THE COLD WAR CINDERELLA SERVICE: RAF MARITIME PATROL AIRCRAFT OPERATIONS SINCE 1945

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Abstract: 'The Cinderella Service', a phrase coined to describe Coastal Command during World War Two, is perhaps equally apposite when applied to RAF Maritime Operations in the post war period owing to the lack of public recognition of these often clandestine operations. Despite often being the only RAF force 'in daily contact with the enemy', there is little acknowledgement, even today, of the unforgiving and dangerous operations conducted off the coast of the British mainland in defence of UK interests. This article provides an overview of the activities of the 'Kipper Fleet', from the nadir immediately following World War Two until the capability was withdrawn from service in 2010.

INTRODUCTION

'We were the only...[RAF]...force in daily contact with the enemy...outside our magic circle, few people really knew the technological battle being fought daily many miles off the UK west coast...'

RAF Nimrod Navigator.[1]

Coastal Command was known as the 'Cinderella Service' in World War 2 for the way its endeavour and achievements were largely eclipsed by Bomber and Fighter Commands. Sadly, this lack of recognition for RAF maritime operations has arguably persisted up to the modern day. Yet the operational challenges faced by Maritime Reconnaissance (MR) crews have been every bit as constant, varied and challenging as their counterparts from other operational communities.

Emerging from World War 2 as a highly capable and experienced organisation, Coastal Command's maritime capacity was largely centred on US 'lend-lease' types. However, post-War austerity dictated an extremely rapid contraction on the cessation of hostilities and Coastal Command immediately found itself much as it was at the outbreak of war, lacking a suitable land–based Maritime Patrol Aircraft (MPA) to augment its flying boats. After its interim use of Lancasters, the Shackleton entered service alongside the US Neptune in the early 1950s. These types handled the bulk of activity during the early Cold War years in roles which were as varied as they were geographically dispersed. The Berlin airlift, Korea, policing of colonial outposts and use in a secondary trooping role were all to the fore. Yet poor equipment, developmental problems with the Shackleton and attempts by the RN to seize Coastal Command assets from the RAF hampered maritime capabilities. Moreover, these challenges were faced as the Soviet Navy transitioned from being an essentially coastal force to one capable of delivering true 'blue-water' effect.

By the 1960s, the last of the RAF's Sunderland flying boats had finally been retired and the Shackleton formed the cornerstone of Coastal Command's capabilities. Meanwhile, the threat from Soviet surface and sub-surface combatants had developed to the point where it was capable of threatening strategic UK and NATO interests. This dictated expanded cooperation with the US and other NATO members as a new, highly secret and unforgiving technological battle evolved to track Soviet submarines. For Coastal Command, much of this occurred on long sorties over Arctic, Atlantic and Mediterranean waters. Simultaneously, however, RAF MPAs were proving equally essential to the UK's divestment of its Empire. Yet once again, politics complicated the search for a new MPA before the Nimrod MR1 entered service just as its parent organisation was absorbed into the new RAF Strike Command.

After distinguished service throughout the 1970s, the Nimrod proved essential during the Falklands War of 1982, and following the end of the Cold War, the RAF found itself

returning to MPA operations beyond the traditional realm of NATO. In this new unstable world, RAF MPAs found themselves being employed in increasingly varied Command and Control, Intelligence, Surveillance and Reconnaissance (C2ISR) roles to support UK ground forces. However, the reduced Russian naval threat increasingly brought into question the need for an ageing UK MPA fleet. Significant development problems with the Nimrod MRA4 and government focus on land-centric operations in Iraq and Afghanistan saw the Nimrod MR2s retired and the MRA4 Programme cancelled in 2010, leaving the RAF without a dedicated MPA for the first time in its history. Thankfully, the Service now finds itself on the verge of reintroducing the capability from 2019 in the form of the P-8 Poseidon. Against a resurgent Russian naval threat, we can expect to see the 'Kipper Fleet' rapidly re-establish itself as a central pillar of UK Defence.

This essay seeks to provide an overview of post-war RAF MPA operations, in this case defined as fixed wing Anti-Submarine Warfare (ASW), Anti-Surface Warfare (ASuW) (including general surface surveillance and Maritime Radar Reconnaissance (MRR)) and Search and Rescue (SAR) activity. Against a variety of political, technological and operational factors, the disproportionate significance of post-war RAF maritime operations to the RAF remains poorly acknowledged. The modern aircrew branch structure and the Service's position within Joint operations were all heavily influenced by Coastal Command requirements and broader RAF maritime operations. As the initial UK P-8 enters final production in 2018, the regeneration of the RAF's Maritime Patrol fleet will see the Service re-enter the secretive battlespace. Although small in number in comparison to their Typhoon and F-35 counterparts, the RAF P-8 force will be no less important to our Nation's interests.

1945-1960: A NEW WORLD ORDER

> *'We were all conscious of the flash, firstly from seeing the glare through our hands, then quickly from the heat on our backs. I felt it through my flying suit. It grew hotter and hotter; and kept increasing until I began to wonder if someone had miscalculated and we were about to be fried.'*
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> Shackleton co-pilot observing the first British H-Bomb test.[2]

Coastal Command ended the War in Europe with 511 MR aircraft primarily consisting of Short Sunderland flying boats and Lend-Lease Fortresses, Liberators and Catalinas.[3] An immediate run-down of the Command saw the disbandment of Catalina units and the transfer of many Liberators to Transport Command.[4] This process was accelerated with the surrender of Japan in August 1945, not least as many of the squadrons in this latter theatre were from the Commonwealth and rapidly recalled home.[5] Moreover, the UK's enormous fiscal challenges and the parlous state of US Lend-Lease types that had proved so critical to wartime ASW dictated that these

hard-worked aircraft simply could not be economically retained by Coastal Command. By 1946, Coastal Command therefore found itself with an unbalanced force favouring Photographic and Meteorological Reconnaissance, duties for which at that time it was still responsible, but which was already acknowledged to be insufficient for peacetime ASW and ASuW.

The situation was aggravated by the parallel reduction in Defence funding and the cancellation of the planned replacement for the Sunderland, the Short Shetland, and an interim development of the Sunderland named Sealand. It was clear therefore that the Sunderland would have to remain in service for some years yet. Moreover, the loss of the Fortresses and Liberators left Coastal Command in the same position that they had entered the War: lacking a suitable land-based MPA to complement its Sunderlands. Therefore, surplus Lancasters were pressed into Maritime service pending the development of a MR variant of the new Lincoln bomber, soon to be named the Shackleton.

More positively, Coastal Command retained the strong Joint connections with the RN which had proved so critical in facing the German U-Boat threat. These included the ASW Development Unit (ASWDU) at RAF Thorney Island which also included a RN component,[6] and the Joint Anti-Submarine School (JASS) at Londonderry.[7] The former focused on the development of a variety of radar and acoustics technologies while the latter provided annual courses for RAF Coastal Command and Fleet Air Arm crews as well as RN ships and submarines.[8] However, not for the last time in its post-war existence, RAF MPA crews had seen a highly capable submarine threat disappear almost overnight; it would not be until the mid-1950s that Russian naval capabilities evolved to the extent that their submarines could credibly be deployed in the waters patrolled by Coastal Command. Therefore, ASuW would form the bulk of Coastal Command's initial post-war activity, albeit combined with some surprising diversions as the new World order established itself.[9]

Such anonymously named 'Reinforcement Flights' commenced in earnest in August 1947 when Lancaster GR3s deployed to Palestine on Operation BOBCAT searching for illegal Jewish immigrant vessels in the Eastern Mediterranean. BOBCAT was followed by further 'Reinforcement' operations across Africa[10] where Lancasters and Sunderlands conducted ASuW and troop transport. However, it was the Berlin Airlift - Operation PLAINFARE - where Coastal Command Sunderlands were pressed into one of their more unlikely roles, flying supplies onto the River Elbe and Lake Havel.[11] The flying boats were particularly valuable for delivering bulk supplies of salt which corroded the airframes and control runs of land-based aircraft; up to 10,000lb of this precious cargo could be carried per Sunderland flight into the besieged city. Ultimately, 2,120 Sunderland sorties were flown on the Berlin Airlift which lifted a total of 5,429.5 tons;[12] 1,113 malnourished German children were also flown through the Soviet blockade on return flights.[13]

The formation of NATO in 1949 elicited an increased British commitment to the Eastern Atlantic as the Soviet threat grew and AOC-in-Chief (CinC) Coastal Command was appointed as the Alliance's Allied Air CinC, Eastern Atlantic, from 1951.[14] However, it was in China that RAF maritime aircraft first engaged communist forces when HMS *Amethyst* was fired upon by Peoples' Liberation Army (PLA) artillery and ran aground on the Yangtse River on 21 April 1949. Following unsuccessful attempts by RN vessels to reach *Amethyst*, an 88 Squadron Sunderland conducted several landings next to the disabled RN ship over subsequent days. Despite being targeted and damaged by PLA gunfire itself, the flying boat successfully delivered an RAF medical officer, an RN chaplain, replacement crew and vital supplies before HMS *Amethyst's* eventual escape. 88 Squadron also evacuated over 100 British nationals from Shanghai ahead of advancing communist forces the following month.[15] The Sunderland's involvement in Asia continued where it formed one of the few RAF contributions to the Korean War, operating from Japan on typically unglamorous but essential day and night interdiction of Yellow Sea blockade runners, and as a transport for UN troops. Meanwhile, Sunderlands also contributed to anti-communist operations in Malaya on Operation FIREDOG where they flew coastal patrols in conjunction with RN surface vessels along Malaya's eastern islands to prevent smuggling of terrorists and arms supplies. Nine lettered patrol areas were ultimately established and surveillance extended as far as 80 miles from the coast.[16]

A Shackleton MR1 passes over a submarine during a patrol in late 1952.

At home, a long awaited Coastal Command re-equipment was commencing with the first flight in March 1949 of the Shackleton MR1, which entered RAF service in 1951. However, the Shackleton suffered significant development problems including Centre of Gravity (CofG), flight instrument errors and vibration.[17] Crew comfort was also heavily criticised, particularly in

regards to the all-important crew galley and toilet, despite Avro publicity comparing its facilities to those of a hotel![18] Against these problems, Korea had highlighted the need for greater numbers of more modern MPA and 52 Lockheed P2V Neptunes were also ordered under the Mutual Defence Aid Pact with crews training in the US from September 1951.[19] The situation was further complicated by significant political and inter-service wrangling of the sort which was to become an unfortunate feature for future generations of RAF MPA.

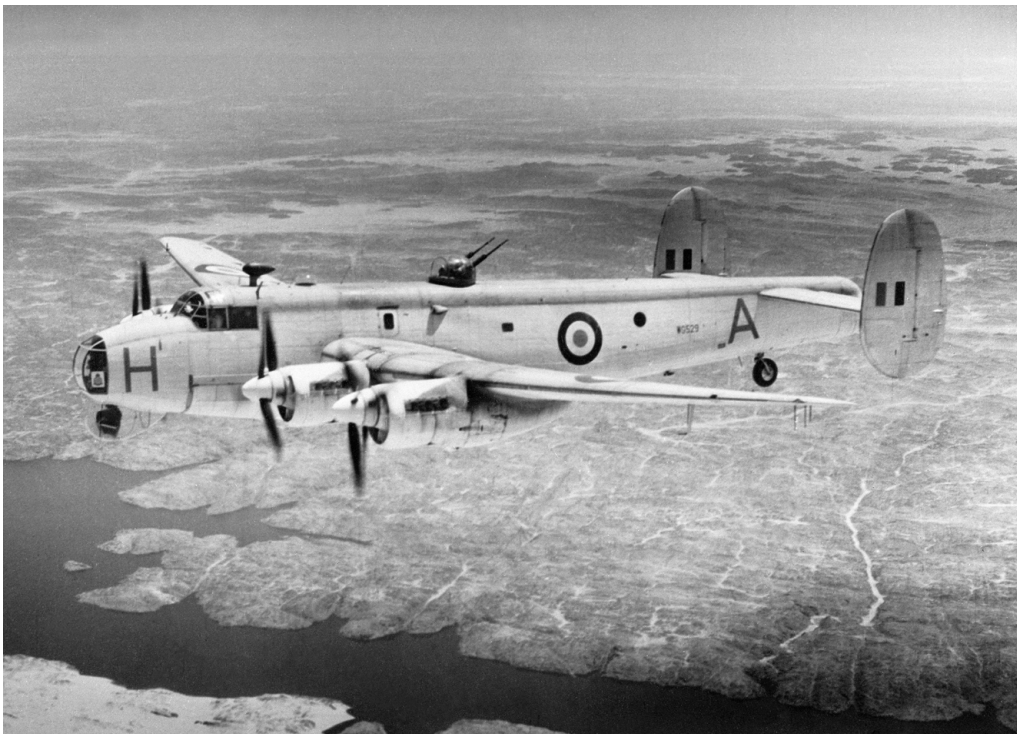
Firstly, with Sunderlands still providing stalwart service in Asia, a vocal flying boat lobby remained, led by British manufacturers Saunders-Roe and Shorts. This debate endured until the late-1950s, largely due to continued Admiralty emphasis upon their value in Pacific operations and political concern regarding the future of domestic flying boat production.[20] Indeed, as the Senior Service had done since the Command's inception, the RN attempted on numerous occasions up to 1955 to wrest control of Coastal Command from the RAF. Such moves were aided by misunderstanding caused by the 'Coastal' nomenclature, with the US particularly perplexed that MPAs fell under the RAF rather than the RN. Attempts to change the name to Maritime Command or Maritime Air Command were vetoed by the Air Staff on several occasions during the period, partly due to nostalgia and partly due to fears that it would encourage RN aspirations.[21] The Admiralty and Air Ministry were more aligned about the mine threat to home waters and agreed that the RAF should operate land-based Short Range Maritime Reconnaissance (SMR) aircraft, leaving Shackletons and carrier-based Gannets to conduct North Atlantic patrols. Coincidentally, the Shorts Seamew was being developed for RN reserve squadrons for use from smaller RN fleet carriers and a modified variant was considered for the RAF. However, the type proved to have extremely poor handling characteristics with one test report stating 'Access to the…[Seamew]…cockpit is difficult. It should be made impossible!'[22] Ultimately, the Seamew was cancelled for both Services, and Coastal Command's focus remained on larger MPAs.

Introduction of the Shackleton and Neptune progressed rapidly and highlighted challenges in several established aircrew trades. Air Engineers arrived for Shackleton conversion training having completed ground and flying training preparing them for the Lancaster.[23] However, navigators graduating from flying training in Southern Rhodesia were particularly sought after due to their exposure to navigation over large areas with few aids or identifiable points. Following a US/UK/Canada Sonobuoy Interoperability Agreement,[24] the first directional T9003 and active T1154 sonobuoys were also delivered to MPA squadrons from 1955 as part of the Mk1 Sonics system.[25] Further advances in technology were evident as the Neptune introduced Magnetic Anomaly Detection (MAD) while the Shackleton was equipped with Electronic Support Measures (ESM) and an improved Anti-Surface Vessel (ASV) Mk21 radar.[26] Such a broad suite of sensors was essential for MPAs to meet the emerging technology race with the Soviets. Passive systems such as ESM, MAD and passive 'listening' sonobuoys allowed the

detection of submarines and ships without compromising the aircraft's own presence. In contrast, active sensors such as radar and active 'pinging' sonobuoys provided warning of an MPA's presence to a target but could be employed for refining target data or sometimes to drive a submarine from an area.

Homing torpedoes were also supplanting World War Two era depth charges as the primary ASW weapon. However, cancellation of the experimental *Pantane* torpedo and upgrades to the British Mk30 weapons saw Coastal Command reluctantly adopt the less effective US Mk43.[27] Such technology dictated that acoustics and other skills should be added to the traditional 'dry' roles of Air Signallers whose training still emphasised communications and gunnery.[28] This resulted in changes to Air Signaller training which ultimately led to the Air Electronics Operator (AEOp) Trade and Air Electronics Officer (AEO) Branch.[29]

Meanwhile, the definitive Shackleton MR2 was starting to enter service featuring an entirely redesigned nose and a retractable radar 'dustbin'. ASWDU trials suggested the MR2 was an excellent MPA although levels of crew comfort remained poor.[30] With Neptune squadrons now at full strength and increasing deliveries of the Shackleton, the Lancaster was finally retired from front-line Coastal Command service.



Shackleton MR1 pictured over the Nile, 22 April 1953, during the outward leg of 42 Squadron's goodwill tour to Ceylon and South Africa.

However, it was retained for SAR duties until 1956 as the replacement 'Lindholme' dinghy equipment for the Shackleton was not yet ready.

Despite such challenges, the Shackleton was deployed on a wide range of tasks supporting operations, exercises and what would today be referred to as Defence Engagement (DE). These included exercises with the Indian and Pakistani navies on the annual RN FLEETEX from Ceylon, or as a 'Royal SAR' asset for overseas flights by the senior members of the Royal Family.[31] Indeed, Coastal Command adopted a formal 24 hour SAR standby commitment from 1952 with squadrons holding the duty for a week at a time in the UK; this task would remain until the withdrawal from service of the Nimrod MR2 almost 60 years later.

In the mid-1950s, the situation in Cyprus deteriorated rapidly with RAF MPAs conducting anti-smuggling patrols to reduce illicit supplies to EOKA separatists.[32] When a state of emergency was declared across the island in November 1955, Shackletons augmented Transport Command in the trooping role, a secondary task repeated during the Suez Crisis of November 1956. However, Suez saw the type's first real commitment to warfighting operations with 37 and 38 Squadrons flying constant MR sorties from Malta along the coast of Egypt from September, as well as supporting Operation MUSKETEER landings themselves.[33] More active involvement was taken by Shackletons in Oman during 1958 where, in addition to their normal maritime roles, they were employed as conventional bombers against Omani Liberation Army guerrillas.[34] Further deployments were made to Jordan following a request for assistance from King Hussein of Jordan in July 1958, and Kuwait following Iraqi moves to annex the territory in 1960; such deployments went some way to restoring the reputation of Britain in the Arab world following the Suez debacle.

By now, sufficient Shackletons were in service - including the new MR3 with tricycle undercarriage - to allow the planned rundown of the Neptune squadrons in late 1956,[35] a measure expedited by US dissatisfaction over Suez.[36] Shackletons notably supported Operation GRAPPLE, the dropping of the first British H-bomb on Christmas Island in September 1958. Here the type conducted meteorological reconnaissance and surface surveillance to ensure no boats inadvertently strayed into the danger area prior to each rehearsal and test. During actual detonations, Shackletons were also employed as photographic platforms[37] following fitment of anti-flash curtains, which were found to deposit silver flakes throughout the cockpit after each blast![38]

In 1959, the final RAF Sunderland sorties were completed from Singapore and the Service's long association with flying boats ended.[39] Since 1945, Coastal Command had finally divested itself of pre-war types to become a wholly Shackleton MPA force. Throughout this difficult period, the Command's aircraft had been deployed throughout the World in peacetime humanitarian, Defence Engagement and nuclear testing

tasks as well as operational service in Korea, Malaya, Africa and the Middle East, while adapting to rapidly advancing ASW technology and political uncertainties. This had driven significant evolution in RAF aircrew structures which continue to influence the Service today. While there would be further challenges ahead, it would be the increasingly assertive 'blue water' Soviet naval threat which would next dominate RAF MPA activity.

1961-1981: SUBMARINE THREAT ASCENDANT

> *'I achieved the equivalent of a 'hole in one' when the…[Soviet]…submarine scraped along the buoy cable and cut off the hydrophone…'*
>
> Nimrod MR1 navigator.[40]

Coastal Command entered the 1960s emerging from considerable turmoil following the rapid retirement of the Neptune quickly followed by the unexpected temporary grounding of nearly all Shackleton MR1s, MR2s and T4s due to the discovery of fatigue issues.[41] Despite early problems, however, the MR2 and MR3 were now increasingly mature maritime assets which had also received several sensor and weapons upgrades including the introduction of the improved US Mk44 torpedo. The significance of ASW to UK Defence was increasing rapidly due to the decision by the Admiralty to establish liaison with the USN regarding the Polaris Submarine-Launched Ballistic Missile (SLBM) system;[42] if the national deterrent moved to submarines, MPA would prove central to its security and credibility. As if to add focus to such considerations, the Cuban Missile Crisis of October 1962 saw RAF MPA squadrons surge to expand maritime patrols in NATO and Mediterranean waters.[43] Indeed, this coincided with a rapid increase in Soviet 'trawler' activity, particularly close to RN ports. Keeping track of such intelligence vessels - known as AGIs - became a regular feature of RAF maritime operations for the remainder of the Cold War.

As the RN looked to the future, so too did the RAF with studies for a Shackleton replacement. The Air Ministry considered several such concepts from the late 1950s and initially showed interest in NATO's NMBR2 requirement which resulted in the Breguet Atlantic, a purpose-designed MPA which ultimately entered service with France, West Germany, the Netherlands and Italy. However, Anglo-French politics resulted in the release of Operational Requirement (OR)350 which attracted a variety of unusual bids including a variable-geometry transonic Hawker-Siddeley MPA design. The requirement evolved via the June 1963 Air Staff Target (AST)357 and later Air Staff Requirement (ASR)381 for a new type to enter service from 1968.[44] Once again, various proposals were received including MPA variants of the VC10 and Trident.[45] By 1964, the Breguet Atlantic had again emerged as the firm RAF favourite with deliveries of 47 planned from 1966.[46] However, a late submission from Hawker Siddeley based on a marinised version of the Comet airliner - a type already in service with the RAF as a strategic transport

and SIGINT platform - appealed to a political desire to protect UK jobs. Of note, early plans for the HS801 'Maritime Comet' included a visual bomb aimer position beneath the cockpit designed to allow conventional bombing on 'internal security' and counter insurgency tasks, a requirement which was soon dropped.[47]

Against these procurement dynamics, the Shackleton continued to meet a rapidly expanding Soviet maritime threat to the UK despite ongoing operations elsewhere. Arguably the best known was the so-called 'Indonesian Confrontation' of 1962-70, an undeclared-war with Indonesia whose objection to the creation of Malaysia precipitated a border war and insurgency designed to destabilize the new country.[48] Throughout the Confrontation, Singapore-based Shackletons conducted surveillance of Indonesian land forces as well as traditional MPA activities over the Straits of Malacca.[49] Meanwhile, the Rhodesian Prime Minister Ian Smith - himself a wartime RAF pilot - made a Unilateral Declaration of Independence on 11 November 1965 to avoid black majority rule despite UK demands for reform. As part of the ensuing embargo, Shackletons joined the RN in the 'Beira Patrol' to interdict Rhodesian oil smuggling via Mozambican ports. Flying from primitive conditions on the Island of Malagasy,[50] Shackletons maintained this patrol until 1972.

The Sharjah-based 'MARDET' conducted similar tasks throughout the 1960s to prevent arms smuggling into Gulf States and cover the withdrawal from Aden. However, these maritime operations were augmented by 'desert reconnaissance and tactical bombing'.[51] The former was carried out at low level to identify rebel camel convoys moving into the Sultanate from Saudi Arabia or Yemen which would subsequently be interdicted by Trucial Oman Scouts. Villages and forts were also overflown to visually check whether flags being flown indicated allegiance to the Sultan or the rebels. Tactical bombing tasks were normally carried out over the rugged Jebel Akhdar in northern Oman with Shackletons carrying up to twelve 1,000lb bombs.[52]

While such events attracted newspaper headlines, RAF Shackletons continued their more low-key patrols over the Atlantic and Mediterranean. Throughout the latter half of the 1950s, Soviet blue water naval power had become progressively more assertive under the leadership of Admiral Sergey Gorshkov. By 1960, he had created a 'combined arms force' of surface ships, submarines and land-based maritime strike bombers, all equipped with a variety of conventionally and nuclear armed Anti-Surface Missiles (ASMs). These were specifically designed to challenge USN carrier strike groups and NATO Nuclear Ballistic Missile Submarines (SSBNs).[53] Early Soviet nuclear attack (SSN) and SSBN submarines such as the November and Hotel classes respectively were far noisier than Diesel Electric submarines (SSKs) - which primarily radiated noise only while snorkeling - and comparable Western nuclear boats.[54] US developments in Low Frequency Analysis and Recording (LOFAR) technology allowed the development of static, sea-bed arrays known as the Sound Surveillance System (SOSUS)[55] to act as

'trip wires' betraying passing Soviet submarines. LOFAR allowed extremely long-range detection of the low frequencies associated with Soviet nuclear submarine machinery and revolutionised NATO ASW capabilities. Throughout the 1960s, SOSUS was secretly deployed across the Greenland-Iceland-Faroes-UK gap with access to such US technology being considered 'invaluable' to RN/RAF ASW operations. The first detections of Soviet SSNs occurred in 1962 and by 1968 SOSUS was proving capable of detecting the latest generation of Soviet 'Charlie' and 'Victor' classes.[56] That year also saw the formal establishment of a Joint US/UK SOSUS Project Team to oversee expansion of the network and the establishment of a 'Regional Evaluation Centre' at RAF Brawdy in Wales.

This era heralded increasing levels of sophistication in cooperation between RAF Shackletons and RN submarine forces exemplified by Operation CLASH in June 1964 against Soviet exercises in the North Atlantic. Prior to the exercise commencing, five squadrons of Shackletons operating from Scotland and Norway tracked initial Soviet surface and submarine deployments from the Murmansk area. Supported by US, Canadian and Norwegian forces, airborne ASuW was scaled back during the exercise itself to concentrate on detecting Soviet submarine barriers. This identified gaps in patrols and allowed several RN diesel-electric submarines to infiltrate the Soviet exercise area undetected and collect valuable intelligence.[57] One of the unique strengths of fixed-wing MPAs over submarines, ships and even ASW helicopters was agility. Once detected, a NATO frigate or submarine's location could be predicted within a relatively limited radius of action for a period, even if tracking was lost. In contrast, an MPA could appear in any area virtually unannounced due to its speed of transit which severely complicated Soviet planning. When combined with the persistence of RN surface and sub-surface assets - the latter of which also enjoyed stealth - the RN and RAF were increasingly acknowledged as amongst the most proficient of NATO ASW teams.

Despite the legacy of Empire and the Indonesian Confrontation persisting, by the late 1960s RAF Maritime operations were dominated by this Soviet threat and NATO tasks. The Shackleton was also approaching the twilight of its RAF maritime career as its replacement - by now named Nimrod - made its maiden flight on 23 May 1967.[58] As if to underline its decline, late 1967 saw a series of tragic accidents with the loss of 3 Shackletons and 27 aircrew; 2 further aircraft were lost in April 1968 with a further 11 killed.[59]

On 14 June 1968, HMS *Resolution* - the RN's first Polaris SSBN - departed Faslane for its maiden patrol.[60] The same year saw the Labour Government's notorious Defence White Paper announced the cancellation of the RN's replacement conventional carriers and the withdrawal of British Forces from 'east of Suez.' While the Nimrod MR1 survived political scrutiny, it would be in greatly reduced numbers due to the claimed ability of

the new MPA to cover the area of 3 Shackletons.[61] Moreover, numerous bases would be closed including RAF Ballykelly in Northern Ireland which had been a long-time RAF Maritime airfield. Indeed, on 1 April 1968, Coastal Command itself, along with Bomber and Fighter Commands, was subsumed into the new Strike Command with maritime tasks falling to 18 Group.

Just over 3 years after the initial contract for the type was signed, the first production standard Nimrod MR1 - XV230 - was delivered to the Maritime Operational Training Unit (MOTU) (shortly thereafter renamed 236 OCU) at RAF St Mawgan.[62] By 1972, some 48 Nimrod MR1s[63] had been ordered to replace the Shackleton MR2 and MR3 in the MPA role. However, it would be some years before the Nimrod could assume all its forebear's responsibilities. Just as Lancasters had been retained in the SAR role during early Shackleton service, so too was the Nimrod unable to take on this role until 1972.[64] Operational roles also continued to fall to the older type as the Nimrod continued to be refined. These included critical contributions to the expansion of the SOSUS network in the Eastern Atlantic. To determine the optimum positions for SOSUS arrays, Shackletons conducted extensive acoustic propagation characterization of the North Atlantic under the highly sensitive Project NEAT.[65] It was some years before the Soviets became aware of this expansion of SOSUS and there was concern that the use of active sonar would be counter-detected by the target submarine and provide an indication that cross-cueing was occurring from such a sensitive source. Therefore, RAF MPAs sometimes had to prosecute SOSUS plots via passive means only to avoid compromising the advantage of such information.[66]

However, the Nimrod MR1 rapidly established itself as an excellent MPA that increasingly outperformed NATO counterparts. Parallel to the type's assumption of the ASW task came the delivery of the first of some 213,000 Jezebel LOFAR sonobuoys which fed the Nimrod's AN/AQA-5 processing system[67] and a navigation system derived from that designed for the TSR2.[68] Despite initial teething problems, the Nimrod MR1 crew comfort and tactical displays were a significant improvement over the unpressurised Shackleton. Throughout the 1970s, further improvements were incorporated including Mk44 and newer US Mk46 ASW torpedoes and the Lindholme dinghy. In a war with the Warsaw Pact, nuclear depth charges would also have been employed and practice 'shapes' were sometimes carried for exercises and certification of air and ground crews.[69]

Nevertheless, the relatively small numbers of Nimrods and the reduction in the RN's carrier capability dictated that additional RAF types had to be pressed into supporting maritime tasks. Luckily, the assumption of the nuclear deterrent by the RN had generated capacity in V-Force squadrons. Victors of 543 Squadron performed a dual radar/photographic role overwater while 27 Squadron was tasked with Maritime Radar Reconnaissance (MRR) employing modified Vulcan B2(MRR)s in a more general ASuW

27 Squadron Vulcan B2(MRR) modified for the maritime reconnaissance role pictured over the North Sea, 7 June 1976.

surveillance role relying on the type's H2S Mk9A radar and a variety of secondary sensors.[70] The Vulcan proved well suited to MRR tasks, particularly on 'Tapestry' patrols of oil rigs and during the Second Cod War when Icelandic Coast Guard vessels actively obstructed British and European trawlers in a bid to enforce claims to expanded fishing rights.[71]

The 1960s and 70s saw RAF maritime capabilities increase as the Soviet naval threat was redefined by Gorshkov. From a largely coastal force up until the mid-50s, the Soviet Navy was now able to deploy SSKs, SSNs and SSBNs of increasing sophistication throughout NATO waters. For the UK, the assumption of the strategic deterrent by the RN added yet further impetus to ASW tasks. Gradually, Coastal and Strike Command emphasis shifted from ASuW and policing the last vestiges of Empire to a role demanding increasingly sophisticated sensors, weapons and thinking. Moreover, while SOSUS and LOFAR technology ensured the West maintained a technological edge over the Soviets, access to such technology could only be secured by retaining credible Maritime capabilities in the eyes of the US. The introduction of the World's first jet powered MPA in 1969 reinforced the RAF's status within the Maritime world and NATO. However, political and inter-service tensions had continued to hinder MPA procurement. While the Nimrod MR1 was arguably the finest MPA in the World by the mid-1970s,

it was only available in relatively small numbers. In the next decades, a variety of unexpected World events would test that capacity to breaking point.

1982-2015: OUT OF AREA AND OUT OF SERVICE

> *'It was a gorgeous winter's day, with the sun shining and hardly any cloud to hide in...We felt just like a goldfish in a bowl...Normally the visual lookout is one of the less popular duties in the Nimrod. But while we were off the Argentine coast almost every piece of perspex on our aircraft had a pair of very intent eyes staring out from behind it.'*
>
> Wg Cdr David Emmerson, Officer Commanding the Operation CORPORATE Nimrod Detachment on Ascension Island, after a flight exceeding 19 hours on 15 May 82.[72]

By 1980, operational Nimrod squadrons had been reduced to four spread between St Mawgan in Cornwall and Kinloss in Morayshire, with aircraft numbers further depleted by the diversion of low-hour airframes to the ill-fated Nimrod AEW3 Programme.[73] However, 35 aircraft were in the process of receiving a major upgrade to the definitive Nimrod MR2 with the first aircraft delivered in August 1979. The MR2 upgrade replaced the obsolete ASV21 radar - which had also been used by the Shackleton - with the EMI Searchwater, an AQS-901 acoustic processor to accommodate the data from more modern sonobuoys, and a replacement Loral 1017 *Yellowgate* ESM system mounted in new wingtip pods.[74]

As deliveries of upgraded MR2s proceeded, Argentina invaded the Falkland Islands on 2 April 1982 and maritime squadrons prepared for an entirely unexpected conflict. On 4 April, 18 Group ordered 42 Squadron to deploy two MR1s, three crews and supporting ground crew to Ascension Island on Operation CORPORATE.[75] The first jet departed the following day and flew the initial operational sortie from Ascension on 7 April.[76] The MR1's contribution to CORPORATE was limited to uneventful ASuW/ASW patrols and SAR cover for deploying Harriers before they were replaced by MR2s from Kinloss from 13 April.[77] With remaining MR1s assuming all UK SAR and Tapestry commitments, further upgraded MR2s deployed to Ascension and immediately commenced communications relay support to Operation PARAQUAT, the retaking of South Georgia. Subsequent sorties from Ascension broadly fell into 3 categories: ASuW/ASW defence of Ascension Island, which was considered a possible target for Argentine air, naval or Special Forces (SF) attack; secondly, the Nimrods provided escorts and screening as the Task Force started its transit south; finally, Nimrod crews provided essential communications relay, radar control and SAR cover for Victor tankers and their receivers including Operation BLACK BUCK missions.[78]

However, Nimrod MR2 support could only be conducted to approximately 2,000 nm from Ascension Island and the feasibility of adding an AAR capability was being

considered. To cover immediate long-range requirements, Victor K2s were pressed into the MRR role[79] around South Georgia and the Falklands from 20 April with several missions lasting over 14 hours.[80] The first Nimrod MR2P modified for AAR arrived at Ascension Island on 7 May and aircraft were soon ranging further south in support of the Task Force. One Nimrod mission proceeded to within 150 miles of Port Stanley before moving to approximately 60 miles off the Argentine mainland where it flew past every major Argentine port, in broad daylight and well within range of Argentine fighters.[81] Although often finding little of significance, these sorties provided vital confirmation that the Argentine Navy had retreated to territorial waters following the sinking of the Belgrano.[82] The longest Nimrod sortie conducted exceeded 19 hours and another saw the greatest distance covered in any Operation CORPORATE sortie: 8,453 miles.[83] The Nimrod MR2P was also famously equipped with AIM-9G Sidewinder air-to-air missiles in case of encounters with Argentine fighters or the Boeing 707 SIGINT platform. Both threats were detected on ESM during various sorties and the latter was visually acquired on one occasion; unfortunately, the Nimrod involved was not yet equipped with the Sidewinder modification.[84] Overall, Operation CORPORATE saw some 111 sorties from Ascension Island and the hasty introduction of AAR - a skill maritime squadrons had never previously employed - demanded much from crews.[85] Largely unsung and despite occasional RN misgivings, 18 Group Nimrods nevertheless contributed vital intelligence on Argentine movements which allowed scarce assets to be prioritised elsewhere.[86]

Following Operation CORPORATE, Nimrod squadrons returned to their established NATO and national tasks where they faced the new generation of quieter Soviet submarines. Yet, older and noisier boats continued to be deployed, sometimes seemingly acting as decoys to allow more modern submarines to slip past SOSUS. This behaviour was perplexing until the FBI uncovered the Walker Spy Ring in 1985 and it became evident that the Soviets knew how NATO were tracking their earlier submarines.[87] The new generation of Soviet submarines included the Victor III SSN and Delta IV SSBN and proved far greater challenges; 'The Victor Is, Victor IIs, the early Deltas, Hotel, Echo, Novembers, all those were easy...then suddenly they turned out the Victor III...life got much harder.'[88] However, the introduction of new sonobuoy technologies such as the 'Barra buoy' and digital High Instantaneous Dynamic Range (HIDAR) passive systems on NATO MPAs eased concerns. When combined with the AQS-971 acoustic processor upgrade and continued efforts to maintain RAF 'wet' skills, parity was maintained in the final years of the Cold War. However, almost overnight, the collapse of Communism saw the Soviet submarine threat virtually evaporate, just as the U-boat threat had suddenly disappeared in 1945.

However, the instability of the post-Cold War world order soon saw RAF maritime crews returning to the Middle East. In August 1991, RAF Nimrods were committed to Operation GRANBY following Iraq's invasion of Kuwait. Operating from Seeb in Oman,

the aircraft initially enforced the UN embargo conducting Maritime Patrol and reporting any suspicious vessels in the Arabian and Persian Gulf to Naval forces.[89] Once hostilities commenced, RAF Nimrods were allocated ASuW tasks in the Northern Arabian Gulf by the USN.[90] As in 1982, Operation GRANBY saw a number of new systems introduced to the Nimrod including defensive aids, a Link 11 terminal which allowed access to naval and AWACS track data, and an Electro-Optical (EO) system named Sandpiper.[91] During hostilities, MR2 Surface Picture ('SURPIC') data led to several successful engagements of Iraqi naval vessels by USN aircraft.[92] Post-war, MR2s continued to contribute to the Gulf via Operation RESINATE and other discrete operations designed to support UN sanctions against Saddam Hussein's regime.[93]

The 1990s saw a wide range of other operational commitments by the Nimrods including enforcing a UN blockade of the former Yugoslavia, a task which endured for much of the decade.[94] The main assets of interest in the Adriatic were Soviet era SSKs operated by the Yugoslav Navy which, although elderly, still presented a credible threat. Thus, Nimrods flew with war loads of 6 Stingray torpedoes although no engagements ultimately occurred.[95]

Meanwhile, plans to replace the Nimrod were already in place. Focus initially fell on the Lockheed P-7 Long-Range Air ASW Capable Aircraft (LRAACA), a heavily modified, new build P-3 variant being developed for USN requirements.[96] However, LRAACA was cancelled in 1990 and RAF maritime squadrons faced another procurement challenge. The MOD then considered a variety of Replacement Maritime Patrol Aircraft (RMPA) alternatives including updated Atlantic and P-3 variants as well as a westernised version of the Russian Be-40 amphibian. However, it was a radically redesigned 'Nimrod 2000' which was selected in December 1996 with 21 scheduled for service entry from 2003.[97] This variant would entail a virtual complete rebuild with new wings and engines being attached to refurbished MR2 fuselages containing entirely new systems.

Following 9/11, and with the Russian submarine threat to British interests by now at unprecedentedly low levels, RAF Nimrods were committed to overland operations, first in Afghanistan and later in Iraq. This was a role which illustrated the versatility of RAF MPAs, yet would ultimately result in their demise. Operations over Afghanistan commenced within weeks of 9/11 with Nimrods largely supporting UK Special Forces (SF) during long sorties from Thumrait in Southern Oman alongside other RAF and USAF assets.[98] Such operations saw an enhanced EO system - the MX-15 - introduced on the Nimrod with SF 'riders' also exploiting the type's C2 capabilities to support their colleagues on the ground. MR2s also conducted more traditional roles off the Omani coast to interdict suspicious vessels in cooperation with Omani Coastguards.[99] In early 2003, three Nimrods and 4 crews deployed to Prince Sultan Air Base (PSAB) near Riyadh in preparation for Operation TELIC - the invasion of Iraq - where they joined possibly the largest collection of USAF and RAF ISTAR aircraft ever assembled. The invasion itself

proved to be a frustrating period for the MR2s due to a lack of suitable tasking.[100] However, it was after the initial invasion and as British troops found themselves mired in the increasingly complex ground situation in Iraq that the MR2 came into its own. Often tracking 'High Value Individuals' or conducting 'Pattern of Life' surveillance of suspect locations with its MX-15 for hours on end, the Nimrod proved indispensable to an increasing number of British Army and UK SF 'strike ops', particularly in Baghdad and Basra. This routinely required aircraft and crews to operate from Basra airport itself where the HQ of the British Army led Multi-National Division (South East) was located.

Nimrod MR2 at a base in the Middle East, 2008.

By 2005, the British ground involvement in Afghanistan had increased and Nimrod squadrons were facing conflicting demands from both Operation TELIC and Operation HERRICK. Missions during the latter also relied heavily on MX-15 but required routine use of AAR due to the duration of the sorties from Oman. It was on one of these missions, on 2 September 2006 that Nimrod MR2 XV230 was lost following an in-flight fire soon after having tanked.[101] Despite the valiant attempts of the crew in fighting the fire, the aircraft exploded at 3,000ft while attempting an emergency diversion to Kandahar and all 14 crew members died. The findings from the subsequent Board of Inquiry highlighted significant airworthiness concerns which led to the Haddon-Cave inquiry and a fundamental redesign of UK military airworthiness procedures. For the Nimrod, Haddon-Cave was damning and questioned the type's basic airworthiness. Despite continued operations over Afghanistan and Iraq, as well as counter-drug operations in the Caribbean and UK, delays to the planned Nimrod MRA4 replacement meant that the MR2s were being expected to operate for far longer than anticipated. Ironically, this decade also saw signs of a revitalised Russian naval threat with increasing

numbers of incursions by surface and sub-surface vessels into NATO areas. Despite its age, the Nimrod MR2's acoustics capabilities routinely proved capable of maintaining track of the latest Russian SSNs that would sometimes be lost when handed to MPAs of other nations.

However, after several further incidents, the MR2 was retired in 2010 and the entire Nimrod MRA4 Programme cancelled in that year's Strategic Defence and Security Review. Although one of the most controversial decisions made by Defence in recent years, only a single production standard MRA4 had flown almost a decade after it was originally planned to have entered service. Moreover, there remained numerous, fundamental system and flight envelope problems to be resolved which raised question marks over the MRA4's airworthiness. For the first time in its history, the RAF suddenly found itself without a dedicated MPA. The author commanded the Squadron responsible for Nimrod MRA4 Operational Test and Evaluation between 2007-09 and regrettably feels that cancellation had been inevitable for some time. However, this does not alleviate the challenges of what has undoubtedly been the Service's most operationally damaging post-war 'capability holiday' in a decade which has seen Russian submarine technology erode traditional Western advantages to unprecedentedly low levels. Faced with new Russian designs such as the Yasen SSN and Borei SSBN, and the reliance on NATO allies to patrol UK waters, many rightly questioned whether the lack of an MPA had undermined the entire UK strategic deterrent.

Fortunately, the RAF immediately anticipated the need to regenerate an MPA capability and over 30 maritime aircrew were distributed amongst RAAF, RNZAF, RCAF and USN squadrons to retain operational skills. As these 'Seedcorn' personnel integrated into their host services, the RAF quietly set about preparing the way to procure a new MPA. Many commentators assumed that, even were the Service successful, only a cheaper MPA such as the CN295 would be affordable. This ignored the point that such types were effective ASuW assets but lacked both the capacity and endurance for 'blue water ASW.' For the UK, an MPA capability needed to cover the full spectrum of ASuW and ASW including the prosecution of highly advanced nuclear boats. In essence, this limited options to an 'all or nothing' choice of the P-8, with which RAF Seedcorn crews were becoming increasingly familiar. Indeed, these RAF personnel had significantly assisted USN P-8 trials as they brought MRA4 experience – a type which shared a common mission system with the Poseidon. In a final twist however, the Japanese P-1 became an extremely viable late contender for RAF requirements. This was the first purpose designed MPA since the Breguet Atlantic of the late 1950s and attracted significant interest from the Service. Following a visit to Japan by ACAS in 2014, RAF MPA specialists visited the Japanese Maritime Self Defence Force and Kawasaki to fly on the aircraft. Despite the P-1 exceeding the capabilities of the P-8 in some respects, several factors dictated that the P-8 remained the preferred option, not least that the RAF had numerous crew qualified on the US type.

Ultimately, SDSR15 confirmed the decision to order the P-8 Poseidon, the first of which will commence flying in RAF service in 2019, closing a critical gap in UK Defence which will have endured for almost a decade. Given a resurgent Russian submarine threat, the regeneration of the Service's 'Kipper Fleet' cannot come soon enough. Although only 9 strong, the RAF P-8s will likely continue to provide discreet (and often overlooked) operational capacity in a variety of roles for decades to come.

CONCLUSION

'We do feel the loss of the Nimrods. The Merlins don't have the legs.'

Capt P Halton RN, 2012.[102]

The post-war history of RAF maritime operations has been uniquely challenging. Emerging from the Second World War as a powerful and effective ASW/ASuW force, Coastal Command rapidly contracted in size as Lend-Lease types and Commonwealth aircrews were released. Within months, Coastal Command was arguably ineffective for even peacetime tasks and it was several years before modern Shackletons and Neptunes arrived to address the imbalance. Throughout the 1950s, a 'Flying Boat Lobby' and RN attempts to seize control of Coastal Command complicated procurement efforts. Nevertheless, established World War 2 era types such as the Sunderland and Lancaster displayed their versatility in the maritime environment and on tasks such as the Berlin Airlift and 'Amethyst Incident'.

The late 1950s and 60s saw a rapid increase in the Soviet submarine threat with a commensurate rise in focus on NATO ASW tasks despite the legacy of Empire. Indeed, once the UK's strategic deterrent was assumed by Polaris, RAF MPA capacity became a crucial pillar of its credibility and proved essential to gaining access to critical related technology such as SOSUS. Yet, once again, political factors complicated the selection of a replacement MPA which eventually emerged in the form of the Nimrod MR1. However, the small numbers procured dictated the use of Victors and Vulcans in complementary roles. Nevertheless, Joint RN and RAF capabilities were now recognised as exemplars across NATO and amongst the finest in the World, capable of meeting the Soviet naval threat with confidence.

As the capability of Soviet nuclear boats increased to new levels, the Falklands Campaign of 1982 saw a return to the historic diversification of maritime roles with Nimrods exposed to Argentine fighter threats on exceptionally long AAR-supported sorties over the South Atlantic. This heralded a return to 'out of area' operations following the end of the Cold War including the Middle East and less familiar locations such as the Adriatic and Afghanistan. Instead of working with the RN and NATO navies, Nimrod MR2 crews now became instrumental to ground and SF operations in both Operations TELIC and HERRICK. The strategic shock of the XV230 tragedy, however,

precipitated the early demise of the MR2 fleet and cancellation of the Nimrod MRA4 due to continuing delays and unresolved problems. This time, historic MPA procurement problems resulted in the complete loss of the RAF's MPA capability, leaving UK defence and its strategic deterrent fundamentally compromised.

Just as the 'Cinderella Service' did in World War 2, post-War RAF maritime capabilities have often existed in the shadows. Despite procurement challenges, the RAF maintained a world leading capability in uniquely challenging and technically unforgiving Joint operations up to 2010. Throughout these decades, the 'Kipper Fleet' demonstrated versatility, adaptability and disproportionate influence in both the Joint arena and the structural evolution of its parent Service's aircrew cadre. It can be anticipated that the RAF's nine P-8s will soon excel in the maritime battlespace as they face new generations of Russian SSNs and SSBNs presenting a very real and present danger to our national interests. While other RAF communities are seeing the impact of increased Russian military activity in what some are already referring to as the 'Second Cold War,' the P-8 crews will share the same unique claim of their Nimrod and Shackleton forebears:

> *'To be within a button push of doing exactly what you would do in war gave a huge feeling of achievement. Whilst other Cold War warriors studied target maps, we were actually up against our potential foe, day after day'.*[103]
>
> Nimrod MR1 Navigator

NOTES

[1] Tony Blackman, *Nimrod: Rise and Fall* (London: Grub Street, 2011), 78-79.
[2] Keith Wilson, *Avro Shackleton 1949-1991 Owners' Workshop Manual* (Sparkford: Haynes Publishing, 2015), 47.
[3] Deborah Lake, *Growling Over the Oceans. Avro Shackleton: The Men and the Missions, 1951 - 1991* (London: Souvenir Press Ltd, 2010), 8.
[4] Chris Ashworth, *RAF Coastal Command 1936-1969* (Sparkford: Patrick Stephens Ltd, 1992), 196.
[5] Id.
[6] 703 Sqn.
[7] Chris Ashworth, *RAF Coastal Command 1936-1969* (Sparkford: Patrick Stephens Ltd, 1992), 198.
[8] Ibid, 199.
[9] Although Coastal Command conducted ASuW *surveillance*, the actual ASuW strike role was initially transferred to Bomber Command in the immediate post-war years. This was due to the rapid contraction and eventual disbandment of Coastal Command strike wings.
[10] Ibid, 200.
[11] Chaz Bowyer, *The Short Sunderland* (Bourne End: Aston Publications Ltd, 1989), 129.

[12] T M Williams, *Air Ministry Publication 3257: A Report on Operation PLAINFARE* (London: HMSO, 1950), 520.
[13] Chaz Bowyer, *The Short Sunderland* (Bourne End: Aston Publications Ltd, 1989), 131.
[14] Chris Ashworth, *RAF Coastal Command 1936-1969* (Sparkford: Patrick Stephens Ltd, 1992), 204.
[15] Chaz Bowyer, *The Short Sunderland* (Bourne End: Aston Publications Ltd, 1989), 128.
[16] Malcolm Postgate, *The Malayan Emergency 1948-1960*, 131.
[17] Chris Ashworth, *RAF Coastal Command 1936-1969* (Sparkford: Patrick Stephens Ltd, 1992), 16-17.
[18] Deborah Lake, *Growling Over the Oceans. Avro Shackleton: The Men and the Missions, 1951 - 1991* (London: Souvenir Press Ltd, 2010), 22.
[19] Chris Ashworth, *RAF Coastal Command 1936-1969* (Sparkford: Patrick Stephens Ltd, 1992), 204.
[20] Chris Gibson, *Nimrod's Genesis: RAF Maritime Patrol Projects and Weapons Since 1945* (Manchester: Hikoki Publications Ltd, 2015), 60.
[21] Chris Ashworth, *RAF Coastal Command 1936-1969* (Sparkford: Patrick Stephens Ltd, 1992), p.208.
[22] Chris Gibson, *Nimrod's Genesis: RAF Maritime Patrol Projects and Weapons Since 1945* (Manchester: Hikoki Publications Ltd, 2015), 71.
[23] Deborah Lake, *Growling Over the Oceans. Avro Shackleton: The Men and the Missions, 1951 - 1991* (London: Souvenir Press Ltd, 2010), 29.
[24] Clive Radley, *Sonobuoy History From a UK Perspective* (Camberley: Clive Radley, 2016), 55.
[25] Ibid, 57.
[26] Deborah Lake, *Growling Over the Oceans. Avro Shackleton: The Men and the Missions, 1951 - 1991* (London: Souvenir Press Ltd, 2010), 210.
[27] Chris Ashworth, *RAF Coastal Command 1936-1969* (Sparkford: Patrick Stephens Ltd, 1992), 210.
[28] Deborah Lake, *Growling Over the Oceans. Avro Shackleton: The Men and the Missions, 1951 - 1991* (London: Souvenir Press Ltd, 2010), 34.
[29] Both the AEOp and AEO aircrew categories survived into the 21st Century and their influence remains evident in the modern Weapons Systems Operator course content and sub-specialisations.
[30] Keith Wilson, *Avro Shackleton 1949-1991 Owners' Workshop Manual* (Sparkford: Haynes Publishing, 2015), 22.
[31] Ibid, 34.
[32] EOKA was a nationalist organisation with the goal of 'The liberation of Cyprus from the British yoke,' claiming to be 'anti-colonialist.' Although not stated in its initial declaration of existence, which was printed and distributed on 1 April 1955, EOKA also had a target of unifying Cyprus with Greece (known as *Enosis*).
[33] Ibid, 53.
[34] Ibid, 55.

[35] Chris Ashworth, *RAF Coastal Command 1936-1969* (Sparkford: Patrick Stephens Ltd, 1992), 212.
[36] Deborah Lake, *Growling Over the Oceans. Avro Shackleton: The Men and the Missions, 1951 - 1991* (London: Souvenir Press Ltd, 2010), 81.
[37] Keith Wilson, *Avro Shackleton 1949-1991 Owners' Workshop Manual* (Sparkford: Haynes Publishing, 2015), 44-47.
[38] Deborah Lake, *Growling Over the Oceans. Avro Shackleton: The Men and the Missions, 1951 - 1991* (London: Souvenir Press Ltd, 2010), 94.
[39] Chaz Bowyer, *The Short Sunderland* (Bourne End: Aston Publications Ltd, 1989), 139.
[40] Clive Radley, *Sonobuoy History From a UK Perspective* (Camberley: Clive Radley, 2016), 70.
[41] Chris Ashworth, *RAF Coastal Command 1936-1969* (Sparkford: Patrick Stephens Ltd, 1992), 215.
[42] Peter Hennessy and James Jinks, *The Silent Deep* (London: Penguin Books, 2015), 207.
[43] Chris Ashworth, *RAF Coastal Command 1936-1969* (Sparkford: Patrick Stephens Ltd, 1992), 218.
[44] Ibid, 219.
[45] Chris Gibson, *Nimrod's Genesis: RAF Maritime Patrol Projects and Weapons Since 1945* (Manchester: Hikoki Publications Ltd, 2015), 155.
[46] Ibid, 157.
[47] Ibid, 163.
[48] From the Federation of Malaya, Singapore and the protectorates of North Borneo and Sarawak, themselves collectively known as British Borneo.
[49] Keith Wilson, *Avro Shackleton 1949-1991 Owners' Workshop Manual* (Sparkford: Haynes Publishing, 2015), 57.
[50] Now Madagascar.
[51] Deborah Lake, *Growling Over the Oceans. Avro Shackleton: The Men and the Missions, 1951 - 1991* (London: Souvenir Press Ltd, 2010), 111.
[52] Id.
[53] John Jordan, *Soviet Warships 1945 to the Present* (London: Arms and Armour Press, 1992), 19.
[54] Peter Hennessy and James Jinks, *The Silent Deep* (London: Penguin Books, 2015). 324.
[55] Ibid, 325.
[56] Ibid, 327.
[57] Ibid, 278-279.
[58] Tony Blackman, *Nimrod: Rise and Fall* (London: Grub Street, 2011), 16.
[59] Chris Ashworth, *RAF Coastal Command 1936-1969* (Sparkford: Patrick Stephens Ltd, 1992), 114-115.
[60] Peter Hennessy and James Jinks, *The Silent Deep* (London: Penguin Books, 2015), 260.
[61] Deborah Lake, *Growling Over the Oceans. Avro Shackleton: The Men and the Missions, 1951 - 1991* (London: Souvenir Press Ltd, 2010), 202.
[62] Tony Blackman, *Nimrod: Rise and Fall* (London: Grub Street, 2011), 18.

[63] Ibid, 19.
[64] Deborah Lake, *Growling Over the Oceans. Avro Shackleton: The Men and the Missions, 1951 - 1991* (London: Souvenir Press Ltd, 2010), 211.
[65] Peter Hennessy and James Jinks, *The Silent Deep* (London: Penguin Books, 2015), 327.
[66] Ibid, 328.
[67] Clive Radley, *Sonobuoy History From a UK Perspective* (Camberley: Clive Radley, 2016), 59.
[68] Ibid, 67.
[69] Ibid, 69.
[70] **https://navalairhistory.com/2012/05/06/when-god-of-thunder-became-mighty-hunter.**
[71] Chris Gibson, *Nimrod's Genesis: RAF Maritime Patrol Projects and Weapons Since 1945* (Manchester: Hikoki Publications Ltd, 2015), 186.
[72] Jeffrey Ethel and Alfred Price, *Air War South Atlantic* (London: Sidgwick and Jackson, 1984), 93.
[73] 42 at St Mawgan which also hosted 236 OCU, with 120, 201 and 206 Sqns at Kinloss.
[74] Clive Radley, *Sonobuoy History From a UK Perspective* (Camberley: Clive Radley, 2016), 71-72.
[75] Rodney Burden, Michael Draper, Douglas Rough, Colin Smith and David Wilton, *Falklands: The Air War* (London: Arms and Armour Press, 1986), 401.
[76] Id.
[77] Ibid, 402.
[78] Id.
[79] 27 Sqn had disbanded in the MRR role on 31 March 1982, only days before the Argentine invasion.
[80] Rodney Burden, Michael Draper, Douglas Rough, Colin Smith and David Wilton, *Falklands: The Air War* (London: Arms and Armour Press, 1986), 394.
[81] Jeffrey Ethel and Alfred Price, *Air War South Atlantic* (London: Sidgwick and Jackson, 1984), 93.
[82] Sandy Woodward, *One Hundred Days* (London: Fontana, 1992), 97.
[83] Rodney Burden, Michael Draper, Douglas Rough, Colin Smith and David Wilton, *Falklands: The Air War* (London: Arms and Armour Press, 1986), 403.
[84] Tony Blackman, *Nimrod: Rise and Fall* (London: Grub Street, 2011), 154.
[85] Rodney Burden, Michael Draper, Douglas Rough, Colin Smith and David Wilton, *Falklands: The Air War* (London: Arms and Armour Press, 1986), 403.
[86] Sandy Woodward, *One Hundred Days* (London: Fontana, 1992), 209.
[87] Peter Hennessy and James Jinks, *The Silent Deep* (London: Penguin Books, 2015), 548.
[88] Id.
[89] Charles Allen, *Thunder and Lightning* (London: HMSO, 1991), 28.
[90] Ibid, 31.
[91] Ibid, 34.
[92] Ibid, 33.

[93] Tony Blackman, *Nimrod: Rise and Fall* (London: Grub Street, 2011), 86.
[94] Known variously as Operation MARITIME MONITOR, MARITIME GUIARD and SHARP GUARD.
[95] Tony Blackman, *Nimrod: Rise and Fall* (London: Grub Street, 2011), 120.
[96] Chris Gibson, *Nimrod's Genesis: RAF Maritime Patrol Projects and Weapons Since 1945* (Manchester: Hikoki Publications Ltd, 2015), 194.
[97] Ibid 195.
[98] Operations VERITAS, ORACLE and latterly HERRICK.
[99] Tony Blackman, *Nimrod: Rise and Fall* (London: Grub Street, 2011), 130.
[100] Ibid, 129.
[101] A date which remains infamous within the Nimrod community due to the loss of XV239 and her crew during an air display in Toronto on 2 September 1995.
[102] Peter Hennessy and James Jinks, *The Silent Deep* (London: Penguin Books, 2015), 17.
[103] Clive Radley, *Sonobuoy History From a UK Perspective* (Camberley: Clive Radley, 2016), 70.