why the U.K.'s limited naval aviation capability proved superior to the land-based air power of Argentina while in support of a maritime expeditionary operation?* Through the utilization of the 1982 Falklands War as an analytical case study of the role played by land and sea-based air power in support of maritime expeditionary operations, factors and considerations influencing the employment of military aviation in this function will be addressed.

To determine *why* the U.K.'s limited naval aviation prevailed over Argentina's land-based air power in the Falklands War, it is crucial to highlight specific factors influencing the

[2] "Limited" is applied to the U.K.'s naval aviation capability during the Falklands War because of the 20 Sea Harriers/Harriers (later augmented by SHAR replacements and a squadron of RAF Harrier GR.3s) divided unequally between the small, non-fleet aircraft carriers HMS' *Hermes* and *Invincible*. Relative to USN aircraft carriers of the period which could hold 80 or more fixed-wing aircraft on one vessel, including high-performance jet fighters such as the F-14 Tomcat, Britain's naval aviation was limited in this respect. Also, the short combat radius, minimal air-to-air armament, an inability to secure permanent air supremacy or superiority in the area of operations (AO), and the lack of carrier-based Airborne Early Warning (AEW) aircraft overstretched the small number of Sea Harriers and allowed Argentine pilots to score several successes against RN vessels. See Department of the Navy, *Lessons of the Falklands* (Summary Report, Washington, D.C.: Department of the Navy, 1983), pp. 4-5, 26.

[3] James S. Corum, "Argentine Airpower in the Falklands War: An Operational View," *Air & Space Power Journal* 16, no. 3 (Fall 2002): p. 63.

effectiveness of air power in supporting maritime expeditionary operations. Therefore, an applicable analytical framework is: *how does one measure the effectiveness of limited naval aviation and land-based air power when they are in support of a maritime expeditionary operation*? Though sea and land-based aircraft operate from different surfaces and featured differing evolutionary paths throughout history, there are nevertheless some overarching commonalities the British and Argentine aviation branches embodied which warrant detailed analysis. Nine factors influencing the effectiveness of land and sea-based air power, divided into four sections for this paper, will assist in measuring U.K. and Argentine performance in the skies over the South Atlantic. Section one analyzes doctrine, training, and aerial tactics while section two features military technology and aerial intelligence. Section three investigates serviceability and military interoperability followed by section four's analysis of geography and logistics. By pursuing an objective and in-depth analysis of the combatants, relative to each specific factor, it will be possible to understand certain requirements for sea and land-based aviation as an effective tool in supporting a maritime expeditionary campaign and also to ascertain *why* Britain's limited aerial capability ultimately overcame Argentina's numerical advantage in land-based aircraft during the Falklands War.

Policy/Strategy Match and the Role of Air Power in Maritime Expeditionary Operations

Prior to an analysis of specific factors relating to *why* the U.K.'s limited naval aviation assets proved superior to Argentina's land-based air power, it is important to highlight the policies of Great Britain and Argentina regarding the Falkland Islands, along with the strategies devised to achieve these policies. When investigating these strategies, the role of air power in facilitating execution will be explored in order to situate the aerial capabilities of Great Britain and Argentina during the conflict. The Argentine military junta, headed by Lieutenant-General Leopoldo Galtieri, had a straightforward policy of evicting the civilian administration and U.K. military presence from the Falkland Islands, South Georgia, and the South Sandwich Islands in order to restore Argentina's claimed sovereignty over these areas.[4] When it became clear that there was going to be a British military response following the successful realization of this initial policy, it was modified to reflect the change in the nature of the conflict. As a result, Argentine policy and strategy were synthesized into an overall objective that changed frequently throughout the duration of the war as they reacted to developing circumstances. This dynamic policy/strategy moved from obtaining victory in the South Atlantic, to defending

[4] Richard C. Dunn, *Operation Corporate: Operational Artist's View of the Falkland Islands Conflict* (Research Report, Newport: Naval War College, 1993), p. 8.

the Falkland Islands, protecting the Argentine mainland from hostile British actions, damaging the Royal Navy task force, and denying the U.K. military a victory.[5] Argentina's air force and naval air arm played a role in prosecuting this questionable policy-strategy synthesis. When compared to the U.K. policy and strategy during the conflict, Argentine Air Force and naval pilots lacked clearly defined objectives, and this impaired their ability in delivering a successful outcome.

The United Kingdom's policy, under the Conservative government of Prime Minister Margaret Thatcher, was to not only remove Argentina's military forces from the Falklands, South Georgia, and South Sandwich Islands, but also to repair Britain's standing as a world power, and confirm the right of self-determination for the residents of the Falklands.[6] The strategy undertaken to realize this policy was clear and concise unlike the vague and dynamic policy and strategy synthesis pursued by Argentina following the success of *Operation Rosario*. Commander of the Task Force Admiral John Fieldhouse, operating from London, focused the strategy within *Operation Corporate* into four main purposes: the establishment of a sea blockade around the Falkland Islands, the re-taking of South Georgia, the gaining of sea and air supremacy around the Falklands, and the eventual repossession of the islands.[7] For the amphibious landing of British ground forces, equipment, and *materiel* on the islands, as well as the subsequent prosecution of the land campaign to remove Argentina's military presence, air supremacy or superiority would be an important factor in assuring the success of this operation.

For maritime expeditionary operations involving an amphibious component, military aviation, whether it is land or carrier-based, has the ability to protect and assist one's own forces on the ground as they carry out a land campaign and to also deny the enemy's aircraft the ability to do the same in support of its forces. The Normandy landings of 6 June 1944, for example, featured American and British land-based fighter and bomber aircraft gaining absolute superiority of the air over the landing beaches as a means of further guaranteeing the success of the ground portion of *Operation Overlord*.[8] For the U.K. in the South Atlantic, the necessity of establishing some form of aerial control was as preeminent as it was in 1944. The situation in 1982, however, was radically different because the nature of air combat had changed so significantly due to the advent of high performance jet aircraft. In addition, the area of operations was geographically disadvantageous for both combatants. Much like what

[5] Csaba B. Hezsely, *Argentine Air Power in the Falklands War* (Research Report, Montgomery: Air War College, 1988), p. 4.
[6] Dunn, *Operation Corporate*, p. 8.
[7] Martin Middlebrook, *The Falklands War* (Barnsley: Pen & Sword Military, 2012), p. 96.
[8] Jeremy Black, *World War Two: A Military History* (London: Routledge, 2003), p. 169.

Luftwaffe Bf 109 and 110 fighter pilots encountered while up against RAF Spitfires and Hurricanes over Great Britain during the 1940 Battle of Britain,[9] the Fleet Air Arm's Sea Harriers and Argentina's *FAS* land-based air assets would generally be operating at their maximum combat ranges over the Falklands, thus constraining time available to be airborne in the theatre of operations. Though important for consideration, this is one of several factors from which Argentine and British air power will be assessed as they endeavoured to support their maritime expeditionary operations in the South Atlantic.

I. Doctrine, Training, and Aerial Tactics

Doctrine, according to the *NATO Glossary of Terms and Definitions*, is defined as "the fundamental principles by which military forces guide their actions in support of objectives" and "is authoritative but requires judgement in application."[10] Argentina, relying predominantly on its land-based air force and a small number of naval aircraft, witnessed the development of a different aerial doctrine for its aircrews than did Great Britain for its carrier-borne RN Sea Harriers and RAF Harriers. In the context of the *South Atlantic Campaign*, issues with both combatants' aerial doctrines became readily visible due to the nature of the conflict itself. Argentina's aerial doctrine for the *Fuerza Aérea Argentina* was, as a result of an ongoing territorial dispute with neighbouring Chile over the Beagle Channel, designed to reflect a potential conflict along this lengthy border region. In its most basic form, *FAA* aircraft would utilize bases along the border with Chile to conduct short-range strike missions against Chilean military targets and to provide close air support (CAS) to Argentine troops on the ground if required.[11] The result of this doctrinal emphasis on aerial support of overland operations against Chile was a failure to include the possibility of supporting maritime expeditionary operations. Because of this stringent focus on short-range missions into Chile, Argentine Air Force doctrine during the Falklands War was rendered ineffective because it did not include the need for long range air assets[12] or the ability for its aircraft to operate over water.

Western Europe, because of the United Kingdom's membership in the North Atlantic Treaty Organization (NATO) and its geographical proximity to the continent, was the focal point of British strategy and doctrine as there was the constant threat of attack by the Soviet

[9] Black, *World War Two*, p. 53.
[10] North Atlantic Treaty Organization, *AAP-6 NATO Glossary of Terms and Definitions* (Brussels: NATO Standardization Agency, 2012), p. 2-D-9.
[11] Corum, "Argentine Airpower in the Falklands War," p. 62
[12] Hezsely, "Argentine Air Power in the Falklands War," p. 11.

Union. For the Royal Navy, its role within the U.K.'s commitment to NATO was the defence of the eastern Atlantic Ocean and the English Channel.[13] Owing to these NATO responsibilities, and the nature of the Sea Harrier's V/STOL characteristics, RN pilots operated under a different doctrine than their land-based Argentine counterparts. The SHAR performed numerous roles in the Falklands. These roles included close air support (CAS), reconnaissance, offensive counter-air, and ground attack even though its original doctrine in fleet operations was far more limited. Sea Harriers, in conjunction with U.S. Navy Grumman E-2C Hawkeye Airborne Early Warning (AEW) aircraft, were tasked with providing air defence of the fleet from Soviet maritime patrol aircraft, conventional fighters, and anti-ship bombers in addition to utilizing their onboard equipment to partake in the maritime attack of surface vessels.[14] In air-to-air engagements against conventional fighters, the subsonic Sea Harrier proved itself capable of besting the most recognized aircraft in the inventories of militaries during the late 1970s and early 1980s.[15]

Without the USN AEW aircraft, and the limited number of Sea Harriers available to adequately support a maritime expeditionary operation, RN pilots were forced to adapt their aerial doctrine during the South Atlantic Campaign. Air defence of the fleet in the absence of AEW, for example, featured the Sea Harriers as part of a "defence in depth" framework. Six aircraft would constantly be on combat air patrols (CAP) to the east of the carrier fleet to act both as AEW and interceptor, but the inability of the onboard Blue Fox radar to detect low-flying aircraft meant there was a large gap in the task force's air defence capability.[16] In terms of the RN's aerial doctrine, it was not initially well-suited to support a maritime expeditionary operation. This, however, did not preclude the doctrine from being adapted for this role, due mainly to the versatility and reliability of the Sea Harrier, as well as the quality of RN pilots.

Training serves as the fundamental building block for every branch of a modern military. Without adequate training, the successful planning and execution of strategic, operational, and tactical objectives by the army, navy, or air force will be hindered significantly, if not rendered impossible. In the realm of military aviation, well-trained personnel are of the utmost importance since modern jet aircraft have a steep learning curve due to their complex avionics, weapon systems, and communications equipment. Training is heavily influenced by the aerial doctrine employed by an air force or naval air arm and directly affects the type of aerial tactics utilized by pilots in air-to-air or air-to-surface engagements. The nature of military

[13] Christopher Chant, *Air War in the Falklands 1982* (London: Osprey, 2008), pp. 9-10.
[14] Roy Braybrook, *Battle for the Falklands (3): Air Forces* (London: Osprey, 1982), p. 9.
[15] Commander 'Sharkey' Ward, *Sea Harrier Over the Falklands* (London: Cassell, 2005), p. 8.
[16] Rodney A. Burden et al., *Falklands: The Air War* (London: Arms and Armour Press, 1986), p. 190.

aviation necessitates a lengthy and intense training program for prospective pilots and the state must be prepared to invest in their development. If a state is unable to properly support the satisfactory training of its pilots, the performance of its air force or naval air arm will most assuredly suffer in a conflict scenario when pitted against a better-trained and a well-equipped opponent. Factoring in the need to support amphibious forces as part of a maritime expeditionary operation necessitates that pilots be well-versed not just in air-to-air engagements or maritime attack, but also in close air support (CAS), ground attack, and aerial reconnaissance. When analyzing the air war during the 1982 South Atlantic Campaign, it is important to look at the training of aviators on both sides of the conflict. This assists in determining whether training can be considered as one of the factors responsible for *why* the U.K.'s limited naval aviation proved superior during their South Atlantic Campaign in 1982.

Argentina, unlike the British, did not have any twentieth-century aerial experience utilizing aircraft in a conventional war scenario. Although Argentine aircraft were involved in suppressing left-wing insurgencies in remote parts of the country prior to the Falklands War, knowledge gleaned from these operations added little to understanding modern air-to-air and air-to-ground combat involving jet aircraft. Argentina's air force, despite lacking practical experience, was nevertheless rated as the best in South America.[17] This desirable classification resulted from Argentina being able to effectively train its military aviators, domestically and abroad, for modern air operations involving high-performance jet aircraft as well as advanced weapon, communication, and information systems. As mentioned previously, the territorial dispute between Chile and Argentina over the Beagle Channel was the impetus for the orientation of the *FAA's* aerial doctrine leading up to the Falklands War. Because of this focus, Argentina's land-based aircrews were well-trained when it came to flying short-range strike missions into Chile and the provision of CAS to infantry on the ground.[18] For the conflict over the skies of *Las Islas Malvinas*, the larger distances separating mainland Argentina's airbases from the disputed islands (roughly 300 to 400 hundred miles), coupled with the limited combat radius of its aircraft, proved problematic. These factors resulted in Argentina's air force being unable to properly support a maritime expeditionary operation in its own "backyard."

In terms of training abroad, both *FAA* and *COAN* aircrews received instruction on how to operate their aircraft from other states. Since Argentina was seen by the United States as an important anti-communist ally in South America, arms sales from the latter to the former was

[17] Corum, "Argentine Airpower in the Falklands War," p. 60.
[18] Ibid., p. 62.

common,[19] as was the training of military personnel. Aircrews of both air branches underwent flight training in the U.S. and this time spent with aviators of the United States Air Force (USAF) and United States Navy (USN) contributed to their performance during the conflict.[20] Arms purchases and training of military personnel were not restricted to North America. *2d Escuadrilla* of the naval air arm operated a small number of advanced French-made *Super Etendard* aircraft capable of launching the "Exocet" anti-ship missile (ASM). Because of the *Etendard's* French origin, these pilots undertook their training in France and were fully qualified by their naval air force instructors to operate Super Etendards.[21] Jorge Colombo, Commander of *2d Escuadrilla*, did not feel the training of his pilots was at all sufficient in France since they spent roughly 45 hours each in the *Super Etendard* and only received basic instruction on how to fly the aircraft.[22] Despite this shortcoming in the training of the naval pilots, they nevertheless were well-suited and reasonably well trained to support a maritime expeditionary operation in the South Atlantic. This was demonstrated by the sinking of HMS *Sheffield* and the cargo ship *Atlantic Conveyor* after employing the AM39 Exocet ASM. Overall, Argentine pilots were effectively trained on various airframes for short-range sorties against ground targets, CAS support of ground troops, and anti-ship attacks utilizing the Exocet. Geography hindered the short range sorties and CAS support, both of which will be explored in more depth further along. Aerial tactics in air-to-air engagements during the Falklands War, however, were another story as RN Sea Harrier pilots dominated this aspect of the campaign.

Despite the RN being charged with an important task relative to a possible NATO war in Europe against the Soviet Union, and training for this role religiously with the United States and other NATO allies, Britain's expeditionary forces suffered cutbacks in order to permit their NATO responsibilities to be fulfilled more cheaply with less personnel and equipment.[23] Fortunately, these cutbacks did not hamper the training of Sea Harrier pilots of the RN's Fleet Air Arm. Though the last combat operation participated in by the RN aircraft occurred during the 1956 Suez Crisis, its aircrews nevertheless had an advantage in training over their Argentine opponents in 1982. Compared with the *FAA* and *COAN*, which featured roughly fifty-percent conscripted personnel, the RN's aerial capability was made up entirely of professional and expertly-trained volunteers, thereby giving the RN a decided edge in the quality of pilots and

[19] Jimmy Burns, *The Land That Lost Its Heroes: How Argentina Lost the Falklands War* (London: Bloomsbury, 2012), pp. 90, 141.
[20] Department of the Navy, *Lessons of the Falklands*, p. 52.
[21] Corum, "Argentine Airpower in the Falklands War," p. 68.
[22] Jeffrey Ethell and Alfred Price, *Air War South Atlantic* (London: Book Club Associates, 1983), p. 27.
[23] Raymond E. Bell, Jr.,"The Falkland Islands Campaign of 1982 and British Joint Forces Operations," *Joint Force Quarterly* 67 (2012): p. 102.

ground personnel.[24] Because Sea Harrier doctrine was focused on fleet air defence and maritime attack in the event of a NATO conflict with the Soviet Union, RN pilots were well versed in air-to-air combat in maritime settings. Argentine air force pilots, who comprised the majority of Argentina's aerial capability, were effective in short-range ground attack sorties and CAS missions, though there appears to have been a deficiency in air-to-air combat that would have otherwise allowed Argentina's land-based air power to more effectively support the maritime expeditionary operation during the Falklands conflict.

Aerial tactics can simply be defined as the methods and manoeuvres developed for use by aircraft pilots to pursue an objective. These methods and manoeuvres can be used in the shooting down of an enemy plane during a dog fight, or they can be the low-altitude manoeuvres of a Super Etendard to avoid radar detection by patrolling RN Sea Harriers. In terms of air-to-air engagements, *FAA* and *COAN* pilots were outclassed by their British counterparts. This allowed the Sea Harriers to better assist the navy and army as the amphibious task force landed at Port San Carlos and expanded their land campaign on East Falkland toward Stanley. Overall, the Argentines suffered the loss of 25 fighter, fighter-bomber, and other attack aircraft in this type of engagement, whereas the Sea Harrier pilots lost none in return.[25] This can be attributed to the superior training of RN pilots which permitted the development of aerial tactics such as the Hook manoeuvre[26] to break up Argentine formations and single out individual aircraft. Several Sea Harrier pilots, when reflecting on the air-to-air tactics employed by Argentina's aviators, found that they were impractical in addition to there being unfamiliarity with how to properly utilize their air-to-air missiles.[27] Although the British dominated the skies when their Sea Harriers were present to intercept Argentine aircraft, this was but one component of aerial tactics. For air-to-surface engagements in support of maritime expeditionary operations, it was Britain's opponent that firmly held the advantage.

Although 25 *FAS* aircraft were lost in air-to-air combat, their pilots proved effective at attacking the task force's surface vessels. Due to the forward-looking Blue Fox radar system onboard each Sea Harrier, the limited range of Royal Navy ship-borne radar, and the lack of U.K. carrier-borne AEW capability, Argentine aviators realized that in order to remain undetected and increase the chance of hitting surface vessels of the task force, it was necessary

[24] Chris Hobson and Andrew Noble, *Falklands Air War* (Hinckley: Midland Publishing, 2002), p. 19.
[25] Chant, *Air War in the Falklands 1982*, p. 79.
[26] David Wragg, *A Century of British Naval Aviation, 1909-2009* (Barnsley: Pen & Sword Maritime, 2009), p. 182.
[27] Ethell and Price, *Air War South Atlantic*, pp. 64-65, 72.

to fly at incredibly low altitudes.[28] Super Etendards of *2d Escuadrilla* utilized this aerial tactic to great effect, successfully disabling HMS *Sheffield* and sinking the STUFT (Ships Taken Up From Trade) cargo ship *Atlantic Conveyor* with the potent Exocet anti-ship missile. Argentine Air Force and naval pilots, utilizing conventional ordinance, employed the same tactics when they struck the British amphibious task force at Port San Carlos on 21 May while it was disembarking troops and equipment. As a result of numerous Argentine air attacks, 17 RN, Royal Fleet Auxiliary (RFA), and civilian STUFT vessels were damaged or sunk by *FAA* and *COAN* aircraft during the conflict.[29] Despite the impressive number of ships sunk or damaged by *FAS* aircraft, none of the British aircraft carriers were hit, nor were the vital troop and landing ships specifically targeted.[30] This tactical error by Argentine pilots had operational and strategic consequences because the U.K.'s limited naval aviation threat was not eliminated and the ground campaign on East Falkland was permitted to develop, eventually leading to the defeat of Argentina's forces on the Falkland Islands by 14 June.

II. Military Technology and Aerial Intelligence

Military technology is a broad term encompassing a wide range of items, from aircraft and communications equipment to missiles and radar. Maritime expeditionary operations supported by naval air power can benefit greatly from this branch's investment in advanced military technology. Though this important component of modern military aviation can afford one side an advantage over another in combat, it cannot by itself govern the outcome. Doctrine, training, and aerial tactics are equally as important as military technology and must be utilized in a coordinated fashion in order to assure success, in the sky or on the ground, while supporting land and naval forces. To fully and properly assess why the U.K.'s naval aviation capability proved superior to Argentina's land-based air units, and highlight the importance of naval air power in assisting amphibious operations, it is necessary to analyze how both combatants employed military technology. This section of the paper will focus specifically on three main areas of military technology: fixed-wing aircraft, airborne early warning (AEW), and air-to-air and air-to-surface missiles.

[28] Michael Clapp and Ewen Southby-Tailyour, *Amphibious Assault Falklands: The Battle of San Carlos Water* (Barnsley: Pen & Sword Maritime, 2012), 142; and Tom Clonan, "The Falklands War: Closer Fought Than Commonly Understood," *The Irish Times*, 1 January 2007.
[29] Ethell and Price, *Air War South Atlantic*, pp. 253-254.
[30] Burns, *The Land That Lost Its Heroes*, p. 373.

Argentine land-based air power, capable of challenging the V/STOL Sea Harriers in air-to-air combat and striking at Task Force vessels during the Falklands War, was reliant primarily upon fixed-wing jet aircraft of French, American, Israeli, and Argentine origin. In terms of high-performance airframes that could reach speeds in excess of Mach 1, the French-made Dassault Mirage III fighter, Super Etendard naval attack aircraft, and the Israeli-made IAI Dagger fighter-bomber had this capability, whereas the American-made A-4 Skyhawk attack aircraft was subsonic.[31] Although the Mirage III and Dagger had a much higher speed than the Sea Harrier, their advantage in performance was restricted to high altitudes[32] which British naval aviators had the discipline to avoid in their V/STOL aircraft. To effectively support Argentine forces on land and at sea, the various airframes of the *FAA* and *COAN* needed to eliminate the air threat posed by the SHARs and at the same time sink enough RN, RFA, and STUFT vessels to materially impair the United Kingdom`s ability to successfully advance its own campaign in the South Atlantic. To achieve this, the Argentines had to engage the U.K. aircraft at low to medium altitudes where the Sea Harrier was usually operating. In doing so, the Argentine aircraft lost their edge in speed and manoeuvrability, suffering the loss of 25 aircraft in air-to-air engagements. While attempting to sink U.K. vessels involved in supporting the disembarking of troops and equipment in San Carlos from 21 May onwards, 21 fighter aircraft and a quarter of Argentina`s pilots that were part of these initial attacks were lost to ground fire or aerial combat as a result of flying at dangerously low altitudes.[33] Though several ships were sunk as a result of *FAS* air attacks, vital British landing and troop ships were not targeted. These losses demonstrated that Argentina`s aircraft were not well-suited to partake in efforts to support their own maritime expeditionary operation given their failure to effectively contest Britain in these two vital areas.

Unlike the numerous types of high performance aircraft employed by the *FAA* and *COAN*, the Royal Navy`s Fleet Air Arm was dealt a hand which resulted in one type of revolutionary aircraft being adopted, and it was to dominate Argentine aircraft in air-to-air engagements over the Falklands. Throughout the late 1970s, the Royal Navy was subject to defence cuts which resulted in the abandoning of large, angled-deck fleet carriers. Fortunately, the V/STOL Sea Harrier FRS.1 allowed the remaining smaller aircraft carriers the ability to provide a limited naval aviation capability. In terms of RN Sea Harrier performance, it could achieve a maximum speed of 690 miles per hour at low and medium altitude, had a combat

[31] Santiago Rivas, *Wings of the Malvinas: The Argentine Air War Over the Falklands* (Ottringham: Hikoki Publications, 2012), pp. 326-328.
[32] Ethell and Price, *Air War South Atlantic*, pp. 254-255.
[33] Burns, *The Land That Lost Its Heroes*, pp. 374-375.

radius of 828 miles, and was armed with two 30 mm Aden cannons along with the option of two AIM-9L Sidewinder air-to-air missiles or three 1,000 pound conventional "dumb" bombs.[34] Compared with the various airframes employed by the Argentines, the SHAR, despite lacking in speed, range, and overall ordinance capacity, proved a very flexible airframe for the air war in the South Atlantic. Though the Sea Harrier's doctrine did not incorporate the need to conduct counter-air, ground attack, and CAS missions well beyond the range of its home aircraft carriers, its flexibility and superb performance at low and medium altitudes prevented Argentina from gaining anything other than temporary and localized air superiority. Since Argentina was denied control of the skies due to the loss of 25 aircraft in air-to-air combat, U.K. land and naval forces were able to effectively progress their campaigns within *Operation Corporate* and achieve victory by 14 June. The RN's limited number of Sea Harriers, in conjunction with the expert training of it pilots, allowed for effective support of the land and naval forces throughout the South Atlantic Campaign.

The *NATO Glossary of Terms and Definitions* defines Airborne Early Warning (AEW) as the '[a]ir surveillance and control provided by airborne early warning aircraft which are equipped with search and height-finding radar and communication equipment for controlling weapon systems."[35] Modern-day AEW aircraft, such as the Boeing E-3 "AWACS," permit around the clock detection and surveillance of aircraft at various altitudes beyond the horizon, that land or sea-based radars are unable to detect. For sea or land-based air power to adequately support maritime expeditionary operations it is crucial for there to be a constant and mobile method of detecting and surveying aerial threats. AEW serves as a means of protecting forces on the ground or at sea as it allows the vectoring of one's own air assets to intercept enemy aircraft. Throughout the Falklands War, however, Argentina and the U.K. lacked AEW capability that would have otherwise allowed for a more efficient and effective employment of air assets in support of their respective maritime expeditionary campaigns.

Argentina, despite possessing a relatively modern air force and naval air arm, did not have a dedicated AEW platform. Two vintage P-2 Neptunes were in Argentina's arsenal, but these airframes were only capable of detecting surface vessels at 50 nautical miles (NM)[36] and not aircraft. This gap in Argentine aerial capability, however, was partially closed by the installation of two ground-based radar systems. They were an advanced Westinghouse AN/TPS-43F radar system coupled with a Cardion AN/TPS-44 tactical surveillance radar system

[34] Bryan Perrett, *Weapons on the Falklands Conflict* (Poole: Sterling Publishing Company, 1984), p. 75.
[35] NATO, *AAP-6 NATO Glossary of Terms and Definitions*, pp. 2-A-5.
[36] Corum, "Argentine Airpower in the Falklands War," p. 67.

which could "see" over the horizon from their positions in Port Stanley.[37] These powerful systems, manned by Argentine air force personnel, were able to determine the position of the British task force and launch air attacks against it by analyzing flight patterns of RN and RAF aircraft operating from HMS' *Hermes* and *Invincible*.[38] The major disadvantage of these ground-based radars was the fact they were static and could be readily targeted by RAF Vulcans operating out of Ascension Island, or fixed-wing aircraft of the Task Force. Nevertheless, the radars greatly assisted in vectoring Argentina's land-based aerial assets to specific targets such as HMS *Sheffield* and the *Atlantic Conveyor*, along with providing a substantial early warning capability so aircraft could avoid areas patrolled by Sea Harriers.[39] For the U.K. Task Force, however, there had to be a reliance on other stop-gap measures to offset its disadvantage in the realm of AEW, a direct result of the scrapping of the RN's fleet carriers during the 1970s.

Severe budget cuts were the driver that led to the scrapping of Great Britain's large fleet aircraft carriers during the 1970s and the fallout included the AEW capability of the RN being essentially eliminated. The withdrawal of the RN's last remaining fleet carrier, HMS *Ark Royal* in 1978,[40] left only the "Harrier carriers" HMS' *Hermes* and *Invincible*. Both lacked the ability to launch and retrieve propeller-driven Fairey Gannet AEW aircraft. Gannets required a CATOBAR-capable (catapult-assisted take-off but arrested recovery) carrier, but *Hermes* and *Invincible* were unable to support their launch and recovery because of modifications made to support the V/STOL characteristics of Sea Harriers. There was no need for catapults or arrestor wires aboard the smaller carriers as Sea Harriers utilized vectored thrust to take-off under their own power and had the ability to land vertically. When the carrier task force sailed for the South Atlantic in April 1982, the only early warning capability was the Blue Fox radar of the Sea Harrier and the onboard radars of RN Type 21 frigates which could only detect aircraft at 22 miles.[41] This was a severe shortcoming for the RN and factored into the loss of the *Sheffield* and *Atlantic Conveyor*. AEW is an enduring requirement for naval air arms if they are tasked with supporting large-scale amphibious operations. It greatly assists in protecting one's own vessels, while at the same time allowing surface forces to pursue their objectives without having to contend with the threat of aerial assault.

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[37] Ibid.

[38] Colin Clansey, "Factors Influencing the Defeat of Argentine Air Power in the Falklands War," *Royal Canadian Air Force Journal* 1, no. 4 (Fall 2012): p. 14.

[39] Ethell and Price, *Air War South Atlantic*, pp. 221-222.

[40] Kev Darling, *Fleet Air Arm Carrier War: The History of British Naval Aviation* (Barnsley: Pen & Sword Aviation, 2009), p. 236.

[41] Willard A. Buhl, "Sea-Based Airpower – The Decisive Factor in Expeditionary Operations? (Norway, 1940; Falkland Islands, 1982)," (Master's diss., Command and Staff College, 2002), p. 38.

Although the task force lacked an early warning capability comparable to what was provided by Argentina's Westinghouse and Cardion systems, there were still efforts to acquire this type of information from other areas. Argentina's tenuous relationship with neighbouring Chile meant the U.K. received significant support from this ally in the region. General Fernando Matthei, Commander-in-Chief of the Chilean Air Force, established an underground command center in Punta Arenas where the radar information from Chile's radar sites was collected.[42] At this underground site, RAF Wing Commander Sidney Edwards was permitted by Matthei to analyze the radar data and send real-time intelligence about Argentine aircraft movements, from their mainland bases, via satellite communication to British Task Force Headquarters in London.[43] Prime Minister Thatcher, reflecting after 1982 on the role Chile played in partially solving the airborne early warning issue, stated that

> [d]uring the Falklands War the Chilean air force was commanded by the father of Senator Evelyn Matthei, here with us this evening. He gave us early warning of Chilean air attacks which allowed the task force to take defensive action. The value of the intelligence was proved when it stopped. One day, near the end of the conflict, the Chilean long-range radar had to be switched off for overdue maintenance. That same day - Tuesday 8th June, a date etched in my heart - Argentinean planes attacked and destroyed our ships the Sir Galahad and Sir Tristram. They were landing ships with many people aboard and they left us with heavy casualties.[44]

Though this transmission of radar information from Chile to Task Force HQ in Britain gave the Task Force some degree of early warning, it could never adequately replace a dedicated AEW aircraft operating from the fleet.

Great Britain's elite Special Air Service (SAS) might also have played a valuable role in providing early warning to the Task Force throughout the duration of the Falklands War. *COAN* had based its force of five Super Etendards at the Rio Grande air base in Tierra del Fuego for operations against the Task Force. *Operation Plum Duff* was the planned drop of nine SAS personnel just outside this airbase to perform reconnaissance prior to an eventual and larger assault (*Operation Mikado*) by the SAS, where the Exocet-carrying aircraft would be destroyed in their hangars with the pilots to be targeted as well.[45] Despite having to land in Chile due to a combination of weather and the need to avoid detection by Argentine radar, there is a

[42] Paolo Tripodi, "General Matthei's Revelation and Chile's Role During the Falklands War: A New Perspective on the Conflict in the South Atlantic," *Journal of Strategic Studies* 26, no. 4 (2003): p. 116.
[43] Tripodi, "General Matthei's Revelation," p. 116.
[44] "Pinochet was this country's staunch, true friend," *The Guardian*, 6 October 1999.
[45] Middlebrook, *The Falklands War*, pp. 192-193.

possibility this SAS team, and perhaps another which infiltrated Argentina via Chile, successfully acted as early warning for the Task Force outside some Argentine airbases by reporting the taking-off of jet aircraft.[46] Despite attempts at solving the AEW issue, the sinking or damaging of 17 vessels by Argentine aircraft nevertheless highlights what can occur when this important piece of military technology is absent from maritime expeditionary operations.

Missile technology, another crucial component of sea and land-based air power, can have a profound impact on effective aerial support of maritime expeditionary operations. For *COAN*, French-made air-deployable AM39 Exocet anti-ship missiles proved a potent addition to the small number of Super Etendards received from France. The air-launched variant had a range of 47 miles, a speed of between 600 and 700 miles per hour, and a 364 pound blast/fragmentation warhead designed to detonate after penetrating a ship's structure.[47] With the absence of AEW capability, and the range of the RN`s Type 21 frigates` radar being restricted to 22 miles, the Exocet would take just under two minutes from the time of detection to impact. Though two minutes appears to be enough time to conduct evasive manoeuvres or deploy suitable countermeasures, breakdowns in communication are entirely possible. HMS *Sheffield* suffered such a breakdown and was lost to an Exocet attack. Unfortunately for Argentina, only five Etendards and five Exocets were in its possession when hostilities broke out on 2 April 1982.[48]

Despite the limited number of ASMs, two of the five missiles fired scored hits and this had a profound effect on the future conduct of the campaign by the U.K. Following the sinking of the HMS *Sheffield* on 4 May 1982, fear of further Exocet hits being scored against vital aircraft carriers necessitated that HMS' *Hermes* and *Invincible* be positioned further away from the Falkland Islands.[49] In doing so, the loitering time of the SHARs in the area of operations was significantly curtailed and left gaps in the protection of land and naval forces as they operated on and around the islands. The loss of the STUFT *Atlantic Conveyor*, along with the three Chinook and six Wessex transport/logistics helicopters it was carrying, resulted in the land campaign to liberate East Falkland taking longer than it initially was supposed to.[50] Instead of permitting the vertical envelopment by helicopter of Argentine positions between Port San Carlos and Port Stanley, troops of the Royal Marines, Parachute Regiment, and other units were

[46] David Boyce, *The Falklands War* (Houndmills: Palgrave Macmillan, 2005), 63; and Ken Connor, *Ghost Force: The Secret History of the SAS* (London: Cassell, 2002), p. 382.
[47] Perrett, *Weapons of the Falklands Conflict*, pp. 125-126.
[48] Martin Middlebrook, *Argentine Fight for the Falklands* (Barnsley: Pen & Sword Military, 2009), p. 121.
[49] Middlebrook, *The Falklands War*, p. 164.
[50] Derek Oakley, *The Falklands Military Machine* (Speldhurst: Spellmount, 1989), pp. 151, 154.

forced to march the entire way. Had the Argentines obtained additional Exocets, this temporary setback for the British could have been further exacerbated, including the possibility of an aircraft carrier being lost. Fortunately for the U.K., this was not the case.

Exceptional training and the flight characteristics of the Sea Harrier allowed British pilots to dominate air-to-air engagements. These advantages were greatly augmented by the advanced American-made AIM-9L "Sidewinder" heat-seeking missiles slung under the SHAR's wings as they effectively denied the Argentines any measure of control in the skies over the Falklands. This most recent iteration of Sidewinder had a speed of 1,980 mph at 40,000 feet, a range of 11 miles, and was armed with a 25 pound high explosive warhead.[51] Compared with the vintage AIM-9B, and French-made Matra AAM variants being used by Argentine aircraft, the AIM-9L Sidewinder's had two critical characteristics that made it a more effective weapon in air-to-air combat. The AIM-9L variant could lock onto enemy aircraft from virtually any angle, not just directly behind, and had a limited head-on intercept capability.[52] By giving the pilot a wide aspect from which to engage enemy aircraft with heat-seeking missiles, a greater flexibility in aerial tactics was permitted since it was no longer necessary to "get on the six" of an opposing aircraft in order to guarantee a successful hit. The potency of this new iteration of Sidewinder was demonstrated throughout the conflict by SHAR pilots. Of the 27 Sidewinders fired by RN Sea Harriers during the Falklands War, 24 missiles hit their targets and resulted in 19 Argentine aircraft being destroyed.[53] Though SHARs dominated these air-to-air engagements and suffered no losses to Argentine AAMs, this unfortunately did not translate into anything other than temporary and localized air superiority. Sidewinders nevertheless factored significantly into denying Argentina full command of the air during the conflict and permitted U.K. operations to move forward with some measure of cover.

Aerial intelligence is a vital component of maritime expeditionary operations and involves land or sea-based air power in a supporting role. If a satisfactory aerial intelligence gathering capability is not present in such operations, the land, sea, and air forces being employed in its prosecution are shrouded in the "fog of uncertainty" more so than an adversary who embraces it. Aerial intelligence can be gathered via manned reconnaissance aircraft or unmanned aerial vehicles such as drones or military satellites. The value of accurate and timely intelligence concerning what the enemy is doing beyond the frontlines cannot be overstated as it facilitates preparation and employment of one's own forces, allowing them to react and respond quickly. In the context of sea and land-based air power supporting maritime

[51] Perrett, *Weapons of the Falklands Conflict*, p. 131.
[52] Ethell and Price, *Air War South Atlantic*, p. 22.
[53] Chant, *Air War in the Falklands 1982*, p. 79.

expeditionary operations, aerial intelligence can assist all branches involved by determining the number and type of enemy aircraft at a specific airfield, how many threatening surface vessels have left a port, or where fixed artillery positions are located for the coming amphibious operation. However, throughout the Falklands War, both Argentina and the U.K. struggled to acquire this form of intelligence.

Geographically speaking, the Falkland Islands, South Georgia, and the South Sandwich Islands were right in Argentina's "backyard" during the 1982 Falklands War. For the accumulation of aerial intelligence over these islands, however, Argentina lacked a dedicated intelligence gathering and surveillance aircraft that could be used in the event of hostilities with the U.K. When the Task Force left for the South Atlantic on 5 April, Argentina needed to create an aerial intelligence gathering platform if they hoped to determine the size of the fleet and the types of vessels that were steaming southwards. In an attempt to solve this problem, three Boeing 707 transport jets of the *Escuadron II, Grupo 1 de Transporte* were pressed into service as long-range maritime reconnaissance and surveillance airframes[54] in order to keep tabs on the Task Force as it closed in on the Falklands and South Georgia. The 707s modified for the intelligence/surveillance role proved successful on one occasion. A 707 reconnaissance flight resulted in detection of the British fleet on 21 April, but was chased off by Sea Harriers and culminated in warnings by the British government to the Argentines that any such future flights would be shot out of the sky.[55] As a result, these reconnaissance 707s would only play a minor role throughout the rest of the conflict.

In addition to the 707 "stop-gap" reconnaissance aircraft, Argentina's lacklustre aerial intelligence gathering capability was augmented by satellite imagery obtained from the United States. Throughout April and May of the conflict, Argentina requested satellite imagery of the Falklands, South Georgia, and sections of the South Atlantic from NASA to be taken by LANDSAT civilian satellites.[56] Britain sternly objected to this intelligence sharing, despite the image resolution being of poor quality and having no significant military value, and the U.S. obliged them and delayed the April request, but Argentina was eventually provided the imagery in May after a second request.[57] Though the information gleaned from the short duration of 707 flights assisted the Argentines in locating the position of the Task Force out at

[54] Salvador Huertas and Jesús Briasco, *Argentine Air Forces in the Falklands Conflict* (Poole: Arms and Armour Press, 1987), p. 7.
[55] Darling, *Fleet Air Arm Carrier War*, p. 247.
[56] Lawrence Freedman, *The Official History of the Falklands Campaign, Vol. 2: War and Diplomacy* (London: Routledge, 2007), pp. 388-390.
[57] Freedman, *The Official History of the Falklands Campaign, Vol. 2*, pp. 388-390.

sea and LANDSAT imagery maybe having also done the same, RN, RFA, and STUFT vessels were constantly manoeuvring and changing course as they approached and operated around the Falklands and South Georgia. Had Argentina invested in acquiring dedicated long range maritime patrol/reconnaissance aircraft, continual surveillance of the Task Force could have occurred and information then relayed in real time to commanders on mainland Argentina, the Falklands, and South Georgia. This would have permitted a superior coordination of air and naval assets to strike at the Task Force and impinge on its ability to effectively support *Operation Corporate*.

The British, despite lacking military satellites or long-range and carrier-borne reconnaissance aircraft, were in a superior position to that of the Argentines in the area of aerial intelligence gathering capability when hostilities broke out on 2 April. This advantage permitted the U.K. to monitor Argentine military activity and better prosecute its maritime expeditionary operation. Although the British were in a superior position, this did not mean there was a complete absence of obstacles in their path. Specific intelligence on Argentina's aerial capabilities and order of battle was severely limited as the Task Force sailed towards the South Atlantic. Rear Admiral Sandy Woodward, Commander of the Falklands Battle Group, and his subordinates relied on a *Jane's* companion book on the world's fighting aircraft, along with information provided by military attachés, to paint an initial picture of Argentina's military aviation.[58] The Royal Air Force on Ascension Island had no long-range aircraft capable of conducting reconnaissance over mainland Argentina and the Falklands. Several RAF Victor tankers, however, were able to conduct reconnaissance flights to the north of South Georgia in search of Argentine naval vessels on 20 April thanks to in-flight refuelling.[59]

Fortunately for the British, Argentina's tense relationship with neighbouring Chile once again partially resolved this issue. As indicated earlier, RAF personnel were permitted by General Matthei to analyze Chilean radar information and relay this intelligence back to Task Force HQ in London. In addition to this information sharing, RAF Canberra reconnaissance aircraft of *39th Squadron* and RAF Nimrod electronic intelligence aircraft of *51st Squadron*, were given Chilean Air Force markings and permitted to operate out of Chile's Punta Arenas airbase in the south of the country.[60] The nature of the aerial intelligence gathered from these clandestine flights along the Chilean-Argentine border by RAF aircraft, however, remains unknown. It can be surmised that the presence of "oblique" cameras in some of the airframes

[58] Sandy Woodward and Patrick Robinson, *One Hundred Days: Memoirs of the Falklands Battle Group Commander* (London: HarperCollins*Publishers*, 1993), p. 104.
[59] Ethell and Price, *Air War South Atlantic*, pp. 34-36.
[60] Chant, *Air War in the Falklands 1982*, p. 33.

allowed for the observation of Argentine military activity from Chilean airspace.[61] The absence of carrier-borne and long range reconnaissance could have been a limiting factor, but fortunately for the British there was an ally next door to their enemy and they were ready to assist the U.K. in retrieving the Falklands.

Satellite imagery provided by the United States also augmented Britain's aerial intelligence capability during the war. As stated earlier, Argentina received satellite imagery of the Falklands, South Georgia, and portions of the South Atlantic from NASA's LANDSAT environmental satellites throughout the conflict despite Britain pleading with the U.S. to delay or stop the delivery of this satellite imagery. Although Britain was rightfully stupefied by the behaviour of its closest ally, it was not all bad news. The Reagan administration informed the British of Argentina's requests for the LANDSAT imagery of the South Atlantic and also made available the very same data to ensure the U.K.'s military planners would have the identical intelligence as was provided to their adversary.[62] Given the low quality of this imagery, what useful intelligence it provided to the British during their maritime expeditionary operation is difficult to determine. It is possible, however, that Argentine positions in South Georgia and the Falklands might have been visible in the photographs. Compared with the aerial intelligence provided by Chile, in the form of "early warning" and the use of RAF reconnaissance and surveillance aircraft from Chilean airfields, the LANDSAT imagery from the United States was of only marginal importance within *Operation Corporate*.

III. Serviceability and Military Interoperability

Modern jet aircraft, with their advanced avionics and onboard weapon, communication, and information systems, are mechanically and electronically complex. Much like an infantry soldier must keep his or her weapon at a satisfactory operational status, aircraft and their intricate systems must be constantly serviced since standard flight and aerial combat tax them significantly. If an aircraft is poorly serviced or maintained, the likelihood of mechanical failure increases and acceptable performance in air-to-air combat can be severely curtailed. This could result in an aircraft being declared unfit to fly and grounded. Overall poor serviceability within an air force or naval air arm can limit the total number of combat-ready airframes available for deployment in a war scenario, thereby affecting the actual conduct of any potential aerial campaign. Simply throwing more combat-ready aircraft into the sky than the enemy does not

[61] Tripodi, "General Matthei's Revelation," p. 116.
[62] Freedman, *The Official History of the Falklands Campaign,* Vol. 2, pp. 388-390.

guarantee victory, but providing well-trained aircrews with functional tools from which they can fulfill their objectives is advantageous and a critical factor for success. It is integral to the effective support by air and sea-based aviation of land and naval forces in a maritime setting. Since Argentina and Britain incorporated air power into their respective maritime strategies, serviceability was a real challenge that both states had to contend with throughout the Falklands War.

Argentina's overall number of aircraft prior to the outbreak of hostilities in the South Atlantic significantly outnumbered the Royal Navy's small force of Sea Harrier FRS.1s. Initial British estimates were not far from reality as Argentina theoretically had available around 230 offensive combat aircraft.[63] Poor serviceability of this seemingly formidable force, however, resulted in only about 50 percent being available at any one time.[64] The causes of Argentina's serviceability issues can be traced back to the aging nature of specific airframes, inadequate spares holdings as a result of arms embargos during the 1970s, and roughly 50 percent of air force and naval personnel being conscripts.[65] Compared with the all-volunteer and professionally-trained support personnel deployed by the RN to maintain and repair their SHARs Argentina's conscripted personnel were at an extreme disadvantage. Conscripts, because of their temporary status within the air force or naval air arm, were given basic instruction on aircraft maintenance and servicing. Had the Argentines fully comprehended the implications of a conscript force in such a critical area, they very well may have been able to obtain a combat readiness that would have been much higher than 50 percent.

Along with the decreased number of aircraft available for use against the British, ongoing tension with Chile over the Beagle Channel forced Argentina to maintain a sizeable military presence along the lengthy Chilean-Argentine border. With extreme serviceability issues already plaguing the air force and naval air arm, the need for the continued presence of a substantial military aviation contingent in the east of the country further reduced the numerical advantage in fixed wing combat aircraft held by Argentina. Brigadier General Ernesto Crespo, commander of *Fuerza Aérea Sur*, supposedly had 122 mainland-based *FAA* and *COAN* combat aircraft on hand for offensive operations against the British.[66] Brigadier General Lami Dozo, head of the Argentine Air Force, countered this figure when he stated the *FAA* only had 82 combat-ready aircraft in the theatre, along with 14 *COAN* A-4 Skyhawks and Super Etendards.[67] In terms of the number of sorties flown by the *FAA* in the South Atlantic, 445 were initiated

[63] Hobson and Noble, *Falklands Air War*, p. 18-19.
[64] Ibid.
[65] Burden et al., *Falklands: The Air War*, p. 110; and Hobson and Noble, *Falklands Air War*, pp. 18-19.
[66] Corum, "Argentine Airpower in the Falklands War," p. 63.
[67] Ethell and Price, *Air War South Atlantic*, p. 26.

with only 302 actually reaching their objectives.[68] Had the 230 total combat aircraft Argentina theoretically possessed actually been available for operations against the British, more sorties in support of its own maritime expeditionary operation may have been provided and potentially altered the war's outcome. Also, the increased numerical advantage *FAS* held over the RN's naval aviation capability could have facilitated many more attacks against Task Force vessels and a campaign of aerial attrition against the small number of SHARs and RAF Harriers could have been implemented. This would have effectively hampered the U.K.'s maritime expeditionary operation in the region.

Since the Royal Navy and its 20 Sea Harriers (on 1 May) were split between HMS' *Hermes* and *Invincible*, serviceability was a critical factor that allowed it to adequately protect the Task Force and best the numerically superior land-based air power of Argentina. The added demands placed on this limited naval aviation capability were a necessity because of the need to support U.K. land and naval forces during their maritime expeditionary operation. These demands were significant, but faced head on despite Sea Harrier doctrine not being suited to this newfound role. Normally, Sea Harriers, in conjunction with USN AEW aircraft, provided defensive air cover via CAP for the fleet from maritime reconnaissance, fighter, and bomber aircraft, in addition to fulfilling a naval attack role. A lack of carrier-borne AEW aircraft forced the available SHARs to be in the air more frequently in order to prevent any gaps in aerial coverage of the Task Force. A typical CAP over the Task Force in 1982 involved 18 SHARs (three flights of two on CAP, six en route to relieve them, and six returning to their carriers after being relieved) and this would have been impossible if serviceability of these 20 airframes was not satisfactory.[69] Despite lacking downward-facing radars capable of picking up low-flying aircraft, Sea Harriers partaking in CAP over the Task Force proved effective in protecting the RN's two vital aircraft carriers from aerial attack.

In the Falklands theatre, SHAR pilots found themselves having to undertake more tasks than just fleet air defence due to the lack of land-based air power. As a result of this shortcoming, ground attack, CAS, offensive counter-air, and reconnaissance sorties were also required of this small force of 20 Sea Harriers. To deliver on the multitude of tasks required without causing the airframes to fall apart or have the advanced systems malfunction, maintenance and repair crews were fully engaged aboard the two aircraft carriers, ensuring the SHARs were at a high state of combat-readiness. Aboard HMS *Hermes* for example, 13 of the 14

[68] Anthony H. Cordesman and Abraham H. Wagner, *The Lessons of Modern War Volume III: The Afghan and Falklands Conflicts* (Boulder: Westview Press, 1990), p. 302.
[69] Burden et al., *Falklands: The Air War*, p. 190.

SHARs carried were combat-ready at the start of the day's operations before falling to 10 following the flying of 45 sorties by day's end.[70] Even though it was a decrease of three aircraft, the quick turnaround of SHARs meant that by the next day, *Hermes* would be operating at near full strength again. This level of serviceability was something the Argentines simply could not match.

A direct outcome of the Royal Navy's superior serviceability and maintenance of its Sea Harriers was an impressive sortie generation rate within the area of operations as compared to what the numerically-superior Argentines accomplished. Due to a 90 percent availability rate, a direct consequence of exceptional serviceability and maintenance standards, SHARs and RAF Harriers undertook a total of 2,376 sorties (1,100 air defence, 215 ground attack, and other miscellaneous sorties) throughout the campaign.[71] This sortie rate was nearly seven times what the Argentine Air Force alone managed during the war. Because of the efforts put forth by the RN maintenance and repair crews onboard *Hermes* and *Invincible*, sorties over the area of action were 3:2 in favour of the British with an overall sortie rate being six times that of Argentina's land-based *Fuerza Aérea Sur*.[72] For such a small force, roughly 20 to 30 RN Sea Harriers and RAF Harriers, to attain a superior presence over the Falkland Islands when outnumbered 5 or 6:1 in fixed-wing jet combat aircraft was an impressive and critically important achievement. Of the sorties flown, 90 percent were undertaken with fully operational main avionics.[73] By maintaining such a high availability rate for the small number of Sea Harriers and RAF Harriers, the gap in numerical superiority enjoyed by Argentina's 100 to 120 fixed-wing combat jet aircraft was narrowed. Superior serviceability made certain an effective fleet air defence of the Task Force could be undertaken, while at the same time supporting the ongoing maritime expeditionary operation. Unfortunately, the limited number of V/STOL aircraft meant they could not be everywhere at once in the area of operations, which accounts for the sinking or damaging of numerous British vessels.

Military interoperability is defined by NATO as "the ability of military forces to train, exercise and operate effectively together in the execution of assigned missions and tasks."[74] Modern militaries with their army, navy, and air force branches have the potential to assist each other in attaining specific objectives in a war scenario. If the army, navy, and air force are fighting a war independently and not providing mutual assistance to one another, three

[70] Braybrook, *Battle for the Falklands (3): Air Forces*, p. 25.
[71] Department of the Navy, *Lessons of the Falklands*, p. 27; and Cordesman and Wagner, *The Lessons of Modern War Volume III*, p. 302.
[72] Steve Jeremy, "Maritime Air Power," *RUSI Defence Systems* (Autumn 2004): p. 84.
[73] Cordesman and Wagner, *The Lessons of Modern War Volume III*, p. 333.
[74] NATO, *AAP-6 NATO Glossary of Terms and Definitions*, p. 2-M-6.

different wars are being fought concurrently and unity of effort is absent. Effective military interoperability or "jointness" ensures that each branch, from the lowest rank on up to the commander, is well-versed in how to properly work with other military arms in pursuit of a common objective. In the context of maritime expeditionary operations, the requirement of these distinct components of a modern military to work in coordination with each other to achieve specific objectives is an absolute necessity if success is to be attained. The unique nature of air power is that it allows aircraft to directly support the army and navy because of the medium from which they operate. The 1982 Falklands War featured the employment of land-based air power by Argentina and naval aviation by the U.K. in support of their respective maritime expeditionary campaigns in the South Atlantic. Military interoperability exhibited by the two combatants, however, was not balanced and serves as another key factor in explaining *why* the U.K.'s limited naval aviation capability proved superior to Argentina's land-based *FAS* in supporting a maritime expeditionary operation.

Because Argentina's air force doctrine was geared towards short-range strike missions into Chile and the provision of CAS missions to support Argentine ground troops, it was implied that interoperability was in place within the Argentine military and that they were satisfactorily trained for this. The actual prosecution of the war in the South Atlantic, however, revealed that this form of military interoperability had not been satisfactorily achieved. Unity of effort and coordination of these joint forces in pursuit of a single objective, or objectives, should have been prepared for as the Task Force approached the South Atlantic on 5 April. The unique nature of a maritime expeditionary operation in the Falklands necessitated effective coordination of the army, navy, and air force, but this rarely occurred during the campaign. This was directly attributable to the failure of Argentina's armed forces to centralize its command structure, maximize integration, fully use all forces available, and offer mutual support.[75] A clear indicator of Argentina's failure in the realm of interoperability was the military junta placing the heaviest load on *FAS* aircraft to carry out the campaign against the Task Force.[76] Coordination with the navy and army was minimal, meaning that Argentina's potent aerial capability was fighting the war in relative isolation from the other branches. General Crespo, commander of *FAS*, reinforced this assessment when he stated Argentina had no doctrine for joint operations and that "there [were] three forces totally different in their conception and strategy for joint action."[77] Overall, the "jointness" of command and strategy

[75] Rodolfo Pereyra, "Clausewitz and the Falkland Islands Air War," *Air & Space Power Journal* 20, no. 3 (Fall 2006): p. 115.
[76] Buhl, "Sea-Based Air Power: The Decisive Factor in Expeditionary Operations?" p. 50.
[77] Cordesman and Wagner, *The Lessons of Modern War Volume III*, p. 328.

expected of modern militaries was clearly missing throughout Argentina's prosecution of the war and affected its outcome. The end goal was common to the different arms of the Argentine military but there was no integrated plan to allow for maximization of all her assets.

Actual instances of effective interoperability displayed by Argentine air assets during the Falklands War were few. Argentina's mainland-based combat aircraft, deployed by *FAS* over the Falklands, lacked sufficient fuel capacity and as such could not remain over the area of operations and provide CAS to ground or naval forces if required. Instead, strikes against U.K. vessels or ground positions were conducted with haste and then the aircraft "exfiltrated" almost immediately thereafter. The burden of CAS and ground attack, as a result of this deficiency, fell to a limited number of propeller-driven and light jet aircraft. On 29 May, *FAA Pucara* propeller-driven counter-insurgency planes stationed on the Falklands conducted CAS and ground attack missions in support of Argentine troops at Goose Green and Darwin.[78] Ultimately, however, British forces seized both locations from Argentine troops and continued their advance through East Falkland. Effective interoperability between the different aerial contingents within *FAS*, much like support for the ground forces, was rarely on display. Ineffective Argentine unity of command and strategy resulted in the *FAA* and *COAN* combat aircraft only operating in conjunction with each other to attack Task Force vessels with two weeks left in the war. On 30 May, Argentine Air Force A-4 Skyhawks and navy Super Etendards operating from bases in southern Argentina worked together for the first time in a failed attack against HMS *Invincible*.[79] Though this event was a demonstration of effective interoperability, the infrequency of such action ensured it did not translate into tangible results for Argentina's maritime expeditionary operation.

The United Kingdom's limited naval aviation capability in the Falklands benefitted from training and doctrine which emphasized interoperability with NATO forces in the North Atlantic and Western Europe. Compared with Argentina's military, which lacked comparable doctrine and training relative to interoperability, the small contingent of RN Sea Harriers and RAF Harriers were able to effectively support naval and land forces in the execution of their respective campaigns within *Operation Corporate*. The CAPs over the carrier Task Force, which involved 18 SHARs as part of a "defence in depth" arrangement to protect the two vital aircraft carriers and other important vessels, were, for the most part, successful. The amphibious component of the Task Force, when it moved beyond the protection of these CAPs to land troops and equipment at Port San Carlos, however, suffered numerous vessel losses to Argentine air attacks. Prior to the arrival of RAF Harrier GR.3s in mid-May, SHARs also

[78] Rivas, *Wings of the Malvinas*, pp. 112-115.
[79] Freedman, *The Official History of the Falklands Camapign, Vol. 2*, p. 545.

undertook ground attack sorties against Argentine airfields at Port Stanley, Darwin, and Goose Green, even though these V/STOL aircraft were not intended to fulfill this role.[80] SHAR effectiveness in undertaking ground attack missions was limited because of the ordinance the aircraft could carry, their radars not being well-suited for ground attack, and a lack of training in this area.[81] Nevertheless, the RN's Sea Harriers displayed an impressive versatility which allowed them to protect the carrier Task Force from Argentine aircraft and undertake several ground attack sorties before the arrival of a squadron of the aforementioned RAF Harrier GR.3s in mid-May.

The RAF;s *1st Fighter Squadron* operating Harrier GR.3s, despite being land-based and tailored for ground attack, CAS, and reconnaissance on the European continent,[82] participated in the U.K.'s maritime expeditionary operation in the South Atlantic. 1(F) Squadron was initially deployed aboard HMS *Hermes* before some of the aircraft were later transferred to a forward operating base (FOB) in San Carlos on East Falkland on 1 June.[83] Effective interoperability between Harrier GR.3s and U.K. ground forces was displayed on several occasions throughout the war. The Battle of Goose Green, which saw elements of the Parachute Regiment attack a formidable Argentine force in the area, benefitted greatly from ground attack and CAS sorties carried out by aircraft of 1(F) Squadron. Assistance to the advancing "Paras" at Goose Green took the form of multiple sorties using cluster munitions and two-inch rockets to neutralize camouflaged Argentine positions and their heavy 35 mm anti-aircraft guns.[84] Compared with the small number of ground attack and CAS sorties conducted by mainland-based Argentine aircraft during the war, RAF Harriers were the polar opposite of their opponent. In total, some 130 low level ground attack sorties were undertaken by just one squadron of GR.3s during the campaign.[85] Aircraft of 1(F) Squadron, operating from HMS *Hermes*, often performed missions in support of ground troops while stretched out to the very maximum of their combat range. With the establishment of a FOB at Port San Carlos capable of handling RAF Harriers, however, range issues were overcome. Nine Harriers based at this FOB were able to respond to CAS/ground attack requests from land forces within 25 minutes.[86] Their specific CAS/ground attack role was well-suited for the campaign once this Harrier FOB

[80] John E. Marr, *War in the Falklands: Perspectives on British Strategy and Use of Air Power* (Research Report, Montgomery: Air War College, 1988), p. 39.
[81] Marr, *War in the Falklands*, p. 39.
[82] Jerry Pook, *RAF Harrier Ground Attack - Falklands* (Barnsley: Pen & Sword Aviation, 2011), pp. vii-vii.
[83] Pook, *RAF Harrier Ground Attack*, p. 132.
[84] Cordesman and Wagner, *The Lessons of Modern War Volume III*, pp. 316, 327.
[85] Pook, *RAF Harrier Ground Attack*, p. 180.
[86] Cordesman and Wagner, *The Lessons of Modern War Volume III*, p. 317.

was established and facilitated effective interoperability between air and ground units during the land phase of *Operation Corporate*.

IV. Geography and Logistics

For Argentina and the United Kingdom, the geographic distances separating them from the Falkland Islands were radically different. The Falkland Islands are roughly 300 miles from mainland Argentina and over 8,000 miles from the United Kingdom. Military combat aircraft, at the time of the Falklands War, were capable of operating over land and sea at great speeds because of their powerful jet engines. A consequence of this technology was the limited range of some of these aircraft as compared to their propeller-driven predecessors. Though the geographic location of the area of operations was a factor which could not be physically altered, it nevertheless was something that required consideration in the planning and execution of both maritime expeditionary operations. Argentine air power, despite having the battlefield right in its "backyard," was profoundly affected by geographic considerations. The 300 mile distance heavily influenced Argentina's employment of its air assets against the *Las Islas Malvinas* and the Task Force. The 8,000 mile distance separating the Falklands from the U.K., as well as the 4,000 miles between Ascension Island and the Falklands, restricted the type of air power and the number of aircraft that could be used to liberate the islands. Geography represented a substantial obstacle for both Argentina and the U.K., but each military had the ability to overcome this impediment and utilize their different forms of air power to effectively assist the other branches as they undertook this maritime expeditionary operation.

Brigadier General Crespo's *Fuerza Aérea Sur*, despite having an area of operations 300 miles off the Argentina's eastern coast, were hampered by the limited range of his *FAA* and *COAN* high-performance jet aircraft. Recognition of the limited range of the *FAA's* A-4 Skyhawks, Mirage IIIs, and Daggers was factored into the aerial doctrine, training, and tactics to be utilized in a possible war with neighbouring Chile. Short-range strikes and CAS missions into Chile did not force *FAA* aircraft to operate at their maximum combat ranges nor did it necessitate the development of a large air-to-air refuelling capability. In the South Atlantic, however, this lack of preparation for long range strike missions and the absence of a sufficient air-to-air refuelling capacity exacerbated the geographical distance separating Argentine airbases from the Falklands and the Task Force vessels lurking further east of the islands. *FAS*, however, did have a small air-to-air refuelling capability for some of its aircraft. Two *FAA* propeller-driven KC-130 Hercules aircraft were retrofitted with an air-to-air refuelling capacity, but only *COAN* Skyhawks and Super Etendards had the necessary in-flight refuelling

equipment to effectively utilize these valuable assets.[87] The ability of COAN's 15 aircraft to refuel in flight resulted in the successful Exocet attacks against HMS *Sheffield* on 4 May and the STUFT vessel *Atlantic Conveyor* on 25 May.[88] Because the *FAA's* Skyhawks, Mirage IIIs, and Daggers did not have the appropriate equipment, only 10 percent of *FAS's* 122 aircraft were able to refuel in flight. The consequence of this was that most Argentine aircraft were operating at their maximum combat ranges when engaged in strike or anti-ship sorties, leaving little fuel to engage SHARs in air-to-air combat.[89] Had more dedicated airborne refuelling aircraft been acquired, and air force fighter aircraft been provided with in-flight refuelling equipment, geography would have been a less of an issue. More effective support to land and naval forces would have also been possible and air-to-air combat with the SHARs could have been undertaken.

Range issues, which afflicted the Argentine land-based air power, impaired their ability to properly support a maritime expeditionary operation and properly challenge the U.K.'s air power. This might have been alternatively solved by moving frontline jet combat aircraft to airfields on the Falklands. Doing so would have increased the reach of *FAS* strike and fighter aircraft further into the South Atlantic from where the Task Force was managing their operations against the Argentine presence in the Falklands arena. The main runway at Port Stanley's airfield, however, was unable to support the landing and taking-off of *FAS* Skyhawks, Daggers, Super Etendards, or the *Mirage IIIs*. Even though a 200 foot extension of the 4,000 foot runway was completed, failure to further lengthen it prevented *FAS* high performance jet aircraft from being able to use their 400 to 500 mile combat radius to strike further out into the South Atlantic.[90] Had the runway been adequately extended, and Exocet-carrying Super Etendards of *2d Escuadrilla* been relocated from Rio Grande to Port Stanley, HMS' *Hermes* and *Invincible* would have been forced to operate even further away from the Falklands. SHARs and RAF Harriers, as a result of having to fly increased distances, would have had much less time to linger over the area of operations and support the U.K.'s maritime expeditionary operation. Unfortunately for the Argentines, they failed to adequately deal with geography while defending *Las Islas Malvinas* using land-based air power. By not recognizing the need for a better air-to-air refuelling capability and neglecting an extension of the runway at Port

[87] Department of the Navy, *Lessons of the Falklands*, p. 27.
[88] Middlebrook, *Argentine Fight for the Falklands*, pp. 121-124, 174-175.
[89] Craig G. Lokkins, *The Falklands War: A Review of the Sea-Based Airpower, Submarine, and Anti-Submarine Warfare Operations* (Research Report, Montgomery: Air War College, 1989), pp. 9-10.
[90] Hezsely, *Argentine Air Power in the Falklands War*, pp. 18-19.

Stanley, Argentina's ability to influence its own maritime expeditionary operation, and defeat the U.K.'s, was substantially limited.

Geographically, the 8,000 mile distance separating the United Kingdom from its Overseas Territories in the South Atlantic was clearly a severe disadvantage. The need for long-range fighter and bomber aircraft for operations outside of the NATO area was never contemplated by successive British governments. In the context of aerial support for the land and naval components of *Operation Corporate*, no land-based aircraft had the range to reach the Falklands from the U.K. RAF Avro Vulcan bombers, however, were capable of traversing the 4,000 mile distance to the Falklands from Ascension Island with the benefit of air-to-air refuelling. In order for these "Black Buck" Vulcan raids to occur, this complex and demanding air-to-air refuelling process was required. A typical mission involving one or two Vulcans required the 11 Victor tanker aircraft to refuel each other and the bombers frequently throughout the flight to the Falklands.[91] Geography ensured the Black Buck raids were infrequent due to the high cost in tanker resources, but they may have resulted in Argentina holding and repositioning some of its *Mirage III* fighters on the mainland for defence against potential Vulcan attacks.[92] The U.K. was able to mitigate the geographic disadvantage and allow for more frequent and direct support of land and naval forces. It was naval aviation operating from HMS' *Hermes* and *Invincible* that was the critical solution and facilitated this support.

Aircraft carriers, by their very nature, act as moveable airfields capable of launching and retrieving aircraft while making way at sea. The presence of aircraft carriers in the Task Force permitted the huge geographic advantage Argentina might have enjoyed to be brought down to a geographic "parity" with the U.K. *Hermes* and *Invincible*, however, were unable to fully overcome geography and maximize this factor since they were never placed close enough to the coast of the Falkland Islands. This was due primarily to the threat posed by Exocet-carrying Super Etendards of *2d Escuadrilla* based on the mainland, and also because of the potential for attack by Argentine aircraft operating from smaller airfields on the Falklands. To minimize the possibility of Exocet and air attack from aircraft based on the Falklands, the Task Force's position relative to the islands had to be safe. Admiral Woodward restricted the movement of his aircraft carriers and escort vessels to a roughly 100 mile arc east of the Falklands so his SHARs and helicopters could reach the islands and conduct sorties.[93] The distances flown by SHARs and RAF Harriers to reach the Falklands, as a result of the positioning of both carriers,

[91] Ethell and Price, *Air War South Atlantic*, p. 45.
[92] Ethell and Price, *Air War South Atlantic*, p. 218.
[93] Middlebrook, *The Falklands War*, pp. 155-156.

allowed for just 20 minutes of on-station time.[94] Only when a FOB at San Carlos was established on 1 June did the U.K. attain some semblance of a geographic balance with the Argentines. Without aircraft carriers, the extreme geographic disadvantage British air power faced could not have been overcome and effective support for the maritime expeditionary operation would have been near impossible.

Logistics is defined in the *NATO Glossary of Terms and Definitions* as "[t]he science of planning and carrying out the movement and maintenance of forces."[95] Militaries, if they seek to operate for prolonged periods in the field, must devote considerable time and effort to the logistical component of their campaign. Military personnel, ammunition, equipment, vehicles, fuel, and spare parts need to be quickly and efficiently moved to the frontlines or forces in the field would be ineffective during prolonged operations. In the context of air power, whether it is land or sea-based, a substantial logistical effort supporting its movement and maintenance is required. Mechanically-complex jet aircraft routinely need maintenance and ready access to spare parts to remain combat-ready. Munitions and aviation fuel, particularly during extended air operations, are consumed at a rapid pace and need frequent replenishment. If aircraft are lost in combat, they need to be replaced in order to prevent one's aerial capability from being worn down through attrition. The Falklands War saw the employment of two radically different military aviation logistical apparatuses by Argentina and the U.K. Argentina's mainland-based frontline jet aircraft appeared to hold a great advantage over the carrier-based aircraft of the Task Force in terms of logistics. Although the Argentines did not have to rely on a tenuous 8,000 mile supply line stretching from the U.K. to Ascension Island and then on to the Falklands, there were nevertheless logistical issues which significantly hindered their ability to effectively support land and naval forces on *Las Islas Malvinas*.

Argentina's air power, throughout the conflict, was plagued by a logistical issue tied to serviceability and this greatly affected its performance in the skies over the South Atlantic. Unlike the near-identical SHAR and Harrier GR.3 airframes used by the British in the conflict, Argentina utilized various airframes of American, French, and Israeli manufacture. To maintain and repair such a wide variety of jet aircraft necessitated that an adequate stockpile of spare parts for each type be acquired prior to engagement in a war scenario. The *FAA* and *COAN*, however, did not undertake any such pre-emptive stockpiling of spare parts prior to Argentina's occupation of *Las Malvinas*. A lack of spare parts for *FAA* and *COAN* aircraft affected overall serviceability of Argentine air power, cutting down the number of combat-

[94] Lokkins, *The Falklands War*, p. 5.
[95] NATO, *AAP-6 NATO Glossary of Terms and Definitions*, p. 2-L-5.

ready aircraft by about 50 percent.[96] For Crespo's *FAS*, this resulted in less aircraft being available to him for operations in the South Atlantic. Various iterations of the American-made A-4 Skyhawk fighter-bomber used by the *FAA* and *COAN*, for example, suffered from a lack of spare parts because of an arms embargo instituted by the Carter administration in response to human rights abuses during the "Dirty War." Of 25 refurbished A-4C Skyhawks delivered to the *FAA* from the USN in 1976, several were not in an airworthy state and were grounded because the American arms embargo prevented delivery of much-needed spare parts.[97] The five new and modern French-made Super Etendards of *2d Escuadrilla* also suffered from a lack of spare parts. Due to a French arms embargo following Argentina's occupation of the Falklands, one of the Super Etendards served as a source of spare parts for the other four aircraft.[98] Logistically, Argentina failed to understand the importance of having an adequate supply of spare parts for its jet aircraft before taking the first step and the resultant demanding war in the South Atlantic. More aircraft, with an appropriate supply of spare parts, could have been introduced to better support the army and navy against the Task Force, but arms embargos and a lack of foresight prevented this from occurring.

In the logistical realm of advanced munitions, the French-made air-launched AM39 Exocet anti-ship missile proved to be a potent addition to Argentina's arsenal during the Falklands War. This was highlighted when it was used successfully to sink HMS *Sheffield* and the STUFT vessel *Atlantic Conveyor*. As already mentioned, five of these advanced missiles were supplied to Argentina's naval aviation branch along with the five Super Etendards capable of launching them. However, *COAN* was due to receive a further nine Etendards from France[99] and more Exocets before the war in the South Atlantic started. Argentina's decision to start a war before it procured a sufficient number of Exocets, and the aircraft capable of launching them, was a surprising choice and somewhat equivalent to giving an infantry platoon one ammunition magazine to share between them in a firefight. Once the war actually began, Argentina realized its logistical gaff of not securing enough of these missiles and attempted to obtain more of them through other means, including the black market and from allies in the region. Britain's Secret Intelligence Service (MI6), with the help of France, caught wind of Argentina's efforts to acquire more Exocets and was given permission by Prime Minister Thatcher to buy up any on the black market.[100] Peru requested an expedited delivery of the Exocets it had ordered from France, but the British and French realized these missiles would

[96] Hobson and Noble, *Falklands Air War*, p. 19.
[97] Burden et al., *Falklands: The Air War*, p. 110.
[98] Ethell and Price, *Air War South Atlantic*, p. 26.
[99] Hobson and Noble, *Falklands Air War*, pp. 18-19.
[100] Burns, *The Land That Lost Its Heroes*, pp. 191-192.

likely be given to Argentina and delayed the order.[101] Due to the combined efforts of MI6 and France, Argentina was limited to the five Exocets it received ahead of the actual war. The U.K. saw an opportunity to disrupt one component of Argentina's air power logistical apparatus and prevented an already potent threat to its vessels from being increased exponentially.

The United Kingdom's efforts to establish and maintain an 8,000 mile logistical supply line for the Task Force as it sailed towards the South Atlantic was a massive undertaking on fairly short notice. Without the flow of munitions, aviation fuel, spare parts, and replacement aircraft in support of the limited naval aviation capability afforded by HMS' *Hermes* and *Invincible*, the critical aerial support of the land and naval forces during *Operation Corporate* would have been seriously compromised. Unlike nuclear-powered USN aircraft carriers, vessels in the Task Force, including *Hermes* and *Invincible*, were conventionally powered and relied on a large number of support and auxiliary vessels of the Royal Fleet Auxiliary to provide them with fuel and other supplies while making way. Unfortunately, the U.K.'s unpreparedness for such a large operation so far away from their area of responsibility within NATO proved beyond the abilities of both the RN and RFA. The requisitioning of 50 civilian STUFT, such as tankers, ferries, cruise liners, and cargo vessels, to augment RN and RFA capabilities[102] allowed for vital resources such as aviation fuel, spare parts, and munitions for the SHARs and Harriers to be transported to the area of operations. Throughout the campaign, the conventionally-powered Task Force was forced to rely on having at least one support ship for every combat ship[103] thus proving the need for STUFT vessels to augment the RN and RFA. During the 21-day transit from the U.K. to the South Atlantic, 2,000 replenishment at sea (RAS) operations were completed, of which 1,500 involved refuelling while the remaining 500 involved the transfer of 15,000 packet loads.[104] These RAS operations allowed the vessels of the Task Force, including the aircraft carriers, to reach the Falklands in three weeks. Despite the U.K. having such a tenuous logistical situation, it was not interdicted by Argentina and they were able to continue to supply the Task Force's SHARs and Harriers with the fuel, munitions, spare parts, and replacements required to effectively support the overall operation.

Ascension Island, lying roughly 1,000 miles off the east coast of Africa and 4,000 miles from the Falklands, is a British possession which in 1982 served as a valuable asset to the U.K.'s logistical effort in the South Atlantic. Because of the excellent anchorages off its shores, Ascension served as a Forward Operating Base (FOB) for the Task Force where ammunition,

[101] Ibid.
[102] Cordesman and Wagmer, *The Lessons of Modern War Volume II*, p. 331
[103] Ibid,, pp. 330-331.
[104] Ibid., p. 331.

stores, and POL (petrol, oil, and lubricants) were built up and delivered via helicopter to the vessels before they proceeded on to the Falklands.[105] Though it was located 3,500 miles away from where the expeditionary operation was to take place, Ascension nevertheless offered a convenient location where vessels of the Task Force could stockpile much needed logistical material. The United States, which was leasing the Ascension's airfield from the U.K. at the time, used the island as a dropping off point for items essential to the British war effort. United States Air Force (USAF) tanker aircraft flew in large amounts of aviation fuel so RAF and RN aircraft operating on the island would not be facing shortages.[106] Aviation fuel provided by the Americans was then transferred to *Hermes* and *Invincible* in order for the carriers to be at full capacity as they made the final leg of their journey to the South Atlantic.

Ascension also served as dropping off point for vital munitions for the RN's Sea Harriers. In addition to the aviation fuel, large numbers of American-made AIM-9L Sidewinder air-to-air missiles were also delivered to the British on Ascension Island by USAF aircraft.[107] According to Admiral Woodward, if it were not for the Americans supplying the quantities of AIM-9Ls that they did for the British, "the Sea Harriers would not have been good enough."[108] Clearly, the limited naval aviation capability delivered by the RN's two aircraft carriers extracted great benefit from Ascension. The island permitted the stockpiling of valuable items relevant to the coming aerial campaign and served as a drop-off point for American-supplied aviation fuel and potent Sidewinder missiles. The supply of AIM-9Ls in particular was a critical component of the U.K.'s logistical effort as it facilitated the SHARs domination of air-to-air engagements. By denying Argentina air superiority, mainly because of Sidewinder's effectiveness, the land and naval components of *Operation Corporate* were able to more easily move forward.

Conclusion

The 1982 Falklands War witnessed the armed forces of Argentina and the United Kingdom venturing well outside of their comfort zones as they each engaged in maritime expeditionary operations in the treacherous South Atlantic. Each expected to be fighting a specific enemy in a different geographical region of the world. Both trained for these

[105] Valerie Adams, "Logistic Support for the Falklands Campaign," *The RUSI Journal* 129, no. 3 (1984): p. 46.
[106] Middlebrook, *The Falklands War*, p. 91.
[107] Woodward and Robinson, *One Hundred Days*, p. 118.
[108] Ibid.

hypothetical war scenarios and were unprepared when hostilities broke out in April 1982. Aerial warfare was a critical factor for both combatants in the skies over the South Atlantic and was absolutely necessary to assist land and naval forces in their efforts to either hold *Las Islas Malvinas* or plant the Union Jack firmly back on the Falkland Islands. *Why* the U.K.'s limited naval aviation capability of 20 to 25 Sea Harriers and a squadron of RAF Harrier GR. 3s proved more able to satisfactorily support a maritime expeditionary operation than Argentina's land-based air power cannot simply be explained by one or two factors. Both sides suffered shortcomings in areas crucial to the effective employment of military aviation in this role and excelled in others. For example, aircraft carriers and their complements of V/STOL SHARs permitted sea-based air power to influence the conduct of the campaign in the South Atlantic, but by themselves did not guarantee victory. Instead, there are many factors applicable to both land and sea-based air power that directly influence their effectiveness in warfare.

The nine factors explored in this paper showed how, despite disadvantages numerically, geographically, logistically, and in the areas of airborne early warning and aerial intelligence, SHARs were sufficiently able to support their land and naval forces in the South Atlantic by excelling in other areas. Some of these deficiencies were partly or fully solved with the impressive serviceability of SHARs/Harriers, mobility of aircraft carriers, assistance from Chile, the requisitioning of STUFT vessels, and the presence of Ascension Island in the South Atlantic. But the Royal Navy's aviators overcame their Argentine adversaries because of superiority in the areas of training, air-to-air tactics, the V/STOL Sea Harrier/Harrier, "Sidewinder" missiles, and interoperability. The 1982 Falklands War serves as a valuable case study when analyzing the integral role air power, whether it is land or sea-based, plays in maritime expeditionary operations. The nine factors explored throughout this essay should serve as a guide for the effective employment of air power in support of such operations, otherwise the same mistakes made by the British and Argentines in 1982 are doomed to be repeated.

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