



BENEATH THE WAVES

— THE —
ROYAL NAVY'S
SUBMARINE SERVICE

FOREWORD

By the Flag Officer Submarines

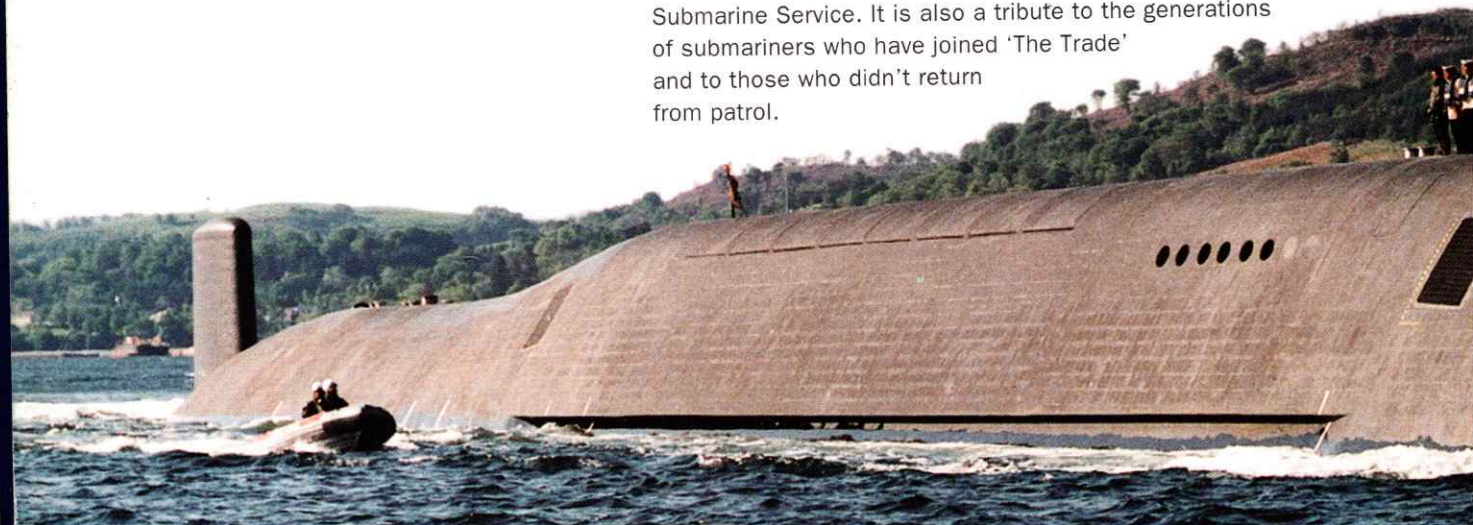


Since 1901, when the Royal Navy's first submarine, Holland 1, slipped into the water at Barrow-in-Furness, the Nation has continued to invest in a sub-surface warfighting capability. Today, the sixteen Royal Naval nuclear submarines represent the most technologically sophisticated ships in the world, far outstripping anything remotely imagined by our forebears. This stunning achievement is a testament to the ingenuity of the naval architects, engineers and planners who conceived the programmes. Equally important are the men who have manned the Royal Navy's submarines in peace and war throughout this momentous century.

In 1913 the Flag Officer Submarines issued a memorandum to the men of the Submarine Service. He wrote 'It is essential that the crew of a submarine should be highly trained, for every officer or man has it in his power, by neglect or stupidity, to jeopardise his vessel and risk the lives of his shipmates. For this reason the very highest standard of efficiency is demanded. The good comradeship, which undoubtedly exists between the officers and men of the Submarine Service, is admirable, but the fact that they often live together in close proximity and great discomfort should not be allowed to lead to any relaxation of discipline.' This ethos remains as strong today as it did before the First World War.

We face an uncertain future in the next millennium and submarines are constantly practising new roles and facing new challenges. Today's nuclear powered boat can spend 120 days underwater, can deploy world wide without any sort of outside support, is the only type of naval ship which is capable of operating undetected in areas where air and sea superiority have not been established, and deploys the Nation's total Strategic and Sub-strategic nuclear arsenal for Deterrent Operations. On top of this, attack submarines will very shortly deploy the Tomahawk Land Attack conventionally armed missile, allowing them to engage targets many hundreds of miles inland. They are also fitted with extremely potent anti-ship and anti-submarine torpedoes. This capability cannot be disregarded by any potential aggressor and is the cornerstone of the Nation's insurance policy in an increasingly uncertain world.

This brochure aims to provide an informative guide to the Submarine Service. It is also a tribute to the generations of submariners who have joined 'The Trade' and to those who didn't return from patrol.



CONTENTS

- 2 **SECTION I** THE HISTORY OF SUBMARINE OPERATIONS
- 4 **SECTION II** SUBMARINE CONCEPT OF OPERATIONS
BRITAIN'S NUCLEAR DETERRENT FORCE
THE 'SWIFTSURE' CLASS FACT FILE
THE 'TRAFALGAR' CLASS FACT FILE
ROLES OF TODAY'S ATTACK SUBMARINE (SSN)
- 15 **SECTION III** ROYAL NAVY SUBMARINES – THE WAY FORWARD
- 16 **SECTION IV** THE PEOPLE OF THE SUBMARINE SERVICE



HMS Vanguard Control Room Simulator

HMS Vanguard entering harbour



SECTION I – THE HISTORY OF SUBMARINE OPERATIONS

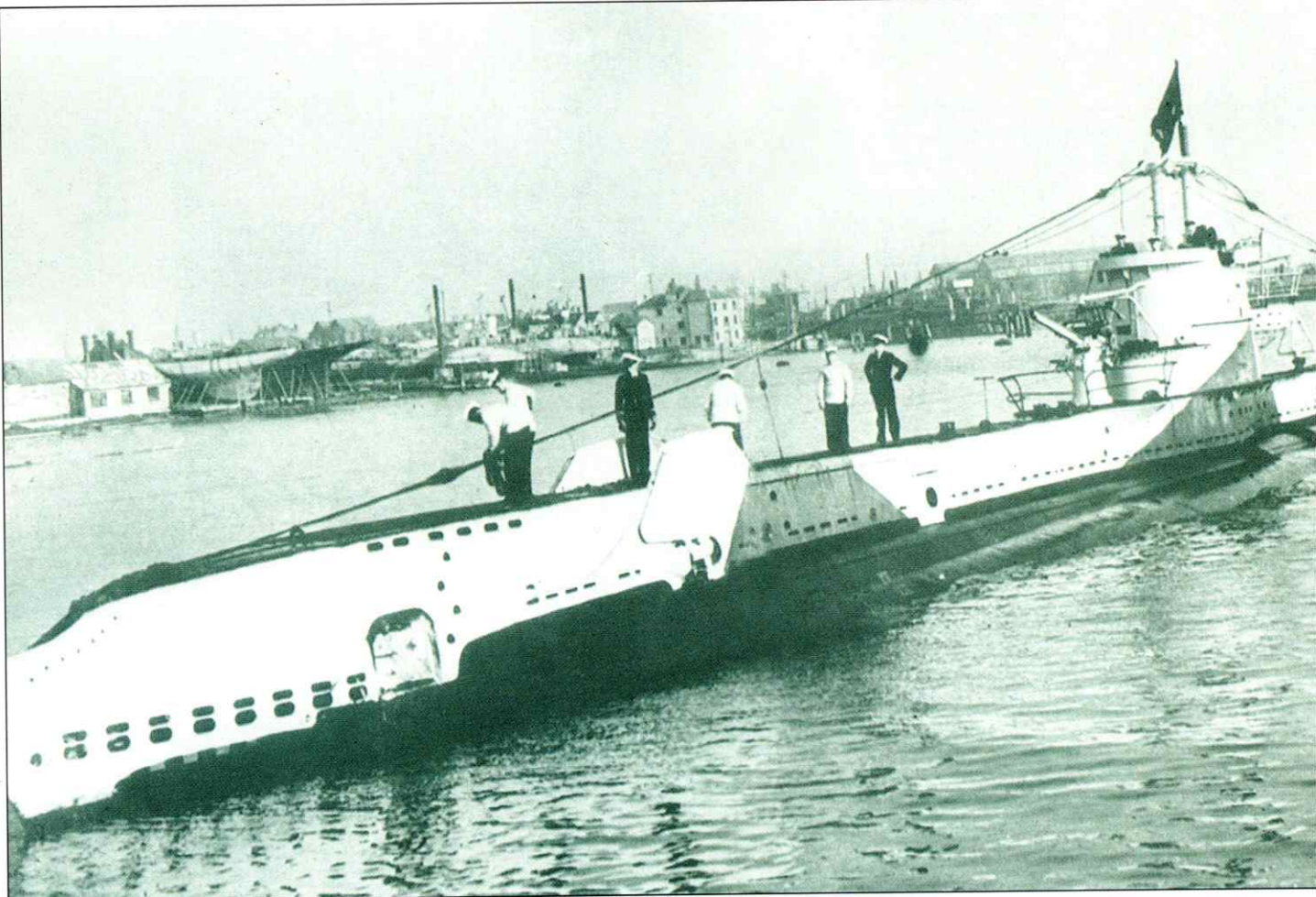
'underhand, under water and damned un-English'

In 1900, Britain was the only major maritime power not to have at least an embryo submarine flotilla but, despite vehement condemnation of the submarine as a means of waging war, those determined to find out what all the fuss was about prevailed in the argument. Holland I was launched in 1901 and the RN's Submarine Service was born.

The pioneering days of the submarine, in all the navies which embraced the new technology, brought disaster as well as

triumph. However, it was not long before increasing range and endurance meant that submarines became fearsome offensive weapons and formidable opponents.

During World War 1 German submarines, attacking Britain's lifelines of trade across the sea, sank 6.5 million tons of allied merchant shipping. The Royal Navy Submarine Service quickly made its mark as well, and finally laid to rest its image of being manned by 'unwashed chauffeurs'. Equipped in the main with the excellent E-Class, and operating in the confined and distinctly unhealthy arenas of the Baltic and Dardanelles, they sank fifty four enemy warships, including nineteen submarines. From their ranks emerged names like Horton, the first CO to fly the Jolly Roger, and Holbrook, the first Naval Victoria Cross winner in World War I and the first in the Submarine Service - he was followed by thirteen others.



A World War II submarine

'Of all the branches of men in the forces there is none which shows more devotion and faces grimmer perils than the submariners...'

Sir Winston Churchill



Submariners of World War I

Between the wars, design hardened into a diesel electric boat with torpedoes and a small bore gun for armament. These submarines had a good range but, to achieve tactical mobility, they had to surface in order to keep up with surface ship targets. It was with this type of submarine that the warring factions entered World War 2.

From the start, the Germans took advantage of the situation using surface mobility to the full, for convoys had few escorts and there were virtually no anti-submarine aircraft. The U-boats operated as submersible destroyers, only diving to escape counter attack or in the latter stages of a day attack. This is perhaps the first glimpse of the potential that a submarine has, given speed equal to or higher than its quarry. Likewise the Americans in the Pacific, fitted with efficient radar and up against poor anti-submarine forces, were able to use their high surface speed to get ahead of their targets. Our submarines, on the other hand, operating in inshore waters against stronger anti-submarine warfare (ASW) forces, largely used the surface only to charge their batteries at night.

The nature of RN operations took a heavy toll on submarines and submariners' lives.

In addition to the hazards of inshore navigation and wary ASW forces, Commanding Officers faced the ever present danger of mines, and it is estimated that 50% of the seventy four RN submarines lost during the war fell prey to that weapon.

Notwithstanding the risks – Winston Churchill described it as the most dangerous of all occupations – the Service never lacked for volunteers and they acquitted themselves with great distinction. The major operating arenas were Norwegian Waters; the Mediterranean where, under the leadership of Captain 'Shrimp' Simpson, the 'Fighting Tenth' Flotilla fought an often bloody, but ultimately successful battle against the Axis replenishment route to North Africa; and the Far East where, based at Trincomalee and in Australia, and operating in appalling conditions when foot-rot, sweat rash and prickly heat were constant companions for weeks on end, RN submarines posed an unrelenting threat to Japanese shipping operating in the Malacca Straits.

Stories of submarine exploits during World War 2 are legendary. Wanklyn in Upholder, lost after 25 gruelling patrols, but with a remarkable 135,000 tons of enemy shipping to his credit; Linton in Turbulent, who in the process of sinking over 90,000 tons of enemy shipping, was hunted 13 times by the opposition and was depth charged on over 250 occasions; Miers in Torbay, who sat on a glassy sea inside an enemy harbour charging his batteries before applying the 'coup de grace' to his targets - were all VC winners (the first two posthumously), and personified the skill and courage of all the crews. Hezlet's remarkable 'five out of eight' torpedo hits from Trenchant when he sank the Japanese Cruiser Asigara at a range of 4000 yards will remain a world record for all time. Cloak and dagger operations, which were immensely dangerous but always rewarding and vital to the war effort, figured largely in the tapestry of submarine operations, and there were also the achievements of the mini-submarines, the X-craft and the Chariots. The sinking of the German battleship Tirpitz and the Japanese Takao earned a further four VC's but, in addition to these very highest awards, were a string of medals for feats of outstanding courage in the most challenging of circumstances.

By the end of the war British submarines had sunk 2 million tons of enemy shipping and fifty seven major war vessels, including thirty five enemy submarines, by gun and torpedo.

SECTION II – THE SUBMARINE CONCEPT OF OPERATIONS

The Royal Navy deploys two types of submarine. These are the Submarine Ballistic Nuclear (SSBN) and the Submarine Nuclear (SSN).

Their primary purposes are:

SSBN

To provide the United Kingdom's strategic and sub-strategic nuclear deterrent.

SSN

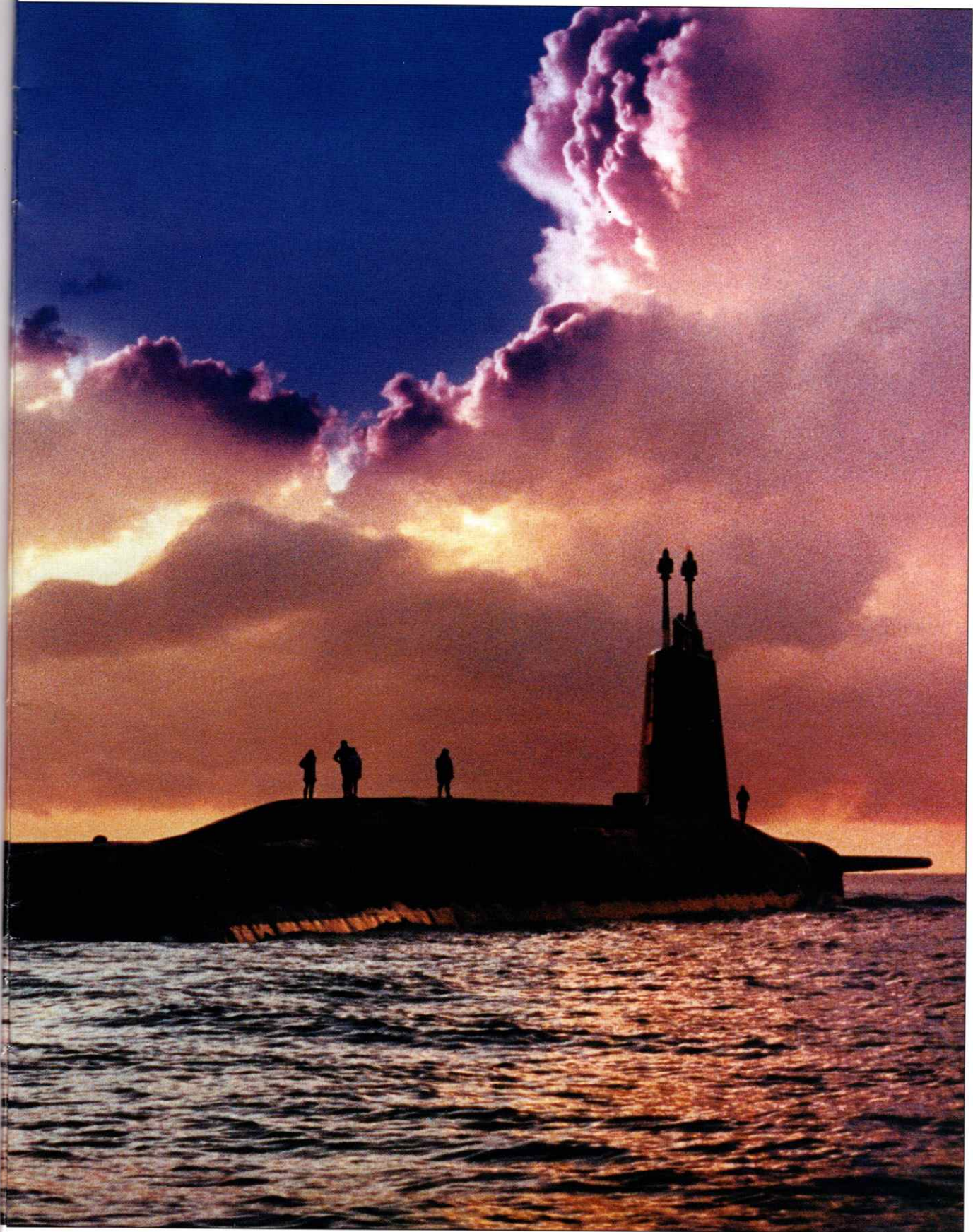
To contribute to peace and security by providing conventional deterrence. In time of conflict the SSN's unique qualities of stealth, endurance and flexibility afford it unparalleled freedom to operate unsupported, worldwide, in a threat area, whilst remaining undetected, either independently or in support of surface ship task groups and land operations.

A Sea King anti-submarine helicopter with HMS Vanguard



HMS Victorious

THE SUBMARINE CONCEPT OF OPERATIONS



BRITAIN'S NUCLEAR DETERRENT FORCE

Since 1968 the United Kingdom has deployed a force of four ballistic missile submarines (SSBN) armed with Polaris missiles as the nation's ultimate guarantee of security. This minimum deterrent force, provided until recently by the four Resolution Class SSBNs Resolution, Renown, Repulse and Revenge - each of 7,500 tonnes displacement, has been highly successful in achieving over 229 consecutive and continuous patrols since the first, conducted by HMS Resolution in 1968.

The age of the force, and improvements in potential adversaries' capabilities, dictated that the Government should upgrade the Polaris system. The replacement of Polaris with Trident has been a highly integrated process. As part of this seamless transition, successive Resolution Class boats were paid off as the larger Vanguard Class SSBNs entered service. These submarines are based at Faslane, on the Clyde.

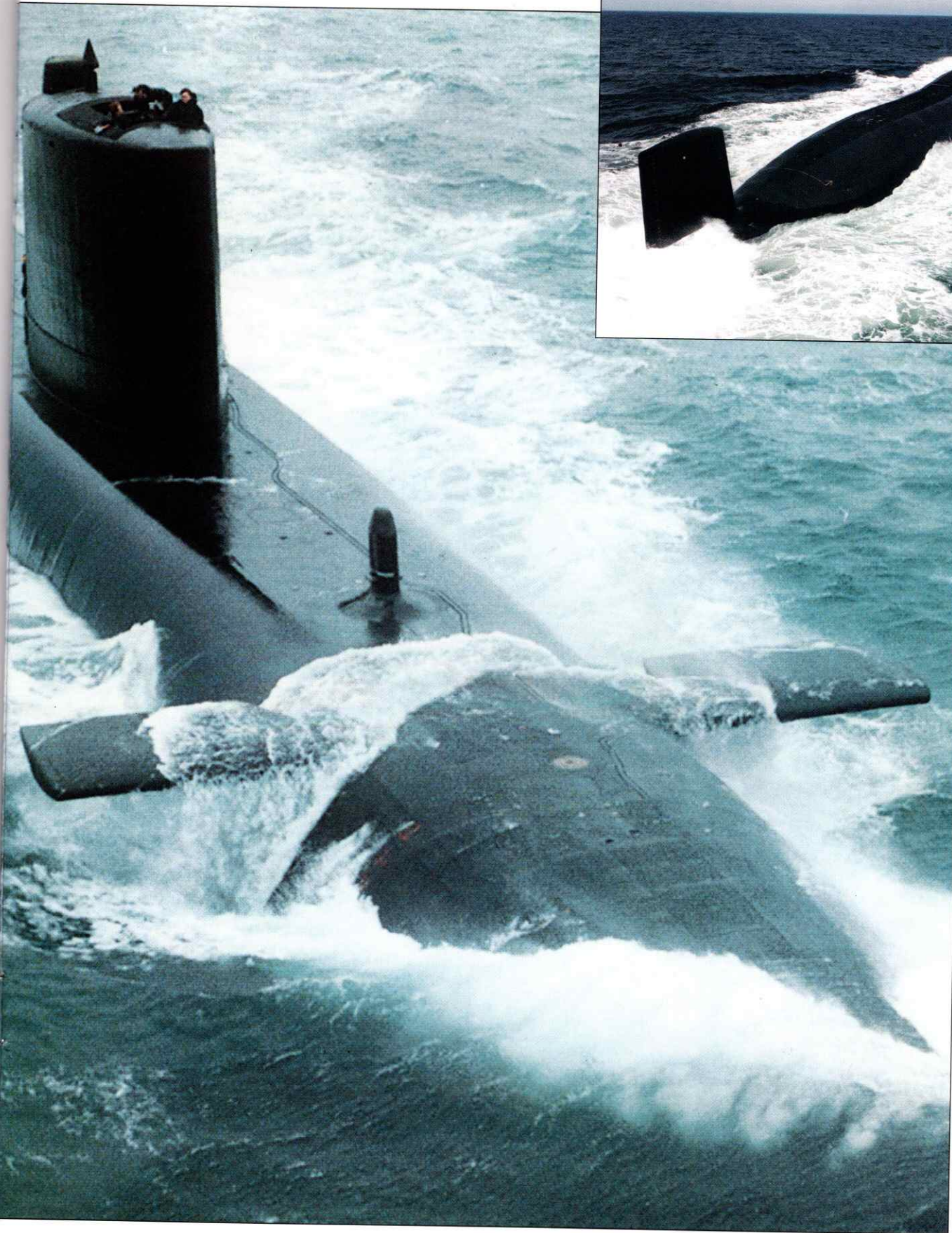


**HMS Renown firing
a Polaris Missile**



**A Resolution Class submarine -
HMS Revenge**

BRITAIN'S NUCLEAR DETERRENT FORCE



HMS Victorious

The Vanguard Class submarine has been purpose-built as a nuclear powered ballistic missile carrier, incorporating a selection of successful design features from other British submarines. In this respect it is unlike its Polaris predecessor, which was adapted from the then existing Valiant Class SSN. At over 150 metres in length and over 16,000 tonnes, it is also the largest UK submarine ever built and the third largest unit in the Royal Navy. Its sixteen Trident missiles, with a range of over 4,000 miles, offer an effective deterrent against all threats to the nation's strategic defence. Vanguard's design incorporates a number of significant improvements over previous UK submarines, including a highly sophisticated tactical weapon system for self defence both before and after missile launch. This is especially important in the modern world where Vanguard Class SSBNs also carry the nation's ability to maintain a flexible response to any political threat by the deployment of Trident missiles in a sub-strategic role. As the then Secretary of State for Defence, Malcolm Rifkind, wrote in May 1993, 'Trident remains the cornerstone of our future defence capability.'

Moreover, it will be fully declared to NATO, representing a significant contribution to the Alliance's deterrent forces In planning for the maintenance of our strategic deterrent we must take account of the unknown as well as the known and set our course for the long-term, insuring ourselves against worst-case possibilities. Trident will provide that insurance at the minimum level necessary to maintain an effective independent deterrent into the next century and will, as Polaris before it, serve as a force for peace, stability and restraint.'

HMS Vanguard and HMS Victorious at the Clyde Naval Base





THE 'SWIFTSURE' CLASS FACT FILE

Type:

Nuclear Powered Attack Submarine (SSN)

Build:

Total of 5 in class, built between 1973-1980

Displacement:

4,200 tons surfaced 4,900 tons dived

Dimensions:

Length: 83m Beam: 9.8m Draught: 8.2m

Propulsion:

One pressurised water-cooled reactor driving steam turbines giving a dived speed of approx 27kts

Complement:

97

Weapons:

5 torpedo Tubes capable of firing:

- a. Spearfish Torpedoes
- b. Tigerfish Torpedoes
- c. RN Sub-Harpoon Missiles
- d. Mines
- e. Tomahawk Land Attack Missile (being introduced into service)

The submarine carries a mixture of these weapons dependant on task

Sensors:

Multi-environment as follows:

Numerous sonars including, Bow, Flank, Active intercept and Towed Arrays

Attack & Search periscopes
Collision avoidance radars
Electronic warfare equipment





HMS Superb heading to sea

THE 'TRAFALGAR' CLASS FACT FILE

Type:

Nuclear Powered Attack Submarine (SSN)

Build:

Total of 7 in class, built between 1983-1989

Displacement:

4,800 tons surfaced 5,300 tons dived

Dimensions:

Length: 85m Beam: 10m Draught: 8.5m

Propulsion:

One pressurised water-cooled reactor driving steam turbines giving a dived speed of approx 27kts

Complement:

98

Weapons:

5 torpedo Tubes capable of firing:

- a. Spearfish Torpedoes
- b. Tigerfish Torpedoes
- c. RN Sub-Harpoon Missiles
- d. Mines
- e. Tomahawk Land Attack Missile (being introduced into service)

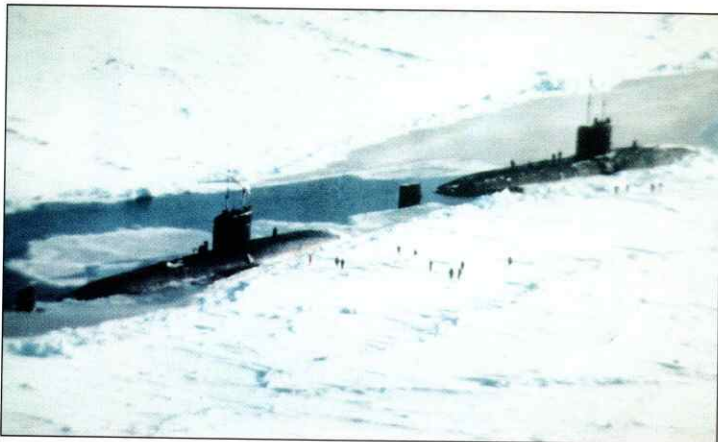
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Attack & Search periscopes
Collision avoidance radars
Electronic warfare equipment



HMS Tireless at the North Pole

HMS Triumph in the Suez Canal



ROLES OF TODAY'S SSN

The SSNs of the Swiftsure and Trafalgar class are extremely sophisticated, deep diving, high speed submarines, capable of fulfilling a range of maritime military tasks undreamt of by the strategists of previous generations. These include:

■ Co-ordinated high intensity strike

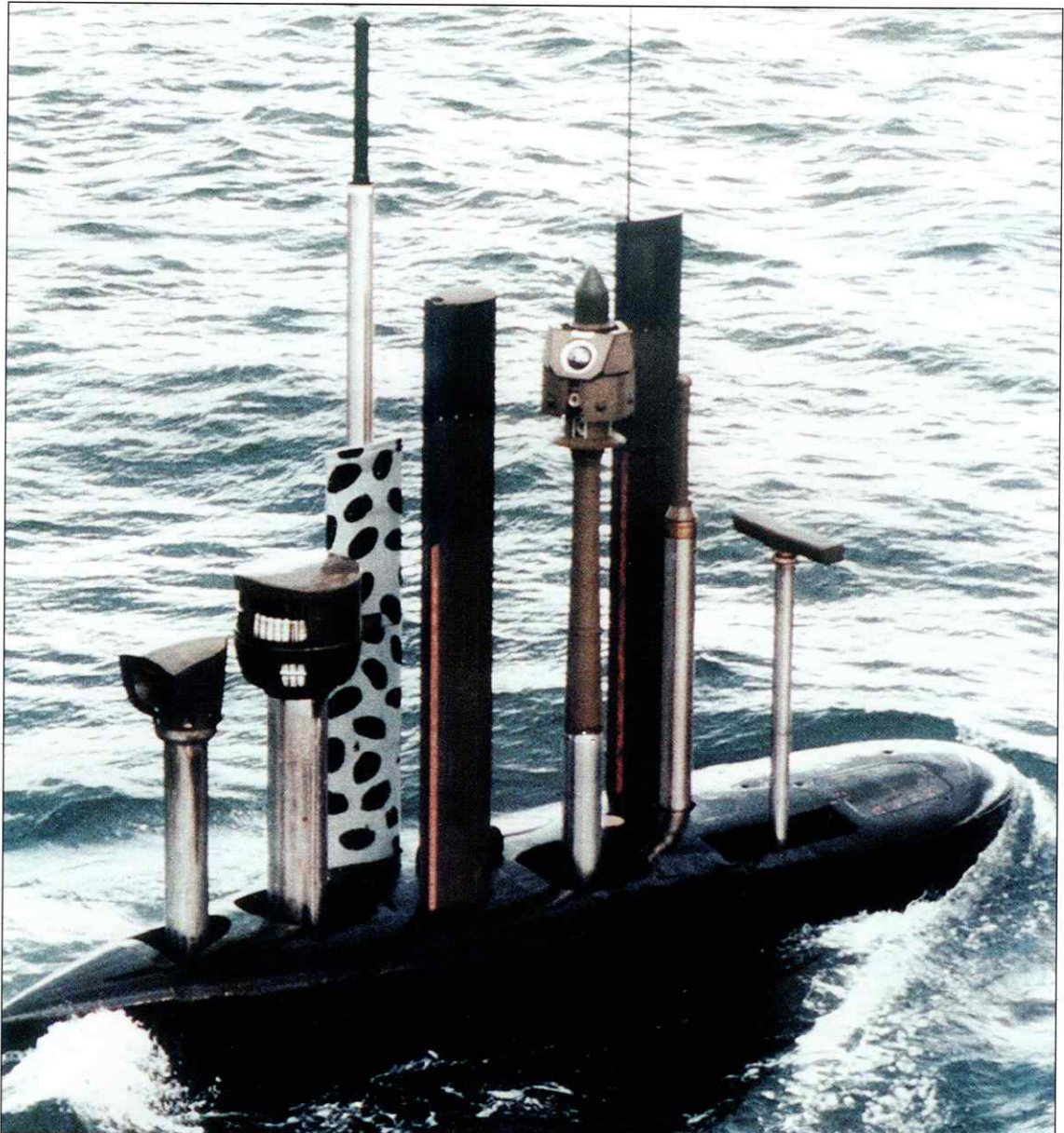
The Tomahawk Land Attack Cruise Missile will shortly be introduced into service and deployed in SSNs. With this new missile, the submarine will be able to influence the land battle by posing a serious threat in the period prior to hostilities and, after hostilities commence, the use of a highly accurate and lethal warhead

against important targets which may otherwise be relatively invulnerable.

■ Anti-Submarine and Surface Unit Warfare

Arguably the most important role of the submarine, the SSN has an unrivalled capability to seek out and destroy other submarines which may present a threat to any friendly force. The SSN also has a well proven capability to detect and attack surface forces.

■ **Surveillance** The ability to approach close to opposition forces and monitor their operations and movements whilst remaining undetected is a classic capability of the submarine.



A dived SSN exposing her masts during a training exercise

■ **Regional Sea Denial** The SSN is a most potent area denial platform, which is able to deploy in advance and whose presence can considerably reduce the flexibility of an opposition force to use a disputed area of sea for its own purposes.

■ **Covert Power Projection** The Falklands Conflict is a classic example of the effective use of the submarine's unique capabilities to tie down an opposing force. Capable of sustained high speed transits, submarines arrived in the disputed area first and operated independently for some time prior to the arrival of the main task force.

■ **Offensive Inshore Operations** A valuable capability and often practised by submarine crews who take pride in their ability to approach an enemy harbour unseen, often in very shallow water, with the intention of tying down an opposition force or preventing the use of a harbour; or indeed protecting the approaches to a planned amphibious landing area.

■ **Covert Operations** Special forces can be inserted by a submarine employing its exceptional ability to remain undetected to approach a coastline and provide an accurate launch point for any operation ashore.

■ **Inshore and beach reconnaissance** A traditional role and one that has by no means been circumvented by the introduction of satellite technology. Using modern video technology a submarine, able to approach a hostile coastline in shallow water, can make a significant contribution to the intelligence collection effort prior to any subsequent maritime or land action.

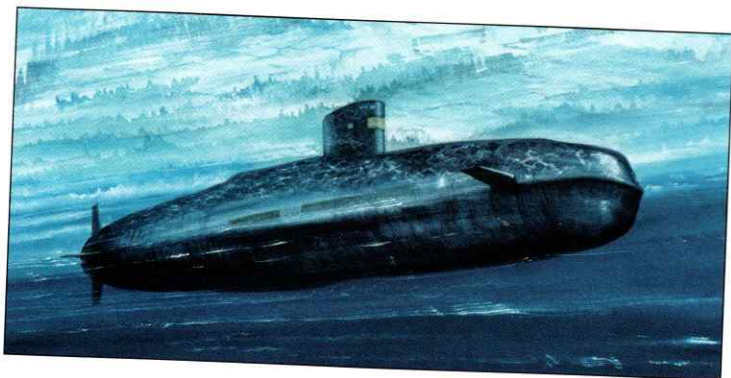
■ **Support of amphibious landings** Having provided intelligence of a beach area for a proposed landing, and the platform from which Special Forces might be launched, the submarine would subsequently become an integral part of the forces supporting an amphibious landing force, being capable of a flexible response against any surface or subsurface threat.



Periscope workshop
at the Clyde Naval
Base

SECTION III – THE WAY FORWARD

Today's strategic environment requires forces that can contribute to peace and security at all levels of the spectrum of conflict. This requirement will not diminish in the future and the Submarine Flotilla will constitute a core defence capability and continue to provide the UK national strategic deterrent well into the next century.



Artists impression
of a Batch 2
Trafalgar Class

Armed forces must remain well equipped and well trained if they are to retain the world-wide credibility necessary for them to achieve their tasks. Nowhere is this statement more true than in submarines where the unseen threat of a capable and well equipped adversary can be enough to achieve the desired level of coercion or control. The Royal Navy's Submarine Service has evolved forward-looking procurement strategies embracing the latest technologies and building methods, aimed at ensuring that the Service retains its leading edge in the years to come.

The coming years will see the completion of the build programme of four Vanguard Class SSBNs which will complete the transition between the Polaris and Trident eras. GEC Marconi have recently been selected to negotiate a contract with the Ministry of Defence to build the first three submarines of the Batch 2 Trafalgar Class. The first of these new SSNs is planned to enter service in 2004, bringing new technology and capability to ensure that the Flotilla retains military superiority and the ability to fulfill its defence roles into the next century.

Pre-feasibility studies are already being conducted into the Future Attack Submarine which is planned to enter service in 2015. Many exciting new areas of technology will be considered for this submarine including the use of air independent propulsion and fuel cell energy sources as a successor to the current nuclear propulsion plant.

Future generation submarines will be fast, stealthy and capable. Armed with the heavyweight Spearfish torpedo, Royal Naval Sub-Harpoon missiles and the Tomahawk land attack missile they will be extremely potent platforms offering many unique military capabilities and political options that cannot be provided by any other land, sea or air platform. They will continue to offer fast, covert forward deployment, without the risk of political embarrassment or the requirement for complicated multi-national command arrangements.

HMS Vanguard



SECTION IV – THE PEOPLE OF THE SUBMARINE SERVICE

The common theme running throughout the epic history of the Submarine Service is that of the commitment, dedication and ability of its people. Generally acknowledged as the most professional of all the world's submarine operators, the Royal Navy's submariners achieve their lead through training, effort and teamwork.

Whilst qualifying as a submariner, the spirit of co-operation combined with the challenge of controlling a submarine in all situations becomes second nature. This esprit de corps encompasses the whole Submarine Service, inspiring self discipline, self confidence and, most importantly, trust in one's colleagues to perform to the same exacting standards.

There are 3250 people in the Submarine Service, almost one tenth of the whole Navy, and, of these, 78.5% are on sea service. A submarine is a self contained community, with everybody from cooks and nuclear engineers to sonar experts and weapon technicians onboard. All this expertise is found in a crew with an average age of only 28; typically led by a 36 year old Commander.

This is a 24hr a day job where 100% commitment is required; the stakes are high, but the rewards are higher. It is more than the satisfaction of a job well done, it is being immersed in the culture and professionalism of the Submarine Flotilla, and upholding the traditions of excellence which underpin the submariners' ethos.

It is not always hard work and no play; time at home is matched by the rest of the Navy and opportunities for sport and adventurous training are available. Submariners enjoy their share of foreign visits whilst operating world-wide from South America to the Far East.

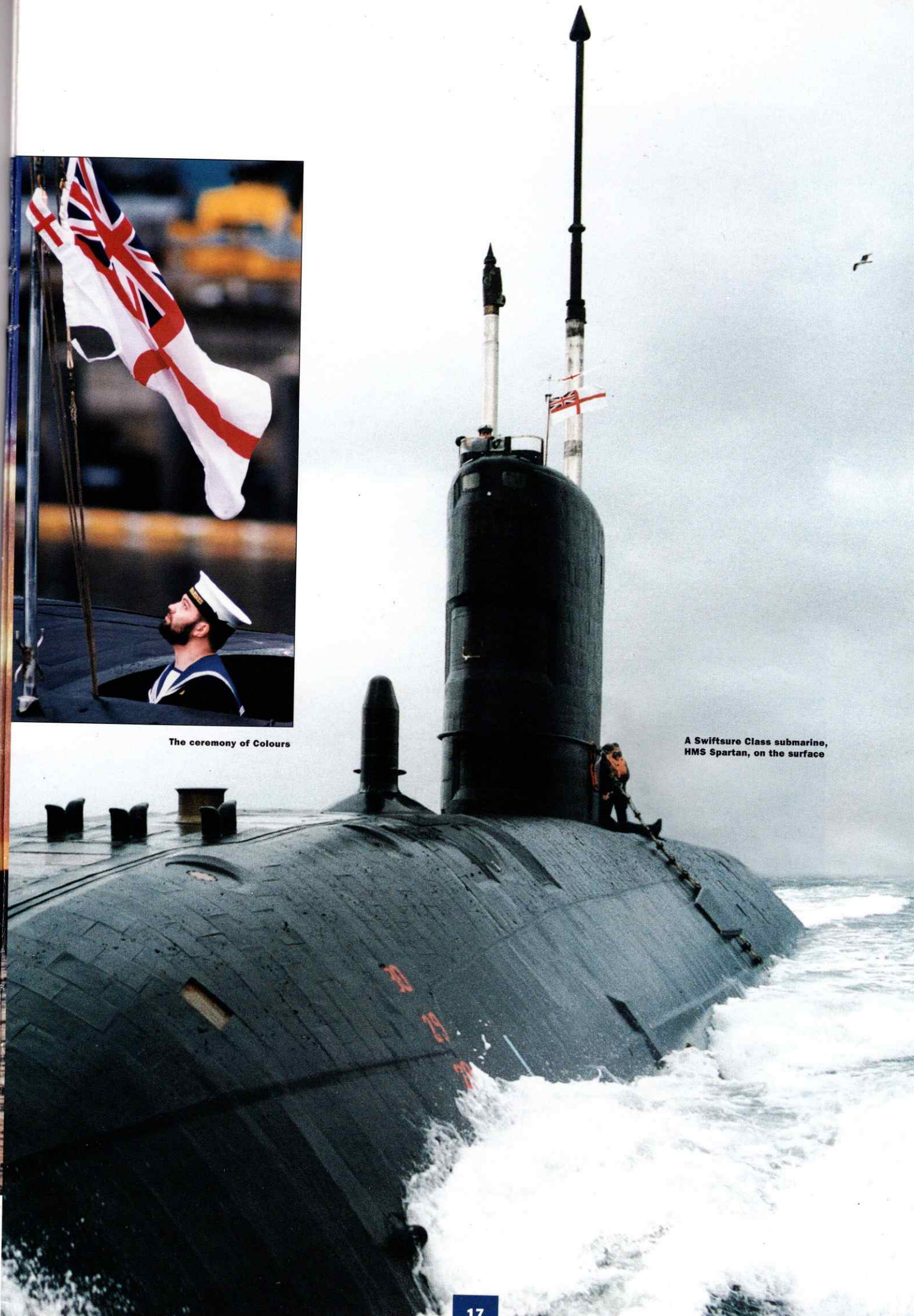


Officer of the Watch





The ceremony of Colours



A Swiftsure Class submarine, HMS Spartan, on the surface



HMS Vanguard
Control Room



Surfacing from 100ft in the Submarine Escape Trainer



HMS Victorious alongside

This has been a short account of the Submarine Service, its history and its people. It takes courage to go beneath the waves but our island nation depends on the freedom of the seas for its trade, wealth and survival. Over 92% of all our overseas commerce moves by sea. The Royal Navy in general, and the Submarine Service in particular, play key roles in ensuring that our liberty is something that we are able to take for granted.

THE PEOPLE OF THE SUBMARINE SERVICE





HMS Vanguard

