

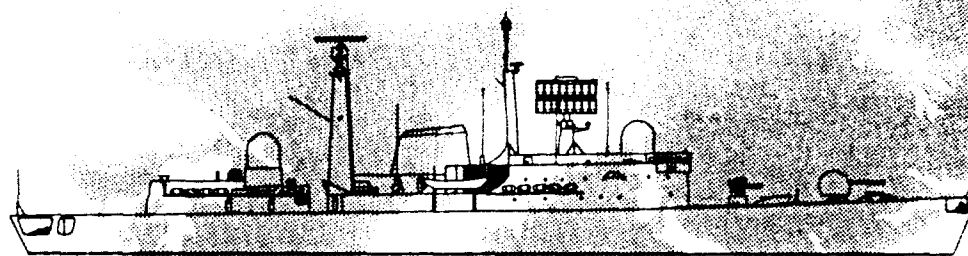
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LESSONS OF THE FALKLANDS

SUMMARY REPORT

FEBRUARY 1983



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Office of Program Appraisal
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Washington, D.C. 20350

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1. OVERVIEW

A. INTRODUCTION

The Falkland Islands conflict included the first truly naval confrontation since the Pacific conflict in World War II.

In trying to relate the lessons--and there are many to be learned from the Falklands war--to a potential conflict with the Soviet Union, we first need to look at the conflict in absolute terms and then consider it in the light of Soviet-U.S. capabilities.

The essential lesson from the Falklands is confirmation of how well the U.S. Navy and Marine Corps would have been prepared for a similar event. U.S. Navy and Marine Corps forces have been structured to project power and carry out actions of this nature anywhere on the globe.

Most of what happened in the South Atlantic supports the judgments that underlay all that is being done in this Administration's naval recovery program. These efforts are based on almost 40 years of post-World War II experience in U.S. naval operations in peace and hostilities, with extensive and sustained operations in European, Asian, and Indian Ocean waters, often under tense regional conditions and in close proximity to Soviet operating forces.

The overall lessons of the Falklands conflict are currently being studied in great detail by a study group formed by the Secretary of Defense. That effort is expected to be completed in the Summer of 1983. The purpose of this report is to present an unclassified summary of the Department of the Navy's study of the conflict in the South Atlantic.

B. PERSONNEL

As in nearly every battle in recorded history, the performance, training, and morale of the personnel involved were the most important determinants in the outcome. The Argentine armed forces relied heavily on conscription and had a low experience level, being trained primarily for internal security and border defense.

British armed forces, like their U.S. counterparts, are entirely volunteer. Their training and exercising is oriented toward combat against the Soviet armed forces) and they participate extensively in a wide variety of offensive and defensive NATO military exercises. The performance and morale of personnel in all elements of the British forces was uniformly high, and their training and experience were significantly higher than were the Argentines'.

Argentine Air Force and Navy pilots performed extremely effectively, demonstrating a high degree of dedication and courage. The

approximately 1,000 Argentine Marines who took part in the conflict showed a considerably higher level of experience and morale than their Army counterparts, who were generally young, inexperienced conscripts with only a few months service and only minimal training. A comparison of staff planning, logistic support, troop employment, and overall combat condition of ground troops suggests a substantial British advantage in quality of leadership preceding and during the battle.

C. INTELLIGENCE

Next to personnel, the most important determinant of the battle outcome appears to have been intelligence. From a variety of technical and other sources, the British forces had available to them substantially better information regarding Argentine force levels, deployments, tactics and intentions than had the Argentine forces about those of the U.K. Some knowledgeable observers go so far as to say that without that substantial intelligence edge, the outcome would have been reversed. The experience of the Falklands has demonstrated that it is necessary to have accurate, up-to-date information on weapon and sensor systems capabilities worldwide. This includes allies as well as potential adversaries. Efforts must be enhanced to collect and analyze information on all potential threats--not merely on the major threat, the Soviet Union.

D. DEFENSE IN DEPTH

There are obvious limitations in extrapolating useful comparisons from a very limited conflict. However, the repeated success of Argentine aircraft in penetrating British defenses in daylight, and attacking forces afloat and ashore, provides a sound basis on which to draw some lessons. The British fleet lacked adequate fleet air defense in depth, including the essential keystone of Airborne Early Warning and long-range air defense fighters with multiple missile capability. Virtually none of the aircraft which hit the British ships from mainland bases in Argentina could have done so had there been modern, full-sized carrier airwings in the opposing force. A well-rounded complement of aerial surveillance aircraft, interceptors, antisubmarine aircraft and all-weather attack bombers would have made all the difference. The British were further hampered by a lack of modern radars, target identification systems, data management systems, and electronic warfare equipment in their fleet.

The outer air defense rarely consisted of more than four SEA HARRIERS, each with a short-range intercept radar, carrying only two air-to-air missiles each. Due to the range of the patrol stations from their carrier bases, the SEA HARRIERS were capable of maintaining station for only about 20 minutes. Against the large number of attackers that penetrated this very thin air defense outer barrier, British surface-to-air missile systems like SEA DART and SEA WOLF, although often saturated, generally performed better than expected. But because their combatant ships lacked adequate "last ditch" close-in weapons, the British were unable to knock down the remaining bombers reaching the fleet. Of course, the

merchant-type ships had little or no defenses. Two destroyers, two frigates--all equipped with missiles and guns--a landing ship and a merchant ship were lost. Another nine ships were hit by bombs which, had they detonated, could have caused their destruction. That they did not was both a tribute to the courage of the Argentine aviators for pressing the attacks so close in an effort to evade British defenses and still bomb their targets--and a lesson that inattention to ordnance fuzing can negate the best military performance. Seven antiship missiles were launched, five from aircraft and two from shore launchers. Three ships were hit by these missiles, and two of those were lost, but to fire, not to the explosions of the missiles. In fact, the missiles that hit HMS SHEFFIELD and the ATLANTIC CONVEYOR probably failed to detonate. These attacks are being studied carefully--the tactics employed and the weapons systems involved--with a view toward improving U.S. Navy point defense systems, and the Navy is working toward more rapid installation of antimissile systems, such as NATO's SEA SPARROW, VULCAN PHALANX, and the RAM (Rolling Airframe Missile) system. It is important to remember that--with its vastly superior early warning and outer air battle assets--the percentage of "leakers" which could get through to an American force would be significantly lower than in the Falklands. Those that did get through would still have to face a much thicker and more capable set of close-in defense layers than the British were able to provide.

Electronic warfare equipment, to detect enemy radars and communications, played a role in the conflict. The necessity for passive electronic threat warning systems, and decoy systems like chaff was amply demonstrated. Chaff expenditure, to confuse radars on aircraft and missiles, was extremely heavy. The U.S. Navy is reevaluating the need to increase each ship's allowance of chaff, and also the tactics for its employment, based on the Falklands experience. The U.S. Navy is also looking closely at the requirement to expand the Fleet's electronic warfare capability in light of the demonstrated greater threats it faces.

E. LARGE WARSHIPS VERSUS SMALL WARSHIPS

One of the clearest lessons of the Falklands is that smaller, cheaper, less-well armed combatants can be a very false economy because of their much higher degree of vulnerability, as demonstrated by the loss of the four Royal Navy combatants. If any one of the 14 successful attacks against British ships had instead hit the Battleship NEW JERSEY, it could not have done sufficient damage to prevent continuing operations. The EXOCET missile that sank SHEFFIELD, for instance, would not have been able to penetrate the armor system of the NEW JERSEY. Numerous similar instances occurred in World War II, such as when the Battleship SOUTH DAKOTA sustained 45 hits from 8-inch naval guns and continued to operate, or when the Japanese battleship MUSASHI absorbed 14 torpedoes and 22 large bombs and continued to steam ahead. It is doubtful if any of the attacks sustained by British ships would have penetrated to a vital space or done significant damage to a modern U.S. aircraft carrier. The smaller carriers deployed by the U.K., by contrast, are far more vulnerable to complete loss

from torpedo, missile, or bomb attacks because they lack the multiple hulls, armor plate and redundant damage control systems which are inherent design characteristics of large U.S. carriers.

The small British carriers, though well-designed and professionally manned, are incapable of accommodating modern high-performance aircraft. They were barely able to provide the minimum air power necessary to support the retaking of the Falklands and, despite heroic efforts by SEA HARRIER pilots, the British never established anything approaching control over the skies above the Falklands. Even Argentine resupply aircraft from the mainland were able to land at Stanley right up until the night before the surrender. Fortunately for the British, Argentine air attacks were confined to daylight hours only, which limited the air threat to about 8 hours out of every 24.

A U.S. carrier could have maintained a vastly more capable CAP on station on a round-the-clock basis, if necessary, and a U.S. Task Force would have suffered far fewer losses and damage overall because of the order of magnitude greater protection afforded by sophisticated Navy aircraft, missiles, guns and electronic systems.

Under peacetime conditions, the British carriers accommodate only five SEA HARRIERS and 9 to 12 SEA KING antisubmarine helicopters each. HMS HERMES, the largest British carrier, displaces about 30 percent of one of our NIMITZ class carriers and--even with an enhanced air group literally jammed on board for the Falklands conflict--carried a very small air group of very limited capabilities: a dozen SEA HARRIERS, half a dozen RAF HARRIERS and half a dozen ASW helicopters. This compares to a U.S. carrier group with 80 or more fixed-wing aircraft and a half dozen ASW helicopters.

The smaller carriers are far less sustainable. Propelled by gas turbines or, in the case of HERMES, steam turbines, these ships have relatively limited endurance before they require refueling. They also have limited on-board stowage for ordnance. In the Falklands, both ships had flight decks encumbered by stacks of bombs, missiles, and fuel tanks which could not be fitted into the ships' magazines, thus making them very vulnerable had any Argentine aircraft been able to locate and attack them. In contrast, nuclear-powered U.S. carriers not only have virtually unlimited steaming endurance, they also carry thousands of tons of munitions and months' worth of spare parts for all of their embarked aircraft. Additionally, our carriers have extensive on-board repair capabilities which cannot be provided on a small carrier. Taken together, two British carriers were able to operate less than 30 V/STOL aircraft and about a dozen ASW helicopters at the peak intensity of combat activity. That's about 50,000 tons of aircraft carriers to operate one-third of the number of far more capable aircraft that we carry in one 90,000-ton NIMITZ class carrier.

F. AIRCRAFT PERFORMANCE

V/STOL HARRIER

U.K. HARRIERS, both Royal Navy and RAF, were surprisingly reliable and versatile during the battle. The 28 SEA HARRIERS deployed to the South Atlantic flew more than 1,200 sorties in 44 days. Their availability was exceptionally high--almost 90%. Fewer than one percent of planned missions were scrubbed because of aircraft unserviceability. The radar and attack weapon control systems in the SEA HARRIER proved to be reliable and versatile but limited in range and capability. In air-to-air combat, SEA HARRIERS destroyed at least 20 Argentine aircraft, 16 of them with U.S.-produced SIDEWINDER missiles. In many engagements the SEA HARRIERS were attacking aircraft which were operating at the extreme limits of their range and could not afford to maneuver if they were to return home safely. Similarly, the SEA HARRIERS had limited time on station and limited air-to-air ordnance loads. They were placed at great disadvantage by the lack of adequate radar-controlled cueing and vectoring for intercepts. Fortunately for the British, the Argentine aircraft actually attempted to attack the SEA HARRIERS only on the first day of the air battle.

The performance of both types (RN & RAF) of HARRIERS in air-to-ground action was less impressive. Together they delivered fewer than 200 general-purpose bombs, including only four laser-guided bombs, and had little effect on the outcome of the land battle.

Four SEA HARRIERS and one RAF HARRIER were lost in operational accidents and two SEA HARRIERS and three RAF HARRIERS were lost to enemy action, none in air-to-air combat.

The advanced HARRIER AV-8B being procured for the United States Marine Corps will play a very different, but equally versatile, role in support of Marine operations. It is optimized for very high sortie generation and close air support from unprepared sites. A totally new cockpit and control augmentation will substantially reduce the high accident rate formerly experienced by earlier HARRIER models, while the range and payload will be nearly doubled.

Helicopters

Helicopters were, without question, a most valuable aviation asset of the British forces. They were used successfully as antiship missile platforms, for at-sea replenishment, logistic support, troop lift, equipment lift to the battlefield, command and control, commando raids, and many utility functions. Three of the four heavy lift CHINOOK helicopters were lost on the ATLANTIC CONVEYOR, resulting in a severe shortage of mobility for heavy equipment. Since the battle, the U.K. has deployed an airborne early warning radar aboard several Sea King helicopters and operates them routinely.

The Argentine forces used their helicopters almost entirely for battlefield logistics, utility support and surveillance.

VULCAN Strike Aircraft

Flying from Ascension Island, the RAF undertook a total of five strike missions by VULCAN strategic jet bombers against the Falklands. Three single plane sorties with each VULCAN carrying 21 1,000-pound bombs attacked Port Stanley Airfield. Two single plane sorties with antiradar missiles attacked Argentine radar installations. Each of these sorties required multiple inflight refuelings and had virtually no impact on either the Argentine surveillance radars or on Port Stanley Airfield. Both the airfield and surveillance radar installation remained operating until the last day of the war.

C-130 HERCULES

The venerable HERCULES provided the backbone of airborne logistics for both the U.K. and Argentina during the conflict. For the British, they were operated as aerial refuelers, were refueled themselves, and were used to air drop critical supplies at sea and ashore. Right up to the final day of the war, Argentine HERCULES transports flew critical resupply missions from the mainland, usually under threat of HARRIER attack. Argentine bombers were air-refueled by HERCULES tankers to extend their operating range.

A-4 SKYHAWK

The Argentine Navy and Air Force operated about 64 SKYHAWK light attack aircraft with considerable effect, inflicting most of the damage on the British fleet.

SUPER ETENDARD

The Argentine Navy operated five SUPER ETENDARD fighter bombers (about the equivalent of the U.S. A-7E in capability). They were very effective as the firing platforms for EXOCET missiles with their attack radar and inertial navigation system permitting them very low level ingress, with a pop-up to fire, and then a rapid egress. The Argentines did not hazard these aircraft in iron bomb attacks over the target.

G. LOGISTICS

The old aphorism that amateurs talk about strategy while professionals talk about logistics was validated again in the Falklands. The outcome of the battle may be seen to be a failure of Argentine logistics and a major success of British logistics. Following their capture of the Falklands, the Argentines poured troops and military supplies into the islands. A large stockpile of weapons and munitions was built up. The Argentine command in the Falklands, however, was unable to effectively distribute the supplies and weapons, hence troops in the field were critically

short of some items that were available in abundance at supply dumps in the Falklands themselves. Once the British Task Force arrived in the area, bulk supply by sea almost ceased, and the Argentine command was dependent upon airborne resupply. These resupply flights were carried out at night from the mainland to Port Stanley Airfield right up until the eve of the surrender. Only one of these supply aircraft was intercepted and destroyed by the British, and the efforts of ship-based HARRIERS and Ascension-based VULCANS to close down the airfield at Stanley were not successful.

Though the battle was relatively brief, the British forces required enormous quantities of munitions, provisions, fuel and other supplies.

British logistics operations were hampered by the distances from home bases and supply depots, an initial shortage of shipping, and limited stocks of certain materiel. Fifty merchant vessels described by the RN as "Ships Taken Up From Trade" (STUFT) were used in supporting British operations. They included a variety of merchant types--container, roll-on roll-off, passenger, tanker, plus several special purpose ships, such as the youth cruise ship, UGANDA, that was rapidly converted to a hospital ship. Fuels were the most critical logistic consideration, with nearly one-third of the STUFT ships being tankers. Most of the merchant ships were rapidly fitted with at-sea refueling capability and maritime communication satellite terminals. Nineteen ships were additionally fitted to operate helicopters (two of these also delivered HARRIERS). A small number of merchant ships were also fitted with 20 or 40 millimeter antiaircraft guns or light machine guns.

Ascension Island, approximately half-way between Britain and the Falklands, served as a staging base for British forces. During the conflict, the British logistic buildup included the airlifting of 5800 personnel and 6600 tons of supplies from the United Kingdom to Ascension, an indication of the magnitude of the shore-based logistic support needed for an operation the size of the Falklands campaign. In many ways the logistics problems facing the British force off the Falklands were similar to those faced by U.S. naval forces which have been deployed to the Indian Ocean since 1979. The U.S. Navy has already instituted some changes in logistics planning and operations as a result of those earlier lessons and is refining them in the light of the British experience.

While the U.S. Navy has developed plans in conjunction with the Maritime Administration to use merchant ships from trade and the Ready Reserve Force, more effort is required to develop self-defense, aviation, and other naval systems for merchant ships so employed (a major initiative of the Reagan Administration has been to increase the size of the Ready Reserve Force from 29 merchant ships to 77--all intended for activation within 5-10 days). The U.S. Navy has developed the Arapaho concept of operating helicopters from a container ship and has evaluated and tested the hardware at sea. It has proved to be a feasible operation.

The magnitude of the operation required from the merchant fleet to support an operation the size of the Falklands underlines the fact that, while the task of mobilizing sufficient strategic sealift for adequate conventional deterrence is difficult enough, it would be impossible to sustain a conflict given the level of attrition suffered from submarine warfare in World War II. Allied naval forces can only defend the sealanes by ensuring a forward offensive defense against submarines.

H. SUBMARINE OPERATIONS

The Argentine Navy began the conflict with two of their four submarines operational: one relatively new German-built diesel-electric submarine, and one former U.S. GUPPY-type submarine of World War II construction. The guppy submarine SANTA FE, which was present when Argentine troops landed in the Falklands, was totally disabled by British forces off South Georgia on 25 April.

The German-built SAN LUIS, completed in 1974, made a patrol of an estimated 36 days during the conflict. The SAN LUIS located and operated in the area of the main British Task Force for some days. She was, however, unable to make a successful attack because of materiel problems. The submarine's main torpedo fire control panel was not operational and improper wiring of the backup panel caused all torpedoes to be fired on incorrect bearings. The British force prosecuted numerous suspected submarine contacts during that period, without success. The Argentine type 209 submarine SALTA did not participate in the conflict, because of problems with her diesel propulsion plant.

The ability of a modern diesel-electric submarine to engage a naval task force that is essentially stationary while operating in a specific area is not surprising. These submarines are extremely quiet when operated at low speeds and for this reason substantial helicopter, subsurface and surface antisubmarine warfare defense is required whenever a naval task force is constrained to a limited area.

The U.S. Navy remains convinced that diesel-electric submarines, as useful as they might be in such constrained areas, are not cost-effective for United States naval missions. This would not be the case if it were not for well over 100 modern diesel-electric submarines in our allied navies which are available to carry out those responsibilities.

As the crisis escalated in the South Atlantic in late March, three British nuclear attack submarines were directed to the Falklands area. Their ability to transit such a long distance at high speed permitted the U.K. to establish an exclusion zone 200 nautical miles in radius around the Falklands early in the conflict. The SSNs began at once to enforce this exclusion area to prevent Argentine ships from further reinforcing the garrison in the Falklands. They were successful. On 7 May, the British Government warned that any Argentine warship sighted more than 12 miles from the Argentine coast would be regarded as hostile and subject to attack. Ultimately, the Royal Navy deployed five SSNs and one

diesel-electric submarine (HMS ONYX) to the South Atlantic. One of these SSNs, HMS CONQUEROR, was sent to South Georgia in late April to ensure that Argentine ships did not interfere with the recapture of that island by Royal Marines. The following week CONQUEROR successfully intercepted and sank the Argentine cruiser GENERAL BELGRANO, using 55-year-old design steam torpedoes. Following the sinking of the BELGRANO, the Argentine surface navy effectively retired from action. Thus, the effectiveness of the SSNs can be said to have contributed to the neutralization of the Argentine Navy.

I. SHIP SURVIVABILITY

No defense in depth, however effective, can be relied on as impenetrable. Thus, no matter how good, naval ships must be built to take substantial hits and keep fighting. The Falklands battle is rich in such lessons to be relearned.

GENERAL BELGRANO

The cruiser BELGRANO was sunk by a British SSN, as previously stated. The poor materiel condition of the 44-year-old cruiser and limited damage control training by the crew resulted in rapid, uncontrollable flooding and loss of the ship.

British Casualties

The British lost one destroyer to a fire started by the residual fuel from an unexploded EXOCET missile, one destroyer to bombs and strafing, two frigates to bombs, one landing ship to bombs, and one container ship to a fire caused by one or two EXOCET missiles that did detonate. In addition, two British destroyers, 14 frigates, and one landing ship were damaged during the conflict, all by Argentine air attacks with bombs, rockets or strafing, except for the destroyer GLANORGAN, which was damaged by a shore-launched EXOCET missile.

There has been extensive discussion of the use of aluminum in warship construction and its effect on ship survivability. Aluminum is used in British and American ships for nonstructural bulkheads, ladders, and ventilation ducts. Most U.S. warships of post-World War II construction do have aluminum superstructures, because of the weight saving--particularly important when the ships carry radar antennas and other equipment relatively high above their centers of gravity.

The SHEFFIELD--which was lost to an uncontrolled fire after being hit by an EXOCET that did not detonate--had a steel superstructure, although one class of British frigates does have aluminum superstructures. There is no evidence that use of aluminum contributed to the loss of any of the British combat ships. The decision to provide a steel superstructure

in the new ARLEIGH BURKE (DDG 51) class of U.S. destroyers was made well before the Falklands conflict.

In general, U.S. warships have better damage control and fire-fighting features built into them than any other navy. Constant training of the crews at sea and ashore in damage control has remained a fundamental element of U.S. Navy training since the lessons of the Pacific battles of World War II were learned the hard way. The effectiveness of this training has been demonstrated in several near catastrophic peacetime incidents, most recently the NIMITZ crash and fire in July 1981. The British experience in the Falklands, particularly with regard to certain interior construction materials and procedures, is being used to revise U.S. Navy construction techniques and damage control procedures, especially with regard to our smaller, frigate-type ships.

In summary, the Falklands experience demonstrates that modern warships can be defended against modern weapons like cruise missiles, but that they must have defense in depth and must be able to sustain hits, absorb damage and keep fighting. On the one hand, the SHEFFIELD was not at general quarters, was unready to sustain damage and was ultimately lost, even though the missile did not detonate. By contrast, the destroyer GLAMORGAN was struck by an EXOCET missile that did detonate, and while a major fire and shrapnel casualties killing 13 men resulted, the ship was able to continue operations with armament and weapons systems nearly intact--because she was ready.

J. RULES OF ENGAGEMENT

A new lesson to be learned from the Falklands, in contrast to earlier wars, is that in an era of modern computer and satellite communications, there must be much greater attention to command, control and rules of engagement. First, modern communications are now able to provide a veritable Niagara of communications for the operators in a war. The British commander in the field was at times overwhelmed by the volume of information coming to his flagship. Much greater attention must be given to disciplining communications in future conflicts. This is potentially a major problem as American forces modernize communications at all levels. All of it must still funnel into the decision-making commanders in the field. Second, such effective real-time communications carry with them the temptation for higher commanders to micro-manage operations in the field. This does not seem to have been a problem for the British force because of a prudent delegation of authority to the on-scene commander by the political decision makers and national command authorities. Such delegation, however, carries with it the necessity for carefully thought-through, pre-approved rules of engagement. This is particularly relevant to U.S. forces forward-deployed in crisis situations. The more so today, because as Admiral Gorshkov has put it so well, there is an enormous premium on "the struggle for the first salvo."

K. AMMUNITION SUSTAINABILITY

The Falklands conflict is yet another reminder, following on every war since Korea, that rates of consumption of high technology weapons always exceed even generous estimates by planners.

It is perplexing to American planners to hear voices in the U.S. Congress suggesting that defense is getting too much budgetary support when after 15 years of neglect it is not possible to fill the launchers and magazines of the active U.S. Navy fleet of 514 ships even once with high technology munitions.

Another important lesson of the Falklands for U.S. forces is illustrated by the British sinking of the BELGRANO with 55-year-old design torpedoes; since it is not likely under present funding constraints that sufficient new munitions will be available, it is imperative that the older generations of still-useful weapons be retained, rather than scrapping or selling them, as has been the practice in recent times.

L. AMPHIBIOUS OPERATIONS

The British objective in their OPERATION CORPORATE was to recapture the Falklands, South Georgia, and South Sandwich Islands. The major amphibious operation was in the Falklands. The British landing forces, consisting of Royal Marines and British Army soldiers, were carried to the Falklands in a small number of LSL and LSD-type specialized amphibious ships and several passenger-carrying merchant ships.

Through careful planning, skill, and good fortune, the main landings at San Carlos were carried out without initial opposition. This illustrated an often overlooked advantage of amphibious assault. While it is difficult in the era of modern communications and intelligence to achieve strategic surprise, it is still possible, with the right forces, to achieve tactical surprise and to land "where they ain't." For instance, a Marine Amphibious Brigade off the coast of the Virginia Capes at dusk can land troops ashore anywhere between the tip of Long Island and Cape Hatteras before dawn.

The British were at a substantial disadvantage in their Falklands amphibious landings because they did not have air superiority. U.S. carriers would provide air superiority over any U.S. amphibious landing.

The landings at San Carlos, which began in darkness at 0340 local time, were carried out by 16 landing craft carrying troops and equipment to the beach from the ships offshore. At dawn, ship-based helicopters joined in the shuttle of supplies to the beach. The British beachhead had been firmly established when Argentine air raids began in the afternoon. The later amphibious landing at Fitzroy suffered gravely from lack of air cover. The landing was initially conducted unopposed under night and poor visibility conditions. However, when the weather did clear, the two

unescorted and undefended amphibious ships were severely damaged by Argentine air attacks, with heavy loss of life.

The British experience demonstrated that amphibious shipping can survive against air attacks, although not without losses. Most of the merchant ships employed to carry troops and materiel into Falkland Sound mounted only a few machine guns for defense. The two large RN assault ships of the FEARLESS Class did have SEA CAT missiles and 40-millimeter guns, as well as passive ECM, including CHAFF. But the smaller logistic landing ships had only light guns installed.

The U.S. Navy's amphibious ships, which are armed, are being fitted with variants of the SLQ-32 ECM system and chaff, and could be expected to have a significant capability against the same level of threat. The U.S. Navy is investigating the possibility of providing bolt-on self-defense systems for merchant ships that may be called upon to support U.S. amphibious operations.

The U.S. Navy currently has several times the British amphibious lift, with 60 active amphibious ships, most significantly larger than comparative British types, plus four ships in the Naval Reserve Force. In addition, one of the most dramatic breakthroughs in recent amphibious force augmentation has been the establishment of the maritime prepositioning ships, the T-AKX, 12 of which are under contract. This will enable the lift of three conventional Marine Amphibious Brigades into an unopposed environment. In addition, the Reagan Administration has programmed a growth from one Marine Amphibious Force (MAF) equivalent lift to one MAF plus an additional MAB of amphibious lift. In the current five-year plan there are 12 ships of the LSD-41 and the LHD-1 classes, the latter being an amphibious ship that is convertible into a V/STOL carrier.

M. NAVAL GUNFIRE SUPPORT

The Falklands again illustrated the essential value of naval gunfire support. During the battle 14 British destroyers and frigates mounting a total of 18 4.5-inch naval guns fired roughly 7900 rounds in support of the landings and subsequent land campaign. This fire supported friendly troops, suppressed enemy fire, destroyed enemy supplies and aircraft on the ground, and seriously hurt the morale of the defenders. The British were limited by gun caliber, and hence hitting power and range. The United States Navy currently has a large number of five-inch guns in the fleet and is recommending in the 1984 budget the procurement of the five-inch laser-guided projectile, which will greatly increase the one-shot kill capability of naval gunfire.

The most dramatic increase in U.S. Navy naval gunfire capability took place in December, when the battleship NEW JERSEY was recommissioned five weeks ahead of schedule and under budget. This one ship can deliver 803 tons of a variety of 16-inch and 5-inch ammunition types in the space of only 30 minutes. That is the equivalent of 20 modern DD-963 class

destroyers. It carries more than 7000 rounds of ammunition in its magazines. The battleship IOWA will be delivered to the fleet in early 1984, ahead of schedule and on budget. Money for reactivation of USS MISSOURI is contained in the 1984 budget and money for reactivation of USS WISCONSIN will be in the 1985 budget. The 23 mile range of the IOWA class battleship's 16-inch guns means that naval gunfire support capability will be increased substantially when these ships rejoin the fleet.

N. PROGRAM IMPACTS

As a result of the analysis of the South Atlantic conflict, the U.S. Navy has made some changes to the pace and scope of certain fleet modernization programs and ship alterations. Some of these changes are accommodated in the FY-84 budget and more will be reflected as our analysis is refined and we prepare for the FY-85 Navy program. Chapter 3 provides somewhat more detailed information on the Falklands conflict and its relationship to U.S. Navy programs.

2. CHRONOLOGY OF EVENTS

19 March: An Argentine naval transport ship landed about 60 Argentine scrap workers on South Georgia Island (Leith Harbor). Ten of the scrap workers stayed on the island.

29 March: Nuclear submarine HMS SPARTAN ordered to embark stores and weapons at Gibraltar for deployment to the South Atlantic.

30 March: Submarine HMS SPLENDID ordered to deploy. A few days later HMS CONQUEROR sailed.

2 April: The Argentine assault on the Falkland Islands occurred as follows. 0300: Argentine SS SANTE FE landed 20 commandos to secure a beachhead at Stanley. Eighty commandos from DDG SANTISSIMA TRINIDAD assaulted the Royal Marine barracks (empty) and Government House (opposed). 0630: The main force of Marines and 20 LVTs were disembarked from LST CABO SAN ANTONIO to help secure the airport and harbor area. CV VIENTICINCO DE MAYO, with 1,500 army troops embarked, remained just outside Stanley harbor.

3 April: Argentine troops landed by helicopter on South Georgia Island. Royal Marines shot down a PUMA helicopter and slightly damaged GUERRICO before surrendering.

5 April: A British Task Force, including the aircraft carriers HMS INVINCIBLE and HMS HERMES and 1,500 Royal Marines, deployed from Portsmouth, England. (Figure 1 indicates the lengthy distances covered by British forces. The Falklands lie 7,100 miles southwest of the U.K. and over 3,300 miles from Ascension Island, but only 400 miles from the Argentine coast.)

12 April: British imposed a 200 nm Maritime Exclusion Zone (MEZ) around the Falklands. The exclusion zone was initially enforced by submarines.

22 April: British commandos, brought in by helicopter, arrived in South Georgia Island on a reconnaissance mission. Two of the helicopters crashed in a blizzard, but the crews and troops were subsequently rescued.

25 April: A small British Task Force staged an assault on South Georgia Island. The Argentine submarine SANTE FE was sighted on the surface and attacked by helicopters. The submarine was damaged and beached in Grytviken Harbor. After a Naval gunfire barrage, British troops forced the Argentine troops to surrender.

30 April: A Total Exclusion Zone (TEZ) was imposed around the Falkland Islands (Figure 2).

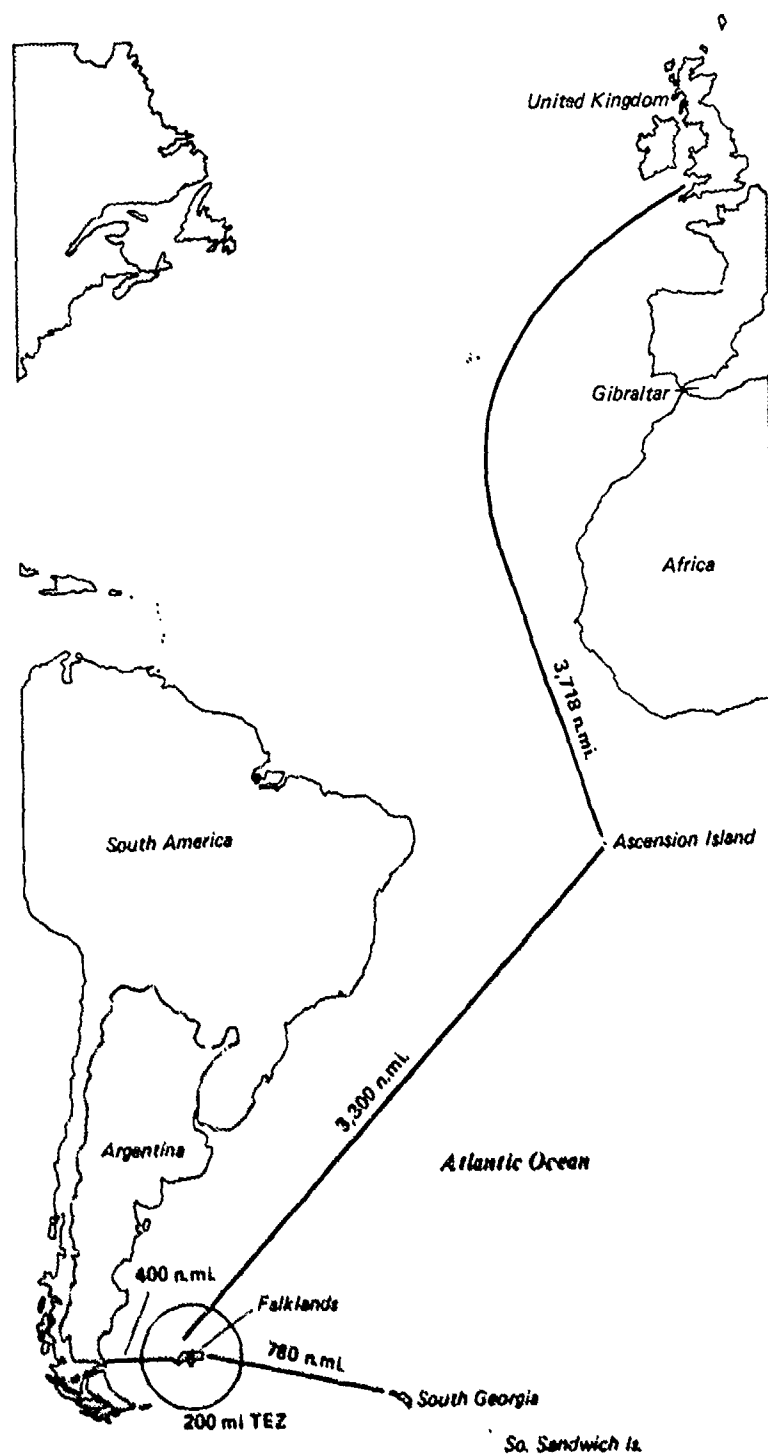


FIGURE 1. ATLANTIC OCEAN
DISTANCES BETWEEN SIGNIFICANT LOCATIONS

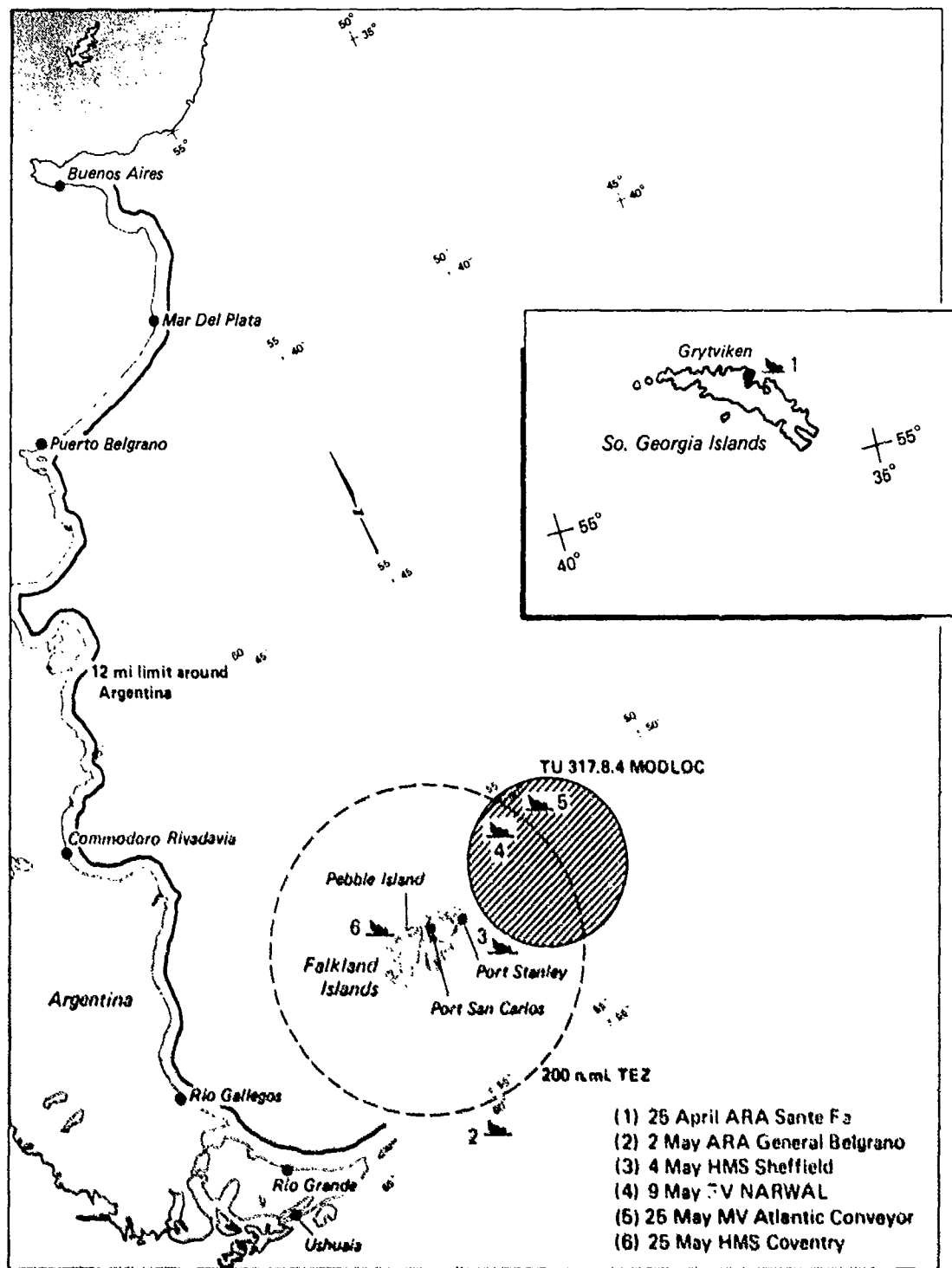


FIGURE 2. SOUTH ATLANTIC OCEAN
APPROXIMATE POSITIONS OF SHIP SINKINGS, THE
TOTAL EXCLUSION ZONE (TEZ) AND RN CARRIER
OPERATING AREA (MODLOC)

1 May: A VULCAN bomber from Ascension Island attacked the airstrip at Port Stanley before dawn. One bomb hit the runway. SEA HARRIERS attacked Port Stanley and Goose Green air strips at dawn. Argentine MIRAGES and SKYHAWKS attacked RN ships operating near the Falklands.

2 May: The Argentine Navy had established four task groups to maintain a presence just outside the 200 nm exclusion zone. One task group included VIENTICINCO DE MAYO, a second included the cruiser ARA GENERAL BELGRANO, and the remaining two consisted of destroyers and frigates. GENERAL BELGRANO was attacked outside the exclusion zone by HMS CONQUEROR and sunk. Figures 2 and 3 indicate the approximate positions of ships sunk during the conflict.

3 May: An Argentine patrol tug fired on a British SEA KING ASW helicopter from HMS HERMES. In reaction, a LYNX helicopter launched SEA SKUA missiles at the ship, ALFEREZ SOBRAL, which was damaged.

4 May: British attacked Port Stanley Airfield with a VULCAN bomber, followed by SEA HARRIERS. SEA HARRIERS staged an attack on Goose Green. HMS SHEFFIELD was attacked by two SUPER ETENDARDS with AM.39 EXOCET missiles. One missile impacted amidships above the water line and started a major fire. SHEFFIELD was abandoned and later sank on 10 May while under tow.

7 May: British warned that any Argentine warships or military aircraft over 12 nm from Argentina's coast would be treated as hostile.

9 May: Two HARRIERS attacked the Argentine intelligence-collection vessel NARVAL operating within the original 200 nm exclusion zone. One Argentine was killed, and 25 prisoners were taken from the vessel before it sank.

11 May: During a night action British frigate ALACRITY attacked and sank the Argentine naval cargo ship ISLAS DE LOS ESTADOS in Falkland Sound. Troop ship SS CANBERRA joined the main Task Force to the east of the Falklands.

12 May: In heavy fog, 12 Argentine A-4s attacked HMS BRILLIANT and GLASGOW near the Falklands. Two A-4s were shot down and a third crashed into the sea trying to evade surface-to-air missiles. HMS GLASGOW suffered damage from a bomb passing directly through the hull without exploding. QUEEN ELIZABETH II sailed from England with the troops of the Fifth Infantry Brigade.

14 May: Special Air Service (SAS) teams landed on Pebble Island and, along with Naval gunfire, destroyed 11 aircraft on the ground, an ammo dump, and a mobile land-based radar.

20 May: UN Secretary Perez de Cuellar announced the collapse of British-Argentine negotiations.

21 May: British troops landed at four separate points around San Carlos. Engineer troops began building a landing pad for HARRIERS. Argentine aircraft counterattacked the invasion forces in several waves. One frigate, HMS ARDENT, was sunk. HMS ANTRIM and HMS ARGONAUT were hit by bombs which failed to explode. Two other ships were seriously damaged. Fifteen Argentine aircraft were reported destroyed in this attack. (Figure 3, a map of the Falkland Islands, indicates the principal settlements in the Islands.)

22 May: British troops expanded and consolidated their positions in the vicinity of San Carlos.

23 May: MIRAGES and SKYHAWKS attacked the British Task Force; one frigate was damaged. British shot down six MIRAGES and one SKYHAWK.

24 May: HMS ANTELOPE exploded and later sank during an attempt to disarm a bomb that had been lodged in the engine room since the 23 May battle. Three waves of Argentine aircraft attacked the British Task Force, and eight were reportedly shot down. Two LSTs were damaged in this attack.

25 May: Argentine aircraft continued to attack the British Task Force. Seven A-4's were shot down. HMS COVENTRY was hit by several bombs and capsized. Two SUPER ETENDARDS launched EXOCET missiles against SS ATLANTIC CONVEYOR and set the ship on fire.

27 May: British Army paratroops advanced on Argentine troops at Darwin/Goose Green while Royal Marines and light armor moved toward Port Stanley. MIRAGES and SKYHAWKS launched another attack on the British Task Force. Two SKYHAWKS were reportedly shot down.

28 May: Paratroops captured Goose Green and Darwin, after about 12 hours of fighting.

29 May: An Argentine MIRAGE and several SKYHAWKS attacked British positions at San Carlos, causing minimal damage.

30 May: Argentine SKYHAWKS and SUPER ETENDARDS attacked the main British Task Force; three SKYHAWKS were shot down with no damage to British ships reported.

7 June: Royal Marine commando forces captured Mount Low, overlooking the Stanley Airfield.

8 June: Argentine SKYHAWKS and MIRAGES attacked two British LSL's at Fitzroy. Both SIR TRISTRAM and SIR GALAHAD were set on fire. Badly damaged, SIR GALAHAD had to be scuttled; the other ship has since been returned to England for repair. HMS PLYMOUTH also suffered serious damage, while in Falkland Sound. Four Argentine aircraft were reportedly shot down.

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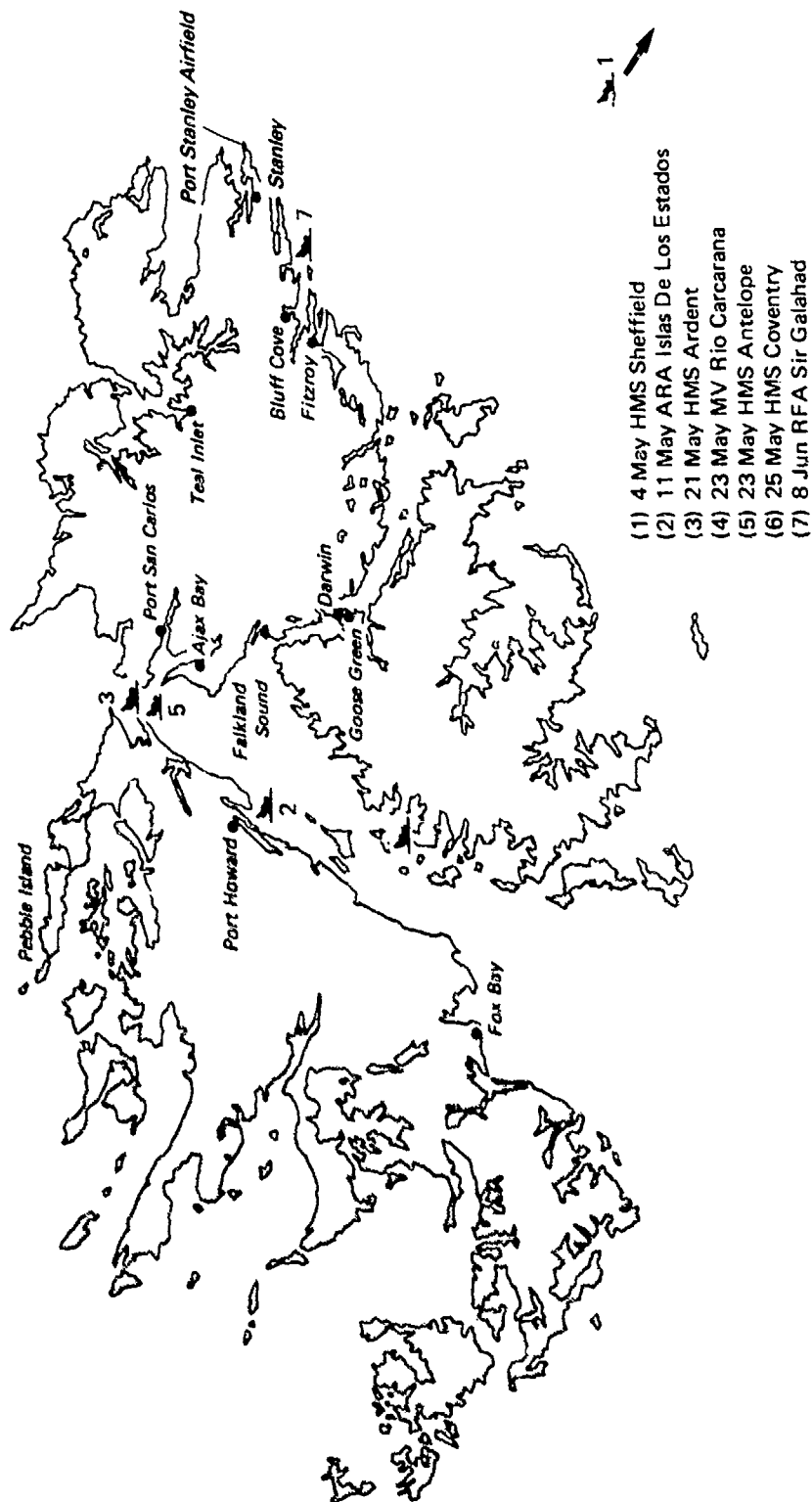


FIGURE 3. FALKLAND ISLANDS
APPROXIMATE POSITIONS OF SHIP SINKINGS AND PRINCIPAL SETTLEMENTS

12 June: HMS GLAMORGAN was hit by a land-based EXOCET missile and suffered moderate damage.

13 June: British troops began a heavy attack against Argentine positions.

14 June: British forces reached the outskirts of Stanley. Most of the high ground surrounding Stanley was soon captured. General Menendez requested a cease-fire and later met with the deputy commander of the British ground forces and surrendered at 2000 EDT.

3. LESSONS OF THE FALKLANDS

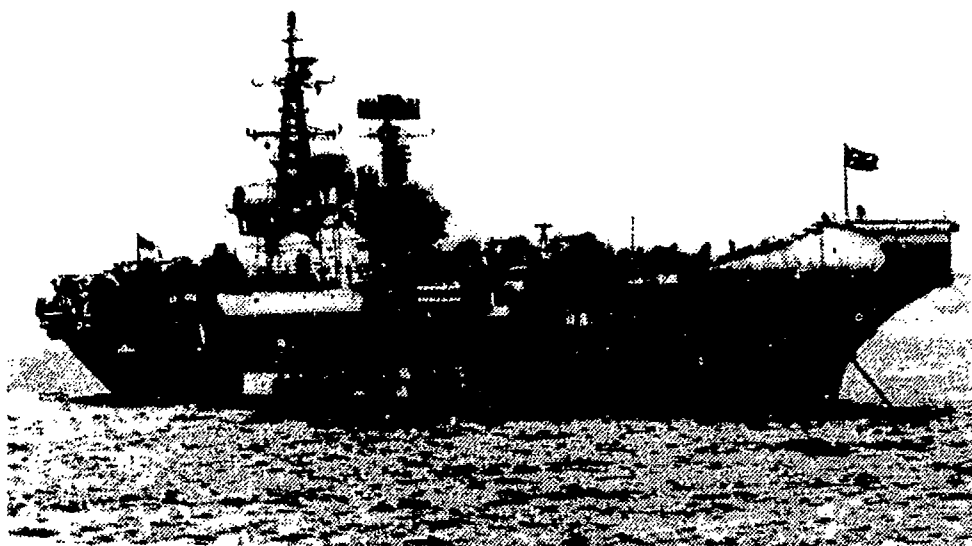
Since World War II, the United States Navy and Marine Corps have played a vital role in supporting U.S. foreign policy in more than two hundred crises and confrontations. In addition, the Navy and the Marine Corps have fought in the Korean War and Vietnam War. In general, U.S. naval superiority and the availability of carrier task forces have made U.S. operations relatively immune to enemy interference during this period. However, the transfer of advanced weapons to the Third World and the growth of Soviet naval forces during the past two decades have increased the potential threats to U.S. naval forces in future conflicts.

There are many ways to prepare for these threats--exercises, war games, studies, intelligence collection, etc. But there is no substitute for actual combat experience, and the Falklands conflict provides a number of actual combat situations that deserve examination. The conflict in the Falklands included:

- The first use of modern cruise missiles against warships of a major navy.
- The first time since World War II that sustained air attacks were made against naval forces.
- The first use of nuclear-powered attack submarines in combat.
- The first known use of Vertical/Short Take-off and Landing (V/STOL) aircraft in combat.

Further, the Falklands conflict lends itself to effective analysis because of (1) the limited duration and geographic area of the conflict, (2) the isolated region in which the conflict took place, (3) the clear military objectives of both sides, (4) the absence of direct third-party involvement, and (5) the nonparticipation of paramilitary or terrorist forces. However, these factors also limit the analysis in some respects because such separation and clarity rarely have been present in recent conflicts. Indeed, the political and military complexity of potential crises and conflicts in which the United States may become involved demand a large, versatile, and highly capable Navy and Marine Corps.

This report focuses on British naval operations and related air activity because the Royal Navy and Royal Marines were forced to deploy major sea, air, and ground forces for a sustained period at considerable distances from home bases. This is similar to the U.S. Navy's operational requirements. Prior to the arrival of the British surface fleet, in the beginning of May, the Argentine Navy deployed four separate surface task groups. The southernmost of these included two destroyers and the cruiser GENERAL BELGRANO, which was sunk on 2 May by torpedoes from HMS CONQUEROR. Two Argentine submarines deployed; A.R.A. SANTE FE was destroyed by British



The V/STOL carrier HERMES, at 28,700 tons full load, is the largest combatant in the Royal Navy. In the Falklands conflict she served as flagship for the British Task Force Commander and initially carried 12 Sea Harriers, plus helicopters.



The 19,812-ton INVINCIBLE is the first of a class of V/STOL carriers being built for the Royal Navy. Originally designed as an ASW or "through deck" cruiser, she deployed to the Falklands with eight Sea Harriers, plus helicopters. Her sister ship, HMS ILLUSTRIOUS, became operational just after the conflict.

forces in the vicinity of South Georgia, and A.R.A. SAN LUIS made one unsuccessful patrol. After 2 May, Argentine Navy surface ships played no significant role in the conflict. Thus, the British Task Force operations and an amphibious landing some 7,000 nautical miles from home bases provide the more-useful data base for this analysis.

This analysis examined how U.S. naval forces could be engaged in a similar conflict. In this regard, the Royal Navy deployed approximately 40 percent of its major surface combatants and virtually 100 percent of its amphibious and logistics support ships to the South Atlantic, including both available V/STOL aircraft carriers. Additionally, a large number of merchant ships was employed in the amphibious, logistics, mine counter-measure, and support roles. The U.S. Navy, in a similar situation, would have sought to employ at least two carrier battle groups (each with one carrier) and a Marine Amphibious Brigade carried in naval amphibious ships plus appropriate submarine and support forces. This is the equivalent of about 15 percent of our carrier strength and almost half of our amphibious lift. The high capability of our forces leads to the conclusion that these forces could successfully prevail against a threat level of the order encountered by the British forces, in considerably less time and with significantly fewer losses.

The following paragraphs describe the major lessons from the Falklands conflict which have direct application to the U.S. Navy and U.S. Marine Corps.

A. Air Operations

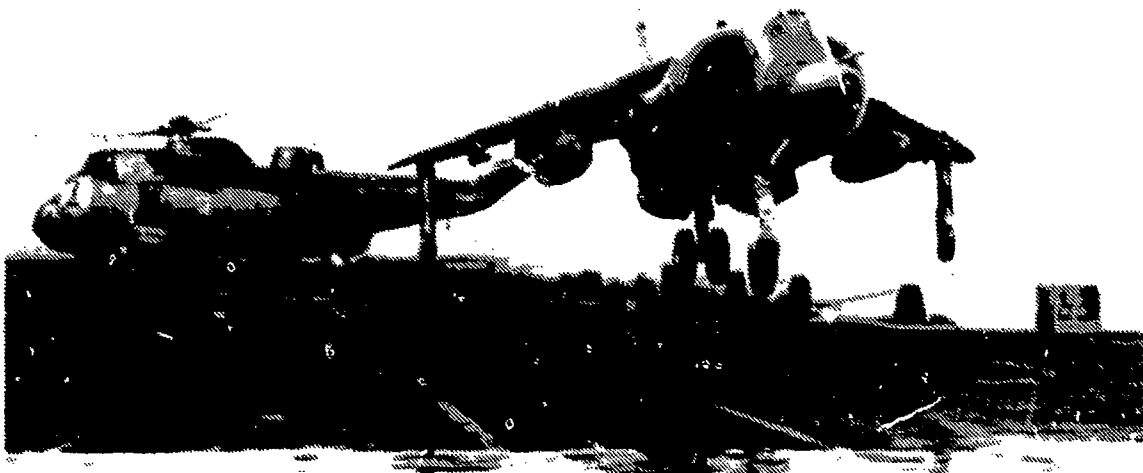
Tactical aviation is a vital component of modern naval operations with aircraft providing a variety of combat, combat support, and logistic functions. In the Falklands conflict, land-based Argentine strike aircraft were the principal threat to the British Task Force and amphibious operations. On the British side, ship-based aircraft flew air defense and strike missions, while ship-based helicopters were vital to commando raids, the amphibious landings, antisubmarine warfare, search and rescue, and logistics at sea and ashore. The British also employed land-based aircraft, flying from Ascension Island, for strike, surface surveillance, tanker, and logistic missions. However, the strike and surveillance missions had only a limited impact on the conflict. The tanker and logistic missions, on the other hand, were often vital.

Argentine Air Operations

The Argentine Air Force and Navy began air attacks against the British surface naval forces on 1 May. During the succeeding six weeks, the Argentines flew about 300 sorties against British surface ships and amphibious landings. These sorties were made mostly with 500- and 1,000-pound "iron bombs," but also included rocket and strafing attacks and five EXOCET missiles launched by Super Etendard aircraft, and unguided rockets fired by NB.339 aircraft (the last based in the Falklands, as were some



Sea Harrier V/STOL fighter-attack aircraft were flown by the Royal Navy in air defense, ground attack, and antiship roles in the conflict. Shown taking off vertically with a standard intercept armament of two AIM-9L Sidewinder missiles (plus two 30 mm cannon) and auxiliary fuel tanks, the Sea Harrier was payload limited.



The naval Sea Harriers were later supplemented with Royal Air Force Harrier GR.3 aircraft for the attack role, with both types being able to carry three 1,000-pound bombs or other air-to-ground weapons. Here a Harrier GR.3 prepares to land on HMS HERMES, with a Sea King MK.5 in the background.

Pucara and T-34 aircraft). Canberra and Pucara aircraft were also flown by the Argentines in the attack role, but apparently without effect.

Argentine Mirage, Skyhawk, and Super Etendard pilots flew strikes against the British Task Force and later the amphibious landings with determination and bravery. However, their efforts were severely limited by having to enter combat almost at their aircrafts extreme unrefueled range. This inhibited their maneuvering and the time available to engage in strikes or air-to-air combat. The Argentine Air Force had a limited in-flight refueling capability consisting of two KC-130 Hercules aircraft plus Skyhawk attack aircraft using the "buddy store" scheme, but only the Navy Super Etendards and Navy and Air Force Skyhawks could be refueled in flight.

British Ship-Based Air Operations

The Royal Navy began air attacks against military targets in the Falklands with carrier-based Sea Harriers on 1 May. Subsequently, Sea Harriers continuously provided air defense for the Task Force and amphibious landings, and carried out strikes against targets ashore. While the HARRIER can take off and land vertically or with very short runs, its payload (i.e., weapons and fuel) is less than that of a comparable conventional aircraft. For example, in the air intercept role the RN Sea Harrier could carry only two Sidewinder missiles plus two 30 mm Aden cannon for a 90-minute mission. The British had no other fixed-wing aircraft that could operate from their two, relatively small, V/STOL carriers, HMS INVINCIBLE and HMS HERMES. The small size of these carriers limited the number of aircraft initially embarked to eight and twelve Sea Harriers, respectively, plus about a dozen helicopters each.

Additional Sea Harriers were deployed to the Falklands to replace losses from the initial carrier squadrons. During the later stages of the conflict RAF Harrier GR.3 aircraft were also deployed aboard the carrier HERMES to provide a strike capability to support ground operations. During the conflict the Sea Harriers flew 1,100 air defense sorties and the Sea Harriers and Harrier GR.3 aircraft together flew 215 ground attack sorties. In the latter role, the aircraft carried up to three 1,000-pound bombs or other air-to-ground weapons.

The Harriers flown in the Falklands conflict had a very high availability rate (about 90%), good all-weather flying capability, long ferry range using in-flight refueling, low maintenance requirements, low combat loss rate, but a relatively high accident rate (five operational accidents, none of which were apparently due to aircraft malfunction). This performance, often achieved under adverse weather conditions, was due in large part to the excellence of the Royal Navy and Royal Air Force pilots and maintenance personnel, as well as to the basic simplicity and soundness of the Harrier design. It was not designed to provide air superiority and did not protect U.K. forces from attack.

The British operated helicopters from the two aircraft carriers, as well as all destroyers, frigates, amphibious ships, and most auxiliary ships. Four converted merchant ships served as transports and holding spots for Harriers and helicopters awaiting space aboard the carriers or secure facilities ashore. The British helicopters performed a multitude of important tasks, including missile strikes against small surface ships and a surfaced submarine. Several helicopter crews distinguished themselves in supporting Special Operations, flying at night and in low-visibility conditions, including a blizzard at South Georgia. The ship-based helicopters, including Marine and Army light helicopters and a single RAF CHINOCK, flew more than 10,000 sorties during the conflict.

British Land-Based Air Operations

Flying from Ascension Island, the RAF undertook a total of five Vulcan bomber missions against the Falklands: three single-plane strikes with each Vulcan carrying 21 1,000-lb bombs for runway attack, and two single-plane strikes with antiradar missiles intended to destroy Argentine radar installations in the Falklands. Each Vulcan flight required several in-flight refuelings. The strikes were unable to put the airfield at Stanley or the surveillance radars out of service. In addition to the Vulcans, RAF Nimrod maritime patrol aircraft flew surface surveillance flights from Ascension, and Hercules cargo aircraft air-dropped critical supply items to the British forces off the Falklands. These flights, and HARRIERs being flown to the carriers in the South Atlantic were refueled in flight by RAF Victor tankers based at Ascension Islands.

Issues and Lessons

Argentine, as well as British air operations were severely hampered by the long distances to the objective areas. The Argentine Navy's aircraft carrier 25 DE MAYO was not yet able to operate the newly arrived Super Etendard aircraft, while the drawdown of the British fleet in the 1970s had left the Royal Navy with only two small V/STOL carriers (plus two more V/STOL carriers under construction).

If the United States were to require tactical air operations at a similar distance from friendly bases, the U.S. Navy could provide large numbers of fighter and attack aircraft from its large-deck aircraft carriers. These ships operate some 80 high-performance combat aircraft, several times the number aboard the small British carriers and of far greater combat capability than the HARRIERs. The F-14 Tomcat, on board most U.S. carriers, is one of the best-performing fighter aircraft in service today, while the F-14's Phoenix, Sparrow, and Sidewinder missiles, and 20 mm Gatling cannon make it the most heavily armed fighter of any nation. Similarly, the A-7 Corsair and A-6 Intruder attack planes on board U.S. carriers provide an effective day/night striking force able to deliver heavy weapon loads with high accuracy.

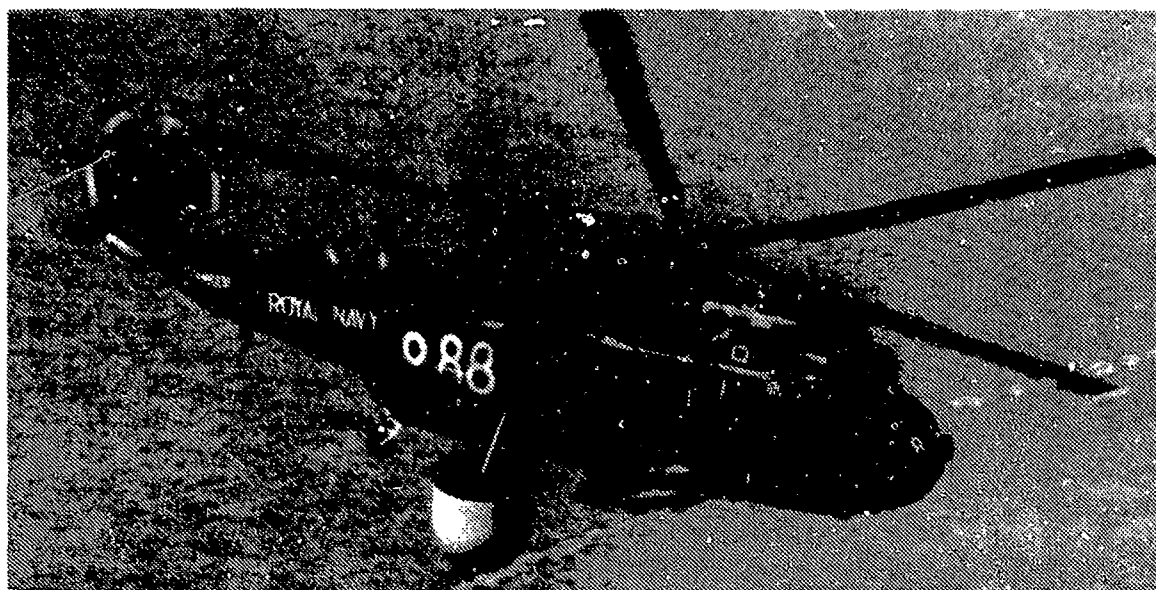
The U.S. Navy's large deck carriers have two additional significant advantages over the smaller British carriers; sustainability and survivability. A large carrier has far more endurance than a small one, with much greater capacity for ship and aircraft fuel, ordnance and spare parts. In the Falklands, both British carriers had their flight decks encumbered with stacks of bombs, missiles, and fuel tanks which could not be stored in the ships' magazines. This situation made them very vulnerable to Argentine aircraft attack. In contrast, nuclear-powered U.S. carriers not only have virtually unlimited steaming endurance, they also carry thousands of tons of munitions and months' worth of spare parts for all of their embarked aircraft. Additionally, U.S. carriers have extensive on-board repair capabilities which cannot be provided on a small carrier.

The smaller carriers deployed by the U.K. are far more vulnerable to complete loss from torpedo, missile, or bomb attacks than are U.S. carriers, because they lack the multiple hulls, armor plate and redundant damage control systems which are inherent design characteristics of those ships. The survivability of the large carrier was nowhere better demonstrated than in the tragic accident aboard U.S.S. Enterprise in the late 1960s. Nine 500 pound bombs exploded on the ship's flight deck, and 32 aircraft were destroyed or disabled. Despite this damage, Enterprise could have launched a major air strike within two hours after the accident, and could have continued to operate with no significant reduction in offensive or defensive capability as long as necessary. No other class of combatant ships in the world today with the exception of Iowa class battleships, has that ability to absorb damage and keep on fighting.

The contributions by British land-based combat aircraft from Ascension were minimal, despite the great skill with which they were carried out. However, the use of Ascension-based Hercules transports to air-drop supplies to the Task Force and the use of Victor tankers for in-flight refueling of Harriers and Hercules were important to the success of the operation. (Some Hercules were also hastily modified and employed as tankers.)

Falklands conflict and the U.S. Navy's Indian Ocean operations have underscored the importance of these modifications.

The outstanding performance of the Harrier under very arduous combat conditions demonstrates the correctness of this Administration's decision to procure for the U.S. Marine Corps the AV-8B variant of the Harrier, which has double the range and payload of those used by the British.



The urgent British need for Airborne Early Warning (AEW) aircraft led to the modification of Sea King MK.5 helicopters to carry the Searchwater radar, as shown in this view. Two of the helicopters arrived in the Falklands aboard the carrier ILLUSTRIOUS just after the conflict.



A Super Etendard of the Argentine Navy's 2nd Attack Squadron, which made the Exocet strikes on the British Task Force. The aircraft were intended to operate from the Argentine light carrier 25 DE MAYO, but the ship was not ready for service when the war began.

B. Antiair Warfare/Antiship Missile Defense

Antiair Warfare (AAW)

The British Task Force, and subsequently the amphibious landings, were defended by Sea Harrier V/STOL aircraft in the fighter role, as well as area and short-range defensive systems--the last including both "hard kill" (guns and missiles) and "soft kill" (chaff).

The British felt very keenly the lack of an Airborne Early Warning (AEW) capability in the South Atlantic. The Argentines, aware of this deficiency, made their air attacks at low level, below ship radar horizons, preventing the British from detecting or engaging them prior to their arrival in the target area. The Royal Navy has since developed and deployed a limited helicopter-borne AEW capability.

As noted above, within the limits of their capabilities, the Harriers had some success in the air-to-air role, despite their weapon system and endurance limitations, flying mostly daytime air defense sorties from the two carriers. They used AIM-9L Sidewinder missiles to shoot down 16 Argentine aircraft (plus one probable) and their 30 mm Aden guns to destroy another four aircraft (plus two probables). However, the Argentine planes were vulnerable because they were operating at almost their maximum range, without the support of Electronic Countermeasures (ECM), and using mostly "iron bombs" that required the attacking aircraft to fly close-in to their targets. No Harriers were lost in air-to-air combat (See Appendix C for combat loss data.) Argentine bombing attacks caused the loss of four ships, while 16 others were damaged by bombs, rockets or strafing.

The area-defense missile system in British warships was the Sea Dart, fitted in seven ships present in the Falklands. The Sea Dart is credited with eight aircraft kills.

After British troops were established ashore, they employed Rapier, Blowpipe, and Stinger antiaircraft missiles for defense against Argentine air attacks. The Rapiers were particularly effective, being used with optical rather than radar control. (The Stinger missiles were used by Special Forces teams.)

Antiship Missile Defense (ASMD)

Seventeen British ships were fitted with the Sea Cat and three with the Sea Wolf short-range missile systems. These weapons destroyed eight and five Argentine aircraft, respectively. More than ten Sea Cat missiles were launched for every kill, but the Sea Wolf was particularly effective, with five kills for only six launches. (There were no opportunities to use the Sea Wolf against incoming Exocet missiles.) Again, the effectiveness of British AAW was enhanced by the Argentines' lack of jamming and other ECM techniques, the Argentine use primarily of "iron bombs," and the relatively small Argentine raid size. Close-in "soft-kill" missile

defense in the British force consisted of chaff launched from surface ships and dispensed from ship-based helicopters.

Although the Argentines fired five Exocet missiles from aircraft and two from a shore launcher in the Falklands, they hit three ships, destroying two, for a high launch-to-hit ratio. The missiles, with relatively small, 360-pound warheads, not more than one of which is believed to have detonated, caused fires which led to loss of the destroyer SHEFFIELD and the aircraft-carrying container ship ATLANTIC CONVEYOR, and damaged another destroyer, HMS GLAMORGAN.

Issues and Lessons

The British were sorely pressed to defend against Argentine air attacks. Despite severe limitations of the attacking Argentine forces and the few Exocet missiles launched, British casualties were significant. This is both a tribute to the Argentine attackers and acknowledgement of the limitations of the British AAW and ASMD systems. The British force lacked defense in depth, which requires at least AEW aircraft, shipboard three-dimensional (3-D) air search radars, integrated shipboard combat direction, and all-weather fighter aircraft that can maintain sustained, long-range air patrols. Figure 4 illustrates Royal Navy Task Force AAW defenses established to counter Argentine air attacks against the main body of the Task Force. Also, the number and capabilities of British missile and ECM systems were limited, and no Close-In Weapon Systems (CIWS) of the Gatling-gun type--to provide terminal defense against incoming missiles--were fitted in their ships. (British shipboard guns were credited with several aircraft kills; see Appendix C. Shipboard guns and small arms fire were also credited with deterring attacking Argentine pilots.)

Facing a similar air/antiship missile threat, the U.S. Navy would employ a number of systems in the "defense in depth" concept. First, each U.S. carrier has four E-2 Hawkeye AEW aircraft, which can provide around-the-clock and around-the-compass early warning of hostile air attacks and control defending fighters. Second, the long-range weapons/radar capability of the F-14 Tomcat provides the opportunity for early intercept of attacking planes. Third, the U.S. Navy's missile cruisers and destroyers are all fitted with 3-D radars and, increasingly, the new series of Standard missiles which provide significantly greater capability than RN ship-launched missiles. Upgrades to the Standard missile's guidance and fuzing systems are being developed to give the missile even greater capability against sea-skimming antiship missiles.

Fourth, the Navy is providing all battle-force ships with close-in defenses: The Sea Sparrow missile is carried in some destroyers, frigates, and aircraft carriers; and almost all important combatant ships are being provided with the Phalanx CIWS. This "last ditch" defense system can fire several thousand rounds per minute and tracks both the incoming missile and rounds in flight to provide a very high probability of kill. For soft kill, all battle-force ships are being fitted with the AN/SLQ-32

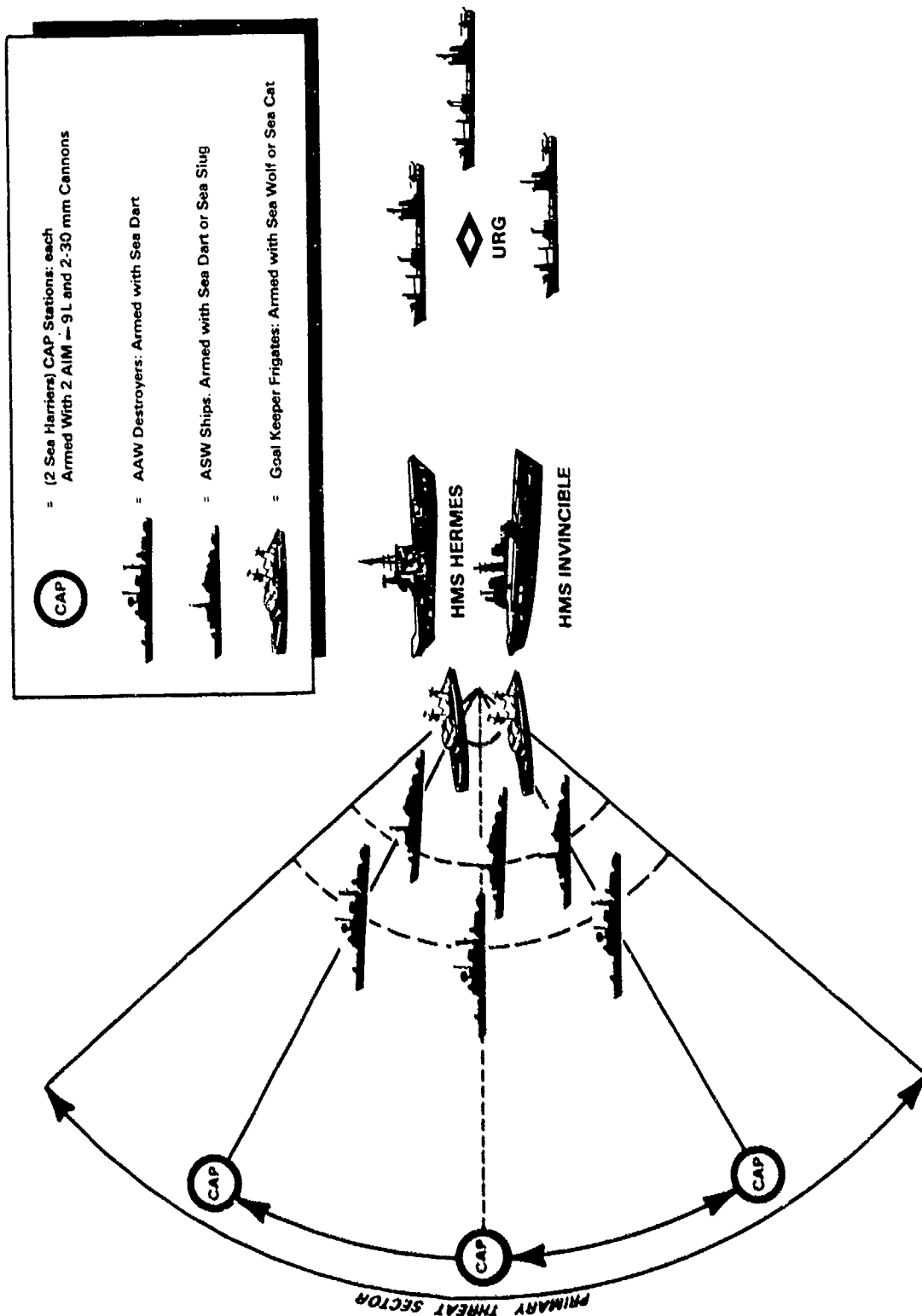


FIGURE 4. STANDARD TASK FORCE AAW FORMATION

ECM system (except the AN/SLQ-17 in carriers) and chaff/decoy launchers. The SLQ-32 can detect hostile missile guidance radars. Through jamming and deception, and by controlling chaff/decoy release, it can be a vital element in defending against missile attacks. To increase the effectiveness of chaff dispersal, an air launch Chaff System is currently being procured for use on Naval aircraft. Airborne ASMD electronic jamming systems are also being developed to complement ship based systems.

Taken together, this defense-in-depth should afford protection to our battle groups and to the amphibious forces or merchant convoys under their protective umbrella. The Falklands conflict did identify some potential problems in countering Western-produced missiles, because U.S. systems are oriented toward Soviet antiship missiles. Expansion of existing soft-kill ASMD systems to counter this threat is in progress.

C. Antisubmarine Warfare (ASW)

Argentine Antisubmarine Warfare (ASW)

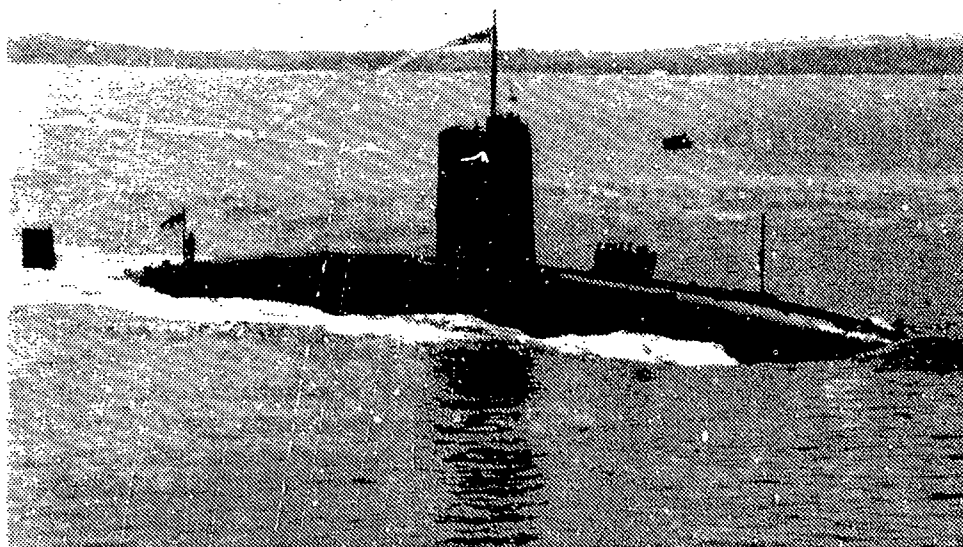
The only known Argentine ASW effort was against the British nuclear-powered submarine CONQUEROR after she torpedoed the cruiser GENERAL BELGRANO. The two Argentine destroyers with the cruiser were modernized World War II-built ships fitted with modernized AN/SQS-29 series sonars. After the CONQUEROR's attack, the destroyers dropped depth charges as they left the scene of the sinking, but without effect.

British Antisubmarine Warfare

Only two Argentine submarines made major patrols during the conflict, one relatively new, German-built Type 209 diesel-electric submarine (completed 1974) and one former U.S. GUPPY-type submarine of World War II construction. Early in the conflict the GUPPY-type submarine SANTA FE was attacked while on the surface off South Georgia by British ship-based helicopters. The submarine was badly damaged and subsequently beached. (On that day, 25 April, South Georgia was retaken by the British.)

The main British Task Force was located and attacked without success by the Type 209, SAN LUIS. That submarine was at sea, and at times in the area of the British force, for an estimated 36 days. The threat from Argentine submarines was a continuous concern for the British Task Force commander, and numerous attacks were made against suspected submarine contacts, with a large number of ASW weapons being expended. In any event, SAN LUIS survived all British ASW efforts, but at the same time was unable to inflict damage on the British force because of materiel problems (see Section 3.Q).

Another ASW consideration was the long British supply line from the United Kingdom to Ascension and then south to the Falklands. Of particular concern was the line of tankers, vital to sustain British fleet operations, and the tankers in various refueling areas. The British were



Nuclear-powered attack submarines like HMS CONQUEROR had a major role in British strategy in the conflict. These submarines permitted the British to establish "exclusion" zones around the Falklands, and then off the Argentine coast, to deny those waters to Argentine surface ships.



The Argentine GUPPY-type submarine SANTIAGO DEL ESTERO and destroyers in port after the Falklands conflict.

fortunate in that the Argentines were unable to attack this Sea Line of Communication (SLOC); had they done so, the British would have required additional escort ships, as well as other ASW forces.

Issues and Lessons

Argentine and British ASW forces were unable to destroy any of the opposing submarines except for the Argentine SANTA FE, caught on the surface and severely damaged by depth charges and AS-12 missiles launched from helicopters. While Argentine ASW efforts were completely ineffective, British ASW activities may have deterred Argentine submarine attacks.

Both navies were inhibited by their ASW sensors and weapons. In addition, the water conditions in the Falklands area were very poor for acoustic detection. Finally, the Task Force operating area was too far from British bases for the effective use of land-based ASW aircraft and no ship-based fixed wing ASW aircraft were available to supplement British ASW helicopters.

U.S. naval forces involved in a similar conflict would have the advantages of carrier-based S-3 Viking fixed-wing ASW aircraft, which could be projected into the submarine threat area to complement the efforts of ship-based ASW helicopters. In addition, large numbers of U.S. cruisers, destroyers, and frigates have high-powered active sonars and towed, passive acoustic arrays which would have been more effective in the Falklands environment. British employment of shipboard torpedo countermeasures systems verifies current U.S. Navy programs to improve our capability in this area.

The British expended ASW ordnance at a higher rate than planning factors had indicated. This fact, and the anticipated high expenditure rates of air-launched sonobuoys in some scenarios, are of particular concern to the U.S. Navy. The U.S. Navy's continued review of combat sustainability now includes the Falklands experience.

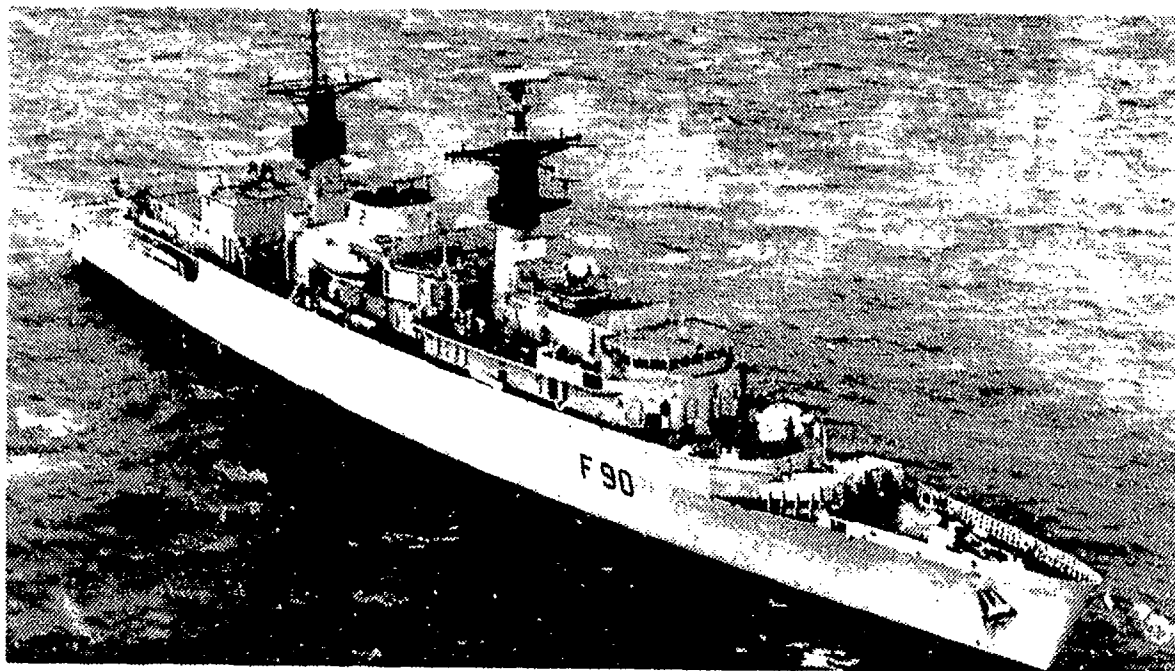
D. Antisurface Warfare (ASU)

Argentine Antisurface Warfare

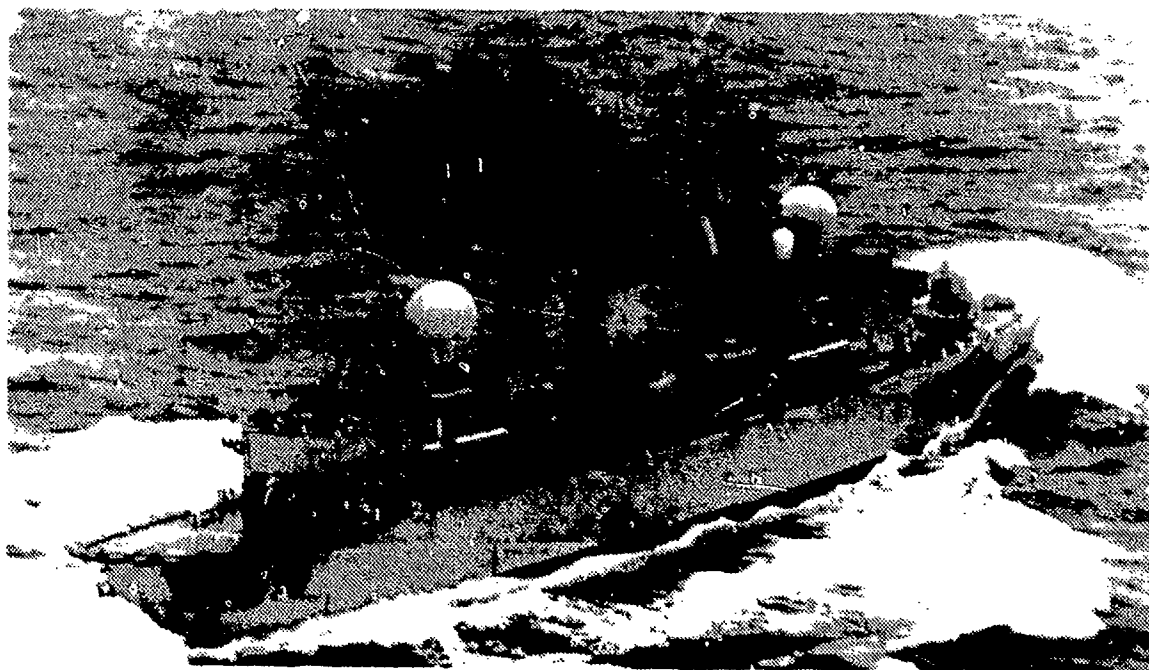
The Argentine efforts to attack British surface ships consisted primarily of air strikes, limited submarine operations, and the early, ill-fated sorties by surface task groups. Only the Argentine air strikes, described above, were successful.

British Antisurface Warfare

Several Argentine ships were sunk or damaged by British forces. Of special note was the use of antitank rockets by Royal Marines on South Georgia to damage an Argentine corvette, and attacks by naval Lynx helicopters with Sea Skua air-to-surface missiles against several Argentine surface ships, as well as the helicopter attack against the surfaced submarine



HMS BRILLIANT is representative of the newest frigate class in British service. The Type 22 ship has highly effective Sea Wolf surface-to-air missile launchers forward and aft and four Exocet antiship missiles in canisters forward. She also carries ASW torpedo tubes and two Lynx helicopters.



HMS GLASGOW is a Type 42-class destroyer, sister ship to HMS SHEFFIELD. The ship has a Sea Dart missile launcher and 4.5-inch gun mount forward, with ASW torpedo tubes and a Lynx helicopter for ASW. This is the newest destroyer class to enter British service.

SANTA FE. The Sea Skua missile, which had not been certified for fleet use at the start of the conflict, is known to have scored at least four, and possibly as many as eight, hits for the eight missiles fired. In addition, RN Sea Harriers sank an Argentine trawler trailing the Task Force, and a British frigate sank an Argentine supply ship in Falkland Sound with gunfire.

Issues and Lessons

The Falklands conflict provided very limited data on antisurface ship operations. The sinking of the GENERAL BELGRANO by a British submarine and the British concern over the threat from Argentine submarines confirm that undersea craft can be highly effective in the ASU role. The use of a torpedo designed over a half a century ago to sink BELGRANO provides a graphic illustration of the potential value of seemingly "obsolescent" munitions.

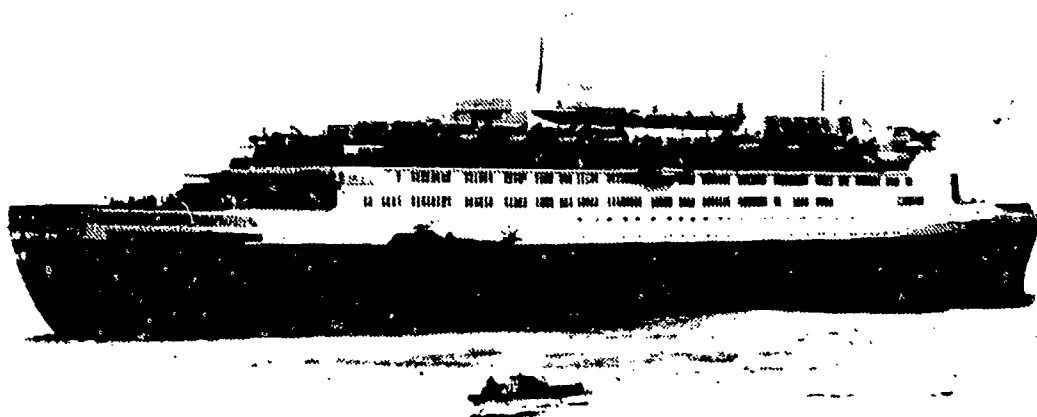
Additionally, the British use of ship-based helicopters in the antiship role has led the U.S. Navy to reconsider the role of the helicopter in ASU. The U.S. Navy uses ship-based LAMPS helicopters in the Over-the-Horizon (OTH) targeting role for ship-launched missiles. There also may be merit in arming these helicopters with antiship weapons in certain situations.

E. Amphibious Warfare

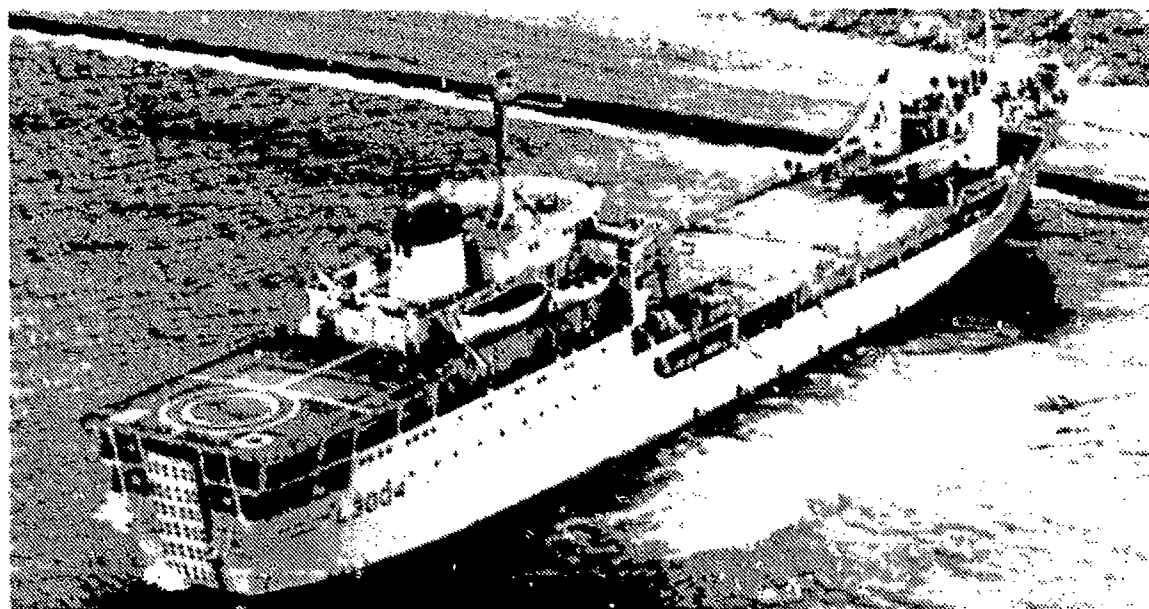
The objective of the British "Operation Corporate" was to recapture the Falklands, South Georgia, and South Sandwich islands. The major amphibious operation was in the Falklands. The British landing forces, consisting of Royal Marines and British Army soldiers, were carried to the Falklands in a small number of specialized amphibious ships of the LSL and LPD type, and converted passenger liners and passenger/vehicle ferries.

Through careful planning, skill, and good fortune, the main landings at San Carlos were carried out with little initial opposition. The landings, begun in darkness at 0340 local time, were carried out by 16 landing craft carrying troops and equipment from the ships offshore to the beach. At dawn ship-based helicopters joined in the shuttle of weapons and supplies to the beach. The British beachhead was firmly established when Argentine air raids began in the afternoon. The later amphibious landings at Fitzroy, unlike the San Carlos landings, were initially conducted unopposed under night and poor-visibility conditions. When the weather did clear, two unescorted and nearly unarmed amphibious ships were severely damaged in air attacks, one later having to be scuttled.

The Falklands landings demonstrated the continued viability of amphibious operations. The significant aspects of the landings included: (1) the British ability to come ashore in undefended areas through the use of deception and prior intelligence, (2) major Argentine air opposition during the landings, (3) the British reliance on merchant shipping as well



The luxury liner QUEEN ELIZABETH II, one of 50 merchant ships pressed into service during the Falklands conflict, helped to compensate for a shortage of amphibious shipping as the British sought to move 10,500 troops to the South Atlantic.



The logistics landing ship (LSL) HMS MEDIVAC is similar to the HMS CALADAN and HMS TRISTRAM, which were used in the Fitzroy landing in the Falklands. These ships did not beach in the Falklands, but unloaded troops and equipment by helicopter and by landing craft.

as specialized amphibious ships, (4) the extensive use of Naval Gunfire Support (NGFs) by British warships, (5) the British shortage of assault landing craft and heavy-lift helicopters, and the lack of adequate helicopter deck spots aboard ships, and (6) cargo offloading difficulties (see Section 3.J).

Issues and Lessons

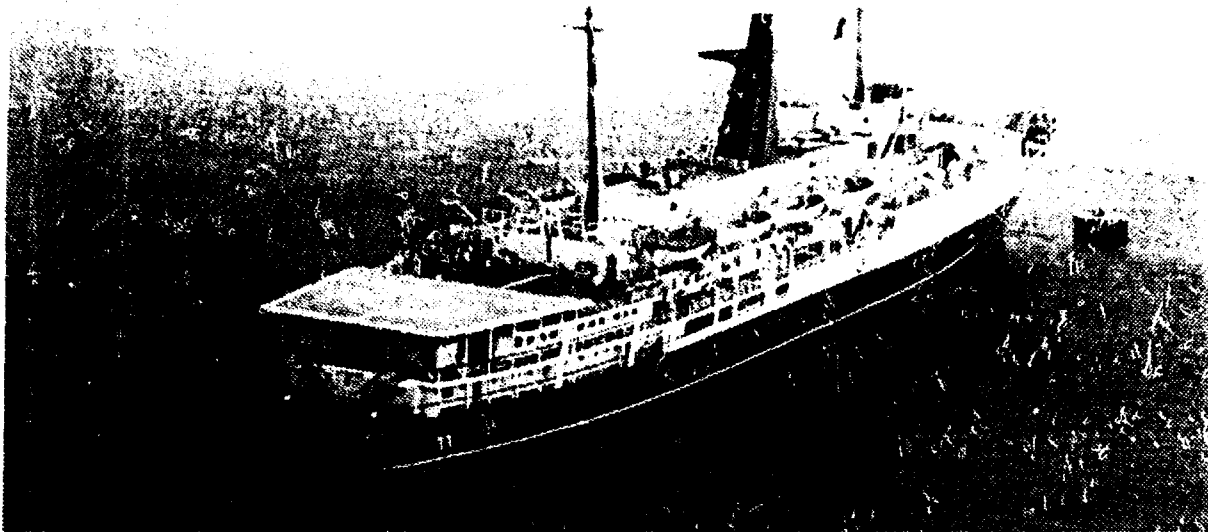
The British landings were initially only lightly opposed, in part because of deception and prior knowledge of the location of Argentine forces. SAS and SBS units carried out raids to confuse the enemy as to the nature and location of the British landings. Although such tactics are preferred to opposed landings, in some situations there is no alternative to having the capability of landing troops against opposition. The U.S. Navy and Marine Corps have developed the tactics, equipment, and weapons necessary to undertake opposed landings.

The British experience demonstrated that amphibious shipping can survive against air attacks, although not without losses. The presence of adequate early warning of air attacks, airborne and shipboard defense, and effective self-defense weapons in the amphibious ships would have substantially reduced losses. Most of the merchant ships employed to carry troops and material into the Falkland Sound mounted at best only a few light guns. The two large RN assault ships of the FEARLESS class did have SEA CAT missiles and 40 mm guns, as well as passive ECM (including chaff), but the smaller logistic landing ships had only light guns installed.

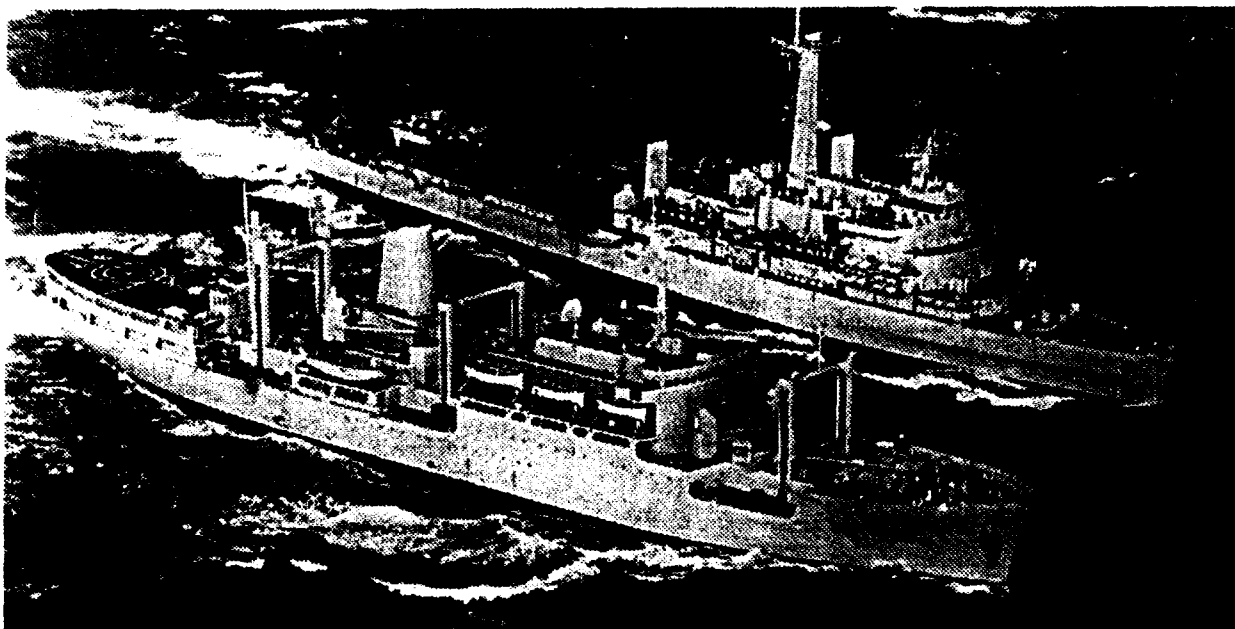
The U.S. Navy's amphibious ships, which are armed and are being fitted with chaff and variants of the SLQ-32 ECM system, could be expected to have a significant capability against the same level of threat. Further investigation is warranted on the issue of providing "bolt-on" self-defense systems for merchant ships that may be called upon to support U.S. amphibious operations.

At the start of the Falklands operation, the Royal Navy had only eight amphibious ships available--two dock landing ships (LPD type) and six logistic landing ships (LSL type). With a requirement to lift more than 10,000 troops to the Falklands, the British were forced to employ a large number of merchant ships, including the large passenger liners QUEEN ELIZABETH II and CANBERRA. The British ground forces also included light armor, artillery, and antiaircraft batteries as well as large stocks of munitions, specialized equipment, and provisions for an extensive ground campaign. It is apparent that commercial shipping is not a substitute for specialized amphibious shipping.

The U.S. Navy currently has several times the British amphibious lift, with 60 active amphibious ships, all significantly larger than comparative British types, plus four ships in the Naval Reserve Force (NRF). (This does not include the merchant-type ships assigned to the Maritime Prepositioning Program.) The total U.S. lift capacity is approximately



The passenger/vehicle ferry RANGATIRA shows her military features in this view: A helicopter platform has been fitted aft, the antenna dome for maritime satellite communications is installed forward, and 20 mm Oerlikon antiaircraft guns have been installed amidships and forward.



The amphibious assault ship HMS FEARLESS during an underway replenishment from the Royal Fleet Auxiliary STROMNESS. HMS FEARLESS and her sister ship HMS INTREPID are Britain's only multipurpose amphibious ships, being fitted with helicopter facilities and a docking well for landing craft.

44,000 troops or one Marine Amphibious Force (MAF), divided about equally between the Atlantic and Pacific Fleets. The current five-year defense program plus the ships already under construction will add nine ships to this force by about 1990. Although several older amphibious ships will be retired in that period, there will be a net gain in ships and the newer ships will have increased capability.

Seventeen British destroyers and frigates in the Task Force were armed with a total of 21 4.5-inch guns. The 14 ships that participated in NGF missions fired approximately 7,900 rounds of ammunition. This fire supported friendly troops, suppressed enemy fire, destroyed enemy supplies and aircraft on the ground, and seriously hurt the morale of the defenders. The British were limited by gun caliber and hence hitting power and range. The U.S. Navy currently has a large number of 5-inch guns in the fleet and the planned recommissioning of the four battleships of the IOWA class will provide significantly more-capable 16-inch guns for NGF in support of amphibious operations. President Reagan recommissioned the first of these ships, the NEW JERSEY (BB-62), on 28 December 1982, and the second, the IOWA (BB-61), will rejoin the fleet in early 1984. Each Battleship can deliver the naval gunfire support equivalent of 20 DD-963 destroyers. Figure 5 illustrates the difference in NGFS ordnance delivery capability between a Battleship and a DD-963. The Battleship can deliver 803 tons of 16-in and 5-in rounds in a space of only 30 minutes while a DD-963 can deliver only 42 tons of 5-in rounds during the same time period. The Battleship carries more than 7000 rounds of ammunition in its magazines as compared to 1200 rounds for a DD-963. The 23 mile range of the Battleship's 16-in guns is significantly greater than the 13 mile range of a DD-963.

SHIP	SALVO RATE/ MIN	ROUNDS ON TARGET AFTER 30 MINUTES	ORDNANCE DELIVERED (TONS)	REMAINING MAGAZINE CAPACITY (ROUNDS)	MAXIMUM RANGE (MILES)
BATTLESHIP					
16" 50	18	540	729	680	23
5" 38	90	2,700	74	3,300	10
		<u>3,240</u>	<u>803</u>	<u>3,980</u>	
DD-963 DESTROYER					
5" 54	40	1,200	42	0	13

FIGURE 5. COMPARATIVE NGFS ORDNANCE DELIVERY CAPABILITY

The British were limited in the landings by the lack of helicopter landing spots on ships. Throughout the operation there was a severe shortage of heavy-lift helicopters, due in part to the destruction of three of the four available Chinook (8-1/2 ton capacity) helicopters when the ATLANTIC CONVEYOR was lost. U.S. amphibious operations would have considerably more landing craft, amphibious tractors, and helicopters available, including several of the new CH-53E Super Stallion helicopters (16-ton capacity). Also, the first of a series of 50-knot air cushion landing craft (LCAC) are under construction.

The British faced several problems in moving men, supplies, and equipment to the Falklands, among them the shortage of amphibious shipping and difficulties in the order that materiel was loaded aboard ship in the United Kingdom and unloaded in the assault area. A similar U.S. operation would rely primarily on amphibious ships that are configured for "combat loading" of materiel. A U.S. Navy shortage of amphibious lift for "cube" materiel (munitions, provisions, etc.) is being corrected with the recent shift of two amphibious cargo ships (LKA) from the Naval Reserve Force (NRF) to the active fleet, with two more NRF ships scheduled to return to the active fleet early in 1983. With respect to total shipping, as noted above, we plan to significantly increase the capability of our amphibious fleet by 1990. At the same time, there is a program to ensure certain merchant ships laid up in the National Defense Reserve Fleet can be rapidly returned to service. The current five year plan will also increase the Ready Reserve Force fleet of merchant ships from 29 to 77.

All analyses of the Falklands, as well as potential amphibious operations which U.S. forces may be called upon to carry out, indicate that specialized amphibious ships are absolutely essential for amphibious assault, because of their rapid offload capability, survivability, and ability to lift specialized military equipment.

Finally, the prepositioning of U.S. Marine supplies and equipment in Norway and in specialized merchant-type ships in the Indian Ocean will permit the more rapid deployment of Marine combat units to those regions.

F. Command, Control, and Communications

The British force, operating more than 7,000 nautical miles from its bases, was in continuous communication with fleet headquarters at Northwood, near London. This was accomplished primarily through satellite links, which were fitted to the warships and submarines, as well as most of the merchant ships used in Operation Corporate. British communications in general proved to be highly reliable throughout the conflict.

Both the British and Argentines lacked secure tactical communication systems and were able to obtain important tactical information through the intercept of the other's tactical transmissions. Another consideration was the large amount of message traffic transmitted between London and the

British Task Force Commander. This volume of traffic taxed the limited resources, both staff and facilities, in the flagship, HMS HERMES.

Issues and Lessons

The U.S. Navy has an extensive and highly capable satellite communications system with HF backup. The Soviet development of antisatellite systems makes it mandatory that the U.S. Navy continue to maintain a viable HF backup capability and explore new concepts to provide reliable, secure, and rapid worldwide communications.

Communications Security (COMSEC) is a vital concern for naval forces. In general, superior secure communications are available to U.S. naval forces in comparison to those found in British warships. The U.S. Navy can achieve a higher degree of COMSEC during contingency and wartime operations. The E-2 AEW aircraft and other systems in the carrier battle group permit airborne radio relay using secure, line-of-sight communications links to battle group units, which reduces the probability of communication signal exploitation and limits the value of enemy use of direction-finding techniques.

The high volume of communications experienced in the Falklands is also of concern to U.S. Naval commanders. Despite the importance of such traffic, it can overload the on-scene commander and his staff. This situation must be carefully reviewed at every level of naval and higher chains of command, and efforts should continue to reduce staff workload and the amount of time Battle Group and fleet commanders are "on the horn."

G. Electronic Warfare (EW)

The Argentine and British forces made minimal use of electronic warfare techniques, due primarily to the limited equipment available to the engaged forces.

Issues and Lessons

During the same period as the Falklands conflict, Israeli air and ground forces made a highly successful assault against Syrian air defenses in southern Lebanon. The Israeli success in destroying the air defenses with minimal losses again demonstrated the significance of sophisticated EW tactics and equipment in modern warfare. Thus, the U.S. Navy views the limited use of EW techniques in the Falklands as an abnormal situation. This is especially true in view of the very heavy emphasis that the Soviet armed forces place on EW activities.

Several components of the U.S. naval forces are dedicated to the EW issue, among them the carrier-based EA-6B Intruder, and the SLQ-32 and SLQ-17 shipboard systems. All aspects of electronic warfare (including COMSEC, referred to above) are receiving increasing special emphasis in the U.S. Navy.

H. Intelligence

Next to personnel, the most important determinant of the battle outcome appears to have been intelligence. From a variety of technical and other sources, the British forces had available to them substantially better information regarding Argentine force levels, deployments, tactics and intentions than had the Argentine forces about those of the U.K. Some knowledgeable observers go so far as to say that without that substantial intelligence edge, the outcome would have been reversed.

The Argentine and British forces were hampered by their lack of intelligence about their opponent's intentions and available combat forces. For example, the Argentines greatly underestimated the speed with which the Royal Navy could deploy a large military force to the South Atlantic and the capabilities of that force; similarly, the British underestimated the size of the Argentine forces in the Falklands.

However, the British forces were well served by tactical intelligence collection activities of the Special Air Service (SAS) and the Special Boat Squadron (SBS). SAS and SBS units were landed in South Georgia and the Falklands by air and sea to obtain up-to-date information on enemy dispositions and the general situation in South Georgia and in the Falklands. They were able to get this information back to the appropriate commanders in a timely manner, so that operational decisions could be made using the most recent information available. These units also carried out sabotage and deception missions.

Issues and Lessons

In recent years the British armed forces have concentrated their intelligence collection and analysis against the Soviet Union and the other nations of the Warsaw Pact. Although the United States has farther-ranging intelligence interests, including the Middle East, Southwest Asia, and Far East, there are limitations to U.S. intelligence collection and analysis activities. These constraints do not reflect a lack of interest or technical capabilities as much as they do fiscal limitations and the need to establish priorities.

The Falklands conflict again emphasizes the need for the continued United States awareness that crises and potential conflicts can occur in any area of the world. Intelligence collection, analysis, and dissemination are vital to U.S. diplomatic and military readiness and success. This lesson of the Falklands conflict cannot be overemphasized.

I. Environmental Conditions

The weather appeared to have had little influence on British Naval or air operations, except that overcast conditions periodically prevented air operations. Surface ships were able to operate in heavy seas with little, if any, reduction in operating tempo. This was particularly



A Wessex helicopter lifts supplies from a support ship to a carrier during underway replenishment operations in the South Atlantic. Royal Navy helicopters, along with a few RAF machines, performed a wide variety of important missions in the Falklands conflict.



Merchant tankers were essential to British success in the Falklands campaign, fought more than 7,000 nautical miles from bases in Britain. A chain of tankers, like the BRITISH TAMAR, shown here fueling HMS FEARLESS, stretched far into the South Atlantic to make up for a shortfall in naval oilers.

true of the V/STOL aircraft carriers, which operated in conditions of very high seas and low visibility. The British were hampered by the limited weather forecasting information available in the region after Argentina ceased to provide mainland weather data to the international weather system. The temperature was not low enough to cause ice accumulation on ships, although on occasion the wind chill factor was very low.

The Royal Navy, long believed to be the best equipped and trained Navy in the Free World in the field of shallow water ASW, was unable to successfully localize and destroy the Argentine submarine SAN LUIS, known to have been operating in the vicinity of the Task Force for a considerable period. The Falklands experience clearly demonstrates the difficulty associated in shallow waters, an aspect of Naval Warfare which requires increased emphasis in the U.S. Navy. (See Appendix D for a description of the Geography and Climate of the Falkland Islands.)

The environment did, however, have a significant impact on British antisubmarine warfare activities. The Falkland Islands lie on the continental shelf, with the 1000 fathom curve between 50 and 100 miles to the east of the islands. The waters in this area are characterized by large quantities of marine life, including whales, heavy mixing of layers and a rough bottom surface. These factors combined to present a very difficult ASW environment to sonar operators, and forced the Royal Navy to rely on active ASW search tactics.

Issues and Lessons

The Royal Navy is accustomed to winter operations in the North Atlantic, and therefore ships and crews were able to carry on in conditions far worse than those normally experienced by U.S. Navy ships.

J. Logistics/Sustainability

Argentine Considerations

Following their capture of the Falklands, the Argentines poured troops and military supplies into the islands. A considerable stockpile of weapons and munitions was built up. However, the Argentine military command in the Falklands was unable to properly distribute the supplies and weapons; hence troops in the field were critically short of some items that were available in abundance at supply dumps in the Falklands.

After British naval forces reached the area, few supplies were brought in for the Argentine garrison by sea. However, C-130 and other Argentine cargo aircraft were able to deliver supplies at night from the mainland to the airfield at Port Stanley up until the eve of the Argentine capitulation. Only one of those supply aircraft was intercepted and destroyed by the British, while the efforts of ship-based Harriers and Ascension-based Vulcans to close down the airfield at Stanley were unsuccessful.

British Considerations

British naval operations were hampered by the distances from home bases and supply depots, an initial shortage of shipping, and limited stocks of certain materials. The British used 50 merchant-type Ships Taken Up From Trade (STUFT) in the Falklands conflict. These ships included a variety of merchant types--break bulk, container, roll-on/roll-off, passenger, and tanker, plus several special-purpose ships such as the youth cruise ship UGANDA, which was rapidly converted to a hospital ship. Fuels were the most critical logistic consideration, with nearly one-third of the STUFT being tankers. Most of the merchant ships were rapidly fitted with at-sea (underway) replenishment receiving capability and maritime communication satellite terminals, while 19 ships were additionally fitted to operate helicopters (two of which also carried Harriers). Some merchant ships were also fitted with light guns.

During the main San Carlos landing, it became apparent that commercial ships were not adequate substitutes for dedicated amphibious ships. Commercial ships were easy to load while in the U.K., but they were a major problem when trying to off-load, because of the unavailability of dock facilities and ramps which were not compatible with the landing craft the supplies had to be loaded into. Moreover, on average, only 20 tons per hour of supplies could be off-loaded from commercial ships as compared, to 90 tons per hour from comparable amphibious ships.

During the conflict RAF Hercules aircraft flying from Ascension air-dropped critical items to the Task Force. These aircraft were refueled en route by tanker aircraft from Ascension. RAF tanker aircraft also refueled the Vulcan strikes, the Nimrod surveillance flights, and 22 Harriers flown from Britain to Ascension (four of these were then flown down to ships in the Falklands area).

Ascension Island, approximately halfway between Britain and the Falklands, served as a staging base for British forces. During the conflict the British logistic buildup included the airlifting of 5,800 personnel and 6,600 tons of supplies from the United Kingdom to Ascension, an indication of the magnitude of the shore-based logistics support needed for an operation the size of the Falklands campaign.

The British forces required large quantities of munitions, provisions, fuel, and other supplies for the relatively brief conflict. The intensity of antiair, antisubmarine, shore bombardment, and, once troops were ashore, artillery activity, demanded a continuous flow of supplies. To meet this demand, the British were forced to use stores earmarked for NATO contingencies.

Issues and Lessons

The logistic issues related to the British naval force off the Falklands were in some respects similar to those faced by U.S. naval forces



The container ship ATLANTIC CONVEYOR en route to the Falklands from Ascension with a deck load of Harriers and helicopters. Note the Sea Harrier on the forward landing pad in ready status for an intercept should the ship be attacked. Four British merchant ships were configured to transport helicopters or Harriers.

deployed to the Indian Ocean since 1979. Obviously, the British force was in a combat situation, with munitions, fuels, and other supplies being consumed at a rapid rate; logistic ships were under the threat of hostile attack; and the distance from Ascension to the Falklands is greater than that from Diego Garcia to the U.S. naval operating area ("Gonzo Station") in the northern Arabian Sea.

The fitting of in-flight refueling equipment to the C-2 Greyhound carrier-capable cargo aircraft and procurement of additional planes of this type will improve long-range logistic support for U.S. Carrier Battle Groups.

While the U.S. Navy has developed plans in conjunction with the Maritime Administration to use merchant ships from trade and the Ready Reserve Force, more effort is required to develop aviation, self-defense, and other "naval" systems for merchant ships so employed.¹ The U.S. Navy has developed the Arapaho concept of operating helicopters from a container ship and the Royal Navy is leasing the equipment for at-sea evaluation. (In October of 1982 the U.S. Navy conducted a most-successful although limited at-sea test of Arapaho. These trials were carried out with naval observers from Australia, Canada, Chile, Great Britain, the Netherlands, and West Germany. This is a most promising program.)

Vast quantities of munitions and other consumables are required for sustained combat, and this is a major concern for U.S. planners. The lack of any single item could influence dramatically a conflict's outcome. While not new, this proposition is receiving special emphasis within the Navy Department. Increasing the combat sustainability of fleet and marine units, while ensuring an industrial expansion capacity to produce quantities for war, is one lesson that was relearned and needed.

The vast quantities of munitions used in the Falklands, as well as in other conventional conflicts during the past few years, and the U.S. shortfalls in certain weapon inventories, indicate that older weapons may still be useful. These experiences reinforce our current effort to reevaluate our policy regarding the disposal of older weapons.

K. Mine Warfare

Argentine Offensive Mine Operations

After the Falklands were captured, an Argentine surface ship laid a single minefield off Stanley. The Argentines used moored contact mines of World War I design which, although obsolete in comparison with modern

¹ There are 29 merchant ships in the Ready Reserve Force, ten of which are intended for activation in five days and the remainder in ten days.

naval mines, still had to be swept or neutralized before British ships could operate in those waters. Had the Argentines placed minefields in Falkland Sound before the arrival of the British force, the landings might have encountered significant delays.

British Mine Countermeasure Operations

The Royal Navy has an effective force of minehunters and minesweepers, and has experimented with air cushion vehicles in the Mine Countermeasure (MCM) role. Apprehensive of Argentine minelaying, the British acquired and commissioned five commercial stern trawlers, manned them with naval personnel, and outfitted them with minesweeping gear. These craft were deployed to the Falklands, but until hostilities were over, they were used in the utility and cargo role. Afterwards, they were used with two regular RN minehunters to neutralize the one Argentine sea minefield.

Issues and Lessons

The limited mining capabilities of the Argentine Navy, if used in a timely and effective manner, could have created major problems for the British force. The U.S. Navy had learned the implications of a minor or nonexistent naval power using obsolete mines during the Korean War (1950-1953). The U.S. Navy MCM capability built up in the 1950s has been allowed to deteriorate. Today the Navy has 21 minesweeping helicopters (RH-53D) and three active minesweepers (built in the early 1950s), plus another 18 outdated minesweepers in the Naval Reserve Force.

Major programs are underway to revitalize the U.S. Navy's MCM capability. The MH-53E minesweeping helicopter is being procured and the lead ship of an improved mine countermeasure class, the USS AVENGER (MCM-1), is under construction. A new class of minehunters for U.S. port clearance (MSH-1) is planned. Unfortunately, MCM forces tend to be particularly vulnerable to budget reductions. The Navy will attempt to ensure that the MCM program is completed as now structured.

L. Personnel

The men who planned, fought, and supported operations in the Falklands were the critical factor in the outcome of the conflict. For a number of reasons the men in the Argentine and British armed forces had different backgrounds: The Argentines rely heavily on conscription, while the British armed forces are entirely voluntary; the Argentine armed forces are oriented primarily toward internal security and defending their borders from other South American nations, while British armed forces train and exercise to fight the considerably more powerful Soviet Union, and do so in conjunction with other NATO military services.

Argentine Performance

There were considerable variations in the standard of performance of the Argentine military forces who fought in the Falklands conflict. The Air Force and Navy pilots who flew reconnaissance and strike sorties against the British forces appeared to be of high caliber and were well trained. (Many underwent flight training in the United States.)

Less data are available on the performance of Argentine naval forces. From the information available it is difficult to distinguish between materiel problems (such as ASW sensors) and personnel shortcomings. There is evidence of major materiel casualties in Argentine ships that could be attributed to lack of adequate maintenance.

Most of the approximately 12,000 Argentine ground troops in the Falklands were Army. Virtually all of the junior enlisted men were conscripts who were inexperienced. About 1,000 of the troops were Marines and they conducted themselves well in combat.

Argentine leadership exhibited major failures in staff planning and logistic support in the Army; this was reflected in the poor employment and condition of the ground troops. There were some exceptions, but in general the Argentine troops, who were more numerous and in some respects better equipped than the British ground units, could have been a more effective fighting force.

British Performance

British military forces demonstrated an almost uniformly high standard of skill and performance. This was true of the forces employed in the capture of the Falklands and South Georgia, as well as the small detachments of Royal Marines who were on the islands when the Argentine troops originally landed on 2-3 April. Those detachments made a determined defensive stand, particularly at South Georgia, where they damaged an Argentine corvette and shot down a helicopter before being instructed to surrender.

The high standard of performance by British forces occurred in severe climatological environment. In particular, Harrier and helicopter pilots took off and landed in weather conditions far worse than operational norms. Extreme environmental conditions such as "white out" were encountered by helicopters operating with Special Forces in the Falklands. (In one instance, during a blizzard a helicopter pilot managed to recover an SAS team plus the crews of two helicopters that had crashed earlier on South Georgia.) Once ashore in the Falklands, some ground units undertook difficult treks over rough terrain, for long distances, with individual soldiers carrying loads of more than 100 pounds. These efforts, coupled with aggressive patrolling and extensive night operations, demonstrated an extremely high level of training by the British units.

Factors contributing to excellent British performance, especially that of the Royal Marines, included intensive Arctic training in Norway, as well as emphasis on unit cohesion and esprit de corps.

British personnel losses at sea and in ground combat were relatively low. At sea, the wearing of foul weather gear and special flash-protective clothing reduced burn casualties. The relatively low number of deaths ashore was attributed to helicopter evacuation of casualties and the excellent medical training of British troops. The availability of hospital facilities afloat and the physical fitness of the ground forces also contributed to limiting casualties. The improvement of protective flash clothing for shipboard use is a major U.S. Navy concern and is receiving high level attention.

Issues and Lessons

The major factors in the success of the British forces in the Falklands conflict were skill, stamina, and determination. As already noted, the British military, like that of the United States, is an all-volunteer force. We believe that today's U.S. sailor is the best trained in the world. Recent changes in naval officer assignment policy and the realignment of Naval War College courses will further improve the tactical skills of our officers. The overall Reagan Administration attitude toward national defense is having a very positive impact on the morale of Navy and Marine Corps personnel.

W. Press Coverage

The national attitudes toward press coverage of the conflict by Argentina and Britain were quite different. In general, the Argentine government suppressed coverage of the conflict, except for official statements from the capital city.

The British government carried out an intensive effort at home and abroad to put forward the British viewpoint and to make news from the war zone available to the news media as soon as possible. In doing so, the British were sensitive to operational security considerations and the need to reduce anxiety of the families of men in the combat area. Accordingly, certain restrictions on press coverage were put in effect. News media representatives were embarked in the British Task Force sent to the South Atlantic. Their stories were subject to censorship before being transmitted to the Ministry of Defence (MOD) in London and again before being released by MOD.

Still, there appear to have been press leaks of sensitive information, although full details are not yet available. Also, some news stories may have benefited the British forces, as journalists were encouraged to speculate on certain British options in order to confuse the Argentines about actual British intentions. This speculation included

reports that the British would initially conduct only hit-and-run raids, and not a large-scale amphibious landing in the Falklands.

Issues and Lessons

The Argentine and British governments were both able to better control the flow of news from the war zone than in many previous conflicts, such as the Vietnam War and the Israeli invasion of Lebanon in 1982. This control was possible because of the remote location of the conflict, the difficulty of reaching the Falklands, and the lack of civilian communications from the scene.

The British Ministry of Defence has commissioned a study by the University College in Cardiff to examine the relationship between the media and the government in time of war.

N. Readiness and Mobilization

In response to Argentine actions in the Falklands and South Georgia, on 29 March the British Commander-in-Chief, Fleet, directed that the Flag Officer, First Flotilla, prepare to dispatch a task group to the South Atlantic. Subsequently, three nuclear attack submarines (SSN) were ordered to take on stores and proceed to the South Atlantic. These were the first precautionary British actions in the Falklands.

After the Argentine landing of troops in the Falklands on the night of 1-2 April, the British government initiated a number of military and political actions. RN ships began sailing almost immediately from ports in Britain and from Gibraltar for the South Atlantic. The aircraft carriers INVINCIBLE and HERMES, with their air squadrons embarked, departed Portsmouth on 5 April.

Several British actions were particularly significant because of their indication of readiness and mobilization capability. These included:

- Obtaining 50 commercial ships for logistics, troop transport, hospital, support, and mine countermeasure functions. Except for the five trawlers taken for the MCM role, in all cases civilian crews sailed the ships. All of these ships were modified in some way for their role in the war (described in 3.J.).
- Establishing additional naval air squadrons to support Falklands operations.
- Exercising and maintaining the ships and, in the case of the carriers, their aircraft, while en route to Ascension and the Falklands. The rapidity with which British forces were dispatched meant that some ships and units were not fully prepared, and a vigorous training and preparation program was undertaken on the passage south.



The North Sea passenger/vehicle ferry NORLAND was typical of the Ships Taken Up From Trade (STUFT) employed by the British to supplement their amphibious lift capabilities. Here the ship is anchored in Falkland Sound, while helicopters carry troops and equipment ashore.



A closeup of the receiving probe fitted to an RAF Hercules. Some of the aircraft were also fitted as tankers. Other aircraft innovations included fitting Nimrods to carry Sidewinder and Harpoon missiles.

- Virtually every type of British aircraft committed to the campaign received rapid modifications to enhance operational capability. The Nimrod maritime patrol, Vulcan strategic bomber, and Hercules cargo aircraft were modified for in-flight refueling, with some also configured to serve as aerial tankers. In addition, the Nimrods were fitted to carry Sidewinder air-to-air missiles and Harpoon antiship missiles.
- Training large numbers of flight crews in in-flight refueling techniques and instructing RAF Harrier pilots in ski-jump operations from the British carriers.
- Moving vast amounts of stores and support equipment to Ascension Island. Wideawake Airfield on the island had previously had an average of only three flights per week; this increased about 50 fold during the conflict, with thousands of additional personnel being sent to the island.

Issues and Lessons

The rapidity with which the British forces deployed was remarkable, especially considering the current size and capabilities of the Royal Navy. In a similar situation, the forward-deployment posture of the U.S. Navy and the general high state of readiness of U.S. forces would permit us to respond in an equally rapid manner. Also, a small number of merchant ships could be made immediately available for U.S. military requirements from the Ready Reserve Force.

In a Falklands-like situation, the U.S. Navy would probably deploy at least two carrier battle groups and a Marine Amphibious Brigade (MAB), i.e., approximately 15 percent of the carrier battle groups and almost one-half of the amphibious lift in the current fleet.

While these forces are readily available within the current Navy force structure, the world-wide interests of the United States require contingency planning for multiple and sustained crisis situations. For example, when the U.S. Navy originally deployed two carrier battle groups and amphibious ships in the Indian Ocean while still maintaining battle groups in the Mediterranean and Western Pacific areas, this sustained, widespread demand for logistic support resulted in a shortfall in logistic support ships. This shortfall was met by purchasing two excess British store ships for U.S. service (AFS type). The resupply of combat expenditures of munitions would have created even more problems for the naval logistic system. The five-year shipbuilding program continues the construction of fleet oilers (AO) and restarts the construction of ammunition ships (AE) and fast combat support ships (AOE).

At the same time, the distance from Diego Garcia, our major staging base, and the Arabian Sea operating area placed a heavy strain on land-based naval aircraft, especially the C-2 Greyhound and P-3 Orion.

Both types are being modified for in-flight refueling, while the C-2 production line is being restarted to provide additional cargo aircraft that can deliver high-priority material directly aboard aircraft carriers, supplementing the older C-1 Trader and the 12 C-2 and 4 US-3A Viking cargo aircraft now in the fleet. The use of the heavy-lift MH-53E for cargo delivery within the battle group as well as amphibious forces will improve fleet readiness.

O. Ship Survivability

Argentine Casualties

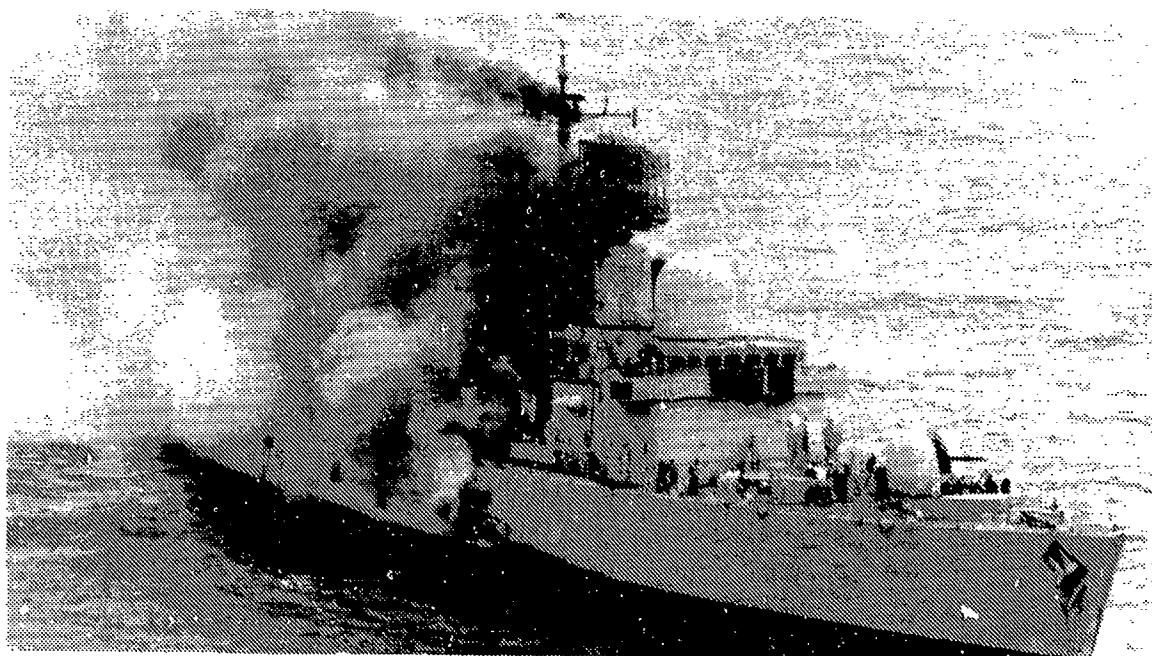
The major Argentine ship loss in the Falklands conflict was the cruiser GENERAL BELGRANO, sunk by a British SSN. The cruiser was struck by two MK VIII torpedoes, each with a 750-pound warhead. The poor material condition of the 44-year-old cruiser and probable limited damage control training by the crew resulted in rapid, uncontrollable flooding and loss of the ship.

British Casualties

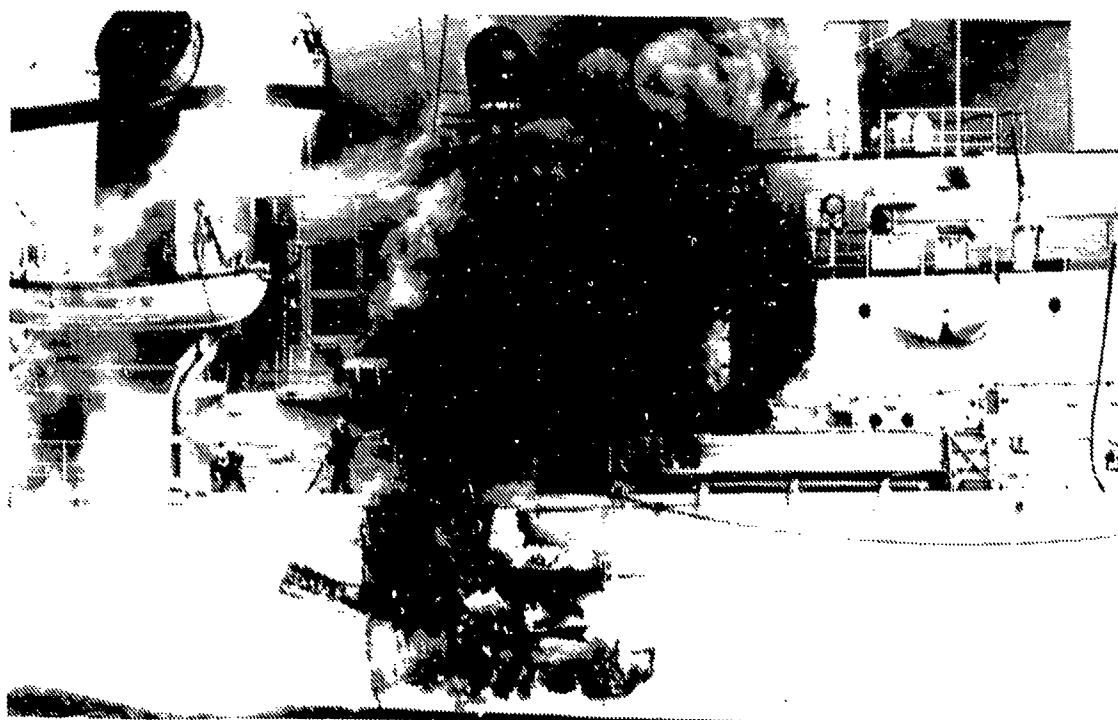
The British lost a total of six ships with several others damaged. The latter included nine ships hit by bombs that did not detonate and were subsequently defuzed, although the frigate ANTELOPE sank as a result of damage sustained when an unexploded bomb blew up as it was being defuzed. Two of the British losses were caused by Exocet missiles launched by Argentine Super Etendard aircraft. Their loss is particularly instructive.

The SHEFFIELD was a 4,100-ton Type 42 destroyer completed in 1975. She was struck by one of two Exocet missiles fired by Argentine Super Etendard aircraft. The missile struck her on the starboard side amidships, penetrated a fuel tank, and smashed into machinery spaces. The Exocet's 360-pound warhead apparently did not detonate. Burning residual fuel from the missile ignited fuel fires, resulting in thick, black acrid smoke being spread through the ship's ventilation system. The missile and subsequent fires destroyed communication cables and fire mains. The ship's company fought the fires for 4-1/2 hours before the ship had to be abandoned. Twenty men were lost in the fire. The SHEFFIELD subsequently sank several days later in heavy seas while under tow.

The merchant ship ATLANTIC CONVEYOR was struck by one and possibly two aircraft-launched Exocet missiles, whose warheads are not believed to have detonated. She was loaded with aluminum freight containers, aircraft, and combustible materials, including fuel and ammunition. Without the extensive damage-control features found in a warship and without the trained damage-control personnel available in a warship to fight fires, she was quickly engulfed in flames and burned out, sinking three days later. Three RN personnel and nine merchant officers and men, including the ship's master, were killed.



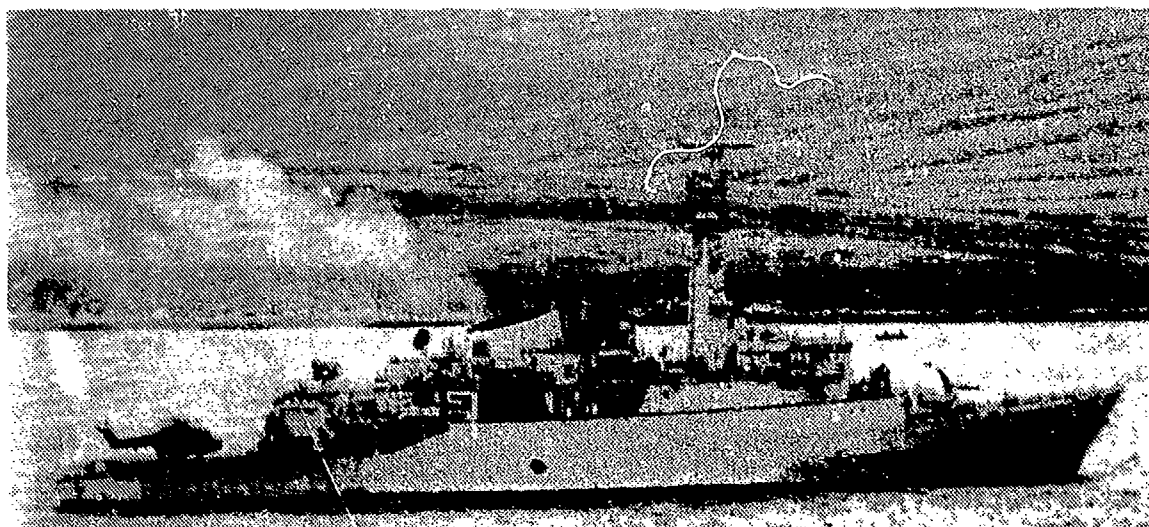
The destroyer HMS SHEFFIELD after being struck by an Exocet missile. The ship lacked advanced missile warning and defense systems of the type being installed in U.S. surface combats.



HMS SHEFFIELD on fire after being struck by an Exocet missile. Note the relatively small size of the hole where the missile hit; the missile's warhead did not detonate, but burning residual fuel ignited fuel fires in the destroyer, leading to her loss.



The aircraft-carrying merchant ship ATLANTIC CONVEYOR burned out after being struck by one or possibly two Exocet missiles. She lacked defensive systems and damage-control features and carried a highly flammable cargo including fuel, ammunition and several helicopters.



Bombs destroyed four Royal Navy ships and damaged several others in the Falklands conflict. This is the frigate HMS ANTELOPE after being bombed, with the hole in her starboard side where an unexploded bomb entered. The bomb later detonated while being defused, starting fires which caused the sinking of the ship.

It is significant to note that a second destroyer, the 6,200-ton GLAMORGAN (completed 1966) was also struck by an Exocet missile, launched from shore. The missile struck next to the helicopter hangar, and the war-head detonated. The still-burning rocket motor skidded into the hangar, causing a major fire. Shrapnel from the explosion killed 13 men on the deck below and the ensuing fire destroyed the hangar and helicopter inside. The ship was able to continue operations with her weapons systems nearly intact.

Issues and Lessons

In general, the cost (and size) constrained British ship designs of the mid-1960's, the Type 42 destroyer and the Type 21 frigate, were the only classes of combatants lost by the RN. On the other hand, both newer (Type 22 frigate) and older (county class destroyers) design ships absorbed substantial punishment and were able to survive. While other factors cannot be discounted in this comparison, one can safely conclude that had the Type 42's and Type 21's been designed and constructed with survivability, rather than cost, as a primary consideration, at least one of the four ships lost might be afloat today, resulting in a substantial savings, overall, for a relatively modest additional investment.

There has been extensive discussion of the effects of aluminum in warship construction and its effect on ship survivability. Aluminum is used in British and American ships for nonstructural bulkheads, ladders, and ventilation ducts. Most U.S. warships of post-World War II construction have aluminum superstructures because of the weight savings, particularly important when the ships carry radar antennas and other equipment relatively high above their centers of gravity.

The SHEFFIELD had a steel superstructure, although one class of British frigates has aluminum superstructures. There is no evidence that the use of aluminum contributed to the loss of any British combatant ship.

The potential vulnerability of aluminum, which loses strength under moderately high temperatures, has long been recognized by the U.S. Navy. The decision to provide a steel superstructure in the new ARLEIGH BURKE (DDG-51) class destroyers was made long before the Falklands conflict, as was the decision to improve survivability of certain existing classes of combatants by the installation of Kevlar armor and fire retardant insulation in key spaces in these ships.

In general, U.S. warships have outstanding damage-control and fire-fighting features, and well-trained crews. This has been demonstrated in several peacetime operational accidents. On the basis of the British experience in the Falklands, the U.S. Navy is reviewing construction techniques and damage control procedures, especially with regard to our smaller, frigate-type ships. British experience with flash protective clothing and battle dress underscores our own efforts to improve shipboard personnel survivability and protection.

U.S. ships are believed to be less vulnerable to fires when in a state of combat readiness (i.e., General Quarters) than were the British ships. However, the materiel condition of U.S. ships with respect to flammable materials is under constant review.

P. Special Forces Operations

The British made extensive use of Special Forces in the Falklands--units of the Army's Special Air Service and the Royal Marines' Special Boat Squadron. SAS and SBS teams went ashore numerous times to collect intelligence, carry out reconnaissance, conduct raids to confuse and disorganize Argentine forces, and to destroy supplies and equipment. In one operation an SAS raiding party, supported by 4.5-inch gunfire from the destroyer GLAMORGAN, destroyed an ammunition dump, stores, and 11 aircraft. These SAS and SBS activities were characterized by a low casualty rate, in part because of the physical fitness and skill of the SAS-SBS personnel, and the initiative and skill of the crews of the helicopters and ships that supported them in these operations.

These teams were put ashore by helicopter, small boat, and submarine. Their activities--sometimes referred to as "Unconventional Warfare"--had a significant influence on the outcome of the conflict.

Issues and Lessons

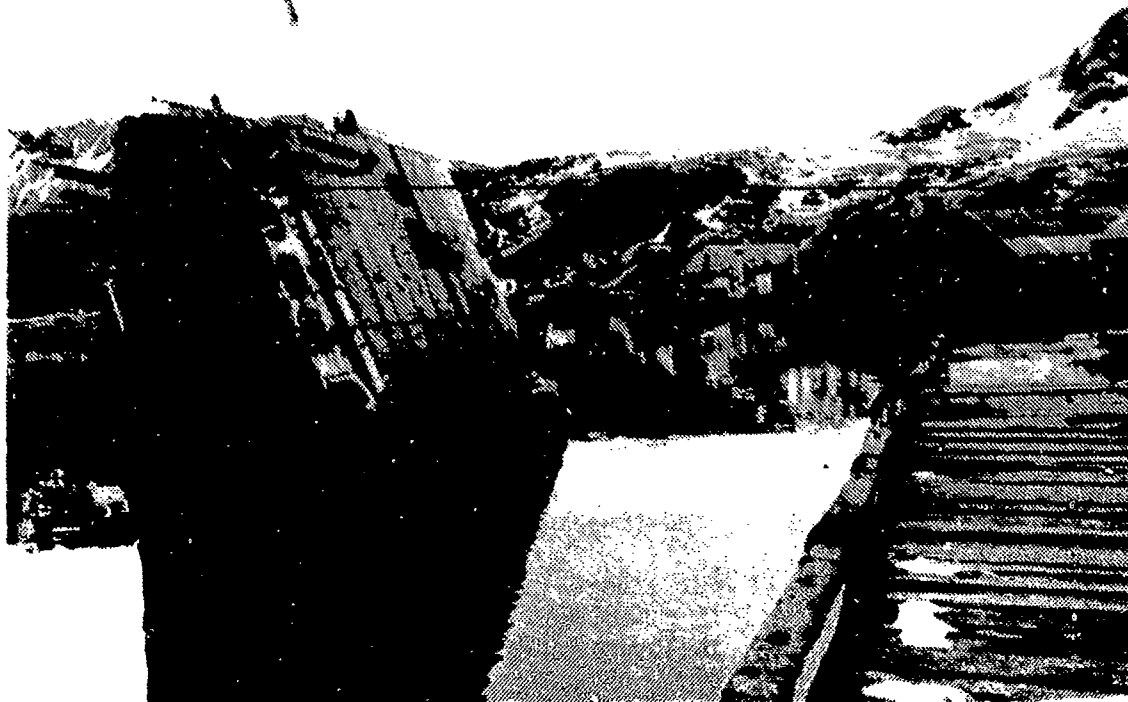
The U.S. Navy's SEAL (Sea-Air-Land) and UDT (Underwater Demolition Team) units, as well as Marine Corps Reconnaissance units, are especially adept at conducting unconventional warfare operations. However, several aspects of the British SAS and SBS operations in the Falklands warrant additional study by U.S. planners in this field. Of particular interest is the extensive and highly successful use of night vision devices by British helicopter pilots, naval gunfire spotters, and ground troops. The U.S. Navy and Marine Corp are upgrading their night vision capability through development and procurement of lightweight, state-of-the-art night vision systems.

Q. Submarine Operations

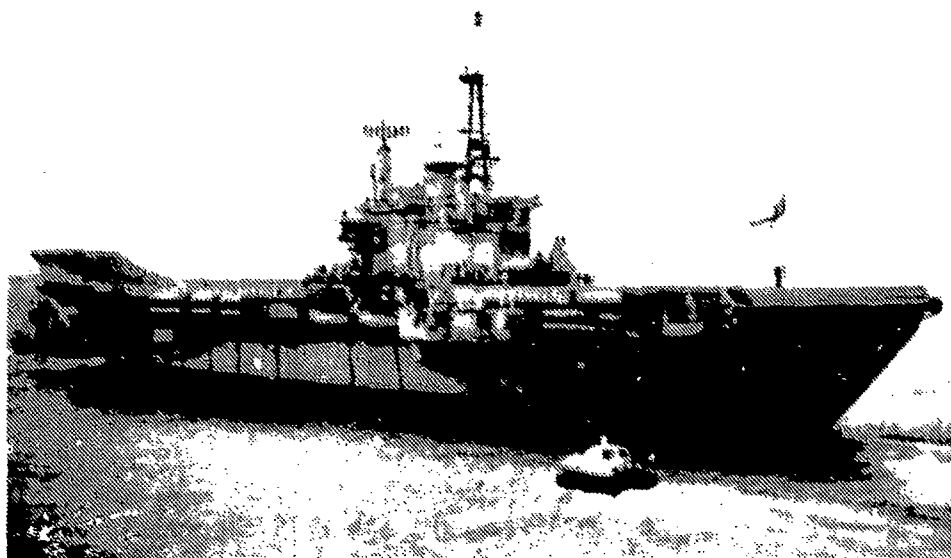
Argentine Submarine Operations

The Argentine Navy began the conflict with two operational submarines--one relatively new, German Type 209 diesel-electric submarine and one former U.S. GUPPY-type submarine of World War II construction. The GUPPY-type submarine SANTA FE, which was present when Argentine troops landed in the Falklands, was subsequently put out of action by British forces off South Georgia on 25 April.

The German-built SAN LUIS (completed in 1974) made a patrol of an estimated 36 days during the conflict. The SAN LUIS reportedly located and



The Argentine submarine, A.R.A. SANTA FE, sunk alongside the pier in South Georgia, after being attacked on the surface by British helicopters. The British had considerable success using helicopters armed with antiship missiles against the SANTA FE and several surface ships.



HMS HERMES, showing the ship's 12° ski-jump ramp which facilitates Harrier takeoffs with increased payloads. HMS INVINCIBLE has a 7° ramp. Despite their small size, both carriers were able to successfully operate Harriers in the heavy seas of the South Atlantic.

operated in the area of the main British Task Force for several days. However, the submarine was unable to make a successful attack because of materiel problems. The submarine's main torpedo fire control panel was not operational and improper wiring of the backup panel caused all torpedoes that were launched to be fired on incorrect bearings. (The Argentine Type 209 submarine SALTA did not go to sea during the conflict because of problems with her diesel engines.)

British Submarine Operations

As the crisis escalated in the South Atlantic in late March, three British nuclear attack submarines (SSN) were directed to take on stores and deploy to the Falklands area. The ability of these nuclear-powered attack submarines to transit at high sustained speeds permitted the British government to establish an exclusion zone 200 nautical miles in radius around the Falklands early in the conflict. Initially, SSNs enforced this exclusion zone to prevent Argentine ships from further reinforcing the garrison in the Falklands. The availability of SSNs allowed the expansion of British sea control, and on 7 May the British government warned that any Argentine warships sighted more than 12 miles from the Argentine coast would be regarded as hostile and subject to attack. Ultimately, the RN deployed five SSNs and one diesel-electric submarine (HMS ONYX) to the South Atlantic.

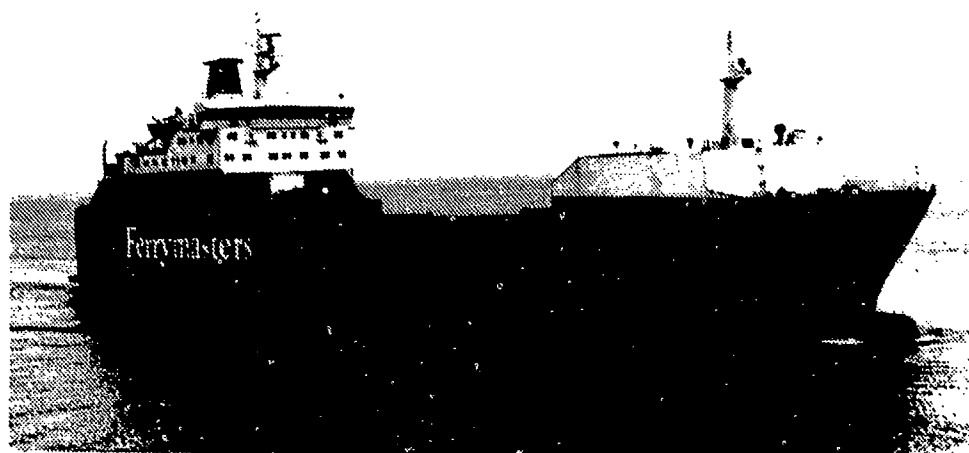
One of these submarines was sent to South Georgia in late April to ensure that Argentine ships did not interfere with the recapture of that island by Royal Marines and SAS units. The following week that submarine, HMS CONQUEROR, successfully intercepted and sank the Argentine cruiser GENERAL BELGRANO.

Issues and Lessons

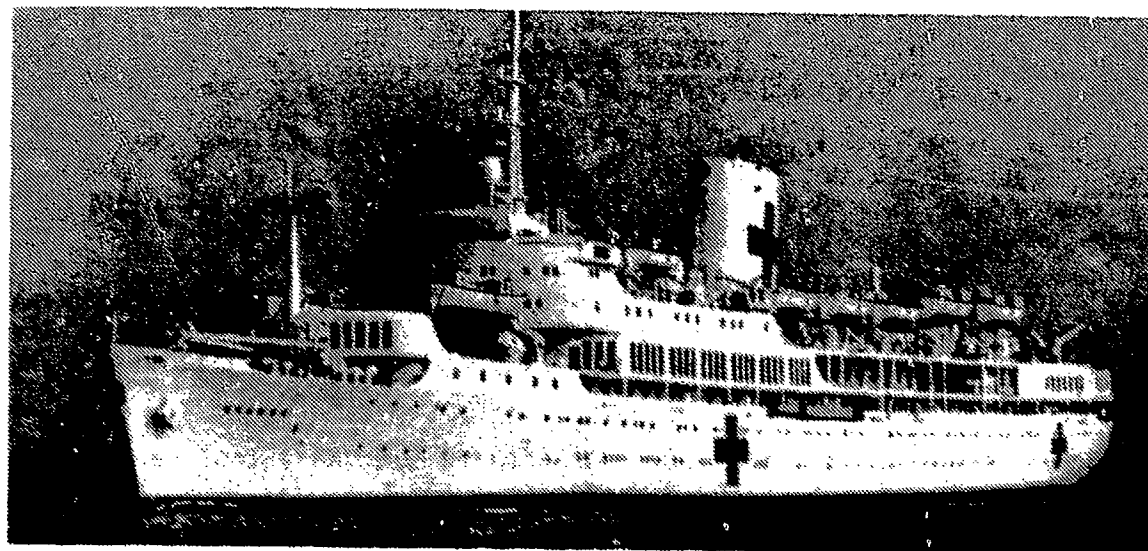
Submarines played a significant role in the Falklands conflict by their actual operations and by the threat of their actions. The loss of a British aircraft carrier or troop transport to submarine attack might well have curtailed the entire British operation.

Similarly, the British SSNs appear to have served as a deterrent to Argentine surface naval operations, especially after the sinking of the GENERAL BELGRANO. British submarines also served in the reconnaissance and intelligence collection roles.

In a similar crisis or conflict the U.S. Navy could employ its attack submarine force in the same manner. Additionally, U.S. SSNs could provide direct support to carrier battle groups, increasing their ASW effectiveness, while the submarine-launched Harpoon and Tomahawk missiles provide enhanced antiship and strike capabilities to SSNs. The operating characteristics of SSNs also permit their early, clandestine deployment in time of crisis, giving increased flexibility to national leaders.



The roll-on/roll-off vehicle cargo ship ELK participated in the conflict still carrying her commercial line name "Ferrymasters." Except for trawlers taken on for minesweeping, the merchant ships had civilian crews, with Naval communications and other specialized personnel assigned to some ships.



The youth training ship Uganda was rapidly converted to a hospital ship at the Naval dockyard in Gibraltar. Three Naval survey ships were also modified for use as "ambulance" ships, to provide rapid casualty evacuation and treatment.

R. Surface Ship Operations

Argentine Surface Ship Operations

The Argentine Navy initially sortied four groups of surface ships, including nine ships armed with Exocet antiship missiles. After the loss of the GENERAL BELGRANO on 2 May there were no further significant Argentine surface combatant operations.

British Surface Ship Operations

The primary role of British surface combatants in the Falklands conflict was to provide AAW/ASW defense for the British aircraft carriers and amphibious shipping, with a secondary role of shore bombardment. Their AAW/ASW effort was effective, although not without the loss of several destroyers and frigates. However, neither of the carriers was damaged and amphibious shipping losses were relatively small in view of the number of amphibious and merchant ships involved in the operation.

A secondary role for surface combatants was shore bombardment, and the ships were highly effective in this role, despite the small gun caliber available (i.e., 4.5-inch).

Issues and Lessons

The U.S. Navy's surface combatants could be expected to be more effective in the AAW/ASW roles because of their superior weapons and sensors, even in the face of more advanced Soviet systems. Further, the availability of Harpoon and Tomahawk missiles provides U.S. cruisers and destroyers with a formidable long range antiship capability.

Defense of aircraft carriers and amphibious forces is vital if those two "force projection" elements are to continue to be viable instruments of national power. Thus, the "defensive" role of surface combatants must continue to be stressed through the improvement of area AAW and ASW defense weapons.

Conclusion

The Falklands conflict was a major naval campaign which included a variety of air, surface, submarine, and ground operations. These included several "firsts" in combat at sea. The U.S. Navy and Marine Corps have examined the conflict to determine those lessons that would apply to U.S. planning and new programs.

Appropriate data from the Falklands have now been incorporated in the U.S. Navy and Marine Corps planning process. In general, the "lessons learned" indicate that current Navy and Marine planning for limited conflicts similar to the Falklands situation is correct.

Appendix A FALKLAND ISLANDS STUDY GROUP

Steering Group

Chairman Melvyn R. Paisley, Assistant Secretary of the Navy
(Research, Engineering and Systems)

Members Gerald A. Cann, Principal Deputy ASN(RE&S)
Robert M. Hillyer, Director of Navy Laboratories
Andrew W. Marshall, Director of Net Assessment,
Office of the Secretary of Defense
Norman Polmar, Consultant
Dov S. Zakheim, Special Assistant, Under Secretary
of Defense (Policy)
Vice Admiral L. Baggett Jr., Director of Naval
Warfare (OP-095)
Vice Admiral E.B. Fowler, Commander, Naval Sea Systems
Command
Rear Admiral C.C. Smith Jr., Director, Office of
Program Appraisal (OPA)
Rear Admiral John L. Butts, Director of Naval
Intelligence (OP-009)
Brigadier General E.B. Russell, Deputy Chief of Staff
(Research, Development and Studies), Headquarters,
U.S. Marine Corps
Commander R.D. Tucker, Office ASN(RE&S)

Study Group

Director Captain John W. Walker (OPA)

Members Captain Roland Brandquist (OP-96)
Captain Ronald C. Trossbach (OP-35)
Colonel J. Pipta (PP&O, Headquarters, Marine Corps)
Commander Richard Farrell (OP-50)
Commander G.D. James (Nav Sea-913)
Lieutenant M. Sidrow (CNA)
A.D. Baker III (OPA)
A.E. Brandenstein (OEG)
L.S. Straus (OEG)

Notes: ASN(RE&S) = Assistant Secretary of the Navy (Research,
Engineering and Systems)
CNA = Center for Naval Analyses
NavSea = Naval Sea Systems Command
OEG = Operations Evaluation Group
OP-() = Office of the Chief of Naval Operations
OPA = Office of Program Appraisal
PP&O = Plans, Policies and Operations

Appendix B FORCES ENGAGED

British Forces

The following ships participated in British operations in the South Atlantic. The Royal Fleet Auxiliary (RFA) ships are government-owned and civilian-manned; the Ships Taken Up From Trade (STUFT) retained their merchant crews except for the trawlers modified for use as minesweepers which were assigned naval crews. However, naval communications personnel and other specialists were placed on board most merchant ships.

Royal Navy

- 5 Fleet Submarines (nuclear propelled)
 - 3 VALIANT class
 - 2 SWIFTSURE class
- 1 Patrol Submarine (diesel-electric)
 - OBERON class
- 2 V/STOL Aircraft Carriers¹
 - HERMES
 - 1 INVINCIBLE class
- 2 Assault Ships)
 - FEARLESS class
- 8 Guided Missile Destroyers
 - 2 County class
 - 1 Type 82
 - 5 Type 42
- 15 Frigates
 - 2 ROTHESAY class
 - 4 LEANDER class
 - 7 Type 21
 - 2 Type 22
- 2 Offshore Patrol Ships
 - Castle class
- 1 Ice Patrol Ship
 - ENDURANCE
- 3 Survey Ships (employed as medical evacuation ships)
 - HECLA class

Royal Maritime Auxiliary Service

- 1 Mooring and Salvage Vessel
- 1 Tug

Royal Fleet Auxiliary

- 10 Oilers
- 4 Replenishment Ships
- 1 Stores Support Ship

¹ HMS INVINCIBLE is officially designated as an ASW carrier and HMS HERMES as an ASW/commando carrier.

Royal Fleet Auxiliary (Continued)

- 1 Helicopter Support Ship
- 6 Logistic Landing Ships

Ships Taken Up From Trade

- 2 Liners
- 1 Training Ship (converted to hospital ship)
- 4 Passenger--Cargo Ships
- 6 Cargo Ships
- 8 Roll-On/Roll-Off--Container Ships
- 1 Container Ship
- 15 Tankers
- 4 Offshore Support Vessels
- 3 Tugs
- 1 Cable Ship
- 5 Trawlers (for use as minesweepers)

The following were the naval air units that participated in the Falklands conflict. The ships that they operated from are indicated in parentheses. The aircraft in these squadrons totaled 28 Sea Harriers and more than 150 helicopters.

Fleet Air Arm Squadrons

- 4 squadrons with Sea Harrier V/STOL aircraft (aircraft carriers)
- 1 squadron with Lynx MK 2 helicopters (aircraft carriers, destroyers, frigates)
- 5 squadrons with Sea King MK 2/4/5 helicopters (aircraft carriers, assault ships, auxiliary ships, merchant ships)
- 1 squadron with Wasp MK 1 helicopters (frigates, ice patrol ship, survey ships, merchant ships)
- 4 squadrons with Wessex Mk 3/5 helicopters (destroyers, auxiliary ships, merchant ships)

The 3rd Commando Brigade Air Squadron of the Royal Marines operated Gazelle and Scout helicopters in the campaign.

In addition, the Royal Air Force deployed 10 HARRIER GR.3 VSTOL aircraft and four Chinook helicopters to the Falklands (with three of the latter lost with the destruction of the merchant ship ATLANTIC CONVEYOR).

Several squadrons of RAF aircraft based in the United Kingdom and on Ascension Island also supported operations in the South Atlantic. These squadrons flew the following principal types of aircraft:

- Chinook heavy-lift helicopters
- Hercules cargo aircraft and tankers
- Nimrod maritime patrol aircraft
- Phantom FGR 2 fighter aircraft
- Sea King search-and-rescue helicopters
- VC 10 cargo aircraft

VICTOR K 2 tanker aircraft
VULCAN B strike aircraft

British Ground Forces

3rd Commando Brigade (Royal Marines)
5th Infantry Brigade (Army)

Argentine Forces

The following list contains all major Argentine naval ships available at the time of the Falklands conflict.

4 Submarines²
 2 Ex-US GUPPY type
 2 Type 209
1 Aircraft Carrier
 Ex-British COLLOSSUS class
1 Light Cruiser
 Ex-US BROOKLYN class
7 Destroyers
 1 ex-US FLETCHER class
 3 ex-US ALLEN M. SUMNER class
 1 ex-US GEARING class
 2 Type 42
3 Frigates
 A-69 type
9 Corvettes
6 Patrol Boats
6 Minesweepers/Mine Hunters
1 Tank Landing Ship
3 Hydrographic Ships
1 Antarctic Support Ship
5 Transports
1 Fleet Replenishment Oiler
1 Tanker
4 Tugs

The Argentine naval air arm operated the following aircraft. All operated from land bases during the conflict.

5 Super Etendard fighter-bombers (carrier based)
10 A-4Q Skyhawk fighter-bombers (carrier based)
5 S-2A Tracker ASW aircraft (carrier based)
2 SP-2E Neptune maritime patrol aircraft
10 MB.339 trainer/ground attack aircraft

² One Type 209 and one GUPPY were not operational at the time of the conflict.

Various helicopters and training aircraft were also flown by the Argentine Navy.

The Argentine Air Force operated approximately 50 Skyhawk fighter-bombers, 40 Mirage III/V fighters, 5 Canberra light bombers, 60 PUCARA ground support aircraft, plus helicopters, transports including two KC-130 Hercules tankers, and training aircraft. The Air Force also flew a modified Boeing 707 in the long-range reconnaissance role.

Argentine Ground Forces

11,000 Army
1,000 Marines

Appendix C COMBAT LOSSES

British Losses

Ships Sunk (Cause):

Destroyer	SHEFFIELD	(Exocet/fire)
Destroyer	COVENTRY	(bombs)
Frigate	ARDENT	(bombs)
Frigate	ANTELOPE	(bombs)
Landing Ship	SIR GALAHAD	(bombs/fire))
Merchant Ship	ATLANTIC CONVEYOR	(Exocet/fire)

In addition, 2 British destroyers, 14 frigates, and 2 landing ships were damaged during the conflict, all to Argentine air attacks with bombs, rockets, and cannon except for the destroyer GLAMORGAN, which was damaged by a shore-launched Exocet missile.

Aircraft Lost to Enemy Action:

- 2 Sea Harrier V/STOL aircraft
- 3 Harrier GR.3 V/STOL aircraft
- 4 Gazelle helicopters
- 3 Scout helicopters

T2

Aircraft Lost Aboard Ships Sunk or Damaged:

- 3 Chinook helicopters
- 3 Lynx helicopters
- 1 Wessex 3 helicopter
- 6 Wessex 5 helicopters

T3

Aircraft Lost Operationally:

- 4 Sea Harrier V/STOL aircraft
- 1 Harrier GR.3 V/STOL aircraft
- 3 Sea King 4 helicopters
- 2 Sea King 5 helicopters
- 2 Wessex 5 helicopters

T2

Argentine Losses

Ships Sunk (Cause):

Submarine	SANTA FE	(helicopters)
Cruiser	GENERAL BELGRANO	(submarines)

Trawler ¹	NARWHAL	(aircraft)
Cargo ship	RIO CARCARANA	(helicopters/ aircraft)
Transport	BAHIA BUEN SUCESO	(captured)
Store ship	ISLAS DE LOS ESTADOS	(gunfire)
1 Patrol craft		(helicopters)

Ships Damaged (Cause):

1 corvette	(antitank missile)
1 patrol tug	(helicopters)

Aircraft Destroyed (British estimate):

Lost to Sidewinder missiles from Sea Harriers	16 + 1 probable
Lost to 30 mm cannon Sea Harriers	4 + 2 probable
Lost to Sea Wolf missiles	5
Lost to Sea Dart missiles	8
Lost to Sea Cat missiles	8 + 2 probable
Lost to ground missiles	24 + 8 probable
Lost to shipboard guns and small arms	7 + 1 probable
Destroyed on ground (to bombs, strafing, naval gunfire, and Special Forces)	31
	<hr/> 103 + 14 probable

¹ Employed as intelligence collection ship.

APPENDIX D

GEOGRAPHY AND CLIMATE

The Falkland Islands are in the South Atlantic, just south of latitude 50° south, some 400 nautical miles east of Argentina. The smaller island of South Georgia lies 780 miles east of the Falklands, and the small South Sandwich Islands about 400 miles to the east of South Georgia.

The Falklands consist of two main islands and about 200 smaller islands with a total land area of 4,700 square miles. East and West Falklands are divided by the Falkland Sound, which at its narrowest point is 2.4 nautical miles across. Stanley, the capital, is on the east coast of East Falkland and had a population of 1,200 out of the 1,800 people living in the Falklands at the time the conflict began.

The coastline of the Falklands is irregular, with numerous small, restricted beaches. The highest ground is in the northern half of East and West Falkland Islands and is between 1,300 and 2,280 feet above sea level. The countryside is very rough and difficult to cross by foot or vehicle. There are only 30 miles of paved roads in the islands. The few trees are man-planted. The islanders relied heavily on air transport, with more than 30 airstrips scattered throughout the islands; five of the strips were usable by C-130 Hercules cargo aircraft. The largest airfield is at Port Stanley.

High winds and a low temperature range characterize the Falkland Islands climate. Mean temperatures by day generally range from 32°F and 20°F in winter. The average rainfall is about 27 inches, spread evenly over the year, with snow falling about 50 days per year. The winds throughout the year blow at about 20 knots two-thirds of the time, with steep seas and regular gale-force winds offshore.

In a word, the Falklands are "inhospitable."

Appendix E GLOSSARY

AAW	Antiair Warfare
AEW	Airborne Early Warning
A.R.A.	Armada Republica Argentina
ASMD	Antiship Missile Defense
ASU	Antisurface Ship Warfare
ASW	Antisubmarine Warfare
CAP	Combat Air Patrol
CIWS	Close-In Weapon System
COMSEC	Communications Security
ECM	Electronic Countermeasures
EW	Electronic Warfare
LAMPS	Light Airborne Multi-Purpose System (helicopter)
MAF	Marine Amphibious Force (U.S. organization)
MCM	Mine Countermeasures
NGF	Naval Gunfire Support
NRF	Naval Reserve Force (U.S.)
OTH	Over-the-Horizon (targeting)
RAF	Royal Air Force
RFA	Royal Fleet Auxiliary
RN	Royal Navy
RRF	Ready Reserve Force (U.S.)
SAS	Special Air Service
SBS	Special Boat Squadron
SEAL	Sea-Air-Land (team) (U.S. Navy)
SLOC	Sea Line of Communications
STUFT	Ships Taken Up From Trade
3-D	Three-Dimensional (radar)
UDT	Underwater Demolition Team (U.S.)
URG	Underway Replenishment Group
USAF	U.S. Air Force
USN	U.S. Navy
V/STOL	Vertical/Short Take-Off and Landing (aircraft)

SHIP DESIGNATIONS

AE	Ammunition ship
AFS	Combat store ship
AO	Oiler
AOE	Fast combat support ship
LCAC	Landing craft air cushion
LKA	Amphibious cargo ship
LPD	Amphibious transport dock
LSL	Logistics landing ship
MCM	Mine countermeasures ship
MSH	Minehunting ship
SSN	Attack submarine (nuclear powered)

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