incendiaries. The submarine I-25 had launched two partially successful seaplane bombing missions over Oregon in September 1942, mere pin pricks, but the long-term objective was to be achieved by free-flying balloons. Thousands of them, made of paper, were to fly at an average altitude of 30,000 feet carrying four small incendiaries and one anti-personnel bomb, dropped sequentially by an altitude regulating device. The campaign finally began in November 1944, because upper air currents between November and March were ideal for the purpose.[102]

This time of year was also, of course, the worst for igniting forests, since they were rain soaked or snow covered. The first incidents occurred in the United States in December, and a balloon came down with its payload near Minton, Sask., on 12 January. Officials, fearing that the balloons might soon be used to transport biological weapons, tried to deny the Japanese all knowledge of the effectiveness of the balloons by instituting tight press censorship.[103]

In Canada the army became the chief co-ordinating agency to deal with Japanese balloons, supported by the RCAF, RCMP, and various research institutions. The RCAF's job was to shoot down balloons where possible, fly army bomb disposal experts to incident sites, and transport recovered material to Ottawa. The Aircraft Detection Corps had been disbanded on 15 November 1944, but the west coast radar stations and filter centres (unlike those in the United States) were still fully operational. Unfortunately they were not much use against these high altitude targets, paper not being a good reflector of radio waves and the metal components being very small. Detection therefore was haphazard. On 21 February 1945 a Kittyhawk of 133 (F) Squadron shot down a balloon near Sumas, BC. On 10 March another aircraft of this squadron got one of two 'Papers' spotted at Galiano Island, in the Strait of Georgia. Two days later, a 6 (BR) Canso forced down a partially deflated balloon drifting at 500 feet over the Rupert Inlet near Coal Harbour. Wartime reports claim another interception in March near Strathmore, Alta, but it cannot be verified in any unit or station diary.[104]

By then the campaign was already near its end. Peak balloon-launching months were February and March, with a corresponding rise in balloon reports in North America. The final balloon was launched no later than April 1945. Faced by silence in North American news sources, and suffering production disruptions caused by more traditional American bombing, the Japanese cancelled the campaign. There had been no fires attributed to balloon bombs and only one incident of injury or death (in the United States). Although civil and military authorities prepared for incendiary and biological defence, there was no real increase in the resources committed to west coast defence.[105]

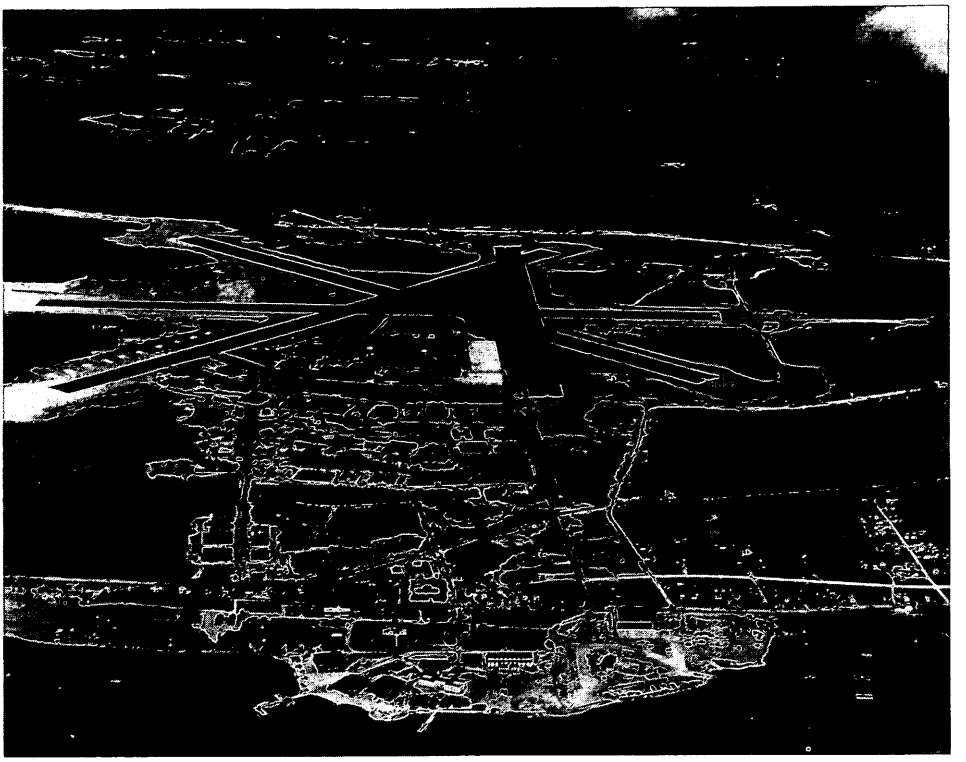
The end was in sight by July. One by one the units of Western Air Command began to stand down. Japan surrendered on 14 August. One month later, on 15 September 1945, 11 (BR) Squadron, a Liberator-equipped veteran of the Battle of the Atlantic which joined the command's order of battle on 25 May, disbanded. It was the last operational squadron of the two home defence commands.

In his postwar report, Air Vice-Marshal Heakes wrote: 'The chief difficulties encountered in all operations was weather, due to limited weather reporting facilities in the Pacific and the mountains with their local weather effects. Throughout the summer months a blanket of fog usually extended out over the Pacific up to a distance of 500 miles, thus curtailing effective visual search and requiring greater dependency upon radar. In this connection, the best types were not available for search.'[106]

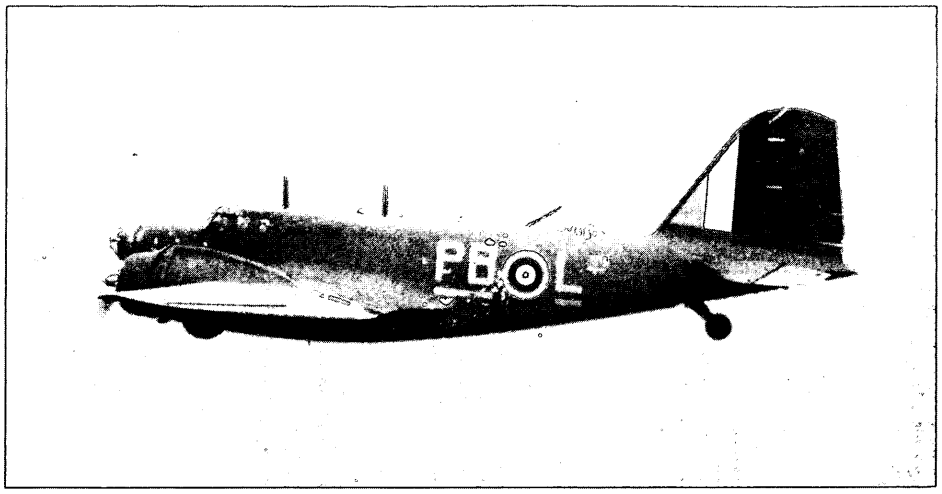
The airmen of Western Air Command, with their frequently old and worn-out equipment, had performed a tedious and dangerous service, dangerous because weather and terrain put aircrew constantly at risk. There had been, however, little threat of enemy attack. The large establishment on the west coast was more to provide insurance against the possibility of Japanese raids than to carry the war to the enemy. Despite a creditable showing in the Aleutians in 1942-3, Western Air Command's principal function had been to give the population of British Columbia peace of mind. It may be regarded at this distance as a questionable use of scarce resources, but there were two useful military consequences: the exercise of sovereignty in Canadian coastal regions and the creation of a trained fighting force to reinforce other regions if and when needed.

PART FOUR

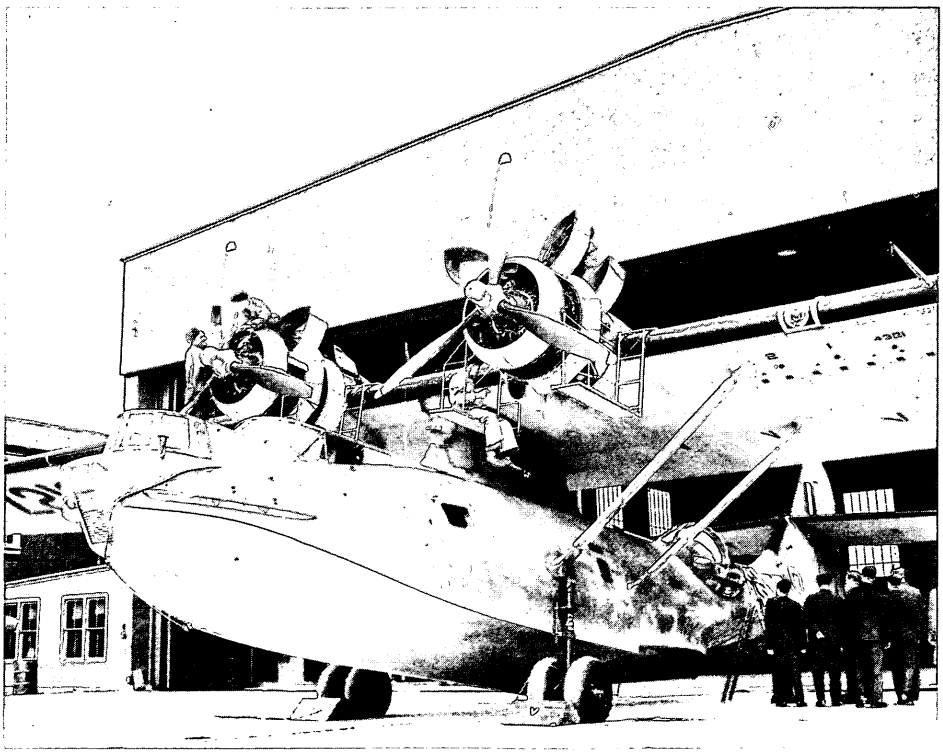
The North Atlantic Lifeline



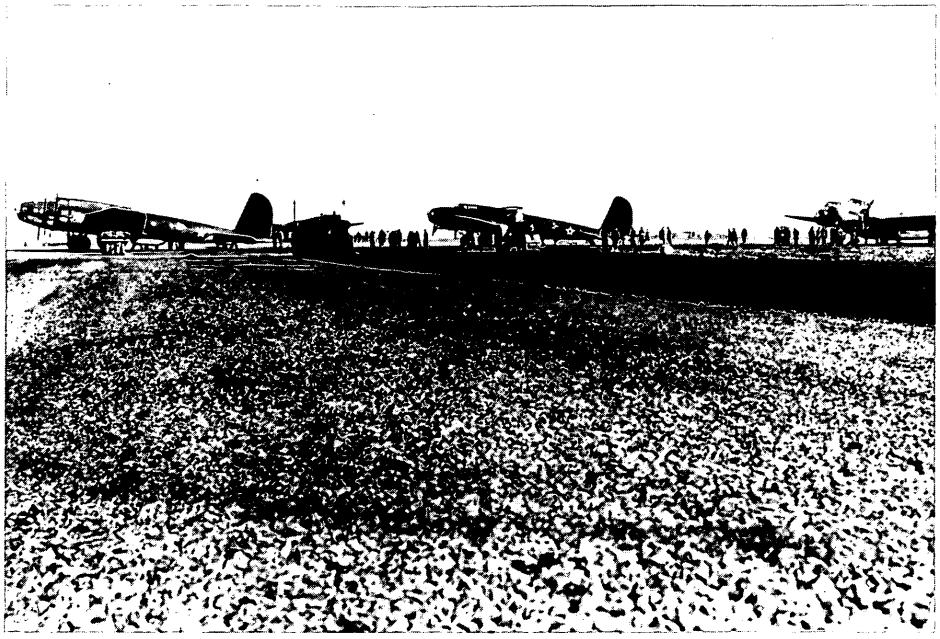
The focus of all Eastern Air Command activity: RCAF Station Dartmouth, 1943, as seen from the southwest. Hangars and slipways for flying-boat operations are in the foreground. (REA 132-53)



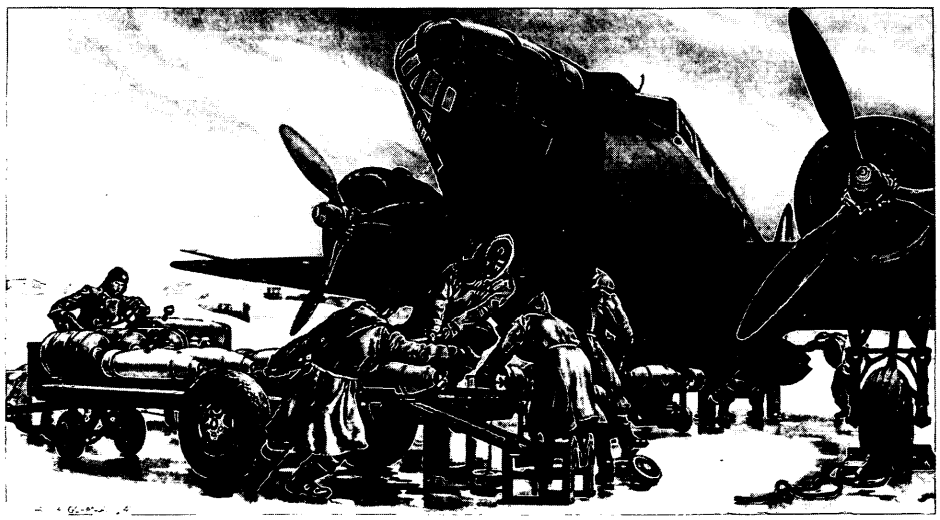
Douglas Digby No 740 of 10 (BR) Squadron, the machine in which Squadron Leader C.L. Annis made the first attack on a U-boat by an RCAF aircraft, in October 1941. Digbys were the mainstay of 1 Group's operations until the end of 1942. (PA 140642)



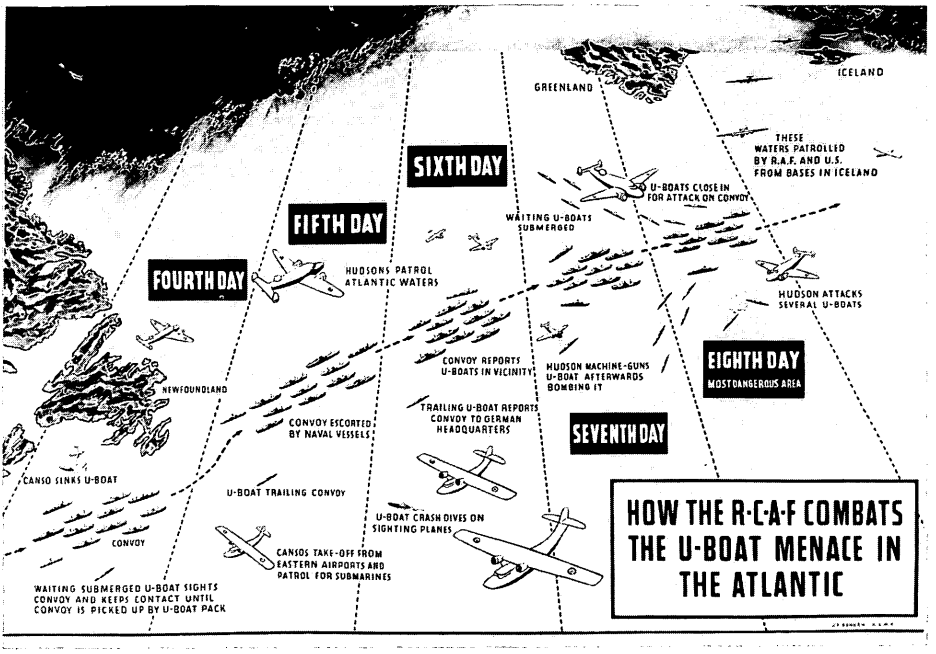
The first of Eastern Air Command's Catalinas, a Mark 1 of 116 (BR) Squadron, undergoes a close inspection by RCAF personnel at Dartmouth, September 1941. (PL 5952)



First arrivals at Torbay, Nfld, October 1941: two B-17s of the USAAF and a Digby of 10 (BR) Squadron. (RE 64-1382)



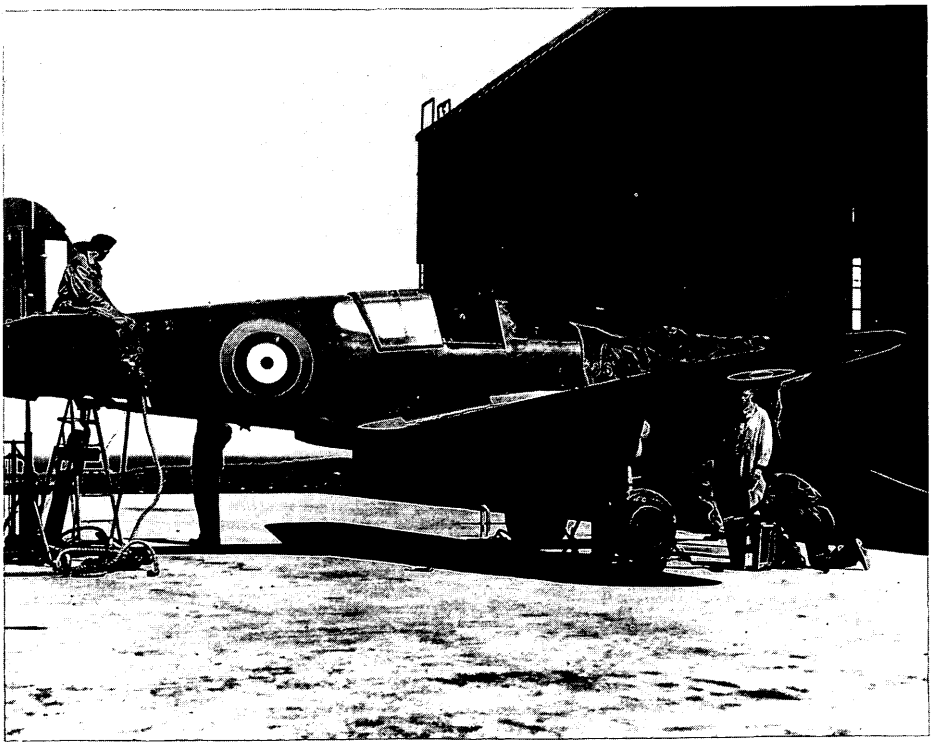
Bombing up a 10 (BR) Squadron Digby at Gander in early 1942, by Paul Goranson. The trolley carries the ineffective anti-submarine bombs and, at the back, three 450-lb Amatol-filled depth charges – the first really effective anti-submarine weapon in the Eastern Air Command inventory. This significant piece of Canadian war art 'disappeared' in the immediate postwar years. Anyone knowing its location is invited to contact the Canadian War Museum. (PL 13418)



A misleading wartime representation of the RCAF's role in the defence of convoys. It was the Cansos which ranged far to seaward and tackled the U-boat packs, while the medium-range Hudsons operated closer to land. (PL 13802)

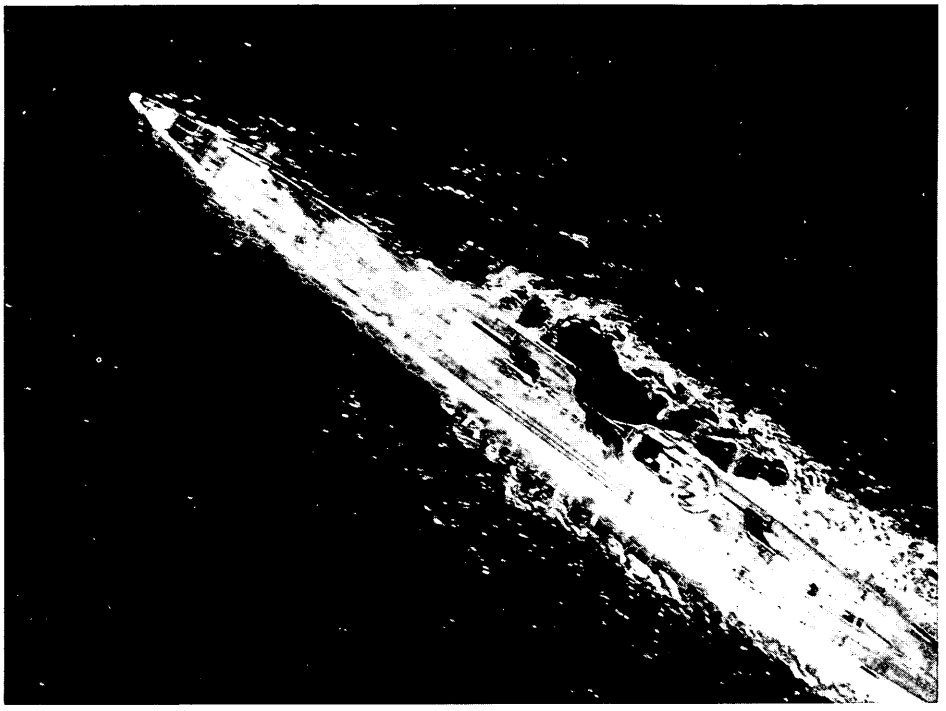
Depth charges falling away from a 116 (BR) Squadron Catalina during an exercise, April 1943. (RE 64-1044)

Squadron Leader N.E. Small, the officer responsible for 113 (BR) Squadron's remarkable success during the 1942 U-boat campaign in Canadian waters. (PL 12610)

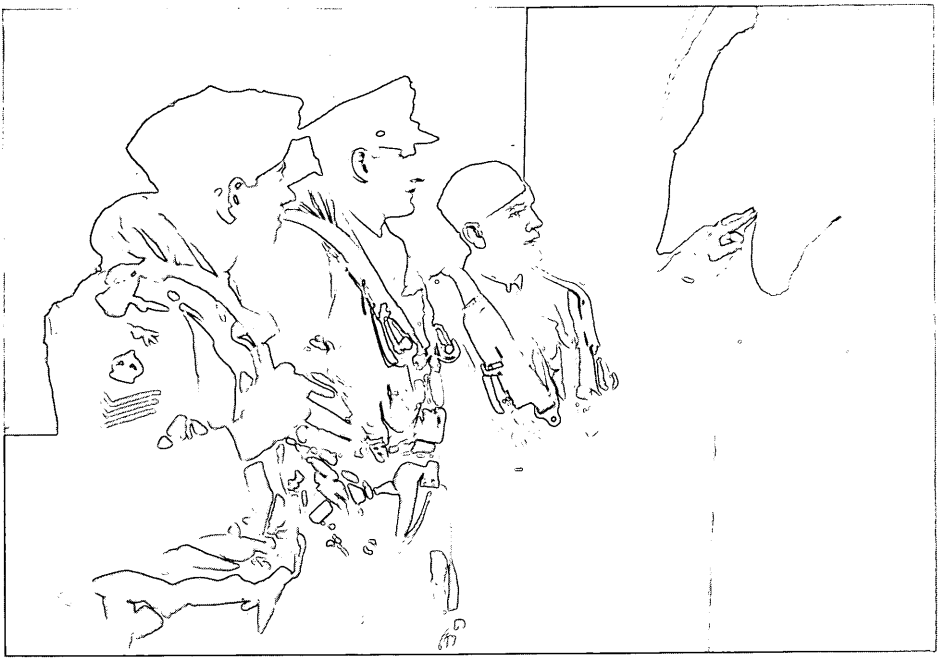


One of 130 (F) Squadron's Kittyhawks at Mont Joli, Que., June 1942. (PMR 75-620)

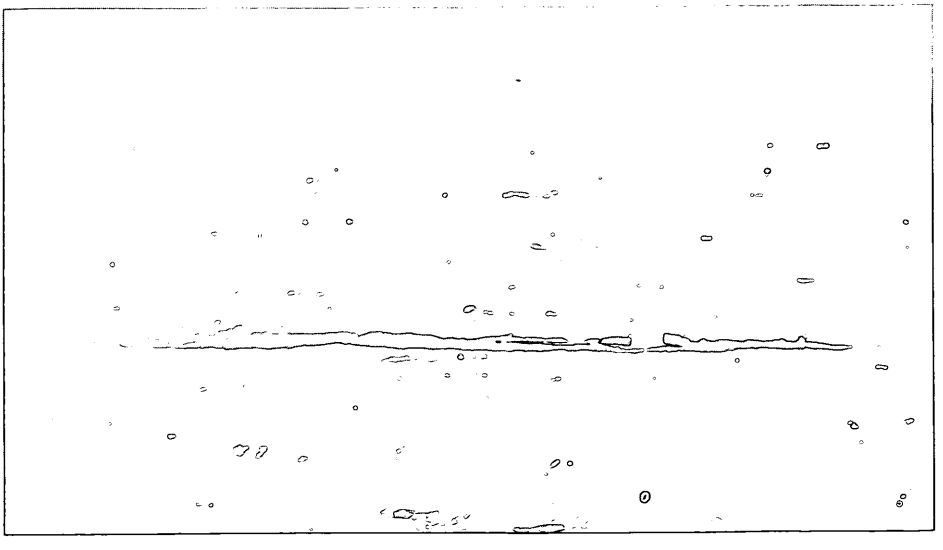
Loading a 250-lb depth charge into the bomb-bay of a Hudson, which sports the white camouflage scheme adopted by Eastern Air Command for anti-submarine aircraft in 1942. (PMR 77-192)



One of the U-boats attacked by aircraft from 113 (BR) Squadron: U-165 as seen from Flight Lieutenant R.S. Keetley's Hudson on 9 September 1942, just south of Anticosti Island. (PL 12814)

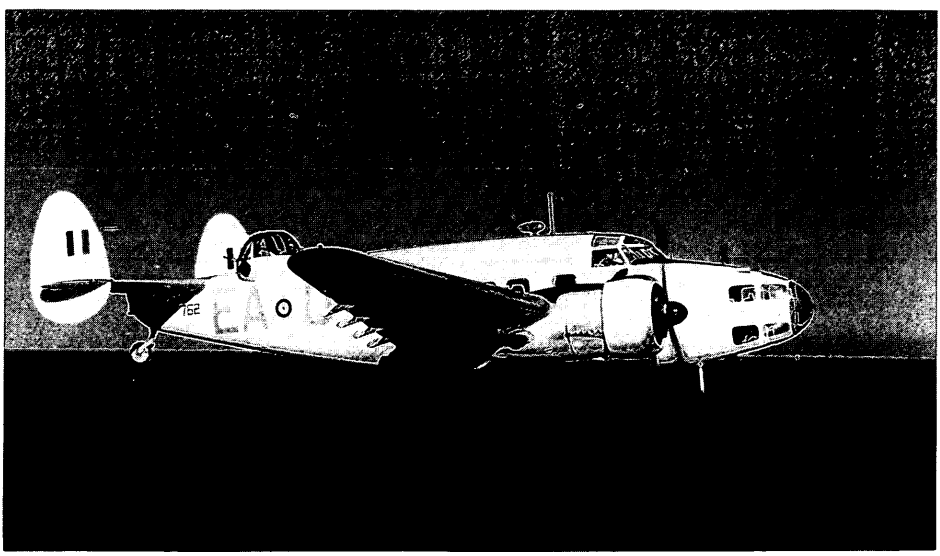


Three pilots of 113 (BR) Squadron who made attacks on U-boats during 1942: left to right, Flight Sergeant A.S. White, Flight Lieutenant R.S. Keetley, and the squadron commanding officer, Squadron Leader N.E. Small. A wartime censor has crudely blotted out the wall map of the Atlantic coast. (PL 12609)

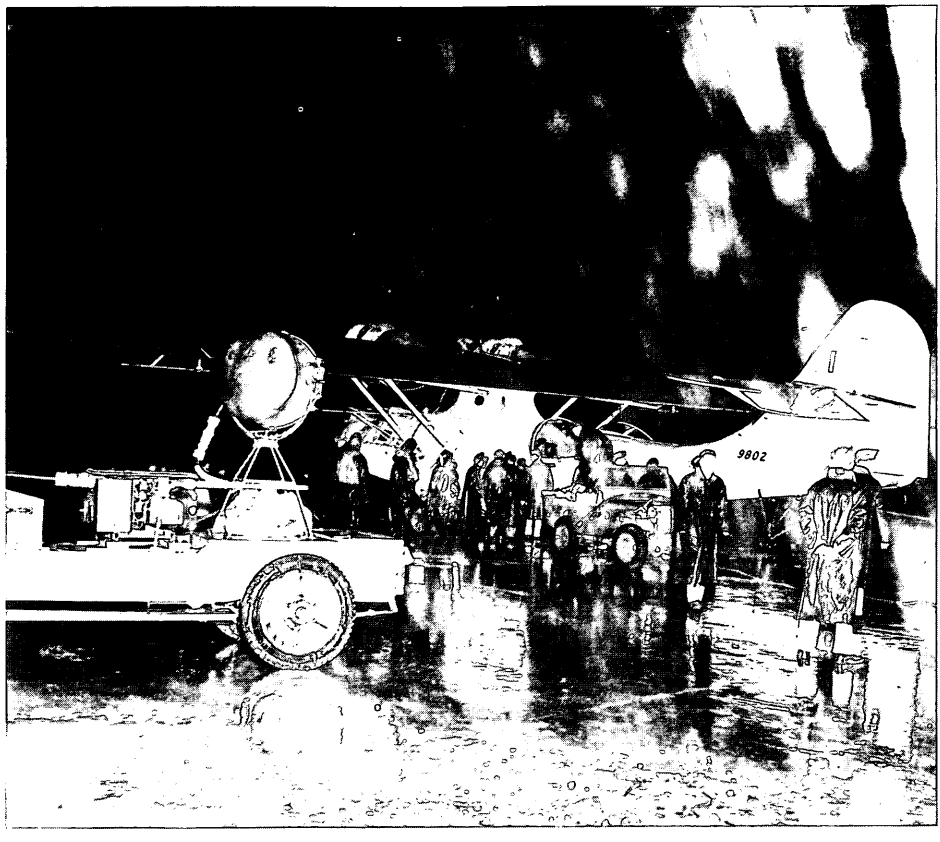


U-517 plunges to safety on 29 September 1942, as Flying Officer M.J. Belanger and crew of 113 (BR) Squadron make an attack run in their Hudson. The Gaspé coast is clearly visible in the background. (PMR 83-26)

Flying Officer M.J. Belanger, second from right, and his crew being debriefed by a squadron intelligence officer. Belanger's three attacks in four days on U-517 in September 1942 were spoiled by the lack of effective shallow-set depth charges. (PL 12628)



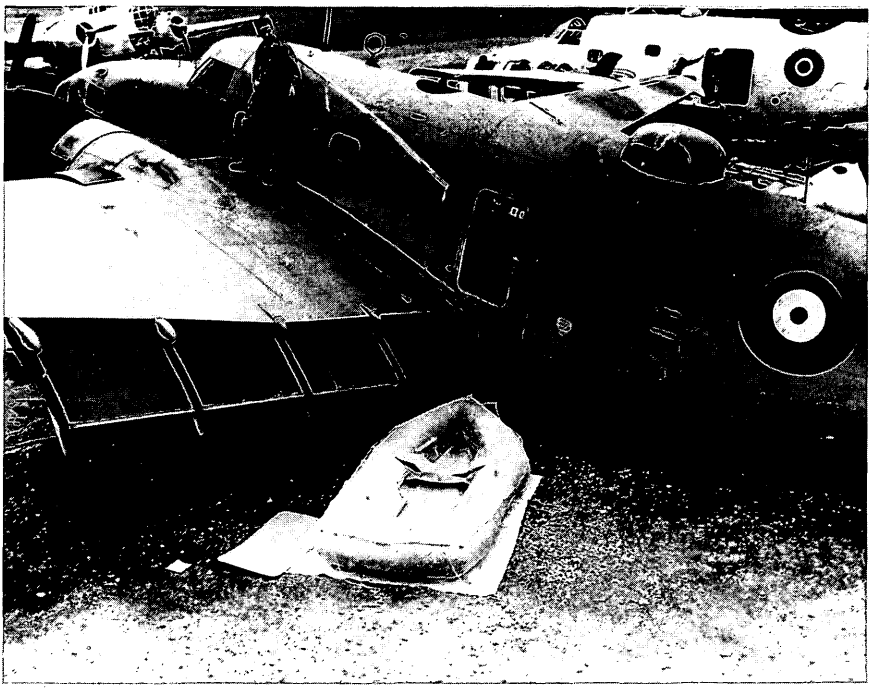
A 145 (BR) Squadron Hudson Mk I on 1 October 1942, its new camouflage scheme so recently – and quickly – applied that even the tires are coated. (PL 117987)



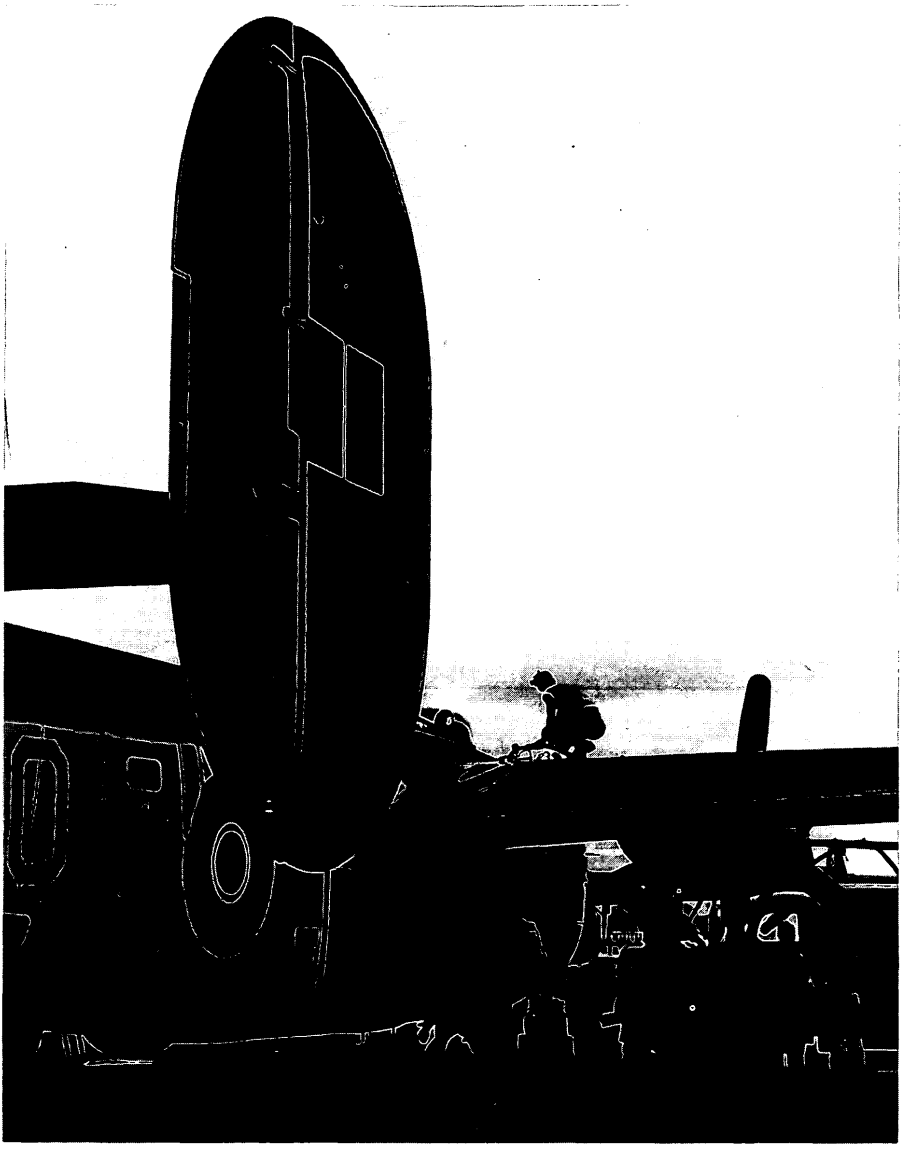
Beaching a Canso, in this instance on the west coast in November 1943. (PL 21928)

Operations plot, Eastern Air Command Headquarters, Halifax, 9 January 1943. (PL 14623)

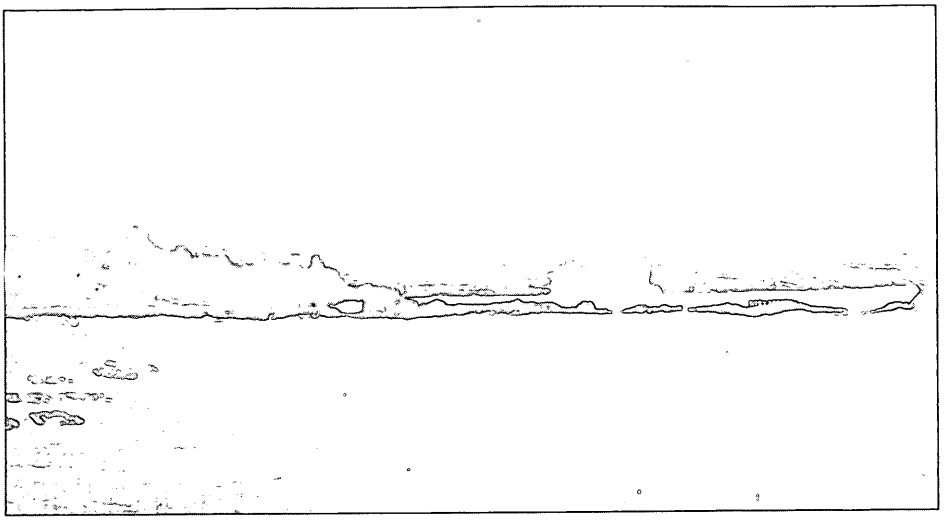
Wing Commander C.L. Annis as commander of 10 (BR) Squadron, with one of the 'North Atlantic Squadron's' new Liberators behind him. Spring 1943. (PL 21786)



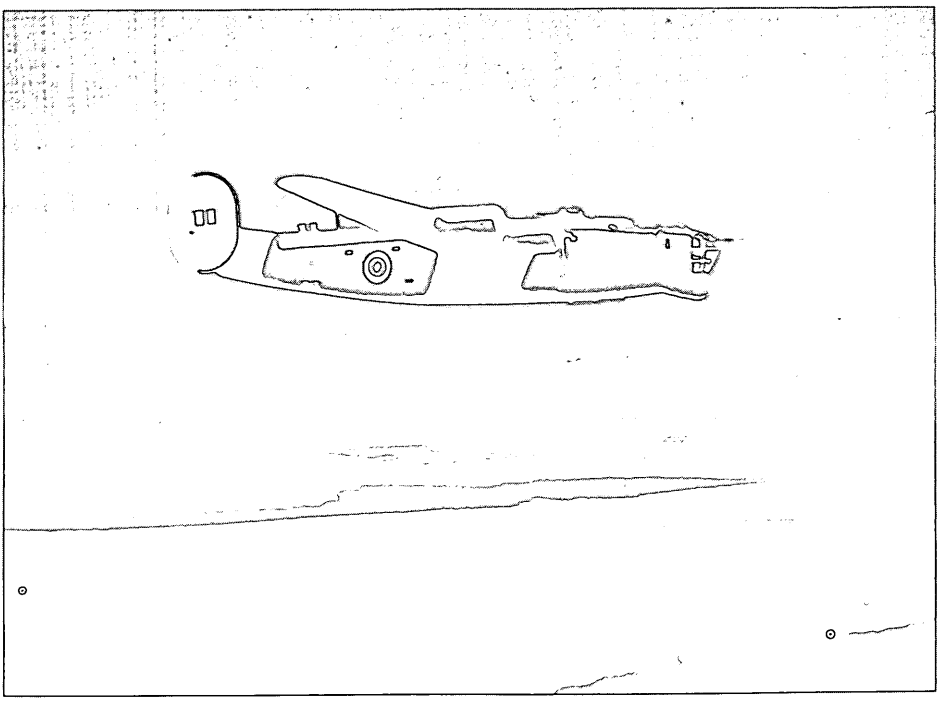
A must for over-ocean operations: the life raft of a Lockheed Ventura, demonstrated at Sydney in August 1943. In the background is a Digby of 161 (BR) Squadron; to the right a Hudson Mk I is being stripped of its useable parts. (RE 69-1562)



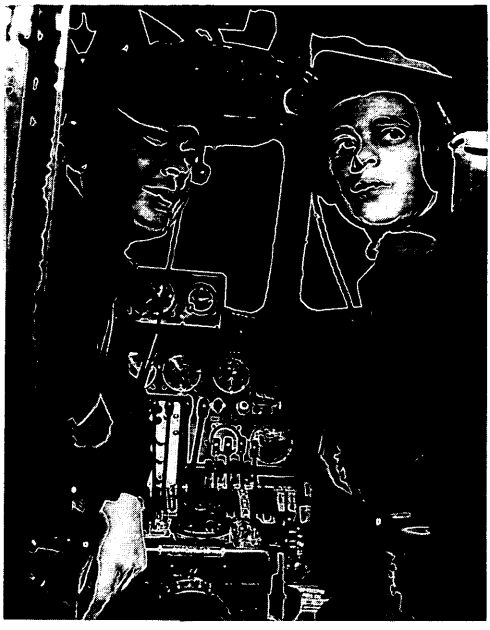
Refuelling a 10 (BR) Squadron Liberator at Gander in the summer of 1943. This particular aircraft has had most of its secondary armament removed in order to conserve weight and thereby increase range. (PL 21169)



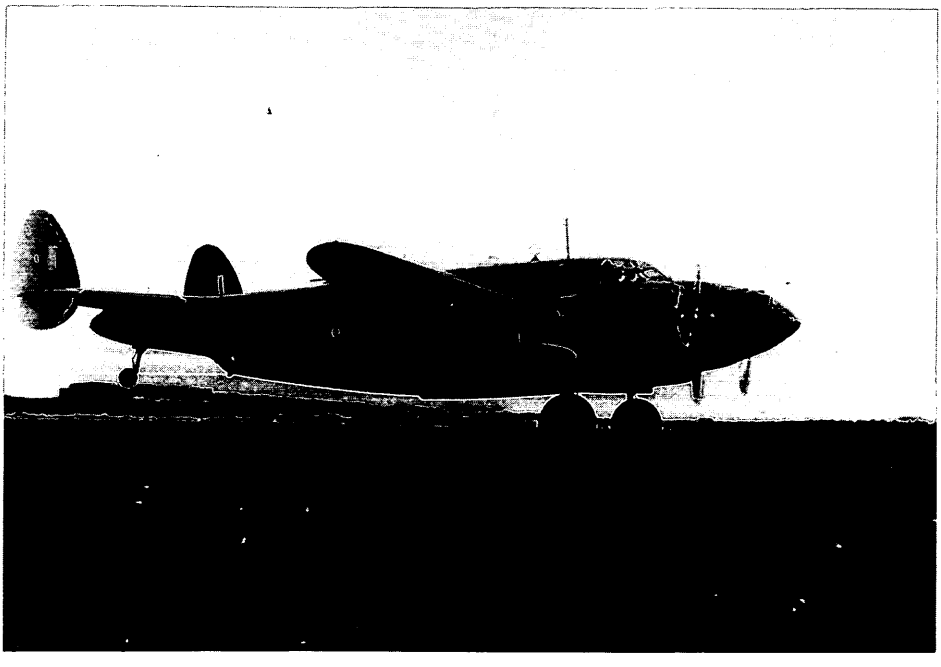
One that got away. A U-boat of Group Leuthen, its guns still trained on the aircraft, as seen from Flight Lieutenant R.R. Inghams's Liberator on 23 September 1943 during the battle for convoys ONS 18/ON 202. (RE 64-1034)



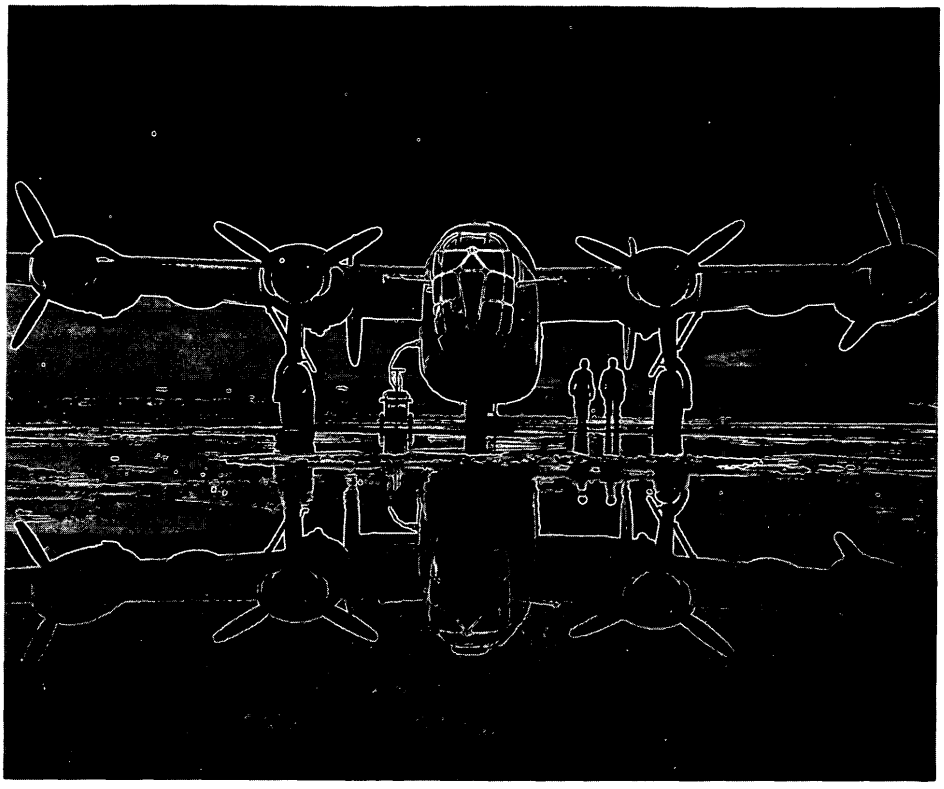
Liberator P of 10 (BR) Squadron over the bleak Newfoundland landscape in the spring of 1943. The bulge under the aircraft's nose housed its 'Dumbo' radar set. (PL 36938)



Flying Officer W. Howes and Flight Sergeant A.J. Marion of 10 (BR) Squadron at the controls of a Liberator, 1 August 1943. (PL 21783)

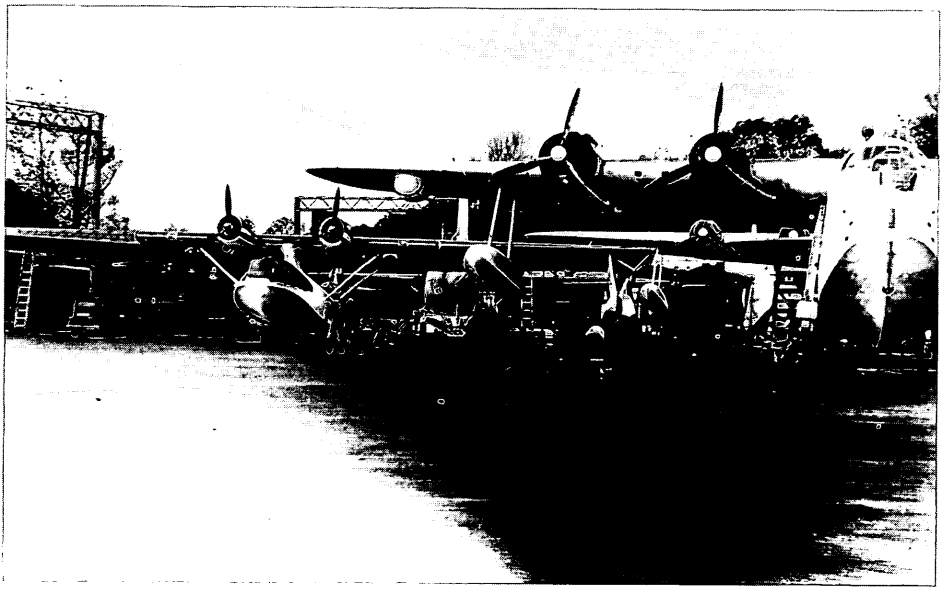


A Lockheed Ventura of 145 (BR) Squadron, still in its United States Navy colour scheme, taking off from Torbay, Nfld, September 1943. (PA 141394)

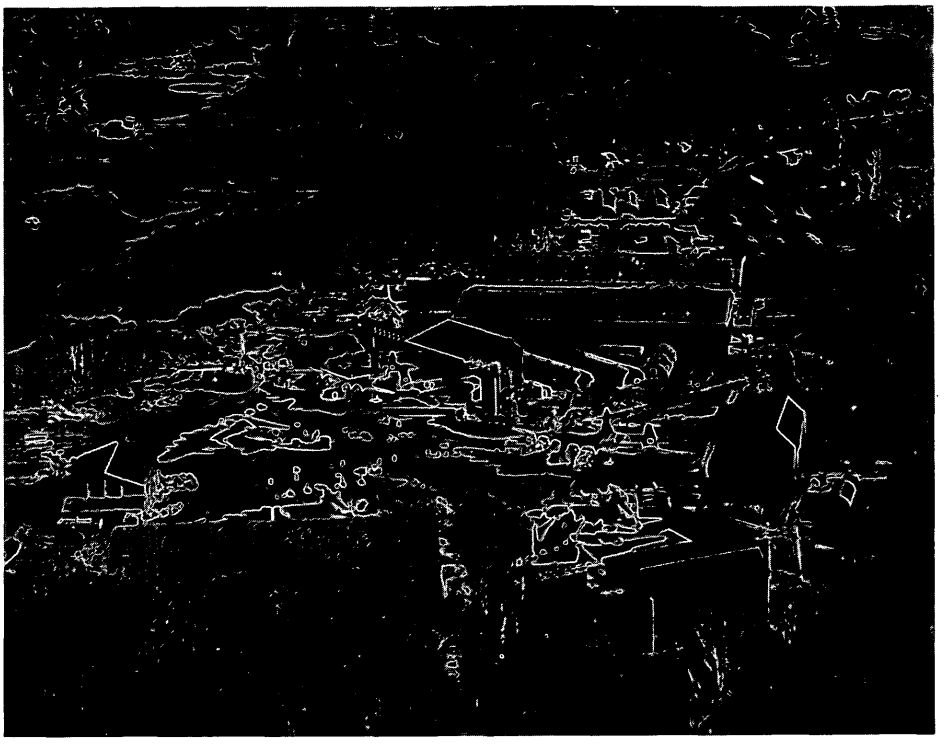


A 10 (BR) Squadron Liberator at Gander, during the winter of 1943–4. (WRF 979)

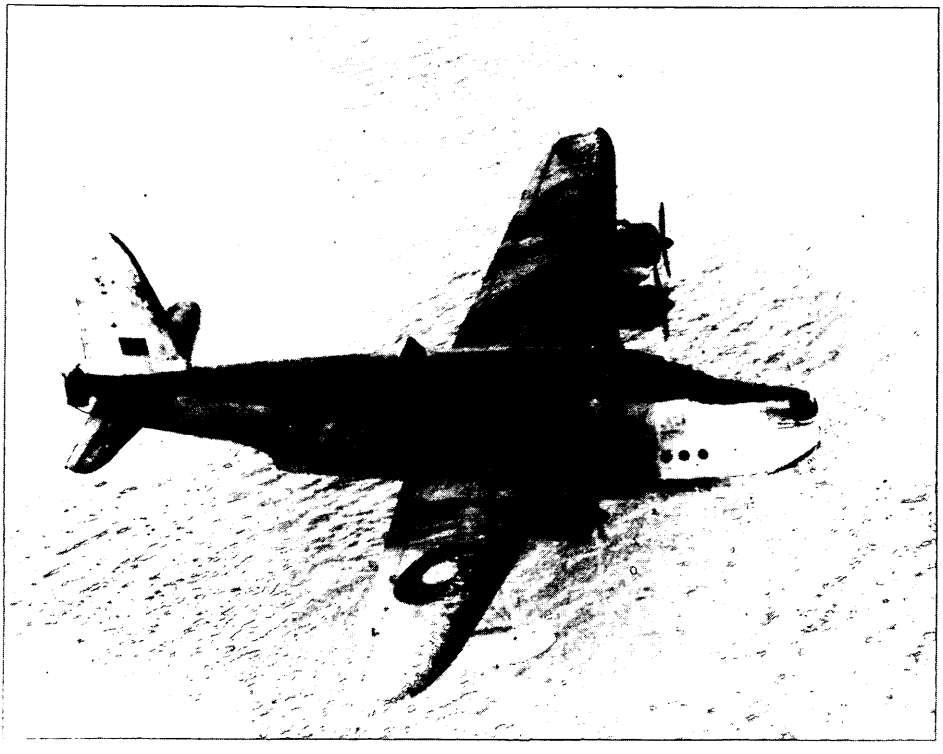
Night operations at Gander, 11 November 1943. Just visible to the right of centre is a row of 10 (BR) Liberators. (PL 21727)



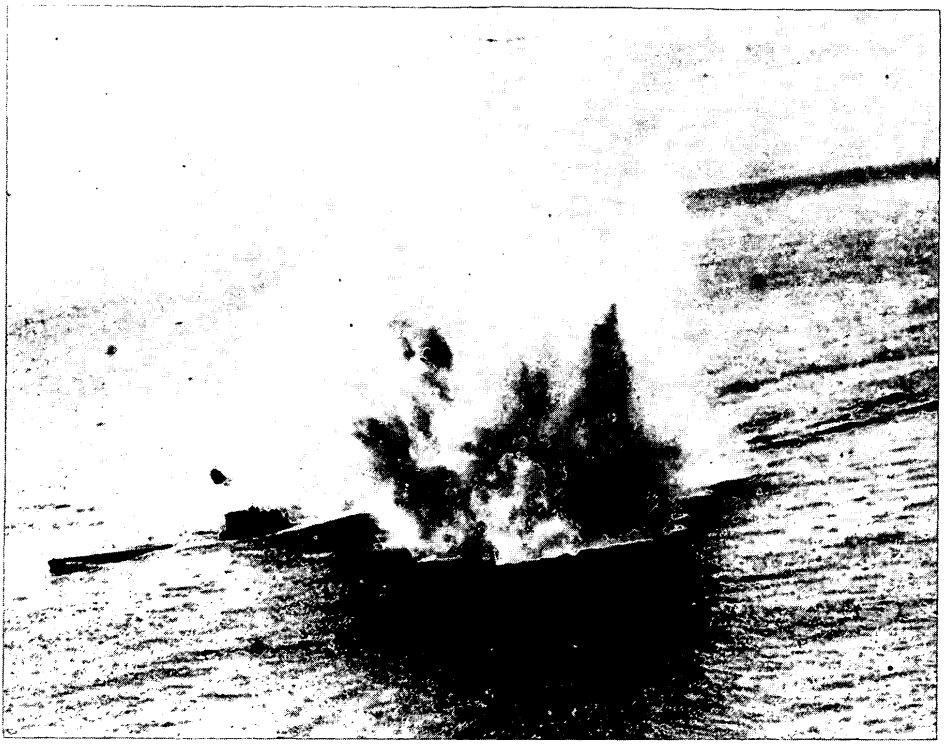
The two flying boats which saw the RCAF through the war at sea: a Catalina of an unidentified RAF unit alongside the larger RCAF Sunderlands of 422 and 423 Squadrons on the ramp at Castle Archdale, Northern Ireland, July 1942. (PL 41166)



Castle Archdale, Northern Ireland, the picturesque home station of the RCAF's two Sunderland-equipped Coastal Command flying-boat squadrons. (PMR 75-585)

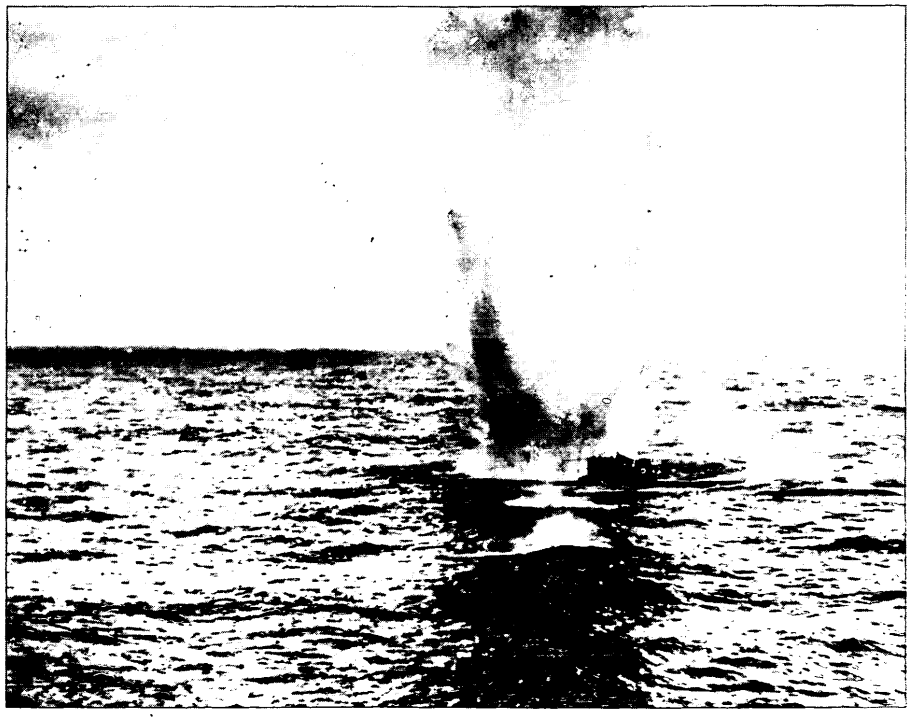


A well-weathered Sunderland of 422 Squadron, RCAF, April 1943. (PL 15752)

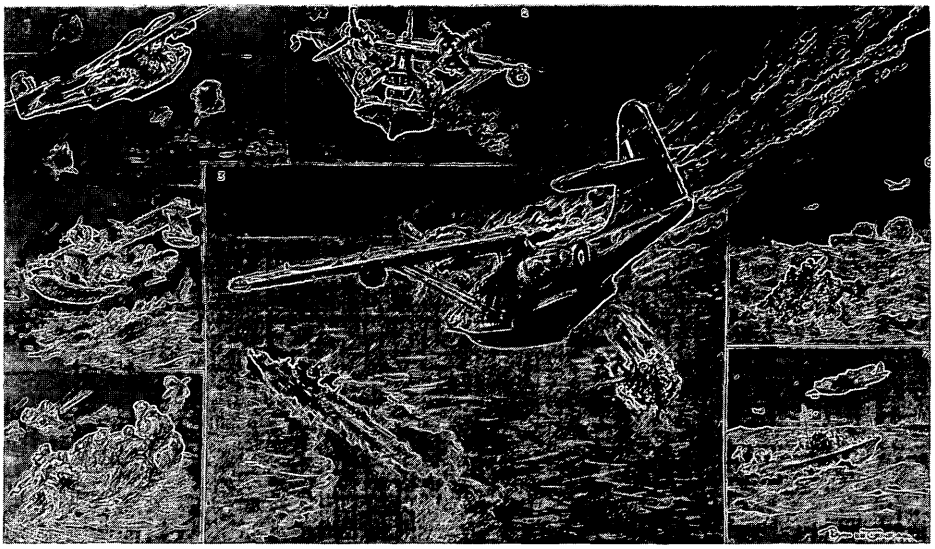


U-625 in its last moments, under attack by Sunderland 'U' of 422 Squadron, 10 March 1944. (RE 68-587)

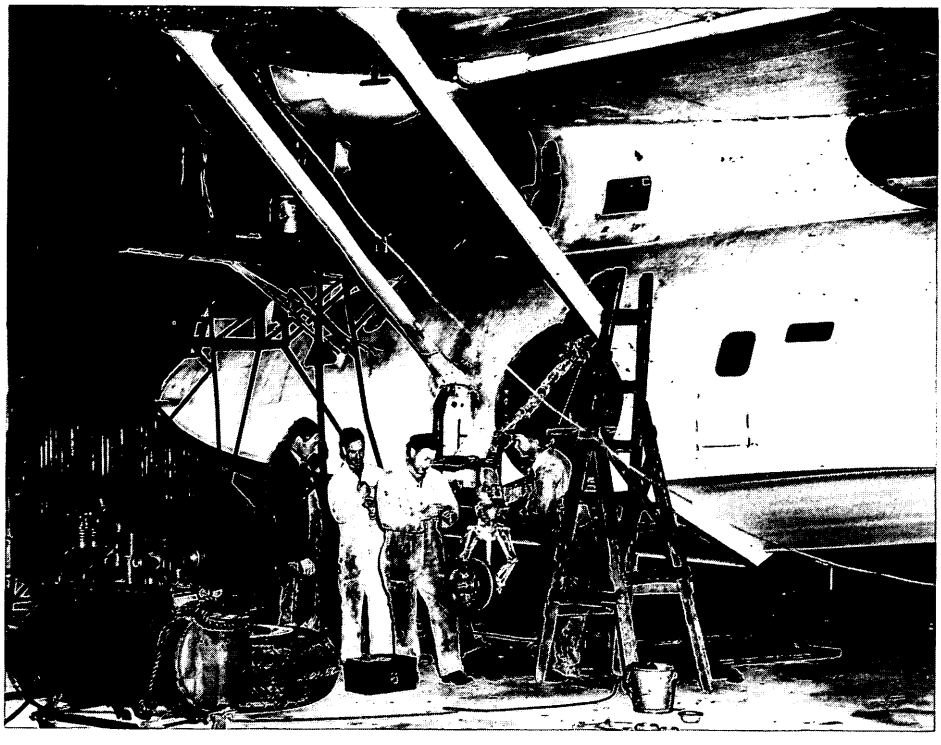
A 162 (BR) Squadron Canso 'A' at Reykjavik, Iceland, 25 October 1944. (PL 33838)



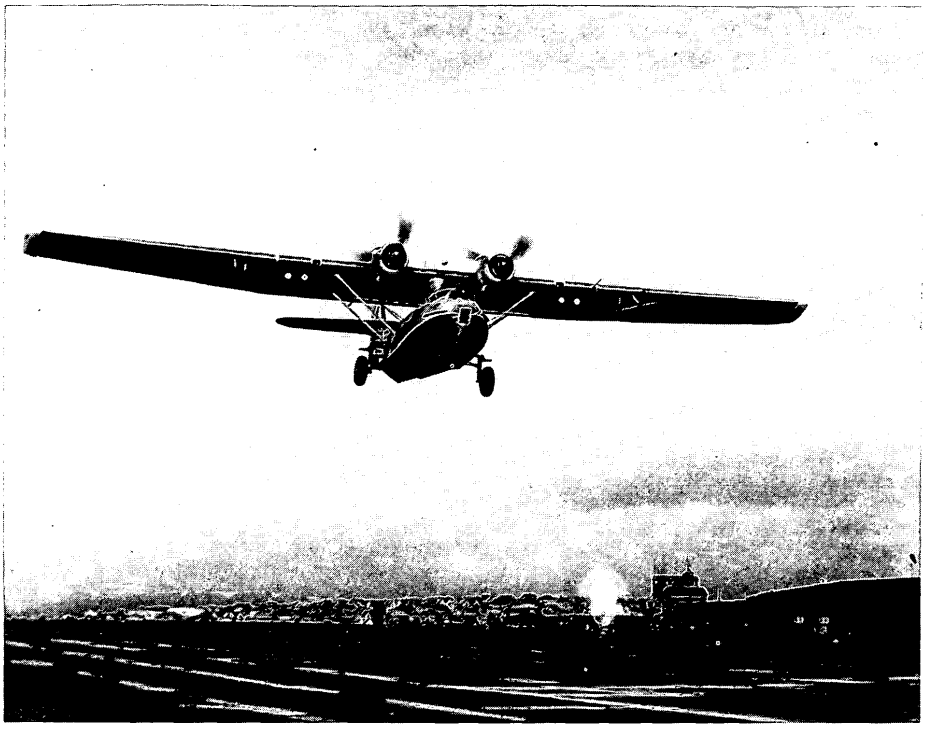
The destruction of U-342 by Flying Officer T.C. Cooke of 162 (BR) Squadron on 17 April 1944. The plume of the first depth charge has reached its apex, the dome of the second has just begun to rise, while the entry splash from the third charge in visible in the foreground. (PL 25259)



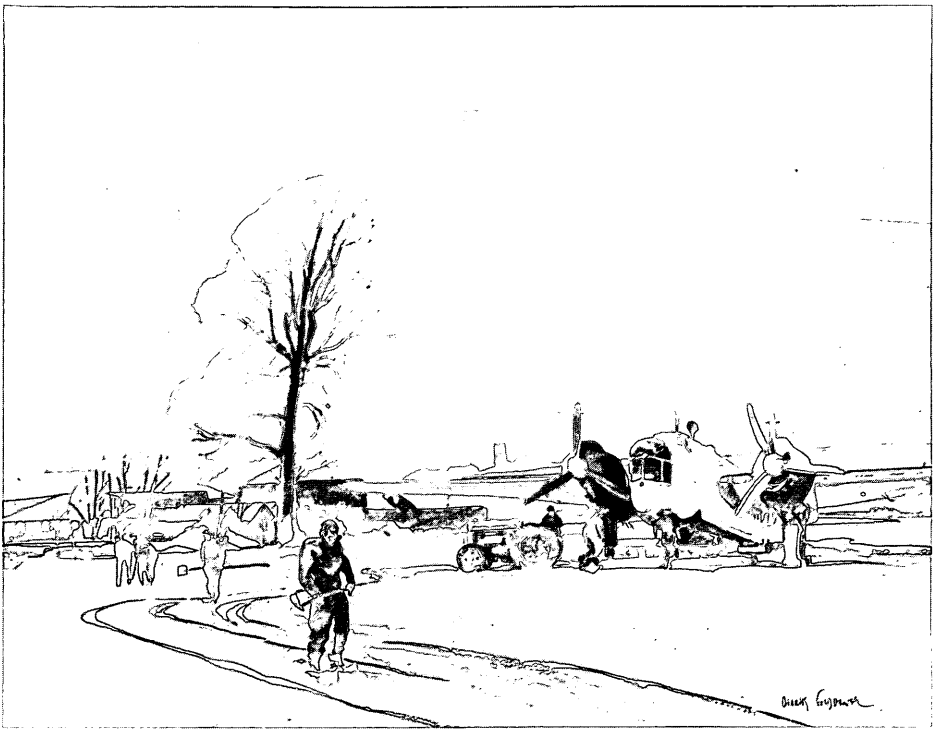
A somewhat fanciful rendering of Flight Lieutenant D.E. Hornell's VC action by the British war artist, de Grineau. The Canso's engine did not fall from the aircraft until the attacking pass was completed. (PL 47810)



A Canso 'A' of 162 (BR) Squadron undergoes a major overhaul by ground crews at Reykjavik, Iceland, September 1944. (PL 117246)

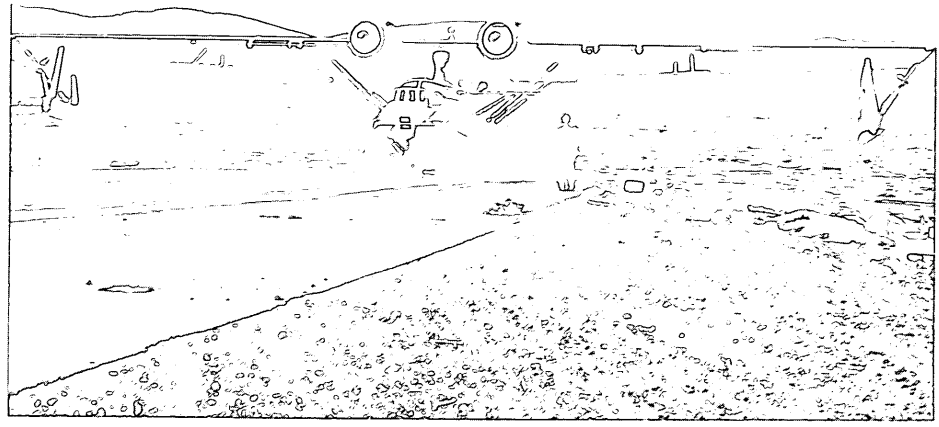


A 162 (BR) Squadron Canso clears the runway at Camp Maple Leaf, the RCAF establishment at Reykjavik, Iceland, in October 1944. (PL 33839)

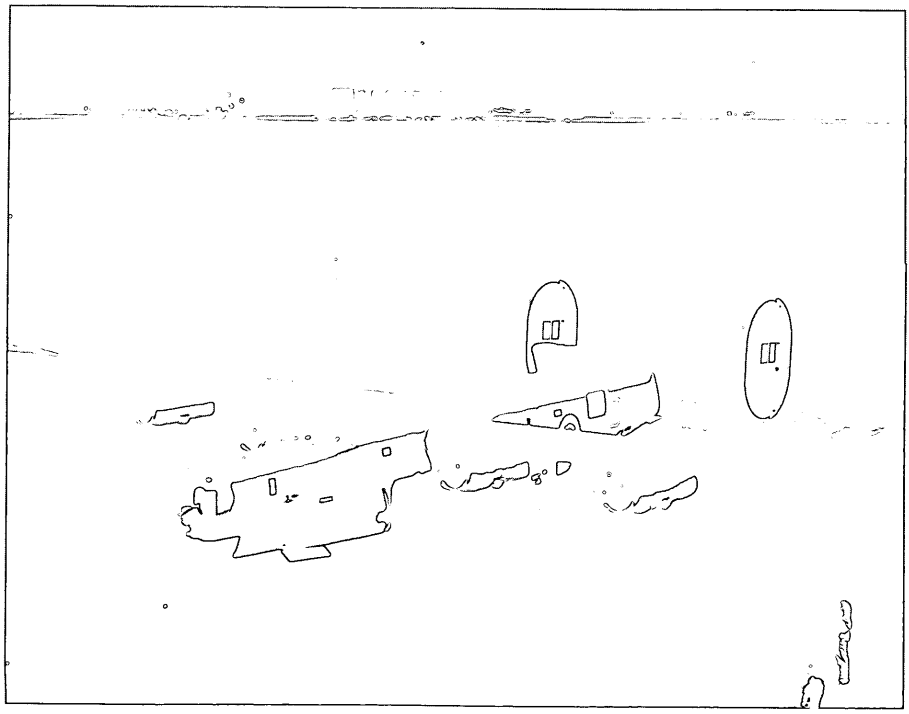


An artist's impression of a 407 Squadron Wellington in the snow at Chivenor, England, January 1945. (PL 47368)

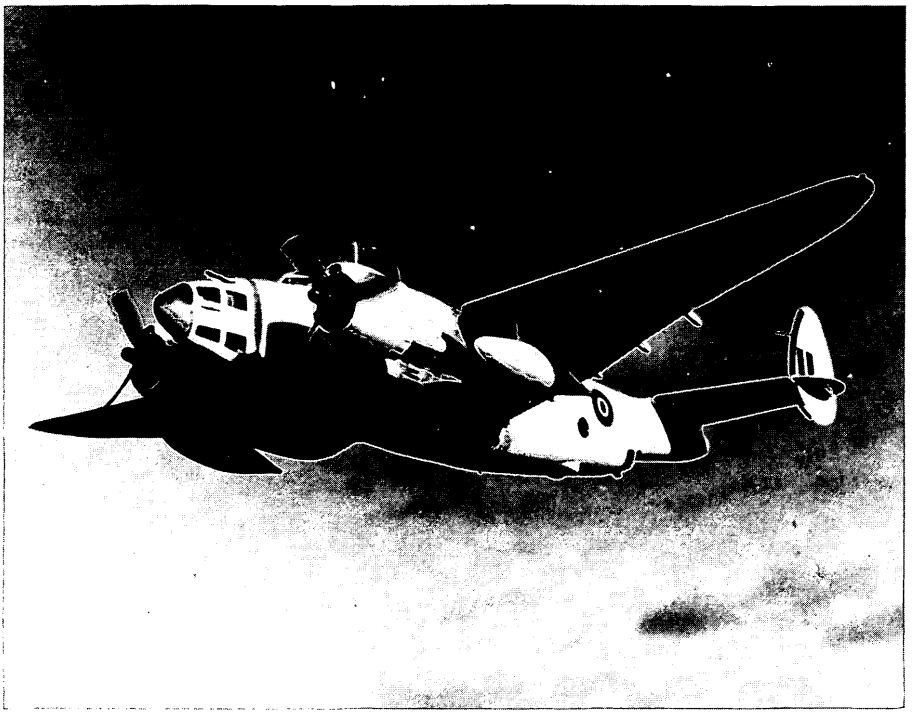
Four Liberators of 10 (BR) Squadron were lost when this fire raged through a hangar at Gander in June 1944. (PA 145400)



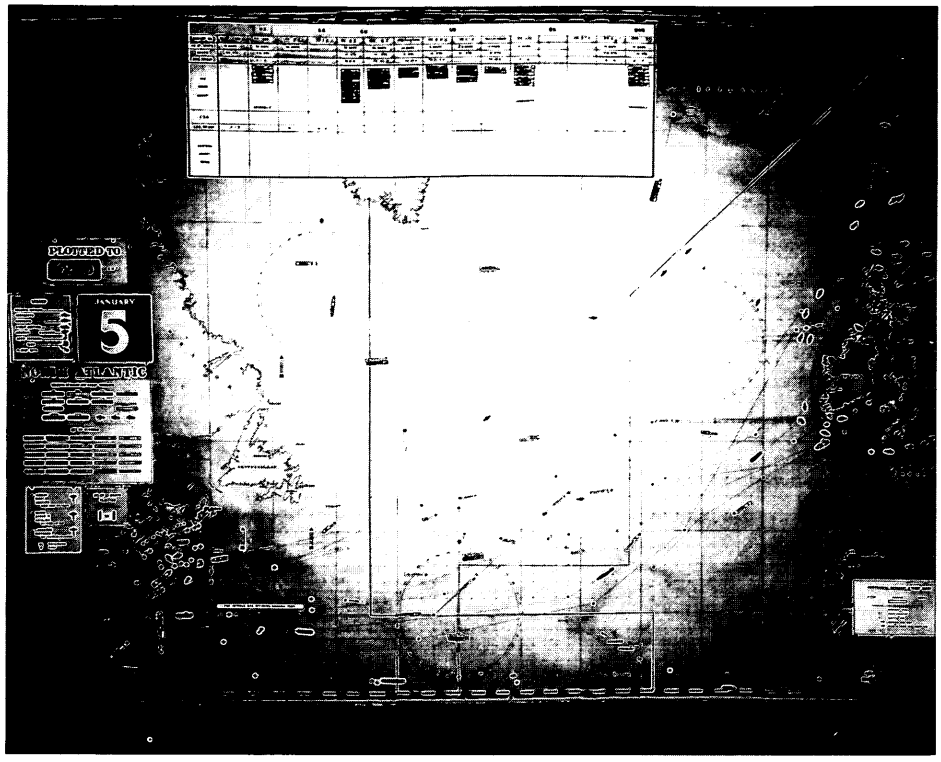
A 161 (BR) Squadron Canso 'A' arrives at Gaspé on 9 May 1944, in response to the renewed German campaign in Canadian waters. (RE 64-1638)



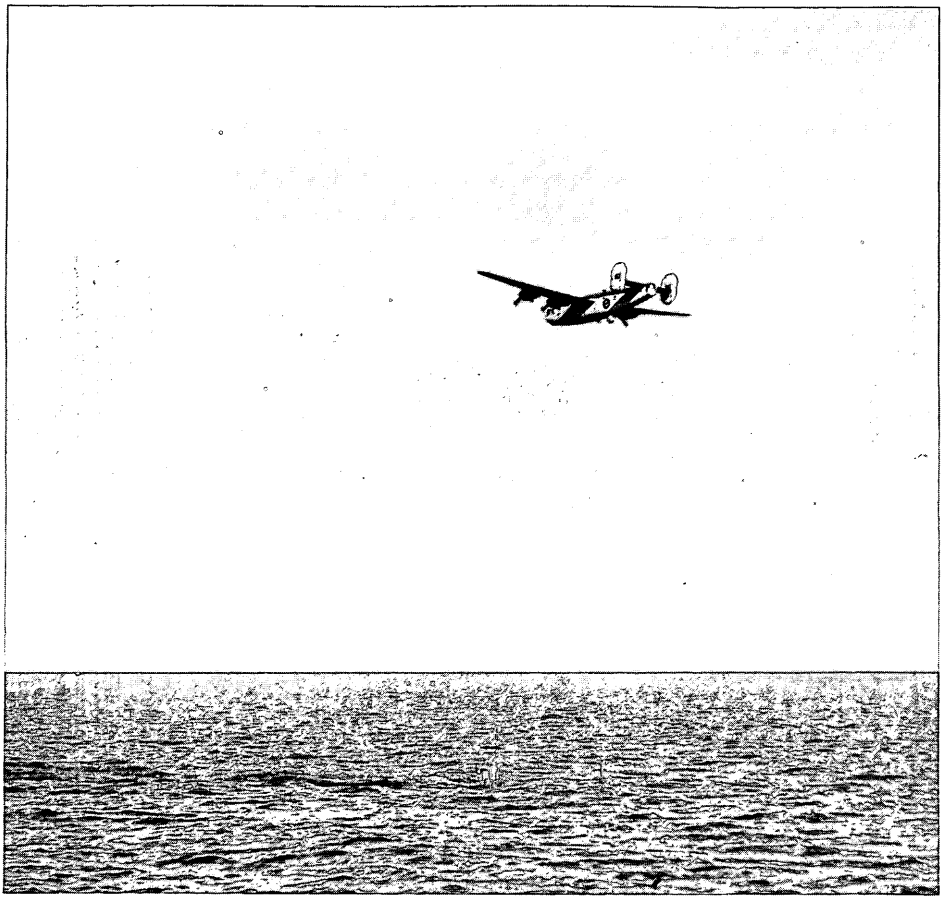
In late 1944 a second Eastern Air Command squadron, No 11 (BR), was equipped with Liberators, one of which is seen here arriving at Yarmouth on 8 September. (RE 64-1563)



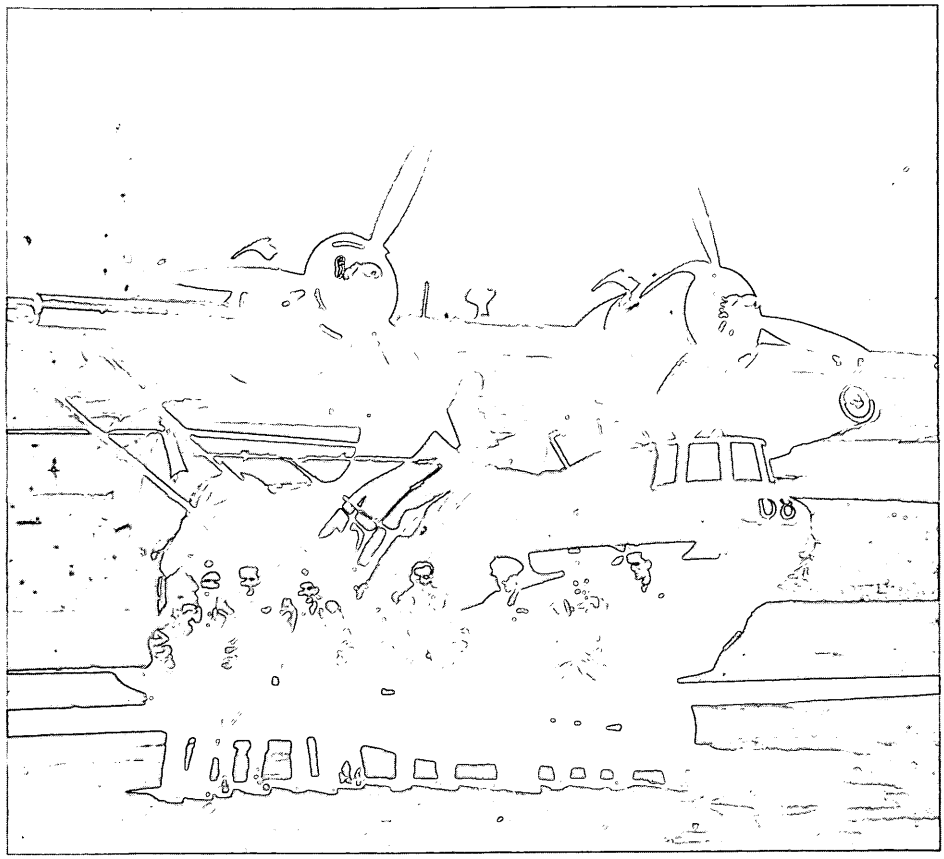
The Lockheed Ventura was a direct descendant of the Hudson, which it closely resembled, although its performance was substantially better. The Ventura could transit to its patrol area at more than 300 miles per hour, and could carry nearly twice the bomb load of a Hudson. (PL 24711)



The Royal Canadian Navy's plot of the North Atlantic for 5 January 1945, the day after U-1232 sank two ships off Egg Island. The arcs of 'Otter' areas off Nova Scotia show clearly, as does the concentration of German efforts off the United Kingdom. (RE 84-1205)



A Liberator of 11 (BR) Squadron practising its radar operators on the dummy schnorkel of the British submarine *Unseen* in the Bay of Fundy, March 1945. (PA 141384)



A Canso 'A' at Dartmouth in June 1945. Note the ASV radar antennae on the starboard side and an acoustic homing torpedo, 'Proctor,' under its port wing. (PMR 77-550)

Wing Commander R.R. Ingrams, left, Eastern Air Command staff operations officer, and Wing Commander D.F. Manders and Squadron Leader C.A. Robinson, both radar officers, inspecting U-889's schnorkel shortly after her surrender. The square-patterned rubber coating of the schnorkel head was intended to absorb radar waves, while the basket-shaped search receiver on the top could detect radar transmissions of 8–12 cm, a range that included the 10 cm sets of RCAF Liberators. (PL 36520)

Introduction

The North Atlantic sea lanes were Britain's lifeline throughout the Second World War, important to the Soviet Union's survival and subsequent successes on the Eastern Front and the prosecution of the war in the Mediterranean, and vital to the successful liberation of northwest Europe. Air cover was essential for the protection of Allied shipping against submarine attacks, and the RCAF contributed heavily to that task, since Canada's (and Newfoundland's) geographic proximity to the key areas of the northwest Atlantic placed it in the forefront of the battle.

Both the technology and tactics in the fight against the U-boats changed repeatedly and rapidly. As has already been noted in this book, the number of modern aircraft available to the RCAF's Eastern Air Command became more than adequate in 1944 and 1945. Until then, however, the Canadians fought at a grave disadvantage. Challenged by some of the worst flying weather in the world, plagued by fog and ice, they coaxed their under-powered, poorly equipped machines to exceed all normal limits of performance, knowing too well that the prevailing westerly winds would often make their return flights the most hazardous part of each mission. Dependent upon reluctant British and American sources for most of their aircraft and much of their equipment, the Canadians were frequently many months behind in acquiring 'state-of-the-art' technical devices that might give them a tactical edge over the enemy. Command and control in the relatively undeveloped conditions which prevailed in Newfoundland and along much of the east coast – particularly between Halifax and St John's – presented major difficulties. Inevitably, Canadian results often failed to match those of the RAF's Coastal Command, the model they tried to emulate.

Canadian airmen did enjoy certain advantages through their close ties with Coastal Command, at that time certainly the most innovative and successful maritime air force in the world. But they did not derive as much benefit as they might have done, largely because the senior officers of Eastern Air Command were overly parochial in outlook and too often failed to get their priorities right, while Air Force Headquarters in Ottawa permitted them too much leeway. Eastern Air Command was slow to adopt new refinements of Coastal Command's battle-tested tactics and, as a result, squandered scarce resources on much less effective methods. Poor tactics sometimes resulted in missed

sightings, and certainly prevented the destruction of several U-boats, notably during the German offensive of 1942 in the Gulf of St Lawrence.

There was also a problem with inter-service rivalry. The RCAF was most reluctant to accept the fundamental principle of British anti-submarine practice – that air forces should operate under the appropriate naval direction. Even when the Royal Canadian Navy came under the authority of an American admiral, based at Argentia, Nfld, in the fall of 1941, the RCAF fiercely maintained its independent stance. Eventually, early in 1943, the RCAF helped the RCN clinch its bid for control of the northwest Atlantic by agreeing that the Canadian admiral at Halifax should exercise operational direction of Eastern Air Command, but the anti-submarine forces of the two Canadian services were never as closely integrated as their British counterparts.

However much these shortcomings reduced the effectiveness of Eastern Air Command's operation, the RCAF's record in the Battle of the Atlantic was one of substantial achievement. Incapable of doing more than patrol the approaches to Halifax and Sydney with obsolete aircraft carrying totally inadequate armament at the outbreak of war, its aircraft were effectively striking at the enemy in mid-ocean by the latter part of 1943. Eastern Air Command squadrons destroyed six submarines between July 1942 – their first success – and October 1943. Thereafter, U-boats became virtually immune to air attack by running submerged during the hours of daylight. The RCAF did not get the centimetric radar and Leigh Light technology which made night attacks practicable until very late in the war.

Even when no submarines were being sunk, however, the importance of air escorts cannot be too strongly emphasized. While submerged, the U-boats' speeds were so slow that they found it difficult to get into position for attacks. Their response was to introduce 'wolf pack' tactics, in which teams of U-boats endeavoured to intercept convoys under circumstances which enabled them to launch co-ordinated night attacks, and there were times when that approach enjoyed success. Nevertheless, the success of air escorts must be measured as much by the number of merchantmen not sunk as the number of U-boats that were, and the ratio between ships sunk and submarines destroyed eventually proved too hard on the enemy. The presence of even a single aircraft with a convoy was enough to frustrate the intentions of a large wolf pack. Slowed by the necessity to move submerged, the U-boats were often unable to achieve good tactical positions.

Once the wolf packs were defeated, the strategic and tactical difficulties posed by improved U-boats (fitted with *schnorkel* tubes which enabled them to 'breathe' underwater), lurking in waters where SONAR detection was inhibited by temperature and salinity gradients, created challenges remarkably similar to those faced by postwar anti-submarine forces. No one found a solution in the last eighteen months of the Second World War, but efforts to solve the problem were instructive. The evidence about British decryption of U-boat signal traffic shows the important part it played in combatting the threat. This is a subject of absorbing interest, about which new information continues to appear from the study of previously closed wartime files. Enough is now known to confirm that

Canadian airmen used this intelligence to advantage. Because of problems inherent in the combined operations of naval and air forces for which there was no joint training, however, the RCAF was unable to carry many of its efforts through to a satisfactory conclusion.

Eastern Air Command's effort was only part of the RCAF contribution to the Battle of the Atlantic. Under the BCATP agreements, six RCAF squadrons formed in Coastal Command, and sank, or shared in the destruction of, nine U-boats in the eastern Atlantic. Large numbers of Canadian aircrew also served in RAF squadrons of Coastal Command and participated in many of its victories; during the last two years of the war, experienced crews from the Home War Establishment reinforced RCAF and RAF units in Coastal Command. Meanwhile Eastern Air Command's 162 Squadron operated from Iceland under British control and, in a three-month period, sank five U-boats, shared in the destruction of a sixth, and saw the gallantry of one of its pilots rewarded with a posthumous Victoria Cross.

12
The Beginnings of Anti-Submarine Warfare

Prior to the outbreak of war, neither the British nor the Canadians (who relied on British appreciations) anticipated the extent to which submarines would threaten the Atlantic shipping lifeline or the decisive part that aircraft would play in countering the U-boat. These developments should not have come as a surprise, however, given the precedents of the First World War. The U-boat offensive against merchant shipping in 1917 had nearly brought Britain to her knees, but the Royal Navy successfully met that challenge by sailing merchantmen in convoys, escorted in Home Waters by shore-based aircraft. Canada, too, had had first-hand experience of this new form of maritime warfare. When U-boats came to North American waters in 1918 the Canadian government had used United States Navy air units loaned to the short-lived Royal Canadian Naval Air Service to carry out anti-submarine patrols off Halifax and Sydney.[1]

Although during the First World War anti-submarine bombs were not very effective, even unarmed aircraft 'rendered convoys virtually immune from attack'[2] by severely limiting the mobility of U-boats. Capable of a sustained underwater speed of only a few knots, submarines could not follow the slowest convoy, let alone get into position for an attack, unless the convoy blundered on to them; U-boats therefore operated mostly on the surface where their diesel engines could deliver speeds of up to eighteen knots while the batteries for the electrical underwater propulsion motors were recharged.[3] The appearance of an aircraft was a signal to submerge immediately, for although the risk of destruction was slight, aircrew could summon anti-submarine vessels. In diving, the U-boat lost a chance to attack the ships it was pursuing, and might also be unable to regain contact with them.

During most of the Second World War, U-boats were able to submerge to much greater depths than their predecessors, but had little more underwater speed or endurance. The lessons of 1917-18 had been forgotten. The development of underwater detection equipment – ASDIC, as SONAR (Sound Navigation and Ranging) was originally known in the Commonwealth navies – seemed to promise mastery of the submarine threat without the need of air support. For its part, the RAF was determined to preserve its independence from the army and the navy by emphasizing the strategic bombing mission. Not until the summer of 1937 did the British government override Air Ministry objections to rule

that co-operation with the Royal Navy should be the principal task of Coastal Command, which had been organized in the preceding year. Even then, the Command's main role was to provide reconnaissance for the fleet against enemy surface warships.[4]

In terms of matériel, Coastal Command was ill-prepared for anti-submarine warfare in September 1939. A total of 298 aircraft were on strength, of which 171 were available for operations, a ratio governed by maintenance requirements which would generally hold true for maritime air forces throughout the war. Most, however, like the Avro Ansons that equipped ten of the eleven land-based general-reconnaissance squadrons and were capable of a maximum effective patrol radius of 200 miles, lacked the endurance necessary to give extended coverage to shipping to the west of the British Isles where ocean-going U-boats patrolled. Nor could the Ansons, whose bomb load at extreme range was only 200 lbs, carry the armament necessary to sink a U-boat. Only the American-built Lockheed Hudsons coming into service in a single general-reconnaissance squadron and the Short Sunderlands in three of the six flying-boat squadrons had adequate patrol ranges (approximately 350 and 550 miles, respectively) and weapon capacity (1000 and 2000 lbs). For many months, however, the latter capability was largely of academic interest, for the anti-submarine bombs available proved to be nearly useless. Attacks in September 1939 saw the bombs skip off the water and detonate in mid-air, fatally damaging the aircraft. Catching so elusive and small a target as a U-boat, moreover, required that a carpet, or a 'stick' of several regularly spaced bombs, should be dropped to produce a chain of explosions across the narrow and rapidly manoeuvring hull of the submarine. At the outbreak of war, only the Hudsons had suitable weapons-release mechanisms.[5]

Nevertheless, Coastal Command's aircraft quickly proved themselves to be valuable in the 'scarecrow' role. The unexpected success of aircraft in sighting U-boats in the North Sea, thus delaying their arrival in the operational areas by forcing them to run submerged, brought the Admiralty to direct, on 13 November 1939, that Coastal Command should now give anti-submarine warfare a priority equal to that of action against the enemy surface fleet.[6]

Much of the credit for the effectiveness of air operations was due to the excellent organization for the command and control of naval and maritime air forces that had been established in 1937-8. Coastal Command squadrons served under three (and later four) group headquarters, each of which was responsible for the waters off a section of the British coast. The order of battle was very flexible; squadrons or detachments could be freely moved from group to group according to operational requirements. Group boundaries closely followed those of the Royal Navy's home commands but, more importantly, the group headquarters were located with the corresponding naval headquarters to form three (later four) Area Combined Headquarters [ACHQ], where the staffs of the two services shared a common operations room. Air and naval commanders worked side by side with a common body of information, so that each service was able to respond rapidly to the requests of the other. At a higher level, Coastal Command Headquarters near London maintained close liaison with the

Admiralty, which functioned as an operational headquarters directing the general disposition of Britain's maritime forces. Naval officers assigned to Coastal Command ensured that air plans and operations were firmly rooted in the realities of sea warfare. When in April 1941 the Admiralty assumed operational control over Coastal Command, the agreement merely set down on paper a system already matured in practice: nearly all operations were controlled by the ACHQs where the air group commanders ordered flying programmes in accordance with the broad requirements laid down by the corresponding naval commanders-in-chief.[7]

Effective gathering and dissemination of intelligence was one of the great benefits of the intimate association of Coastal Command with the Admiralty. Much of the power of naval forces, submarines in particular, derives from the mobility that enables them to strike when and where they are not expected. Information concerning the enemy's whereabouts is a vital weapon, but only if it is processed and dispatched to operational ships and aircraft before the deployment of the opposing force changes significantly. During the last years of peace, the Admiralty laid the foundation for an effective intelligence organization by establishing an Operational Intelligence Centre [OIC], including a Submarine Tracking Room, through which data from all sources was channelled. Every scrap of information was therefore placed in the hands of the experts best qualified to evaluate it. The centre, moreover, was able to communicate directly with naval operational commands, ships at sea, and Coastal Command, thereby supplying the maritime forces with the best information available as quickly as possible.

Initially, in 1939-40, the OIC could provide relatively little, but the situation improved as the Admiralty expanded its network of stations for intercepting radio traffic, and for locating enemy warships by taking cross-bearings on their transmissions, a technique known as direction finding (DF). The Royal Canadian Navy helped by developing a system of DF stations in Canada and Newfoundland that was controlled by Naval Service Headquarters in Ottawa. Patterns and call signs that could be gleaned from German signals provided useful information, but the value of the intercepted messages increased greatly in May-June 1941 when the Government Code and Cypher School at Bletchley Park in England 'broke' the enemy naval code and supplied decryptions of current messages to the OIC.[8]

Organizational excellence, however, could not make good the material weakness of the British anti-submarine forces when, in the summer and fall of 1940, the U-boat campaign became deadly in its effectiveness. From September 1939 to May 1940 U-boats had sunk 200 merchant ships, but only thirteen had been in convoys, and the Germans had lost twenty-three boats, over half of the operational force that had been available in September 1939. This balance was shattered by the German conquest of France in May-June 1940. Immediately U-boats began to operate from ports on the Bay of Biscay, which offered great advantages in striking at the Atlantic sea lanes upon which Britain was now almost completely dependent. No longer did submarines have to make the 450-mile journey around the north of Scotland, slowed by the sweeps of Coastal

Command aircraft. As a result Admiral Karl Dönitz, the commander of Germany's U-boat arm (*Befehlshaber der Unterseeboote* or BdU), was able once again to maintain fifteen boats on operations in the Atlantic despite the fact that wartime construction would not be able to make good his losses until 1941.[9]

The Admiralty soon rerouted shipping onto a northern course towards Iceland, as far as possible from the Biscay ports. Yet it took time to develop naval and air operating facilities to cover the new route, while the shortage of aircraft and escorts became more serious because of the necessity of withdrawing forces from anti-submarine duty to guard against a German invasion. Only in October was the Royal Navy able to extend the anti-submarine escort of convoys from 17 degrees west to 19 degrees west, that is, from roughly 350 to about 425 miles off the coast of Northern Ireland. At that time Coastal Command's aircraft situation had not greatly improved since the outbreak of war. Four squadrons and parts of two others still flew Avro Ansons, while design and production problems, and the priority given to fighters to meet Hitler's air offensive, was delaying the provision of multi-engine types.[10]

Although air patrols forced back German attempts to close in on the new focal point of transatlantic traffic off the North Channel between Northern Ireland and Scotland, the U-boats scored stunning successes from June to October 1940. During these months, submarines sank 217 ships, while losing only six boats to British action. Most alarmingly, seventy-three of the vessels were sunk in escorted convoys, the majority between August and October when Dönitz originated the first 'wolf pack' attacks. Previously, individual submarines had usually chased unescorted ships and struck in daylight. German submarine headquarters now ordered several boats to form a 'patrol line' across the likely convoy course. The U-boat that made contact with the ships (usually in daylight) would shadow them at a distance, beyond the visual range of the escorts. With the assistance of BdU it would then 'home in' the rest of the pack. Once the submarines had concentrated, they would attack simultaneously at night and on the surface. The British defences were helpless: Coastal Command's aircraft were blind at night, ASDIC could not normally detect surfaced submarines whose low silhouettes made them virtually invisible in the darkness, and the surface speed of the boats enabled them to outrun many of the escorts.[11] But had there been long-range air cover over the convoy by daylight, then the U-boats might well have been forced to submerge, either failing to make contact – in the case of the original 'spotter' – or being unable to concentrate in time.

The disasters in the summer and fall of 1940 brought the British government to give first priority to the expansion and improvement of the anti-submarine forces. On one point the Admiralty was adamant: greatly increased long-range air support was essential. In November 1940 Coastal Command had had fewer than five squadrons of long-range aircraft; by June 1941, despite the deployment of maritime aircraft to other theatres, there were nine long-range squadrons in the United Kingdom groups. The development of air and naval bases in Northern Ireland and Iceland permitted a much more effective deployment of the strengthened forces. In April 1941 the Royal Navy extended anti-submarine escort to 35 degrees west longitude and in that same month Coastal Command

began to operate a squadron of Sunderlands and a detachment of Hudsons from Iceland.[12]

Tactics were also developed to counter the wolf packs. The large number of convoys attacked at night after air cover was supplied the preceding day demonstrated that the existing policy of providing as many convoys as possible with at least a few hours' escort by a single aircraft was failing to drive off shadowing submarines. If the shadowers could be suppressed, however, the whole pack could be thrown off the scent. Coastal Command arrived at a satisfactory solution by introducing 'offensive tactics' in April-May 1941. Each day several aircraft flew out to maximum range over the convoy routes. Studies of past operations suggested that aircraft with this roving commission were three times as likely to find U-boats as aircraft closely circling a particular convoy. Nevertheless, constant escort remained essential for convoys that were being shadowed, especially in the hours before sunset when the U-boats were closing to attack positions. Fortunately, pack operations required heavy radio traffic that enabled the Admiralty to judge which convoys were in danger. Coastal Command was therefore able to withdraw support from convoys not at risk, and provide more thorough coverage for those that were.[13]

The strengthening of British anti-submarine forces and their offensive air tactics had telling results when the Germans renewed their assault in the northwestern approaches in 1941. Until late in 1940 the U-boats had concentrated east of 15 degrees, but in the new year did not venture much beyond 17 degrees, about 350 miles from the air bases in Northern Ireland, the range to which Coastal Command aircraft regularly patrolled. The squadrons that began to operate from Iceland in April helped to drive U-boats some 350 miles further out, into mid-ocean; and as the U-boats were forced away from the focal areas of shipping near the British Isles the Admiralty gained sea room in which to route convoys around the packs, whose positions could often be accurately plotted by intelligence. It was the increasing effectiveness of the defences in the northeastern Atlantic that twice brought the U-boats to hunt off Newfoundland in 1941.[14] The British responded to the first of these forays by calling for Canadian support: the creation of the Newfoundland Escort Force at St John's by the Royal Canadian Navy to provide anti-submarine escorts in the western Atlantic from the end of May 1941, and the expansion of Eastern Air Command's operations from Newfoundland.

Great Britain and her allies kept the U-boat menace in check during 1941, destroying thirty-one U-boats as compared to eighteen in the preceding year. Even though the strength of the operational U-boat fleet grew from twenty-two in February to eighty-six in December, the heaviest monthly shipping losses approached but never quite equalled those of the latter part of 1940. Nevertheless, German submarines sank 427 ships in 1941, only a dozen fewer than in 1940, and prospects for the future were uncertain, given the accelerating pace at which the U-boat fleet was expanding. Most particularly, the evasive routing that had saved many north Atlantic convoys from detection would not be so effective as increasing numbers of submarines were deployed on the shipping lanes, or if, as was to happen in 1942, the Germans gained the upper hand in the battle for naval intelligence.[15]

Experience in 1941 bore out the case made by the Admiralty and Coastal Command that airpower was now a vital component of trade defence. In June, for example, only six out of fifty-seven ships sunk by U-boats had been attacked within 350 miles of Coastal Command bases. Sinkings increased dramatically at greater ranges, where the existing aircraft were able to make only occasional patrols, and in mid-ocean, beyond the reach of air cover. Even a few hours' air support at extreme range, however, could help to throw off a wolf pack or blunt the severity of its attack. The requirement, as Coastal Command realized in the spring and summer of 1941, was to station long-range aircraft in Northern Ireland, Iceland, and Newfoundland, so that a convoy being shadowed or attacked could receive support throughout its entire passage. The American-built Consolidated B-24 Liberator bomber answered nicely; when the heavy self-sealing material was removed from the fuel tanks it could patrol to a radius of 700 miles and more. No 120 Squadron, RAF, with nine modified Liberators, began to fly from Nutt's Corner in Northern Ireland in September 1941.[16] Almost immediately, however, it appeared that the Air Ministry was prepared to let the squadron 'die out' by allocating replacement aircraft to transport and bomber operations. As will be seen, Coastal Command and the RCAF had to fight a long and difficult battle for additional Liberators.

Convoy support was only one way of defeating the U-boat. The success of the North Sea patrols of 1939-40 in locating enemy submarines in transit suggested another approach. Renewed coverage of the waters north and northeast of Scotland (the 'Northern Transit Area' as it was now known) during 1941 yielded meagre results because only a small number of newly commissioned boats used the route after completing their work-ups in the Baltic. More encouraging were frequent submarine sightings by air patrols over the Bay of Biscay that began in the summer of 1941, as the U-boats approached or left their operational bases on the French Atlantic coast.[17] In 1942, as the Atlantic packs formed up beyond the reach of all but the longest range shore-based aircraft, the bay offensive became Coastal Command's major commitment, along with a substantial effort in the Northern Transit Area.

However impressive Coastal Command's contribution had been in suppressing U-boats during the first two years of war, aircraft had been singularly unsuccessful in destroying them. To ensure the 'safe and timely arrival of shipping' was the primary mission of Britain's maritime forces, but it was also necessary to sink submarines so that the expanding U-boat fleet would not eventually overwhelm the defences by sheer weight of numbers. Certainly the driving ambition of every member of Coastal Command was to destroy and not merely harrass the enemy.

Most important was the development of an effective aerial anti-submarine weapon. The first big breakthrough was the supply of Mark VII, 450-lb naval depth charges to operational squadrons in July-August 1940. However, the weight and shape of these depth charges restricted their use to flying boats. The answer was the development of the new Mark VIII 250-lb depth charge, which was issued to squadrons in the spring of 1941. Kills still eluded Coastal Command, whose score by September 1941, despite some 245 attacks since the beginning of the war, stood at three sinkings shared with surface

escorts, one boat that had surrendered to aircraft, and a handful of boats damaged.[18]

Study of the problem in the summer of 1941 revealed that aircraft would have a good chance of inflicting serious damage only if they attacked the submarine while it was still surfaced, or, at the latest, within fifteen seconds of submergence; thereafter the unpredictable movements of the boat left little possibility of the explosives having any effect. Existing depth settings of 100-150 feet on aerial depth charges were obsolete. The ideal setting for destroying a surfaced submarine was twenty-five feet, but the naval detonators then in use could be set no shallower than fifty feet. One solution was to use stronger explosives. Most of Coastal Command's depth charges had been filled with Amatol, which included a high proportion of TNT and had about the same power. At the end of April 1942 squadrons began to receive charges filled with Torpex, which gave the charges 30-50 per cent more power than those filled with Amatol. By this time, an improved detonator, the Mark XIII, had been developed, but its minimum setting of thirty-four feet was still not shallow enough to deal with a fully surfaced submarine given the Torpex charge's lethal radius of nineteen feet. Additional refinements were required to counteract the tendency of the depth charge to plane across the water after impact and to prevent the formation of air bubbles that delayed the action of water pressure on the pistol. By July 1942 the Mark VIII depth charge had been further modified with the Mark XIII Star pistol, a break-away tail and concave nose spoiler; these improvements were also incorporated in a new Mark XI aerial depth charge that was also in production by July 1942. The weapons detonated at fifteen to twenty-five feet: at last Coastal Command had the means with which to sink submarines.[19]

Lethal attacks with shallow-set depth charges had to be swift, accurate, and heavy as a U-boat could dive within twenty-five seconds. To this end, Coastal Command Headquarters promulgated the first standard anti-submarine attack instructions in July 1941. These matured in a version revised for fully modified Mark VIII and Mark XI depth charges that appeared a year later. Aircraft were now to patrol at greater altitudes – 5000 feet in clear conditions, and close to the cloud ceiling otherwise. High-flying aircraft were more likely to make a sighting at long range, and to catch a boat unawares, for the lookout on the conning tower could comfortably scan the lower sky but had to strain his neck to sweep the upper altitudes. There was no advantage in flying above 5000 feet, as the unwieldy anti-submarine machines could not then descend to the attack level of fifty feet quickly enough to avoid alerting the enemy in ample time for them to dive. On making a sighting, the aircraft was to swoop in as swiftly as possible and drop all of its depth charges (with the exception of the largest types, like the Liberator, that could carry very heavy weapon loads) spaced at intervals of thirty-six feet (this spacing was later increased to one hundred feet when it became clear that most crews could not deliver a tightly packed 'stick' with sufficient accuracy).[20]

The realization that surprise was essential to successful air attacks made the need for effective camouflage obvious. The undersurfaces of many Coastal

Command aircraft had been matt black until trials in the summer of 1941 demonstrated that U-boat lookouts were unlikely to spot white-painted aircraft until they were 20 per cent closer than those with black paint.[21] When, in late 1941 and early 1942, Coastal Command's anti-submarine aircraft were painted white it was, in the words of one author, 'a tacit recognition of the advantages of a colour scheme gulls and other sea birds had adopted some millions of years earlier.'[22]

Camouflage was an ancient technique, but the notion of locating surfaced U-boats by electronic means was thoroughly modern. Shortly before the war, British research into radio direction finding, or 'radar' to use the later name, had produced airborne equipment that could detect ships. ASV (air-to-surface vessel) sets were first fitted in Coastal Command aircraft in early 1940, but their performance was so limited that they were of no use against the small targets presented by submarines. Night attacks by surfaced U-boats in the summer and fall of 1940 brought accelerated work on the ASV Mark II, which, like the original type, worked on a wavelength of 1.5 metres; by the end of June 1941 about half of Coastal Command's 272 principal anti-submarine aircraft carried the improved equipment. Hudsons were fitted with forward-looking aerial arrays only; larger aircraft also had arrays along the fuselage that covered the areas on either side. Great things were expected of the equipment both for night patrols and for surprising U-boats when daytime visibility was limited. Although operational experience showed that ASV Mark II could regularly locate surfaced boats at ranges of six miles and more, results were disappointing; only an insignificant number of contacts were initially made by ASV, and the human eye continued to be Coastal Command's principal search device. Most frequently, ASV registered false contacts on floating debris, whales, and icebergs; the equipment, moreover, was difficult to use and prone to failure without careful maintenance. At night it was impossible to home on a contact, because at ranges of a mile or less waves on the surface of the sea gave strong returns that masked the target.[23]

The solution to the night attack problem was the 'Leigh Light,' a twenty-four-inch aerial searchlight named for its inventor, Squadron Leader H. De V. Leigh, a staff officer at Coastal Command Headquarters. This lightweight equipment could produce a powerful beam for thirty seconds, long enough to illuminate a target during the last mile of approach. Although Leigh first produced the design in late 1940, bureaucratic inertia and competing proposals delayed installation of the device (initially in Vickers Wellington aircraft for operations in the Bay of Biscay) until the spring of 1942. When the Wellingtons began night patrols in early June the results quickly showed that ASV and the Leigh Light were a lethal combination, damaging two submarines and destroying another.[24]

Although a second victory for the Leigh Light would not come for another seven months, this achievement marked the beginning of a period when Coastal Command's improved training, tactics, and equipment came together to make shore-based aircraft the most effective U-boat killers. During the first six months of 1942 Coastal Command aircraft made eighty-two attacks but sank only two boats and shared a third victory with the Royal Navy. In July to December 1942,

299 attacks produced twenty-four kills (five in the Mediterranean, five in the Bay of Biscay, two in the Northern Transit Area, and twelve while supporting convoys in the Atlantic). Including victories by American aircraft and the RCAF's Eastern Air Command, shore-based aircraft sank thirty-four German and Italian submarines in the last half of 1942 as against thirty-one destroyed by ships.[25]

Coastal Command had revolutionized anti-submarine warfare from the spring of 1941 to the summer of 1942. It was during those months, and in no small part for that reason, that the U-boats came to Canadian waters. From a predictable routine of flying close escort for convoys, and making patrols in response to almost invariably erroneous reports of enemy activity, Eastern Air Command had suddenly to adapt to a new form of warfare, whose weapons and tactics changed rapidly, always in the direction of more sophisticated technology and more rigorous demands on groundcrew and aircrew alike. At the same time the command had to endure severe growing pains, struggling with fundamental problems of organization, matériel, and personnel (including the complex questions of co-ordination posed by the presence of American air forces in Newfoundland). The reader will recall from Chapter 10 that difficulties of rugged terrain and inhospitable weather presented the air force with major problems; Eastern Air Command had had to build from virtually nothing and with meagre resources in the shadow of the Canadian overseas war effort.

Eastern Air Command had received the first firm intelligence of a U-boat within extreme aircraft range of Newfoundland on 20 May 1941. The need to strengthen air operations from the island was obvious, but so too were the difficulties. The only operational maritime patrol aircraft in Newfoundland were fifteen Douglas Digbys of 10 (Bomber-Reconnaissance) Squadron based at Gander, with a maximum effective range of about 350 miles. In bad weather – something that was impossible to predict accurately more than twelve hours in advance – there was no alternate landing field. Canadian attempts to acquire a more suitable aircraft – the Consolidated PBY/Catalina flying boat which had an effective range of about 600 miles and no dependency on airfields – had failed because all evidence at the time pointed to a continued concentration of U-boats in the eastern Atlantic. As seen in Chapter 10, however, the German thrust towards Newfoundland persuaded the British to divert nine Catalinas to Eastern Air Command in late May. By early July personnel had been transferred from 5 (BR) Squadron to man the new aircraft and the first long-range RCAF squadron -116 (BR) – had come into existence at Dartmouth, NS.[26]

On 7 July Squadron Leader F.S. Carpenter flew the first Catalina into Botwood, near Gander, and three others soon followed. This four-boat detachment of 116 Squadron provided the only long-range capability over the northwest Atlantic and even this would have to be withdrawn with the onset of winter when ice-prone Botwood could no longer be used by flying boats. Eighteen US Navy PBYs (Catalinas) based at Argentia and the six Digbys of the US Army Air Forces' 21st Squadron at Gander continued to patrol the Atlantic but could not be counted upon to defend trade or attack German forces. The Americans, after all, were not at war. Their operations were not co-ordinated

with those of the RCAF and, lacking common codes and radio frequencies, the Americans and Canadians could not even talk to one another.[27]

The more numerous RCAF squadrons on the mainland were, of course, well beyond the range of U-boat operations in 1941, and by the time the first Catalinas arrived at Botwood this was also true of Newfoundland-based squadrons. The U-boat foray into the northwest Atlantic had been in search of soft spots in the shipping defences, but it had coincided with the first British intelligence penetration of the German naval Enigma code. The result was the warning of 20 May that U-boats were within range of Newfoundland-based aircraft and information accurate enough to route all convoys clear of danger. By the end of June Dönitz had pulled back all his boats in frustration. But the cipher breakthrough had by then set in motion a sequence of events which thrust upon the Canadians unexpectedly heavy responsibilities.[28]

The allocation of Canadian air and naval forces to ocean escort and long-range patrols did not come within the terms of either ABC-1 (the result of British-American staff talks between January and March 1941) or ABC-22, the joint Canadian-American plan for hemispheric defence. Canada's responsibilities in both cases had been for the local defence of Canadian territory and territorial waters. The creation of the RCN's Newfoundland Escort Force in May was a stopgap measure to provide ocean escort in the western Atlantic until the US Navy could bring its great strength to bear in the region. Similarly, it is doubtful whether the RAF would have given up even nine flying boats without proof of U-boats in the western Atlantic, and it is certain that once American long-range aircraft and ocean escorts arrived in Newfoundland both the British and American governments expected Canada to turn over responsibility for trade protection to US forces, resuming the limited function of local defence. Canadians had very different ideas.[29]

The RCAF and RCN were already seeking to develop a trade defence system along the lines of Coastal Command and the Royal Navy. The RCAF sent observers to Coastal Command, first among whom was Air Commodore N.R. Anderson, air officer commanding Eastern Air Command, a future air member for air staff and deputy chief of the air staff. On 5 June he signalled home:

> Understand Naval Sub-Command will be established St. John's, Newfoundland, control Convoy Ocean Escort ships based same point. As E.A.C. aircraft based Newfoundland will be co-operating, recommend Group HQ be established St. John's at once, forming combined HQ with Navy ... Essential Group HQ St. John's and Operational bases, Newfoundland, be linked HQ E.A.C., HALIFAX, by teletype. Operational and Intelligence reports must pass quickly between Coastal Command RAF and Eastern Air Command, Air Ministry Newfoundland-Birdlip W/T link available this purpose. Also essential aircraft operational frequencies used by both Air Commands Atlantic operations should now be standardized to facilitate co-operation and ensure enemy sighting reports sent by aircraft either Command be received immediately by escort ships, Naval forces and Shore Bases. Recommend frequencies used by Coastal Command be adopted at once by E.A.C. if equipment permits. Coastal Command and Admiralty concur with communication recommendations. Advise if you concur with proposals and give strength ground to air W/T Stations E.A.C.[30]

Unfortunately, direct radio links with Coastal Command and effective long-range ground-to-air communications were not practicable with the equipment available. And Anderson's later proposal to put four Catalina squadrons in Newfoundland during the summer and a squadron of Liberators all year long was also impossible. The RAF was after every long-range aircraft that could be produced. The RCAF, moreover, could only have found the necessary aircrew and groundcrew by robbing the BCATP; article 14 of the agreement committed all but 136 pilots, thirty-four air observers, and fifty-eight wireless operators (air gunner) every year to RAF or RCAF squadrons overseas. Anderson would have welcomed a change in this policy in order to concentrate on winning the battle against the U-boats in the north Atlantic. 'It is more important *now*,' he wrote, 'that personnel be posted to fill Eastern Air Command G.R. [General Reconnaissance] Squadrons than to fill Bomber and Fighter Squadrons of the R.A.F.'[31]

On 9 July a delegation from the RCAF met the new air officer commanding-in-chief Coastal Command, Air Chief Marshal Sir Philip Joubert de la Ferté, and some of his staff in London to discuss co-operation between the two commands. The need for a Liberator squadron based on Newfoundland in order to provide year-round long-range coverage was also clear to all. The long-range Liberator of that time had about the same range as a Catalina, but its cruising speed of 200 knots was twice that of the flying boat and it could carry eight depth charges to maximum range instead of the two carried by Catalinas. The faster and more heavily armed Liberator, with an endurance of sixteen and one-half hours, was therefore much preferred to the lumbering Catalina which could, on occasion, keep its crew aloft for up to twenty-eight hours. Joubert actually offered to transfer his only Liberator squadron to Newfoundland after Iceland operations ceased for the winter, but the Canadians had to decline the offer. There were no hangars at Gander capable of handling the large aircraft and, because work on other air commitments, such as transatlantic ferry operations, had priority, none could be built in 1941.[32]

The meeting of 9 July was also attended by the minister of national defence for air, C.G. Power, the chief of the air staff, Air Marshal L.S. Breadner, and Air Commodores Anderson, G.O. Johnson (deputy chief of the air staff, on temporary attachment to the Air Ministry), and L.F. Stevenson (air officer commanding RCAF in Great Britain). Anderson and Johnson were the present and future air officers commanding Eastern Air Command; Stevenson was about to become the air officer commanding Western Air Command. All the most vitally concerned authorities were aware from the start, then, of the conflict in priorities that would plague Eastern and Western Air commands for the next two years. The operational squadrons of the Home War Establishment had low priority in all essential areas – personnel, equipment, facilities, and even labour. Anderson, possibly as an alternative to having a Coastal Command squadron in Newfoundland, tried to establish an exchange of aircrew that would at least have allowed the RCAF to benefit from RAF experience. The shortage of qualified Canadian aircrew scotched this idea very quickly, and his proposal that five squadrons exchange crews for one year gave way to Power's of exchanging one Catalina crew for a much shorter term. That suggestion went nowhere either. In

November there was some talk of obtaining 'war-weary' crews from the RAF, but this suggestion was never pursued seriously. The northwest Atlantic was no place for a rest.[33]

A start was made, however, in establishing an intelligence organization like the one in the United Kingdom. The Admiralty's 'Y' service – radio intelligence – provided accurate and timely U-boat location reports, which allowed the RAF to organize air searches around known positions of enemy submarines. This was exactly what was needed by a force with very few aircraft and, in June, after visiting Coastal Command, Group Captain F.V. Heakes went to Naval Service Headquarters to see what the RCN's newly formed OIC could do for Eastern Air Command. After several meetings between naval and air force officers in Ottawa the navy agreed to transmit results from the analyses of all direction-finding bearings obtained in Ottawa to operational headquarters on the east coast. 'These analyses,' observed the naval memorandum, 'are based on somewhat less information than is available to the Admiralty and the results obtained by Ottawa are subject, therefore, to correction by the Admiralty.'[34]

Without a single controlling authority a cumbersome system of communication existed between the air and naval services involved in the same maritime battle. Fortunately, airmen and naval officers at lower levels were able to discuss some of their mutual problems and, as a consequence, Heakes persuaded Commander J.M. de Marbois, in charge of the OIC, to set up a direct telephone line to the air station at Dartmouth for passing direction-finding bearings as soon as they were received. This approach certainly bore fruit the following year, when U-boats started penetrating Canadian territorial waters, and it may have been through this channel that information reached 10 (BR) Squadron in mid-June about a U-boat off the coast of Newfoundland. That alert occurred just as U-111 was completing a reconnaissance of the Strait of Belle Isle and proceeding south to join Dönitz's western patrol line a few days before its dispersal. In the following month, however, intelligence from Naval Service Headquarters was useless. The delays were interminable until, in late August, the Admiralty's daily promulgation of submarine positions started arriving regularly and in good time.[35]

The United States Navy's assumption of strategic control over the forces operating in the western half of the north Atlantic in September 1941 raised more fundamental questions about the nature of the Canadian trade-defence effort. Although the RCN's escorts now operated under the general direction of Rear Admiral A. LeRoy Bristol, USN, at Argentia, Nfld, the RCAF would surrender neither its independence nor its commitment to long-range maritime reconnaissance. As seen in Chapter 10, representatives of the RCAF made an arrangement with Admiral Bristol in October whereby USN aircraft operating from Newfoundland flew escort missions for convoys south and east of Cape Race, while 1 Group provided similar coverage to the north of this area. Significantly, representatives of the United States Army Air Forces in Newfoundland did not participate in these discussions.[36]

The infrequent appearance of submarines within range of aircraft on the east coast until late 1941 was a mixed blessing. Without sure evidence of the enemy's

presence it was difficult to motivate the crews. The increased number of convoys sailing in late 1941 made little difference to the airman's dreary routine. Aircrew exposed themselves day after day to hardship and danger with no tangible results. It was a triumph of sorts simply to return safely to base. And, as if natural conditions were not enough, they worked alongside a service which had very little understanding of air operations. After the first Newfoundland Escort Force operation in June 1941, the RCN complained that because an air escort was not provided it took more than twenty-four hours for convoys HX 132 and SC 34 to rendezvous. It was true that in the clear visibility an aircraft would have been useful to the convoy commodores and their escorts, but the available Digbys were, quite correctly, committed to the search for U-111, the only submarine in the vicinity. Although the RCAF soon posted a liaison officer to the staff of Commodore L.W. Murray, who commanded the Newfoundland Escort Force, effective co-operation would not be possible until plans for improvement of communications between St John's and Gander and for the establishment of a combined naval and air headquarters could be carried out.[37] Even then, the complaint of seamen that they could see no escorting aircraft would be heard time and again.

With only a small number of aircraft available and the great distances involved, long-range air operations from Newfoundland were extremely limited in 1941. Although the Catalinas now at Botwood had an endurance of twenty-four hours at ninety-five knots, giving a total range of 2400 miles and a patrol radius of 800 miles, operational conditions greatly reduced these figures. In theory, it took eight and one-half hours for a Catalina to reach a convoy 800 miles to seaward, and once there it could only devote four hours to patrolling. The remaining eleven and one-half hours were needed to combat the average twenty-two knot westerly winds prevalent on the homeward leg, during which ground speed was reduced to seventy knots. It was estimated that if headwinds in excess of twenty-two knots were encountered following a four-hour patrol at 800 miles, the aircraft would not get home at all. In any event, four hours of patrolling in a twenty-four hour flight was considered a misapplication of effort. Eight hours around a convoy, in practice, was the break-even point for a full day's flying, and that period limited ranges to 600 miles. However, it was necessary to retain at least 20 per cent of an aircraft's endurance against the need to land at an alternate base, the nearest of which was frequently North Sydney, NS. This reservation in turn cut effective ranges to 450–500 miles at best. No 1 Group was occasionally able to mount operations to extreme range, but only large, specially modified, four-engine aircraft, such as later versions of the Liberator, could effectively patrol at ranges of 700–900 miles and thereby close the mid-ocean gap in air coverage from Newfoundland and Coastal Command's base in Iceland.[38]

The limits of aircraft operating from both sides of the Atlantic were graphically illustrated in early September 1941, when Dönitz pushed his U-boat packs to the south of Greenland in hopes of better hunting. Between 9 and 13 September, Group *Markgraf* finally made contact with SC 42. It was the only convoy the Admiralty had not been able to reroute successfully around the

danger areas, and it had been deprived of air cover from Newfoundland by several days of extremely heavy gales and low visibility. The convoy, escorted by an RCN group of the Newfoundland Escort Force, lost fifteen ships before air and surface reinforcements arrived from Iceland to end the struggle.[39]

The battle for SC 42 took place well beyond the maximum range of the Botwood-based Catalinas, and the historian will search in vain among squadron records for mention of the desperate fight raging off Greenland. The Catalinas were simply not able to respond to such distant operations. Nor was 116 Squadron up to the task in other respects. By the end of August the inability to make up full aircraft crews on a permanent basis, together with the absence of specialist officers, persuaded the officer commanding to shelve all thought of training, a blow to morale and efficiency. In hindsight, one may wonder if it would not have been possible for a hard-driving officer commanding to do something to improve the efficiency of his squadron or formation. Yet, in September the visit of the Duke of Kent to the Newfoundland bases was the most noteworthy event. And even two months later, when a large number of U-boats were within striking distance of aircraft at Botwood and Gander, comments in 116 (BR)'s diary on operations remained cryptic, while an elaborate description of the marriage of one of the squadron's aircrew to a nursing sister is included. The records of Newfoundland's other BR squadron, No 10, were not much better. Apparently commanders were content for the moment with simply having established air bases in the inhospitable natural surroundings. Effective operations demanded much more.[40]

In the meantime Dönitz, having learned from U-111 that convoy traffic passed through the Strait of Belle Isle, initiated an operation in that region. In late October the OIC in Ottawa began to receive information from the Admiralty on the westward movement of several U-boats, and it was confirmed on the 24th that four were just to the east of the strait. The Digbys of 10 (BR) Squadron were alerted and the next day all available aircraft were in the air, two to provide escort for a westbound convoy, ON 26, steaming into the danger area, and the rest in search patrols. Seven of 10 (BR)'s aircraft and the only two Catalinas available from 116 (BR)'s four-plane detachment at Botwood spent more than eighty hours aloft that day, and the result was the first sighting and attack made by an Eastern Air Command aircraft. The episode unfolded so as to illustrate most vividly the handicaps then afflicting anti-submarine squadrons.[41]

Squadron Leader C.L. Annis, the command armament officer, was visiting Gander when the alert came in and, since 10 (BR) had more serviceable aircraft than it had qualified pilots, took a Digby up on patrol himself. Annis was familiar with the aircraft type and had about 300 hours flying over the ocean, but he had to establish rapport with the crew at very short notice. His second pilot doubled as navigator, and three wireless operator/air gunners manned the rear and nose turrets as well as the wireless operator's seat. Annis's own account describes the flight in detail:

I took off ... at approximately 0750 hours ... As I crossed the coast, outbound, the air gunners proceeded to their look-out posts in the nose and rear turrets ... I instructed (the

nose gunner) to 'arm' the bombs – an act which can be carried out only at the bomb aimer's controls in this compartment. In a few moments he returned and stated that they were armed.

The patrol ordered was a parallel track search consisting of an outward leg of some 40 miles from the Newfoundland coast on a north east heading, then a beat of roughly 270 miles almost due north, a westward flight of 18 miles and the return leg almost due south to base. The wind at patrol height, which was maintained at 900-1000 feet, was established as averaging approximately 45 knots from a little to the west of south. The sea was the roughest I have ever seen it ... I was actually quite surprised to find that a submarine could surface under such sea conditions ...

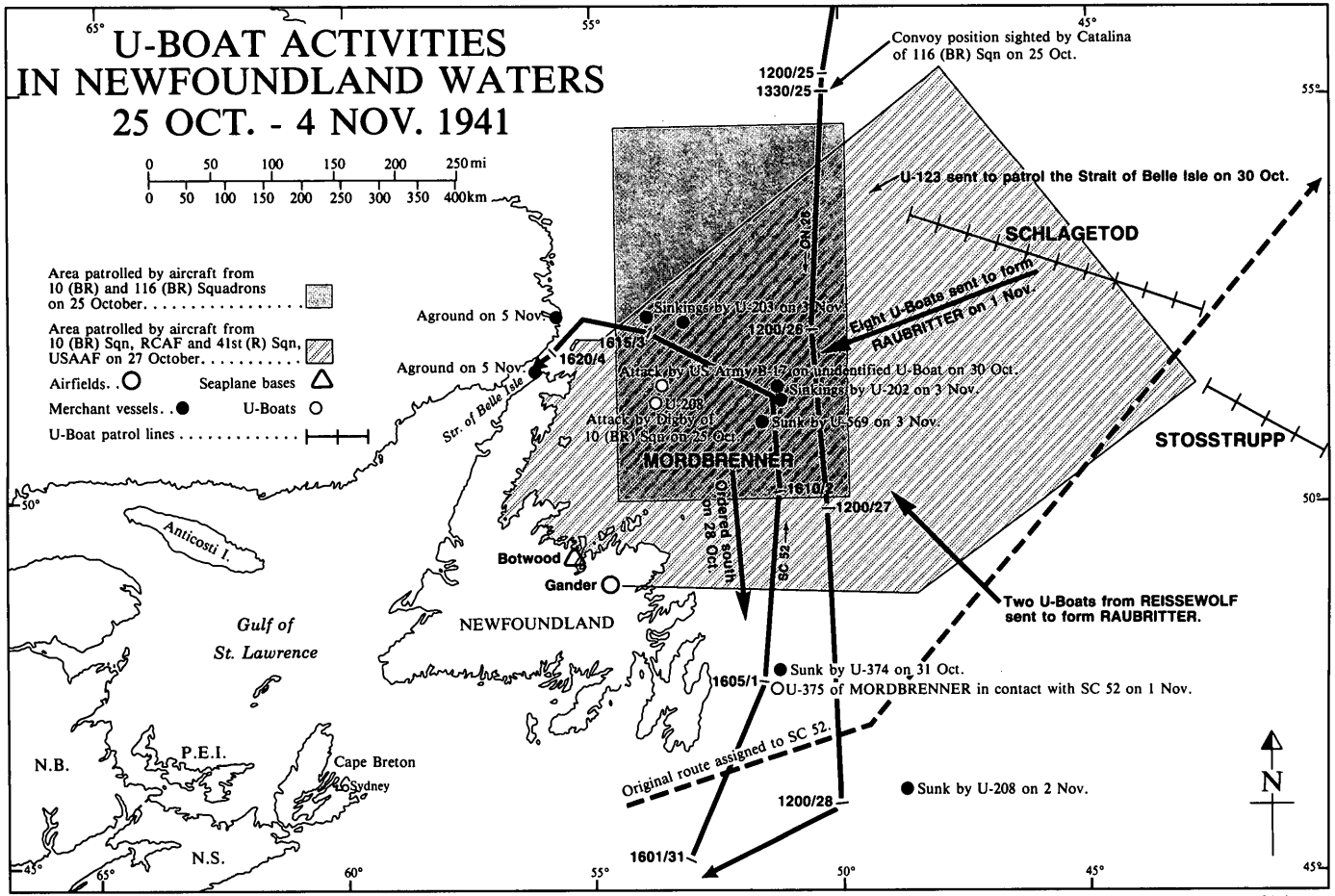
At approximately 1450 hours ... I sighted a submarine. Until that time all search for shipping of any description had been negative. I had noticed the air gunners exchanging lookout posts at approximately two-hour intervals but beyond being satisfied that they were carrying out their post-manning and search duties, I paid no particular attention to them. The air was unusually bumpy, and I was fully occupied in holding a steady course against an oscillating compass, looking after the engines, and scanning the sea. To add to the difficulties salt spray had been depositing on the wind screen from time to time throughout the flight and it now formed a not inconsiderable haze obstructing vision.

As I watched a wave drew away from the submarine towards me leaving its conning tower and upper hull completely exposed and dispelling any doubt as to its character ...

I at once threw out the auto pilot control and started a slight turn to the right in order to keep it in sight. I turned to Redman who was in the navigator's seat behind me, pointed and said: 'Thats a submarine.' He jumped up, looked over my shoulder and said: 'It sure is.' He practically flew into the second pilot's seat as I told him to put the engines into 'manual rich.' At the same time I reached down and jerked open the bomb doors with the pilot's emergency release handle. As Redman adjusted the mixture I increased the boost and r.p.m. on the engines. The engines gave a slight cough and I looked to see that Redman in his excitement hadn't put the mixture into 'idle cut-off' position. When I looked up again I couldn't see the submarine. I yelled 'where is it?' and he pointed ... Only its conning tower was visible and it disappeared into a wave as I watched. The vortex of its dive was plainly visible and the shadowy darkness of its hull showed for a few seconds. As the vortex and bubbles built up towards the east I was able to decide what had been troubling me all along – the direction it was moving and therefore at which point to aim in the attack.

By this time, which I should judge to be 20-30 seconds after first sighting, we were in a 30-40 degree dive as I turned to the left ... to make a quartering astern attack. Remembering to aim short and ahead and estimating a six-second interval between release and detonation, I released the bombs in salvo, by means of the pilot's emergency release, when at a little less than 300 feet indicated on the altimeter, and in an angle of dive of approximately 20 degrees ... The strong wind ... had caused me to undershoot somewhat.[42]

This attack failed because an inexperienced crew member had switched the bomb-arming release lever back to the 'safe' position at some point during the outward flight. It was the kind of mistake that crew training in operational training units [OTUs] was designed to avert, but Eastern Air Command had no



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resources for OTUs. Squadron commanders were merely urged to advance aircrew effectiveness by any means available. It was clear that such instructions were not easy to implement even if the will to do so existed. The BCATP and its quota for overseas squadrons was leaving the Home War Establishment desperately short of aircrew.[43]

Attempts by 1 Group to locate and attack U-boats operating off Newfoundland were sharply curtailed after 26 October by deteriorating weather. In the meantime, yet more U-boats moved into the area until there were eighteen submarines within striking distance of Eastern Air Command aircraft. While Admiral Dönitz received permission to attack south of the Grand Banks, an area previously forbidden to his U-boats because of its proximity to US territorial waters, 1 Group waited for the weather to clear. Before it did U-374 intercepted the eastbound convoy SC 52 just east of St John's, and eleven nearby U-boats were brought together as Group *Raubritter* to attack it. On 3 November orders went out to have every available aircraft flying in support of SC 52, but it was not until two days later that the weather improved enough to make flying possible. By then the battle of SC 52 had been decided. After the loss of four ships the convoy was ordered to return to Canada through the Strait of Belle Isle, where two further ships were lost through grounding in fog.[44]

There was little Canadian airmen could do but pray for better weather, and there was precious little of that in Newfoundland during the first weeks of November. No 116 (BR)'s detachment at Botwood, crippled by the unserviceability of three of its four aircraft, received two reinforcements from Dartmouth but remained hamstrung by poor weather conditions. Finally, on the 19th, the day one of the serviceable aircraft was driven ashore and damaged in a blizzard, the detachment received orders to withdraw to Nova Scotia for the winter. Conditions in 10 (BR) were better, but not much better. By late in the month six of its fifteen Digbys were under repair, while the squadron had only seven crews for the remaining nine aircraft. Not surprisingly, No 1 Group was unprepared when it heard, on 24 November, that U-boats were once again bound for Newfoundland. Three Digbys were held in readiness armed with depth charges, while the remaining RCAF and US Navy aircraft flew patrols to seaward. Four Hudsons from 11 Squadron were hurriedly dispatched to the newly completed aerodrome at Torbay to provide harbour patrols for St John's and Wabana, anchorages which the U-boats were expected to attack. By the time the RCAF had made its dispositions and plans to meet the latest threat it had already passed. On 22 November Dönitz had been forced to satisfy Hitler's demand for U-boats in the Mediterranean in response to the British offensive in North Africa. Much to the German admiral's disgust every U-boat in the Atlantic headed for Gibraltar.[45]

As 1941 drew to a relatively quiet close the state of readiness in Newfoundland still left much to be desired, though the RCAF had far better anti-submarine facilities than could have been imagined a year before. The order of battle included 10 (BR) Squadron with its fifteen Digbys, and a USAAF squadron with six B-17s at Gander. On 14 October, as already noted, the airfield at Torbay, near St John's, had been opened with two runways available, and four Hudsons from

11 (BR) Squadron flew over from Dartmouth, NS, in November. The US Navy also had Catalina detachments of three navy and one marine squadrons at Argentia. Air control remained poor, however. The absence of a land line between 1 Group Headquarters at St John's and the station at Gander forced air controllers to improvise when atmospheric conditions prevented radio communication, as they often did, and aircraft sometimes had to curtail patrols because of a complete radio blackout caused by the *aurora borealis*. Furthermore, the teletype circuits to Halifax were severely overburdened with traffic.[46]

During the fall of 1941, 5 and 116 Squadrons had begun to receive the first PBY5 (Catalina) flying boats from Canadian orders in the United States. In December these aircraft received the RCAF designation 'Canso.' During that same month the first Canso 'A' (amphibians) arrived at 5 Squadron and, by the end of February 1942, thirteen Canso 'A's were on strength. In the meantime, the Canso flying boats had been concentrated in 116 Squadron, which by the end of February had seven of these machines and five of the Catalina boats that had been borrowed from the RAF the previous spring.[47]

The late fall also brought a clarification of Canadian and American operational responsibilities in the northwest Atlantic. In November, largely as a result of urgent questions from the US Navy Department through the Canadian air attaché in Washington, Air Vice-Marshal Anderson and Admiral Bristol promulgated their agreement of 17 October in formal terms. The Canadians were to cover two ocean areas, one north of a line drawn out from Newfoundland along the 48th parallel of latitude, and the other west of a line drawn out from Newfoundland along the 55th meridian of longtitude in to the Canadian coastline. In effect this meant that Eastern Air Command aircraft escorted convoys to the Western Ocean Meeting Point [WESTOMP] about 49 degrees west, while 1 Group Hudsons and Digbys from Gander and Torbay accompanied them for 200 and 400 miles, respectively, north of 48 degrees north. For anti-submarine sweeps and general reconnaissance patrols in the northern sector these ranges for the Newfoundland aircraft were extended further, the Hudsons going to 300 miles and the Digbys up to 600 miles. The latter stretched the Digby to the limit and would not in fact produce satisfactory results.[48]

While Eastern Air Command strove to match the effective ranges of air cover provided in the eastern Atlantic by Coastal Command, the RCAF also followed developments in British aircraft armament. In mid 1941 AFHQ arranged for Canadian production of the new Mark VIII 250-lb Amatol-filled aerial depth charge, and ordered fittings from the United Kingdom to convert naval 450-lb Mark VII depth charges for use in aircraft. By the end of the year the weapons had replaced the undependable anti-submarine bomb in most squadrons.[49]

Thanks to Air Vice-Marshal Anderson's visit to Coastal Command in the summer the sharing of knowledge on technical developments – as evidenced by Canadian production and adoption of the British aerial depth charge – was part of a growing understanding between the two commands. 'Long experience, training and scientific investigation of Coastal Command in maritime air operations,' Anderson wrote, 'has evolved a sound operational policy and procedure which is being continuously advanced to keep ahead of enemy

methods. Any information for guidance which Coastal Command can give Eastern Air Command on advances in operational methods, equipment or procedure will be treated with the degree of secrecy desired and used in the manner most likely to ensure pursuit of a common operational doctrine in the Battle of the Atlantic.'[50]

Air Chief Marshal Joubert de la Ferté had responded personally to the Canadian overture in July with the first of a series of monthly letters between himself and Anderson on matters of mutual interest. But time for such discussion was fast running out. The brief calm following the withdrawal of U-boats in November was shattered by the news of Pearl Harbor on 7 December. This great turning point meant that not only squadrons based on Newfoundland, but also those in Nova Scotia would now be in the front line of anti-submarine warfare. The next move in Dönitz's strategy, Operation *Paukenschlag*, would suddenly and graphically illustrate all the quantitative and qualitative weaknesses of Eastern Air Command. As an immediate reinforcement for the west, 8 (BR) Squadron was moved hurriedly to Sea Island, Vancouver, BC, and its place taken at Sydney, NS, by another Bolingbroke squadron, 119 (BR), from Yarmouth, NS.[51] By early January 1942 the command still had only five principal anti-submarine squadrons deployed for the anticipated upsurge in German U-boat activity.

The timing of Japan's entry into the war came as a surprise to the Germans. Five weeks passed before they were able to send out five large Type IXB submarines, U-66, U-109, U-123, U-125, and U-130, to execute *Paukenschlag*. It was to be a 'tremendous and sudden blow' against merchantmen of over 10,000 tons between the St Lawrence and New York, planned to start, simultaneously, on 13 January. At the same time, seven Type VIIC U-boats, working independently of the main operation, formed Group *Ziethen* and spread themselves out in contiguous attack zones reaching out 250 miles from the south coast of Newfoundland.[52]

On 2 January the British Admiralty issued its first warnings of the offensive, based on Enigma decrypts. Canadian squadrons at Dartmouth, Sydney, Gander, and Torbay, US naval aircraft at Argentia, and the USAAF squadron at Gander accordingly increased their patrol activity. On 9 January HX 169, the convoy nearest to the approaching U-boats, was diverted northeastward towards Newfoundland 'to fight its way,' with a reinforced escort group of nine warships, through the danger area off Cape Race, and thus take advantage of the 'golden opportunity for destroying U-boats in which ... the strength of the air escort will play a large part.'[53] Mercifully for the convoy, the U-boats did not make contact.

Korvettenkapitän R. Hardegen of U-123 struck the opening beat of *Paukenschlag* on the night of 11/12 January. He torpedoed and sank the British ship *Cyclops* 180 miles south of Nova Scotia, the first merchant ship to be sunk in North American waters south of Newfoundland. Some hours later, on a clear, cold morning, Sergeant R.L. Parker of 119 (BR) Squadron took off from Sydney in a Bolingbroke. About forty miles north, while on a routine harbour entrance patrol, the aircraft's crew spotted U-130 'three miles away and awash, conning

tower plainly visible.'[54] In the ensuing attack two 250-lb bombs were released one hundred feet ahead of the diving submarine to produce satisfying explosions. But, as Eastern Air Command correctly surmised, the effort was a 'complete miss,' because the bombs would have fallen short and detonated above the target.[55] Five Bolingbrokes mounted an extensive search of the area, twice came within visibility distance of their quarry, but made no detections. The U-boat slipped away. In the next twenty-four hours it sent to the bottom two independently routed ships, *Frisco* and *Friar Rock*. The latter, a Panamanian-registered vessel delayed at Sydney, had been trying to overtake the last convoy leaving that harbour until spring.[56]

Although U-boats near the mainland of Canada and the United States reported 'Enemy air patrols heavy but not dangerous because of inexperience,' they chose not to tangle with escorted shipping: of the twenty-one merchantmen destroyed north of latitude 40 degrees north and west of longitude 40 degrees west in January 1942, twenty were sunk while sailing independently or after having lost their convoy, and only one was sent to the bottom while under naval escort.[57]

On 19 January a Digby of 10 (BR) Squadron was on a coastal patrol from Gander when the conning tower and upper deck of a fully surfaced submarine lying in the trough of the waves appeared through the snow. The boat was U-86, fresh from inflicting torpedo damage on *Toorak* from convoy ON 52 and sinking *Dimitrios G. Thermiotis*, a straggler from SC 63. Flight Lieutenant J.M. Young brought his aircraft down to an approach course at right angles to that of the target, released the right bank of three 250-lb Amatol charges set to detonate at fifty feet, wheeled round, and dropped the left stick set to one hundred feet at forty-five degrees to the submerging U-boat's presumed course. It was a good attack with disappointing results, splitting welded seams but not sinking the U-boat.[58]

Three days later, when returning to base from a patrol in support of SC 65, another Digby of 10 Squadron encountered U-84. The submarine was moving fast on the surface three miles ahead on the port bow. Flight Lieutenant E.M. Williams started his run in from 1100 feet with his charges set to explode at a depth of fifty feet, but it turned out to be a botched effort. As the official report charitably put it: 'Only one of 3 D.C.'s released due to over keenness of first gunner,' who, in the excitement of the moment, forgot that all the depth charges had to be released manually because a twelve-volt distributor had not been available for the aircraft back at Gander. Williams, who won the Air Force Cross later that year for the quality and dedication of his work, made two more attacks that were obviously out of range. German records confirm a 'near miss.'[59]

Aircraft more often found survivors of sinkings, and led rescue ships to the position. The airman's view of this role is typified by an incident on 24 January. The Catalinas of 116 Squadron, after hours of flying, located all that remained of *Empire Wildbeeste*, a 6000-ton steamer torpedoed by U-106 360 miles southeast of Halifax:

> The two boats were connected by a line and contained approximately 8 survivors in one and 12 in the other. They were signalled first by Aldis lamp and ... a message was

dropped in a water tight container ... They were informed a rescue vessel was on its way.

Later on the same day ... a lifeboat with four or five survivors, with sail up, was sighted ... Messages, water, cigarettes, and flares were dropped in a rubber dinghy.[60]

In February Dönitz allowed his most northerly boats to move gradually southward from Cape Race, escaping the bad weather and intense cold that was forcing them to dive every two or three hours or risk the freeze-up of their diesel exhaust valves.[61] Here again, the majority of vessels they intercepted were alone, without sea or air escort, eight of the month's total of ten being caught in the approaches to the Nova Scotia coast.

To some degree the last ships were the victims of two major Allied setbacks in radio intelligence. On 1 February the Germans introduced a change to the Enigma machine by adding a fourth wheel for communications with U-boats in the Atlantic and Mediterranean. Bletchley Park was unable, except for a few days in February and March, to decrypt such messages for the next ten months. The German cryptanalytical service (*Beobachtungsdienst* or *B-Dienst*) moreover, had finally mastered British Naval Cypher No 3 so that, until June 1943, it was 'reading' a significant percentage of Allied signals concerning North Atlantic convoys.[62] The abrupt end to an important source of information on the submarine fleet, compensated for to some extent by Dönitz's preoccupation with North American coastal shipping, was to have its most serious consequences when a growing force of U-boats returned to the mid-ocean convoy routes later in the year. But the effect on operations in February was bad enough.

On 19 February *Kapitänleutnant* H. Lehmann-Willenbrock, an 'ace' U-boat commander known as *Der Recke* by the Germans, started a series of successful attacks off Halifax with the destruction of *Empire Seal*. By the 23rd his U-96 had accounted for three more vessels, one of them within fifteen miles of the port. On 24 February, following one of the last 'readings' of naval Enigma in 1942, the Admiralty's submarine report noted '1 or 2 off Halifax' but with unmistakeable local evidence of attacks this came as no surprise to Eastern Air Command.[63] On 23 February the merchant ship *Empire Union* had signalled she was being shelled south of the Halifax approaches, and forces had scurried to her aid from all directions. Shortly before 1800 hours Lysander 449, of No 2 Coast Artillery Co-operation [CAC] Detachment, Dartmouth, a most unlikely instrument of vengeance, had left the tarmac. The wireless operator/air gunner, Sergeant R.H. Smith, recorded the ensuing events:

headed approximately south for ... 20 minutes. We were flying parallel to a Catalina until we passed over a freighter coming up the coast. We went on beside the Catalina for another 10 miles then it climbed and turned to sweep back the way it had come. We turned and followed back to the freighter then turned and headed into the setting sun. We flew this course for possibly 15 minutes. Then F/O Humphreys pointed out the periscope of a submarine a mile or so ahead. The periscope was clearly visible, also a swirling around what was possibly the conning tower. As we approached, the submarine started to go under so that it was invisible for the last 30 seconds of our run on it. We passed over the spot where it had disappeared and dropped the depth charges. No air bubbles or oil observed ... We did a climbing turn and the charges went off about 5 sec. after dropping.[64]

Lehmann-Willenbrock had been saved by the alertness of his conning-tower look-outs in spotting the high-wing monoplane, and he was lucky to suffer only minor damage from two well- placed depth charges.[65]

Sinkings so close to the main assembly point for shipping put further strain on the anti-submarine squadrons, which also had to provide air cover for a growing network of local convoys in the Canadian Zone. CAC detachments from Saint John and Sydney were therefore shifted to Dartmouth to fly a continuous harbour entrance patrol in daylight hours. As it happened, this was unnecessary. Even as the RCAF strengthened patrols in the Halifax area, U-boat activity temporarily moved out from the coast. On 22 February U-155, on passage to American waters, fell in with ONS 67, a convoy of forty ships under American escort heading on a southwesterly course towards Cape Race, and still beyond aircraft range. U-boats homed in by U-155 were able to sink eight ships, most of them tankers, and damage another.[66]

The storms and generally foul weather continued into March, hampering U-boat operations. U-404, unsuccessfully depth-charged on the 2nd by a Hudson of 11 (BR) Squadron,[67] reported 'medium air activity, off Halifax a little traffic ... A great deal of fog, freighter *Collamer* sunk ...'[68] Lehmann-Willenbrock in U-96 also noted on 8 March, the day he was engaged for the second time by a Canadian aircraft: 'Traffic very spread out. Much fog and bad weather.'[69] Flight Lieutenant T.V.L. Mahon, who later won a Distinguished Flying Cross for bomber operations with 433 Squadron, made the second attack on U-96 in a 5 (BR) Canso 'A' and believed he 'must have been very close,' since his depth charges caused a gush of oil that was still welling up over an hour later. In fact *Der Recke* suffered very slight damage (there is no explanation of the oil) and the next day torpedoed the unescorted *Tyr* before heading back to St Nazaire.[70]

For two weeks there were no more sightings. Then on 23 March a straggler from HX 181, *Bayou Chico*, saw and reported U-754. Flying a Bolingbroke from 119 (BR) Squadron at Sydney, Sergeant C.S. Buchanan and his four-man crew subsequently spotted the U-boat fully surfaced, moving northward from the area where it had recently destroyed *British Prudence*. The ensuing attack was a disappointment. The airmen claimed to have blown the submarine to the surface, and it is true that the U-boat log records well-placed bombs, but once again there was no serious damage.[71]

Partly as a result of the bad weather but also owing to a dearth of easy targets, Admiral Dönitz now directed his Type VII U-boats to the more profitable areas off New York, while the Type IXs began a fresh round of successful operations against the unprotected fleet of tankers and bauxite carriers sailing independently in the Gulf of Mexico and Caribbean.[72]

The loss of U-656 and U-503 to US Navy Hudsons from Argentia on 1 March and 15 March, respectively, the first Allied air victories over U-boats in North American waters, failed to disconcert Dönitz, who confided to his war diary that

> Sea defense measures so far met with (except area off Halifax and Cape Race) are small, badly organized and untrained.
>
> Air defence in many areas (Aruba, Hatteras and Halifax) is there in sufficient strength

it is true, but inexperienced, and in comparison to the English air escort can only be described as *bad*.[73]

Thanks to U-boat successes further south the Canadian zone was comparatively quiet through April and May. The volume of offshore flying increased significantly with milder weather and the growing number of aircraft. A special detachment (formed after the sharp rise in sinkings south and west of Nova Scotia) of three Canso 'A's with crews from 10 (BR) Squadron and Hudsons of the new 113 (BR) Squadron made their first sorties from Yarmouth air station in April. From Dartmouth other Hudsons of No 31 Operational Training Unit, and Fairey Swordfish of the RN Fleet Air Arm, took their turn on harbour entrance and anti-submarine patrols, while Avro Ansons of No 2 Air Navigation School flew out of Pennfield Ridge, NB. Little was seen or heard of the enemy. Aircraft made two attacks, neither of which is substantiated by U-boat records, even though one was in the area where a U-boat transmission had been detected by shore-based DF.[74] The total of merchant ships sunk in the Canadian coastal zone fell to six in March, declined further in April to four, and rose again to six in May, including two in the Gulf of St Lawrence (which initiated a phase of activities discussed in Chapter 13).

Air Vice-Marshal A.A.L. Cuffe, who had arrived in Halifax on 11 February 1942 to replace Air Vice-Marshal Anderson as air officer commanding, was aware of the shortcomings in Eastern Air Command and brought some remedies. The British advisory teams touring American and Canadian anti-submarine commands early in 1942 found that 'the Canadians had been at great pains to extract all the lessons they could draw from the Battle of the Atlantic, and from our experience on this [the British] side.'[75] Then, on 13 April, the command adopted a modified version of the Manual of Coastal Command Operational Control. A few weeks later the command controller's staff moved to a new operations room in Halifax, imperfectly modelled on its British counterpart at Coastal Command Headquarters, having military and naval liaison officers but inadequate naval input. Reflecting Eastern Air Command's diverse responsibilities, the operations room also housed the facilities for fighter control and air-raid warning. The aim was to establish close operational links with Canadian air, sea, and land forces; the commander Eastern Sea Frontier, USN, whose New York headquarters was also that of the 1st Bomber Command, USAAF; and various American air bases in the northeastern United States and Newfoundland. A combined air-navy headquarters, however, had not yet been organized at Halifax; the interservice stalemate continued with both Cuffe and Rear-Admiral G.C. Jones, commanding officer Atlantic Coast, refusing to budge from their respective operations rooms. Because of distance and poor communications, Cuffe had delegated tactical command in Newfoundland to the commanding officer, No 1 Group.[76] At St John's the staff of Air Commodore McEwen (he received the acting rank in December 1941) was located in a centralized control room similar to but smaller than the one in Halifax, pending the completion of a combined headquarters building, and liaison officers were exchanged between the American and Canadian forces.

Inexperience and insufficient training – there was still no operational training unit specifically established for the command's maritime reconnaissance squadrons in 1942 – undoubtedly played a large part in the failure of aircraft to give U-boats the *coup de grâce*. To raise the level of efficiency of pilots and their crews, the RCAF instituted a syllabus on armament at training establishments and introduced a policy of 'on the job' training in operational units, geared to an up-to-date instructional programme. Aircraft on regular patrols carried additional bombs and gun ammunition for practice purposes, and each squadron assigned one flight commander, who had completed the eight-week armament course for pilots, the responsibility of propagating the training syllabus.[77]

In at least four of seven confirmed brushes with the enemy in early 1942, however, inadequate weapons rather than faulty technique had probably prevented a more successful outcome. Good marksmanship in the attacks on 19 January and 23 March had gone for naught because the depth charges carried the fifty-foot setting that Coastal Command's experience had shown to be ineffective. The latest detonator, the Mark XIII pistol, giving a depth setting of thirty-four feet, arrived in Eastern Air Command in February, many months after Coastal Command had introduced it. It was used in the Lysander's attack on the 23rd of that month, and by 11 (BR) on 2 March. Still, the Amatol-filled 250-lb charges lacked killing power, as Coastal Command's scoreless record in early 1942 also demonstrated. Air Force Headquarters ordered Torpex-filled charges from the United Kingdom early in May, pending the organization of Canadian production, but these were not delivered until late in the year, six months after Coastal Command began to receive the weapon. There were similar delays in the supply of Mark XIII Star pistols that provided the essential shallow setting. In the meantime, the most promising weapon in Eastern Air Command's arsenal was the Mark VII 450-lb Amatol-filled depth charge, whose power was equivalent to that of the 250-lb Torpex weapon, but it could only be carried in the larger aircraft.[78]

To solve the problem of detecting a surfaced U-boat quickly enough to make an effective attack, the RCAF equipped as many aircraft as possible with ASV Mark II radar. By the end of April 1942 the first half-dozen sets had been fitted, but Eastern Air Command's early experience with the equipment in detecting U-boats was as disappointing as Coastal Command's had been. Continued improvements in base facilities, deliveries of modern aircraft, and the organization of new squadrons were more tangible additions to Eastern Air Command's effectiveness. In mid-April there were six bomber-reconnaissance squadrons, one equipped with Digbys, two with Catalinas, Cansos and Canso 'A's, and three with Hudsons, including 119 (BR) which was converting from the less-capable Bolingbrokes. No 117 (BR) Squadron, having been disbanded shortly after mobilization in 1939, reformed and broken up in 1941, reactivated at Kelly Beach, North Sydney, on 27 April 1942, and soon began to receive Canso flying boats. No 162 (BR) Squadron, created at Yarmouth from 10 (BR)'s Canso 'A' detachment on 19 May, and 145 (BR) Squadron, formed at Torbay eleven days later from the former Hudson detachment of 11 (BR) Squadron, were further welcome acquisitions, though 162 Squadron would remain at detach-

ment strength for many months to come.[79] At Argentia the US Navy replaced its Hudson squadron with two PBY squadrons. But at the same time, the Germans were about to expand their operations. The U-boat campaign in the Gulf of St Lawrence – with its wreckage and victims strewn along the Gaspé shore – would finally bring the war home to Canadians and precipitate a bitter domestic debate over the preparedness and capabilities of the RCAF and the RCN.

13
The Battle of the St Lawrence

The marked expansion of Eastern Air Command's strength in the late spring and early summer of 1942 was concentrated around its oceanic anti-submarine capabilities; but between May and the end of that year two waves of U-boats penetrated the Gulf of St Lawrence, adding a new dimension to the command's – and the RCN's – responsibilities. The harbinger of this new campaign was U-553, which slipped quietly through the Cabot Strait into the Gulf of St Lawrence on 8 May 1942,[1] the first enemy warship in those waters since Canada had become a nation seventy-five years before. Others soon followed, and sea and air resources were so scarce that this additional threat could not be properly countered without dangerously weakening the north Atlantic lifeline to the United Kingdom. To the credit of the Canadian government, it resisted this temptation, even though the U-boats scored a clear tactical victory. Without the loss of a single submarine the U-boats sank twenty-one ships in the gulf and forced its closure to ocean shipping in September 1942. By then the RCN was providing nearly half the escorts between Halifax and the United Kingdom, escorts for virtually all convoys between Boston and Halifax, and eight corvettes for oil convoys in the Caribbean. Armed yachts, a few Bangor minesweepers, corvettes, and Fairmile launches had to defend the gulf as best they could, in co-operation with whatever air forces could be spared after ocean requirements had been met.

With Newfoundland and Cape Breton on the east, the Quebec shore to the north, and Nova Scotia, Prince Edward Island, New Brunswick, and the Gaspé shore of Quebec to the south, the Gulf of St Lawrence is actually an enclosed sea about 250 nautical miles across at its widest point. Anticosti and the Magdalen Islands funnel shipping into pre-determined channels while the St Lawrence River itself, with its broad lower reaches, is navigable as far up as Montreal. The mouth of the river, where tidal effects, temperature gradients, river currents, and the mixing of fresh and salt water cause complex layering that often enabled submerged U-boats to escape detection by ASDIC, proved a fruitful hunting ground for bold submariners.

There had been no defence plan for the gulf until late 1938. During the Munich crisis of that year, the Joint Staff Committee in Ottawa had envisaged seaplane bases at Gaspé and at Port Menier, on Anticosti Island, to guard the western half

of the region, with a seaplane base and aerodrome at Sydney to cover the eastern section and its seaward approaches. However, as mobilization began in late August 1939, Eastern Air Command decided it was more important to cover the Strait of Belle Isle, the northern entrance to the gulf, from a small base at Red Bay, Labrador, than to develop a station on Anticosti Island. Aircraft from Gaspé would cover the gulf, and those from Sydney the Cabot Strait and the waters south of Newfoundland. Only the last part of the plan was immediately practicable since no more than six Northrop Delta floatplanes of 8 (General Purpose) Squadron were available, flying from an improvised base at Sydney River until, in December 1939, new accommodation became available at Kelly Beach.[2]

Naval plans were even slower to develop and it was not until March 1940 that the RCN made provision for an establishment at Gaspé able to support up to seven anti-submarine vessels, including two destroyers. These ships would be kept 'at strategic points along the routes, and rely upon air patrols, with their high mobility and wide arcs of visibility to find and report submarines, and then keep them down until the arrival of the hunting force.'[3]

With no immediate threat and aircraft in short supply, operations in the region were extremely limited during the first two-and-a-half years of the war. The only operational unit stationed within the gulf prior to 1942 was a detachment of 5 Squadron Supermarine Stranraers that flew from an improvised base at Gaspé during the 1940 shipping season. Work began in 1941 on the Gaspé flying-boat station, but the arrival of Douglas Digbys from 10 Squadron at Gander in June 1940 had made the base planned for Red Bay, Labrador, unnecessary: the RCAF in Newfoundland became responsible for guarding the Strait of Belle Isle. As recorded in the preceding chapter, a summer detachment of 116 Squadron Consolidated Catalinas at Botwood assumed a major share of this task during the 1941 shipping season.[4]

By early 1942 Eastern Air Command was able to allocate considerably stronger forces to the gulf and its approaches. However, U-553 appeared soon after navigation opened in the southern gulf when defensive preparations were far from complete. Much work remained to be done at the Gaspé air station; 119 Squadron at Sydney aerodrome would not complete its conversion from Bristol Bolingbrokes to Lockheed Hudsons until early June; and 117 Squadron at North Sydney, the unit that was to provide the Gaspé detachment, was in the preliminary stages of organization. The squadrons at Dartmouth were able temporarily to deploy aircraft to the St Lawrence in an emergency, but at the cost of a serious strain on their resources. Not so pressing was the defence of the Strait of Belle Isle where the ice cleared more slowly. The movement of 116 Squadron at Botwood from its winter station at Dartmouth began with a detachment of four Catalinas at the end of May; the remaining four flying boats arrived in July.[5]

Substantial resources of No 3 Training Command were available to assist the operational forces. By May 1942 RAF schools at Charlottetown, PEI, and Debert and Greenwood, NS, had over 150 Avro Ansons and Lockheed Hudsons on strength. RCAF schools at Summerside, PEI, Chatham, NB, and Mont Joli, Que., had fewer aircraft available, but the bases were well placed and would prove

invaluable.[6] Some of the Training Command Ansons were fitted with bomb-racks and machine-guns, and, carrying a maximum load of 500 lbs of bombs, had an operational radius of 200 miles. The airmen of training establishments, even instructional staff, could not normally be expected to perform as well as experienced operational crews, yet they were still a force to be reckoned with.

These were considerable air resources, but no coherent plan of air operations was in place to meet a real crisis. From the first it was clear that *ad hoc* measures would have to do, while co-ordination with the RCN – which forged ahead with its own plan for defence of shipping in the gulf – was almost non-existent. The navy's plan to work in conjunction with the RCAF to track and attack U-boats which penetrated the gulf had given way to a much narrower scheme simply to escort shipping. Some airmen thought this left the RCAF to carry altogether too much of the load.[7] Naval planners had worked on the assumption of sudden and unheralded attacks in the gulf. 'It is important,' wrote Commodore L.W. Murray when he was deputy chief of the naval staff in April 1941, 'that the officers who will be putting this scheme [on which the 1942 plans had been based] into operation should be firmly in a state of mind which will prevent "panic" when a ship has been sunk. They must remember that there may be one, perhaps two and at the very most three submarines, all of which must leave for Germany at an early date.'[8] The only fault in this prediction was Murray's failure to anticipate the six-week patrols which sometimes took place. In the meantime, the navy's Operational Intelligence Centre [OIC] in Ottawa, here as elsewhere, provided indispensable information on enemy activities. Apart from confirming the presence of a U-boat, high frequency direction finding [HF/DF] turned out to be 'often hopeless' in the gulf, but HF/DF was supplemented by other forms of intelligence and by visual sightings, many of which were made by members of the Aircraft Detection Corps [ADC].[9]

The ADC spread to Newfoundland and Labrador in July 1941, thus encompassing the entire gulf. These unpaid civilian volunteers, keen, diligent, and inexperienced as they were, passed their sightings to a 'reporting centre,' usually the nearest RCAF station, by telephone and telegraph. Their reports, which could never be ignored, were often false alarms. When they were not, communications were sometimes subject to fatal delays. On the Gaspé shore between Ste-Anne-des-Monts and Fox River there was no telephone, only a telegraph line with offices as far as twenty miles apart. At Gaspé itself the RCAF station had neither the personnel nor the accommodation to function properly as a reporting centre. Regional army headquarters was only dimly aware of the ADC system, and in at least one instance told civilians they had to report everything to army intelligence. All too often the first indication of the presence of a U-boat was the news that a ship had been sunk.[10]

Poor communications also hampered the control of military operations. Linkages between the headquarters of the three services in Halifax with the gulf bases were incomplete, leaving no alternative but reliance on the inadequate commercial telephone lines. The situation was particularly difficult for the air force, whose job it was to respond quickly to U-boat reports, a task which required frequent redeployments of aircraft among widely scattered stations.[11]

It was this combination of circumstances, not any particular sin of omission on the part of a navy and air force distracted by competing demands elsewhere, that opened the way to U-553's apparently easy successes. The first to enter the gulf, and the first to sink shipping there, *Korvettenkapitän* Karl Thurmann set the pattern for the battle that he set in motion: U-553's appearance, as a distinguished British airman once said of Eastern Air Command operations, was like putting 'a fox in a flock of hens,'[12] an unkind comparison, but not entirely inappropriate.

The initial air search for the boat was triggered by a false sighting by a civilian observer at Cape Ray, Nfld, on 9 May, the day after U-553 had passed through the area. A USAAF Boeing B-17 Flying Fortress from Gander made an unsuccessful attack on the submarine south of Anticosti Island early on the evening of the 10th. Major General C.G. Brant, commanding the United States Army Air Forces in Newfoundland, did not receive news of the attack until the following morning and then failed to pass it to No 1 Group, RCAF. Air Commodore C.M. McEwen, never friendly with Brant, reported that 'I had to extract it myself' and the news eventually reached Halifax late on the evening of 11 May.[13]

Two Canso 'A's from 5 Squadron at Dartmouth swept the gulf very early on 11 May, while 31 General Reconnaissance School at Charlottetown arranged exercise areas for its Ansons that covered the probable route of the U-boat. That night, however, during the early hours of the 12th, U-553 torpedoed and sank the steamers *Leto* and *Nicoya* north of the Gaspé coast. Before dawn the navy instructed ships due to sail through the gulf to remain in port, and a 5 Squadron Canso 'A' took off from Dartmouth to search the vicinity of the sinkings in miserable weather conditions. Later that day, five Hudsons – three from 31 Operational Training Unit [OTU] at Debert and two from 11 Squadron at Dartmouth – swept the area and twenty-four Ansons from Charlottetown exercised over the central gulf. The Canso 'A' and 11 Squadron Hudsons landed at Mont Joli where they were joined on the 14th by a second 5 Squadron Canso 'A'. This detachment operated over the river and western gulf until early June.

Meanwhile, 119 Squadron maintained a heavy schedule of patrols over the Cabot Strait, and 116 Squadron at Dartmouth began to transfer experienced personnel and Canso flying boats to 117 Squadron at North Sydney. By early June, with seven aircraft on strength, the latter unit was able to fly its full share of operations in the Sydney area, and on the 10th of that month dispatched two flying boats to form the detachment at Gaspé.[14] Warships based on Gaspé and Sydney by the end of May for gulf operations included six Bangor minesweepers (with a seventh joining in early June) three armed yachts and nine Fairmile launches.[15]

These modest air and naval forces had large responsibilities for the defence of shipping. Sydney-Quebec City [SQ–QS] convoys got under way on 17 May, following a route south of the Magdalen Islands so that they would be well within range of RAF Ansons at Charlottetown. On 19 May the first SB-BS convoys between Sydney and Cornerbrook, Nfld, sailed. RCAF squadrons from Sydney provided protection for the ferries *Caribou* and *Burgeo*, on the Sydney-Port aux Basques run, until in June the RCN took full responsibility for guarding these

so-called SPAB convoys. Finally, the RCAF assisted in the protection of two other convoy routes, the LN-NL series between Quebec City and the new air base at Goose Bay, Labrador, and the SG-GS series between Sydney and US bases in Greenland.[16]

No doubt the sinking of two merchant ships seemed an adequate return to the Germans, but the results for the U-boat campaign as a whole would have been more spectacular had the sinkings propelled the Canadians into a large-scale redisposition of forces away from the strategically vital oceanic routes. This the naval and air staffs steadfastly refused to do. As it was, the presence of U-553 kept the gulf in an uproar until the end of May. The all-out air effort did not, in the event, achieve even a single sighting for, after his brief encounter with the Flying Fortress on the 10th, Thurmann played his hand very cautiously, surfacing only at night. Caution, however, deprived him of any further opportunities to attack as the naval control of shipping came into force: only a really enterprising submariner, boldly operating on the surface, could expect to locate and strike at convoys. In addition to the disappearance of steamer traffic, Thurmann also reported the 'very careful air patrol' over the gulf, but BdU did not appear to take that warning very seriously.[17]

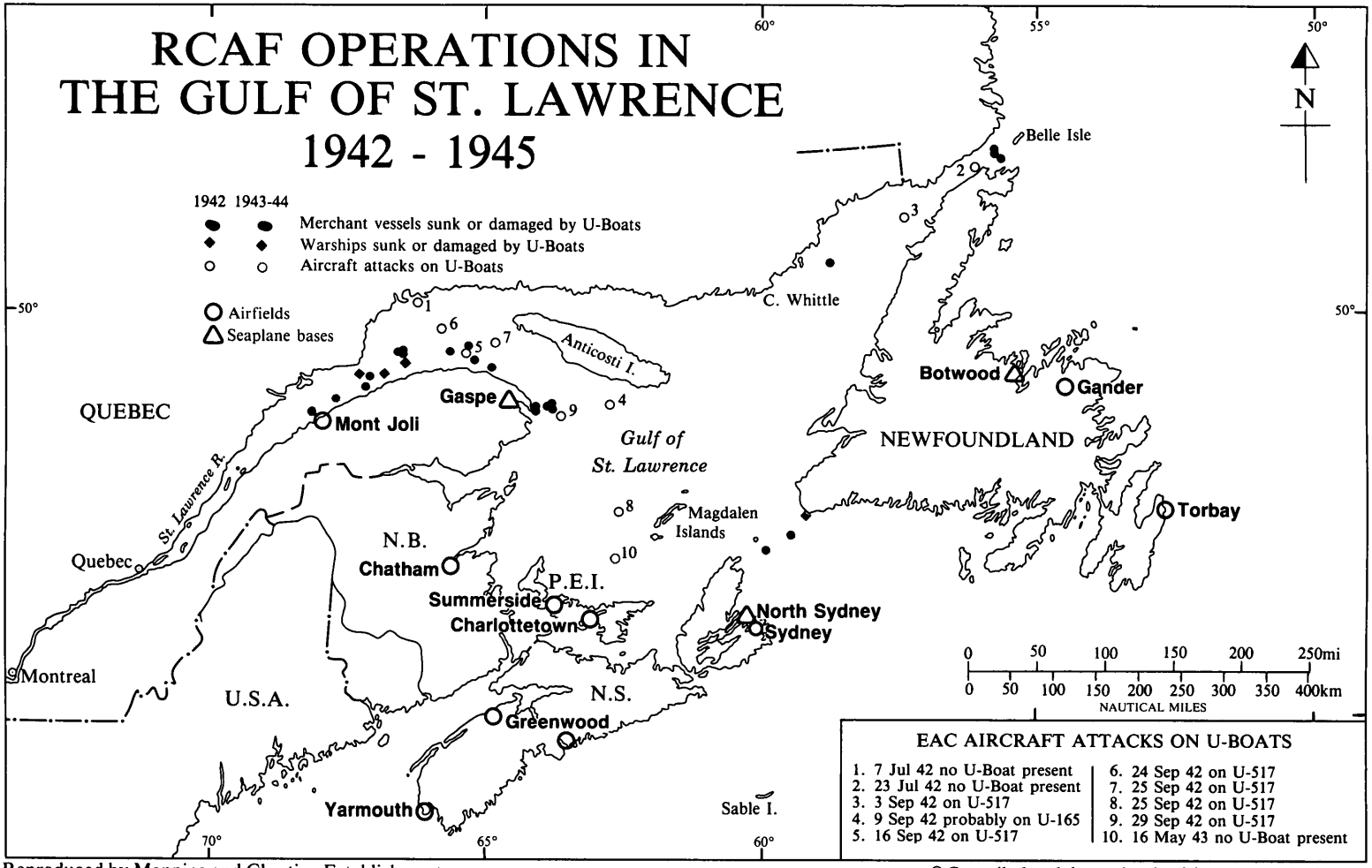
U-553's departure on 22 May, accurately estimated by naval intelligence, was accompanied by some sober reflection. War had suddenly come close to home at a time when acute national controversy over conscription for overseas service was still simmering. The plebiscite of 27 April had split the country on this issue, the nation as a whole supporting the concept but Quebec responding with a resounding 'no.' In Ottawa, Prime Minister Mackenzie King had been about to go into a Liberal party caucus to explain how he would respond to that contradictory mandate when he received the news of the first sinkings. French-Canadian opponents of conscription, he believed, would now see that the war was not a remote affair, and that Canada could not limit its contribution. At the same time enemy operations in Canadian waters created arguments for a stronger emphasis on home defence. He might even be able to avoid sending conscripts overseas. Had Dönitz and the German High Command been privy to King's thoughts they would have marvelled at an unexpected bonus from their strategy; and had there been an enemy spy in caucus he would have listened with delight to King's efforts in presenting the news as dramatically as possible. The day after these events the prime minister reflected that 'Several lives have been lost which would bring home the whole situation to the people as nothing else ...'[18]

He was right. The minister of national defence for naval services, Angus L. Macdonald, announced the loss of one ship to the press on 12 May, and of the second to the House of Commons on 13 May. He did so not because he shared the prime minister's opinions, but because the survivors who streamed ashore on the Gaspé coast had divulged every detail to the press, including the dismal news that the ships had received no warning of a U-boat in the gulf. An additional consequence was that newspaper reports revealed facts likely to be of value to German naval authorities. Macdonald vowed never again to acknowledge such sinkings so soon after the event, and the navy distributed a pamphlet by the

Directorate of Naval Intelligence explaining to the press the ways in which unrestricted publication of news stories could help the enemy.[19] The government of course could not clothe disasters on the St Lawrence in a pall of silence. People living on the shores of the gulf wanted reassurance; they wanted to see troops, ships, and aircraft sent to protect them. Local MPs, especially the Independent member for Gaspé, J.-S. Roy, were bound to point out the long-standing failure to give the Gaspé region any real benefits from the booming wartime economy. For years Roy had been complaining about this neglect; now, albeit with a leap in logic, he could document horrifying results. For its part the Tory opposition, by no means in sympathy with Roy, was glad to seize such a useful opportunity to ridicule the government's war effort.[20]

It was more than a month before the next blow was delivered: U-132 passed through the Cabot Strait on the night of 29/30 June, and following U-553's example, *Korvettenkapitän* Ernst Vogelsang steered directly for the mouth of the St Lawrence River. By the early evening of 5 July U-132 was off Cap Chat, ninety miles upstream from the position of U-553's attacks of 12 May. Air patrols over the area during the day had been restricted to support for convoy SQ 16 in the morning by one of the two Cansos of 117 Squadron available at Gaspé. Shortly after the lone serviceable aircraft returned to base, convoy QS 15 departed its Bic Island assembly area for Sydney; the staff at Eastern Air Command, caught off guard by the convoy's early sailing, made hasty plans to provide air escort at first light on the 6th. Unfortunately, the Germans got there first. In the lingering summer twilight U-132 put torpedoes into two of the convoy's ships, retained contact despite the naval escort's efforts, and two hours later (2307 local time, which was three hours behind GMT and which will be used throughout this chapter) hit another ship, which subsequently sank. HMCS *Drummondville* depth-charged U-132 as it crash-dived following the second attack, but no report of the two attacks reached shore authorities until 0230 – six hours after the first torpedoes had struck.[21]

Because Eastern Air Command usually depended on commercial telephone for communication with the Gaspé region, the air officer commanding, Air Vice-Marshal A.A.L. Cuffe, had decentralized authority, instructing the commanders of Gaspé and Mont Joli to 'take whatever immediate action is necessary on all reports of sightings, in addition to performing the normal functions of a well-coordinated plan.'[22] However, on 5/6 July this system simply was not working. The first thing Gaspé knew of the attack was a phone call from Halifax ordering the two Cansos on detachment from Sydney to take off just before 0300 hours on the 6th. Fog prevented flying until after noon. At Mont Joli a telephone call from the naval detachment at Rimouski prompted some hasty action which turned out to be of a futile and ultimately tragic nature. The most suitable available aircraft were Curtiss P-40 Kittyhawks of 130 (Fighter) Squadron, temporarily based at the station. Groundcrew rushed to fuel and arm the fighters, and four of them took off into the darkness an hour later. Squadron Leader J.A.J. Chevrier, the first to be airborne, never returned, and civilian reports suggest he crashed into the sea near Cap Chat. In the meantime, the groundcrew had to install racks and a pair of depth charges on two Fairey Battles



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of 9 Bombing and Gunnery School. At 0445 two pilots took off, knowing that the engines in the aircraft were not dependable; there may not even have been radio equipment on board. None of these brave efforts was successful, and it was adding insult to injury when the RCAF had to respond two weeks later to rumours reaching the House of Commons 'that the pilots at Mont Joli were all drunk and out with women at the time of the sinking.'[23]

In the wake of the new disasters the navy assigned six corvettes to the gulf, while three Hudsons from 119 Squadron at Sydney and three from 113 Squadron at Yarmouth, NS, went to Mont Joli, where for the remainder of the navigation season there was always a detachment from one of these squadrons or from 11 (BR) at Dartmouth. On 7 July an Aircraft Detection Corps report from Sept Iles resulted in the apparent sighting by a Hudson of 119 Squadron of a periscope feather – the spray thrown up behind the periscope of a moving submarine -and the aircraft attacked. U-132 was far away, however, near the Gaspé coast, and German records do not reveal any other U-boat in the gulf at this time. Whatever the aircrew had seen, it was not a submarine.[24]

The first U-boat campaign in the gulf was also, of course, an extraordinary situation for the remote and peaceful communities along the Gaspé coast. Even though the press obediently kept silent, word spread like wildfire through southeastern Quebec after the survivors came ashore on 6 July. J.-S. Roy could contain himself no longer and rose in Parliament on 12 July to announce that three ships had been sunk in convoy. He then repeated the demand he had been making since May for a secret session of the House of Commons. Angus L. Macdonald was furious. Roy was committing a breach of security, and he was undermining the government's well-considered war policies. 'If he [Roy] thinks for one moment that the whole Canadian navy is going to line up along his shores only, letting the convoy system we have and the protection we have for all the rest of Canada go to the dogs, he is making a tremendous mistake. I am not ready to change the disposition of one ship of the Canadian navy,' Macdonald concluded, 'for him or all the questions he may ask from now until doomsday.'[25]

The intensity of the minister's language reflected his commitment to his service and its intention not to be distracted by the gulf campaign, and perhaps echoed some of the bitterness surrounding the recent conscription controversy. He was evidently against a secret session of Parliament, but cooler heads prevailed: members of all parties, including a number of Quebec Liberals, endorsed the idea.[26] Adélard Godbout, the Liberal premier of Quebec, warned the prime minister that 'a perilous situation exists' because the population was bewildered and nervous, and rumours were legion. Godbout had it from 'two reliable sources' that two men, possibly landed from a submarine, had attacked the wireless station at the Mont Joli aerodrome. King, always sensitive to what Godbout legitimately called 'incalculable elements of danger to the safety and security of Canada,' ordered the secret session for 18 July. This allowed Macdonald and C.G. Power, the air minister, to reassure members about the naval and air measures to defend the gulf, Power seizing upon the Hudson attack on a false contact of 7 July as a 'probable sinking.'[27] For the time being the critics were silenced; they did not react strongly when U-132, attacking QS 19 off Cape Magdalen on 20 July, sank another freighter.[28]

It was the success of anti-submarine measures elsewhere on the eastern seaboard of Canada and the United States that exposed the gulf to its next and worst ordeal. Searching for soft spots in the shipping defences, Dönitz had deployed three U-boats off the Strait of Belle Isle by the last week of August 1942. Two of them, U-517 and U-165, proceeded into the gulf where, over the next six weeks, they carried out the most successful German patrols of the war in gulf waters.[29]

Air coverage of the gulf and its shipping at this time was largely unchanged from what it had been at the time of U-132's cruise. The Newfoundland squadrons continued to guard the Strait of Belle Isle, and 117 Squadron operated three Cansos from Gaspé, while at Mont Joli the 113 Squadron detachment, which had been expanded to seven aircraft after the sinking on 20 July, was reduced to four Hudsons on 1 August. (On the 3rd these were replaced by four similar aircraft from 119 Squadron.) But in confined waters and narrow channels, air coverage of shipping, even when it was almost continuous, was no protection against submarines lying in wait, as evidenced by U-165's and U-517's first successes in the northern reaches of the gulf. The prey was LN 6, a tiny Quebec-Goose Bay convoy, and SG 6, a group of American ships bound from Sydney to Greenland under US navy escort and, at the time of the attack, a Digby from 10 Squadron. The US Army transport *Chatham* was faster than the other ships of SG 6 and was permitted to forge ahead under naval escort but beyond the circuits flown by the convoy's air escort. *Chatham* was torpedoed and sunk by *Kapitänleutnant* Paul Hartwig's U-517 in broad daylight on 27 August, just as the two convoys were entering the Strait of Belle Isle. HMCS *Trail*, the escort of LN 6, which had slipped in between the main body of SG 6 and *Chatham*, sent its two charges to shelter in Forteau Bay while it conducted rescue work. Meanwhile, SG 6 sailed on under continuous air cover. At 2130 that night, when the 116 Squadron Catalina on task was apparently patrolling at some distance from the convoy, U-165 (*Korvettenkapitän* Eberhard Hoffman) and U-517 torpedoed the merchantmen *Laramie* and *Arlyn*. *Arlyn* sank, but *Laramie* was able to limp back to Sydney.[30]

LN 6 now turned back to Gaspé to join up with the two ships of LN 7, and the combined convoy sailed on 2 September with two escorting corvettes. The OIC warned them that day that the U-boats had detected them. The Canso on task from Gaspé lost the convoy in heavy fog about midday. U-517, lying in wait about one hundred miles southwest of the Strait of Belle Isle, sank the freighter *Donald Stewart* in the early morning hours of 3 September.

At daybreak a Hudson from Sydney, with a Digby and a USAAF B-17 from Gander, provided air cover, sweeping the strait in daylight hours. This led to the first actual RCAF air attack in the gulf. Flying Officer J.H. Sanderson of 10 Squadron sighted U-517 in the southern approaches to the strait a few minutes after noon. The submarine had been on the surface for hours and had dived several times because of aircraft: better air search techniques would no doubt have resulted in an earlier detection. Now the Digby, descending from a search altitude of 900 feet, attacked from 150 feet. The U-boat had been submerged for twenty seconds and the only damage inflicted was on the aircraft, from the

premature explosion of a depth charge. Hardly a model attempt, the effort at least saved the convoy from further loss.[31]

At the other end of the gulf U-165 was on the prowl, penetrating the mouth of the river, and by 7 September U-517 had arrived off the Gaspé. The OIC concluded from a number of sources that two U-boats were operating in the gulf and air activity increased as a result. The 119 Squadron detachment at Mont Joli was reinforced by aircraft from 11 Squadron to a total strength of six Hudsons, and Eastern Air Command made extensive use of the Hudsons and Ansons of the OTUS at Greenwood and Debert, NS, and the general reconnaissance schools at Summerside and Charlottetown, PEI. Despite these efforts not every convoy was effectively screened. Weather prevented proper support for QS 33 during its passage of the lower St Lawrence River and although nine sorties were flown in the general area, U-165 and U-517 were able to sink four ships and the armed yacht *Raccoon* off Cap Chat on 6 and 7 September.[32] Without radar, which, even if fitted, was little more than a navigational aid at this time, the airmen were almost blind in conditions of poor visibility.

Eastern Air Command responded by sending three more Hudsons from 113 Squadron, Yarmouth, to Chatham, NB, and a Canso 'A' from 5 Squadron, Dartmouth, to Sydney. The Chatham aircraft, described as 'a special Submarine Hunting Detachment,' acted as a striking force in the central gulf.[33] On 8 September DF bearings, sightings, and a radar contact by the corvette *Summerside* indicated a U-boat off Gaspé and another northeast of Anticosti. Intensive air searches began again, with the Chatham Hudsons performing a 'general A/S [anti-submarine] Search' east of Gaspé.

No 113 Squadron had been the first Eastern Air Command unit to implement Coastal Command's recent tactical innovations by adopting white aircraft camouflage and high patrol altitudes of up to 5000 feet instead of 1500 feet or less; the new methods had quickly proved their value in the squadron's operations from Yarmouth, and did so again in the gulf. On the forenoon of 9 September, Hudson 403, flown by Pilot Officer R.S. Keetley, swooped down from 4000 feet on U-165 about twenty miles south of Anticosti. Because he first mistook it for a sailing boat – 'The conning tower was painted white and the hull sea green,' he claimed incorrectly – Keetley's first pass was too high and the submarine dived eight seconds before the attack.[34] However, his report brought out two corvettes and a Bangor minesweeper to search the area. Subsequent sightings and attacks, although unsuccessful, were enough to make U-165's captain report that air patrols made it difficult to contact convoys east of Gaspé and south of Anticosti.[35] In the narrow confines of the gulf it was still easy for U-boats to locate and attack targets. The very boldness of the submarines furthered their success. On 11 September U-517 was seen off Cap Chat by onlookers on shore just a few minutes before she sank the corvette *Charlottetown* in broad daylight, but Hartwig had gone before aircraft arrived on the scene.[36] On 15 and 16 September, in the same region, U-517 and U-165 had a field-day with SQ 36, a large convoy of twenty-two ships. Undetected by the Canso of 117 Squadron flying patrols ahead of the convoy in clear bright weather, U-517 was spotted by an ADC observer on the surface an hour and a half before she attacked.

By the time the observer's report, transmitted through army channels, had been received, Hartwig had submerged ahead of the convoy, sinking two ships in the afternoon. Subjected to heavy counter attack by the large naval escort – seven ships in all, including a British destroyer – U-517 sustained only minor damage.[37] Air coverage for SQ 36 was taken over by a Canso 'A' from 5 Squadron which stayed on through the night but was unable to prevent further loss when SQ 36 encountered U-165 lying in wait, submerged, off Cap Chat, to sink two more ships and damage a third just before dawn.[38]

Eleven ships sunk in two weeks was a staggering blow, and the U-boats still appeared to be in full cry. DF bearings brought out the Hudsons from Chatham on 16 September and Pilot Officer Keetley spotted U-517 north of Cape Magdalen at about 1000 hours. Keetley reported bracketing the surfaced U-boat with four Amatol charges, but perhaps because they were spaced too far apart, or because they simply were not powerful enough, the charges caused no serious damage. Then for about a week no more was heard from the Germans.[39]

It was at this difficult time that the British government asked for Canadian escort vessels to support Operation 'Torch,' the North African landings. Compliance would mean withdrawing most of the naval escorts from the Gulf of St Lawrence and the west coast, thus shifting much more responsibility on to the air force. There is evidence that the navy had been leaning towards such a solution for some time, because they lacked the escorts necessary to protect gulf convoys adequately in 1942 and saw no improvement on the horizon for 1943. Shipping authorities, too, preferred to eliminate the movement of ocean traffic through the gulf because the thousand-mile passage to Montreal was a drain on critically short merchant tonnage and cargoes could always be moved by rail to east-coast ports. On 9 September the Cabinet War Committee approved a naval staff recommendation to meet the request for 'Torch' escorts by closing the St Lawrence to overseas shipping. The prime minister, moved by Winston Churchill's personal appeal, supported the step with grave reservations. He was sure it would mean more sinkings, and he argued perceptively that the corvettes so important to home defence might prove to be a relatively insignificant contribution to the 'Torch' landings. Even though the chief of the naval staff insisted the ships be returned by April 1943, King's 'fear and guess was that they will all either be gone or be kept by British for continental purposes for an early offensive when Spring comes.'[40]

Within hours of the Cabinet decision Naval Service Headquarters signalled the Admiralty that all ocean shipping bound for the St Lawrence should be diverted to Halifax, Sydney, or Saint John, NB. The navy had hoped to phase out the SQ-QS series, but this proved to be impossible because 40 per cent of the ships that sailed in the convoys were engaged in coastal trade that was essential both to the economy of the region and to the operation of major industries there. Immediate steps, however, almost halved the convoy cycle, and all but one corvette, which was being refitted in Nova Scotia, two Bangors, and the flotilla of six Fairmiles, ceased operations in the gulf in the following month. Shipping control authorities compensated by bringing in more varied and flexible convoy routes.[41] Slim pickings and unpredictable patterns would, it was believed, encourage U-boats to look elsewhere for their prey.

Eastern Air Command did not share that optimism. In spite of severe demands on Canso and Hudson squadrons in Nova Scotia, explained Group Captain M. Costello, senior air staff officer in Eastern Air Command, the air force had failed to achieve a sufficient 'concentration of operational aircraft to drive the enemy from the area.'[42] Air Vice-Marshal Cuffe, who was proposing a temporary withdrawal of all Hudsons and Cansos from Yarmouth in order to reinforce the gulf, had directed Costello to request authority from Air Force Headquarters 'to ask the Americans to take over the air protection of all convoys west of latitude 65 ... as long as is necessary for us to concentrate in the Gulf area.' On 17 September Air Marshal Breadner approved, 'as a temporary measure only, subject to US forces using Yarmouth for refuelling and to their not otherwise using the base ...' The US First Air Force moved into the Yarmouth patrol area on 18 September, and North American B-25 Mitchell bombers from Westover Field, Massachusetts, periodically landed at Yarmouth to refuel until late in October. Although the Canso 'A's of 162 Squadron did not leave Nova Scotia for the time being, 113 Squadron, commanded by Squadron Leader N.E. Small, immediately sent its remaining Hudsons to Chatham.[43]

Small was Eastern Air Command's outstanding pilot and its most conscientious student of maritime airpower. A prewar sergeant pilot in the RCAF, Small had left the service in 1937 to fly commercially before rejoining in 1939 as a pilot officer. His early wartime career was spent as an advanced flying instructor and, in the spring of 1941, as a ferry pilot. His five transatlantic flights in Catalinas marked him for assignment to 116 Squadron in July 1941, as that squadron took delivery of the type. Described by senior officers as a 'master pilot' and 'excellent tactician' possessed of a 'burning desire "to get on with the job,"' Small had received command of the newly organized 162 Squadron in May 1942. A month later he took over 113 Squadron and was awarded the Air Force Cross.[44] Under his inspired leadership, the unit soon achieved great things at Yarmouth (see Chapter 14) and, as already noted, its Chatham detachment made two of the three confirmed attacks on U-boats in the gulf. With the reinforcement of the detachment in late September, the squadron's exploits would considerably brighten the otherwise gloomy record of the effort to defend the St Lawrence.

On 25 September Hartwig, in U-517, reported the reduction in convoy cycles and the 'constantly strengthened' air patrols. The last observation was made with some feeling, no doubt. Only the day before a Hudson of 113 Squadron, escorting convoy QS 37, sighted the U-boat southeast of Sept Iles. Dropping sea markers, Flight Sergeant A.S. White flew back to warn the convoy and on returning was able to attack U-517 about five seconds after the conning tower had disappeared under the sea. A blown fuse prevented the release of three depth charges, and only one dropped. But U-517 had been put down, and after dark the largest night operation yet undertaken saw at least five aircraft on task for search and escort duties. About an hour before midnight another Hudson from Chatham, flown by Flying Officer M.J. Belanger, carried out a fine moonlight attack, catching U-517 completely by surprise and shaking the submarine with two 'violent' explosions close astern. After daybreak the next morning another Chatham-based Hudson in support of convoy QS 37, piloted by Flight Sergeant

M.S. Wallace, sighted and forced U-517 to dive on two occasions. Later that afternoon Belanger, patrolling just below cloud cover, attacked the U-boat again, this time with slightly less accuracy, as U-517 crash-dived. No sign of damage appeared and airmen began to feel that the fault lay with the Amatol-filled Mark VIII depth charges. Nevertheless, the crews of 113 Squadron's Hudsons had scored a remarkable seven sightings and three well-executed attacks on U-517 in twenty-four hours.[45]

That U-517's captain persisted through these constant alarms speaks volumes for his determination, but Eastern Air Command was equally determined in its pursuit. Six Ansons from the RAF's 31 General Reconnaissance School, Charlottetown, flew the school's first extended night patrols on 25/26 September. According to the station diary, 'A large convoy on its way through our area was threatened by three [naval intelligence actually estimated two] enemy submarines. The unit volunteered to escort all night. There was a full moon and a clear sky. Escort with aircraft armed with two 250-lb bombs was maintained till dawn.'[46] As it happened, the Germans had shifted their attention to the Cabot Strait, but they were back a few days later. Before dawn on 28 September U-517 attacked QS 38 off Gaspé without success. In the meantime, 113 Squadron once again began to fly sweeps over the operating area, taking their Hudsons to 5000 feet and once again the new tactics paid dividends; on 29 September Flying Officer Belanger surprised U-517 twenty miles off the Gaspé coast. Diving from the high patrol altitude, Belanger attacked the fully surfaced U-boat with four depth charges. He described the result in some detail: 'The charges were seen to explode all around the hull slightly ahead of the conning tower. One large explosion occurred around the hull ... The U-boat's bow came up out of the water and all forward action stopped. It then appeared to settle straight down. The sea was very rough under the influence of a 31 knot wind and no evidence of wreckage, oil or air bubbles was observed in the one hour and 55 minutes that the aircraft remained in the area.'[47] Like so many before him, Belanger had been deceived by appearances. Hartwig acknowledged that the depth charges were 'well-placed,' but Squadron Leader Small's belief that Belanger had destroyed U-517 was ill-founded. US naval analysts concluded from the photographs on which Small based his assessment that there had probably been an 'overshoot.' Their assessment, 'probable slight damage,' was correct.[48]

Nevertheless, Belanger was later awarded the Distinguished Flying Cross for his service in Eastern Air Command, and he subsequently added a Bar to it for his achievements in the RAF's Bomber Command during 1944.

Momentum was beginning to shift away from the U-boat commanders, but to Admiral Dönitz it still appeared that 'Defences proved comparatively weak and were limited to direct convoy escorts.'[49] More U-boats were already on their way to the region, and there were plans to send further reinforcements. Of the two assigned to the St Lawrence, only U-69, a minelayer which had been operating in Chesapeake Bay, actually entered the gulf, passing through the Cabot Strait on 30 September. By 5 October it was north of Gaspé, shadowing QS 39, but intelligence received at Eastern Air Command three days earlier had indicated

there was a submarine in the vicinity of the convoy and there was constant air cover, including night escorts on 4-6 October. The navy diverted the convoy from the usual shipping route to one north of the Magdalen Islands.[50]

DF bearings obtained on 5 and 6 October suggested that a U-boat was now as far up river as Rimouski. Other intelligence reports on the 6th and 7th indicating that a submarine was off Gaspé and the Baie de Chaleur led the Hudsons at Chatham to investigate, but they came up empty handed. There was no U-boat in the central gulf. Once again, the real danger lay in the river, as convoy NL 9 discovered when, bound from Goose Bay for Quebec, it approached Rimouski on the night of 8/9 October. The air escort remained only until nightfall. A Hudson from 113 Squadron's detachment at Mont Joli flew a sweep beginning at midnight on the 9th but was not assigned to the convoy, and was not present an hour later when U-69 torpedoed and sank the merchantman *Carolus*. Naval escorts counter-attacked with depth charges, and Hudsons from Chatham searched for the submarine from before dawn on the 9th until the afternoon of the 11th, but U-69 slipped out of their grasp.[51]

Eastern Air Command strengthened the defences at Mont Joli on 10-11 October with two Canso 'A's from 162 Squadron at Yarmouth, but by then U-43 and U-106 were presenting a new threat in the Cabot Strait. At risk were two merchantmen escorted by the armed yacht HMCS *Vison*, which had just sailed from Cornerbrook, Nfld, for Sydney on 10 October. A Canso from 117 Squadron at North Sydney met the convoy at daylight on the 11th, and began to fly an inner anti-submarine patrol a half mile from the ships at an altitude of only 750 feet. Conditions were miserable – low visibility, drizzle, rough seas, and low clouds. About an hour before noon U-106 torpedoed SS *Waterton* in a submerged attack near the centre of the Cabot Strait; *Waterton* went down in eight minutes. The Canso, diving down through debris from the cargo of paper thrown up by the explosion, saw no trace of a torpedo track or periscope in the high seas.[52]

Three days later the ferry *Caribou* departed from Sydney for an overnight passage to Port aux Basques, Nfld, with the usual escort of a Bangor minesweeper, HMCS *Grandmère*, but without air cover. Shortly after midnight in 'fair' weather and 'very good' visibility, U-69 fired a torpedo into the ferry in a surface attack. *Caribou*, only forty miles from her destination, quickly sank. *Grandmère* sighted U-69 and increased to full speed to ram, but the submarine crash-dived. *Grandmère* then dropped eighteen depth charges, but raised only a small amount of oil. She rescued 103 survivors from the ferry, of whom two died subsequently, bringing the number of lives lost to 136, including seventy-nine civilians and fifty-seven service personnel. This tragedy resulted in a twenty-four-hour sweep of the Cabot Strait, by Hudsons of 119 Squadron and a 117 Squadron Canso, all from Sydney, but again U-69 made good its escape. From 30 October to about 8 November three Hudsons from 113 Squadron's Chatham detachment operated from Sydney to strengthen air cover over the entrance to the gulf. Regular air escort was also provided for SS *Burgeo*, the remaining ferry on the Sydney–Port aux Basques run.[53]

After sinking *Caribou*, U-69 left the gulf, reporting by radio to U-boat headquarters that the attack on *Carolus* in the St Lawrence River on 9 October

had brought down quite formidable defences: 'strong sea patrol and constant patrol by aircraft with radar ...' On 22 October U-106 confirmed this report on leaving the area, signalling, 'Nothing sighted in ... [the St Lawrence River]. Heavy defence since 16 October.' U-69, located south of Newfoundland by HF/DF after unsuccessfully attacking the freighter *Rose Castle*, was in turn attacked without success on 21 October by a Hudson from 145 (BR) Squadron, Torbay. At the end of the month BdU recorded that U-43 had patrolled the mouth of the St Lawrence 'for seventeen days and operated on two convoys without success.' As Admiral Dönitz went on to note, 'Sea escort in co-operation with air [was present] on a larger scale.' Frustrated by vastly improved defences and more effective routing of shipping, U-43 left the gulf by 10 November.[54]

In the meantime, on 8 November U-518 (*Kapitänleutnant* Friedrich-Wilhelm Wismann) arrived off New Carlisle, PQ, on the north shore of Baie de Chaleur, to land a spy, Werner Janowski, who was promptly arrested by the Quebec Provincial Police. Wismann then slipped away to operate off Gaspé, unaware that the gulf was now closed to all but local traffic. There, in the words of the BdU war diary, U-518 found 'only occasional single ships sailing close to land. Slight surface patrols, no night air patrols. Meagre prospects of success.' Consequently, by 17 November the boat had gone to patrol off Halifax.

It is worth noting that Janowski was the second German agent to land in Canada. Six months earlier, on the night of 13-14 May 1942, U-213 had put ashore an agent named Langbein, about 30 miles south west of Saint John, NB. The Canadian services did not receive any intelligence concerning this mission, but no harm resulted. Langbein buried his radio transmitter near the landing site and undertook no subversive activities. Having lived innocuously in Montreal and Ottawa for two-and-a-half years, he turned himself in to the RCMP in November 1944.[55]

So long as U-boats still appeared to be in the gulf in late 1942, Eastern Air Command did not reduce the strength of the gulf detachments very much. Aircraft still provided escorts for convoys, performing regular sweeps, as well as searching areas where submarines had been sighted or located by DF bearings. Early in December the Gaspé Canso detachment finally left for North Sydney. On 13 December the 113 Squadron detachment at Chatham set out for Yarmouth. Part of the Mont Joli detachment remained until 23 December. QS 46, the last of the gulf convoys for the season, arrived at Sydney on 7 December.[56]

With the sinking of *Caribou* on 14 October the U-boats had drawn their last blood for 1942. But even before news of her destruction and the heavy loss of life was released, public outcry over the handling of gulf defences had boiled up again in the press. Three articles by Edouard Laurent in *L'Action catholique* of Quebec City on 14-20 October 1942, under the title 'Ce qui se passe en Gaspésie,' made particularly grave accusations. At least forty ships had been sunk in the St Lawrence, he claimed, while Gaspesians had never seen an aircraft escorting a convoy. Perhaps the federal government's 'red tape' had hamstrung the defences. When Mayor Louis Keable of Mechins had reported a U-boat close off shore near the RCAF Station at Mont Joli, Laurent reported, the air force had then asked Ottawa for instructions and waited until two members of the RCMP

travelled twenty-eight miles from Matane to confirm the sighting: an aircraft arrived over Mechins a full eight hours after the initial report. With such stories Laurent captured the 'atmosphère de malaise et d'angoisse' in the Gaspé region, and raised a fundamental question: Why was Canada incapable of defending her own shores when she had raised so many thousands of soldiers, sailors, and airmen to fight overseas?[57]

The director of public relations in the Department of National Defence considered it 'significant' that Laurent 'is or has been associated with Mr. Duplessis,' leader of the Union Nationale opposition.[58] But it was Duplessis's opponent and nemesis, Premier Godbout, who sent copies of all three articles to King with the recommendation that they were 'the most complete and objective articles I have seen on the subject.'[59] A major English-language paper, the *Toronto Telegram*, printed one of the articles in translation and heartily endorsed Laurent's position. Laurent's timing was excellent: he published just as news of the October sinkings became public. When on 15 October Angus L. Macdonald announced the sinking of *Carolus*, detailed accounts in the press emphasized that the ship had gone down only 200 miles from Quebec City; news of the *Caribou*'s demise and the heavy loss of life was in the papers by 17-18 October. J.-S. Roy profited from all these revelations by renewing his public campaign to have the government strengthen the St Lawrence defences, receiving support from Jean-Francois Pouliot, a renegade Liberal MP for Temiscouata, and at least two Union Nationale members of the Quebec legislature.[60]

The government moved quickly to rebut the charge that the gulf had been incompetently and weakly defended. Air minister Power supplied Godbout with AFHQ's detailed response to Laurent's articles. The latter were clearly an exaggeration. For example, in the incident concerning Mayor Keable of Mechins, which took place on 19 July, the mayor had informed the RCMP, not the RCAF. The RCMP had phoned the Mont Joli station and fifty-six minutes after the report, not 'a full eight hours,' the aircraft was over the position of the sighting.[61] Power also asked a Liberal organizer in Rimouski to approach Laurent and *L'Action catholique* with evidence disproving allegations of the navy's negligence. On 2 November Louis St Laurent, King's minister of justice, publicly declared that not forty, but only ten to fifteen ships had been sunk in the gulf, and on 24 November Macdonald announced that fourteen had been sunk in the gulf and another six in the Strait of Belle Isle and the Cabot Strait. No doubt to counterbalance the bad news, in mid-December Power released a colourful and detailed account of Pilot Officer R.S. Keetley's two attacks during September.[62]

Whatever the alarm and despondency, and however justified, one thing was certain: the RCAF had exerted enormous efforts to defend the gulf in 1942. Approximate figures compiled at command headquarters in December show that between May and October a total of 5126 operational flights took place in Eastern Air Command, of which 1590, or 31 per cent, were over the gulf.[63] Even this estimate does not reflect the full scale of gulf air operations, as it does not include flights over the Strait of Belle Isle, or the thousands of training flights from Summerside and Charlottetown. During the same period there were

twenty-four air attacks on U-boats in Eastern Air Command. Of these, seven were in the gulf and two more in the Strait of Belle Isle. If the defence of the St Lawrence was a commitment the navy did not want, then the air force, to an important extent, stood in for the senior service.

There is no doubt that the German campaign in the gulf during 1942 scored a clear victory for Admiral Dönitz. Nineteen merchant ships and two escorts were sunk and the Canadians were forced to restrict the movement of ships to and from St Lawrence ports. In exchange, no U-boats had been destroyed and, despite the remarkable efforts of 113 (BR) Squadron, the air force and the navy proved unable to inflict lasting damage on a resourceful enemy. Ineffective tactical procedures and the unavailability of shallow-set Torpex depth charges prevented the sinking of a single submarine, but German records show it was air patrols more than any other single factor that kept the U-boats at bay in the Gulf of St Lawrence for three weeks after 16 September, and from 14 October until the end of the shipping season.

As the 1942 shipping season drew to a close the lessons of the year's campaign – including those bearing on domestic politics – were already shaping plans for the defence of the gulf in 1943. To co-ordinate the efforts of the three services and ensure co-operation with other federal departments and provincial authorities, in December 1942 the chiefs of staff appointed a committee under the chairmanship of Air Vice-Marshal N.R. Anderson, air member for air staff, with representatives from army and naval headquarters.[64]

The navy, determined to avoid an expanded commitment in the gulf, continued to restrict ocean-going traffic to the barest minimum during 1943. It was not possible, though, to stop the shipment from gulf ports of minerals, timber, and pulp and paper that were vital to the Allied war effort, nor to close down the coastal traffic that sustained much of the region.[65] The naval staff expected the air force to carry a heavy share of the inevitable burden. Captain H.N. Lay, director of the Operations Division at Naval Service Headquarters, reminded his air force counterparts that 'although in 1939 and 1940 U-Boats were operating principally in coastal waters around the British Isles, now, due to the excellent work of the RAF Coastal Command and many successful air attacks against U-boats, there were practically no U-Boats operating in these waters.' Lay concluded that 'provided adequate aircraft and suitable bases were available [the RCAF] could produce the same results in the Gulf ...'[66]

Air Vice-Marshal Anderson did not need to be given this advice; he certainly had every intention of emulating RAF Coastal Command, and prepared to make available almost double the forty-eight aircraft that had been in the area during periods of peak activity in the previous year, including those at Gander and Botwood, Nfld. The plan was to increase the strength of each squadron from between eight and twelve to fifteen aircraft, to send a Canso 'A' squadron (No 162) into the gulf and move 113 (BR), a Hudson squadron, from Yarmouth to Sydney, where it would reinforce the Catalina and Canso flying boats of No 117 and the Hudsons of 119 (BR). If required, 113 (BR) would send a detachment of five aircraft to Chatham, NB. Improved aircraft would also be available. No 113 was scheduled to re-equip with Lockheed Venturas, a medium-range bomber

that resembled the Hudson but could fly faster (a maximum of 318 mph as compared to 250 mph for the Hudson) and carry six 250-lb depth charges in place of the Hudson's four. In the event of a major U-boat assault, the St Lawrence defences could be further strengthened by 150 Squadron, with fifteen Venturas, which was slated to organize at Yarmouth and earmarked for service in Western Air Command. The number of training aircraft at schools around the gulf would also rise; 386 would be available in 1943 as compared to 259 in 1942.[67]

This ambitious scheme depended on squadrons as yet unformed or in the early stages of organization, and there were differences between the views of the staffs in Halifax and Ottawa. Headquarters intended to concentrate the weight of the St Lawrence defences at Sydney, while Eastern Air Command wanted to distribute aircraft more evenly through the gulf, and use the additional Canso 'A' squadron, 162 (BR), elsewhere in the command. When aircraft began to move to the gulf at the end of April and the beginning of May 1943, the command view prevailed because it reflected the resources actually available.[68]

There was much more to do in preparing defences than allocating aircraft and warships. Experience in 1942 had shown that a stronger command structure and better interservice co-operation were essential. From the beginning of the 1943 season the station headquarters at Gaspé controlled Eastern Air Command units within the gulf, which were now known as No 5 or the 'Gulf' Group. No separate group headquarters was established, command being exercised by the station commander at Gaspé, which became a group captain's rather than a wing commander's appointment, and additional staff was provided to carry the increased operational responsibilities. The Gaspé headquarters, which had no control over the squadrons at Sydney and Botwood, possessed nothing like the independence of No 1 Group in Newfoundland, and in fact functioned as an advanced controller for Eastern Air Command.[69] The naval and air staffs at Gaspé continued to share a single operations building, but a combined operations room, like those in St John's and Halifax, appears never to have been established.

While both services professed that the arrangements at Gaspé were satisfactory, the logs of the gulf air controller for 1943-5 refer to the navy as a remote entity, and leave the impression that relations were still not so close as they might have been.[70] At Sydney, which played as large a role in gulf operations as Gaspé, Captain C.M.R. Schwerdt, the naval officer in charge, pressed for the establishment of a combined operations room. Because the air and navy operations rooms were miles apart, there was a greater need than at Gaspé, but Eastern Air Command balked, apparently because the navy wished the air force operations staff to move to the Point Edward naval base. Finally, in June 1943, at Admiral Murray's urging, the air force promised to send a liaison officer to the naval operations room.[71] Meanwhile, to improve co-operation at lower levels, aircraft from the squadrons allotted to the gulf participated in exercises with Fairmile flotillas, primarily in St Margarets Bay, from February to April 1943.[72]

Failures in communication had seriously hindered operations during 1942. On the advice of the army, navy, and air signals staffs, Anderson's co-ordinating committee recommended a far-reaching programme at the end of January 1943

that included over-lapping wireless, telephone, and teletype systems linking the gulf stations with Halifax (and in some cases Ottawa) for each of the three services. In addition, wireless communication was to be provided for the Aircraft Detection Corps and the units of the Reserve Army on coast watching duty, and civilian telephone and telegraph systems refurbished and extended throughout the gulf.[73]

The report of the Anderson committee received the Cabinet War Committee's approval in principle on 18 February 1943. By this time the Department of Munitions and Supply had formed a crown company, Defence Communications Limited, to carry out many projects in the vast Atlantic coast communications programme, of which the gulf's requirements were only a part.[74] Difficulties in dealing with many small telephone companies, unavailability of equipment, winter weather, and the physical isolation of much of the coastline frustrated the Anderson committee's hope that the principal improvements in the gulf communications could be completed by 1 May 1943. Nevertheless, good progress was made. On 19 May 1943, for example, the army, which was in charge of the construction of landlines along the north shore of the Gaspé peninsula, reported that work was well under way on the western sector, was about to begin on the eastern sector, and that a chain of wireless stations for interim communication was nearly ready for service. In the event, the landlines were finally reported complete in mid-September.[75]

Observers on shore were at best uncertain sources of information. In the narrow waters of the gulf, shore-based radar stations offered the promise of better reliability. The air force had no suitable equipment, but the National Research Council advised that the army's GL Mark III sets, normally used to control anti-aircraft artillery, would do the trick; tests suggested that a surfaced U-boat could be followed at ranges of 25,000 yards. At the end of March the army responded to the air force's request by allocating ten GL sets for deployment at intervals of roughly ten miles along the coast between Matane and Gaspé, and organizing No 1 Radio Direction Finding Operating Unit, Royal Canadian Artillery, to man the installations. On 1 June the first two sets began to operate and by July six were in service while another three were nearly complete. The stations reported by telephone to the air force operations room at Mont Joli.[76]

In the meantime the National Research Council was completing an experimental 'Microwave Early Warning' radar set which, by working on a short 10.7 centimetre wavelength, could detect surfaced submarines at greater ranges than existing equipment. By May the Treasury Board had approved an air force order for eight sets which were to be placed to cover the Cabot Strait, Strait of Belle Isle, and the Gaspé passage. Work rushed ahead in a crash programme; an experimental set was erected near Fox River on the Gaspé peninsula for tests during the 1943 season. As noted in Chapter 10, by the time the first operational sets were installed in 1944-5, the adoption of submerged tactics by U-boats had rendered them virtually useless and the programme was never completed.[77]

In making plans for the defence of the gulf the services could not ignore public alarm and anger in Quebec. In March 1943 controversy flared up again when

Onésime Gagnon, a Union Nationale member of the Quebec Legislative Assembly, declared that more than thirty ships had been sunk in the St Lawrence in 1942, rather than the twenty admitted by the navy. The Conservatives and members from Quebec in the House of Commons pressed Gagnon's allegations on the government and revived stories that had circulated in 1942 about the inadequacy and ineffiency of the gulf's defences. Once again the press both in Quebec and other provinces showed great interest in the disasters of 1942 and the squabbling among the politicians. J.-S. Roy, the unruly Independent member for Gaspé, cut closest to the quick with a detailed account of how the lighthouse keeper at Cap des Rosiers had vainly attempted to warn the air force about the presence of U-517 an hour and a half before it sank two ships on 15 September 1942.[78] Angus L. Macdonald counter-attacked as vigorously as he had the year before, pointing out that many more ships had been sunk in the gulf of Mexico than in the St Lawrence, and yet no American had suggested that 'the whole United States fleet should be diverted from its other duties to protect the gulf of Mexico.'[79] More sharply still, he referred to the failure of the British services in preventing the escape of the German battlecruisers *Scharnhorst* and *Gneisenau* up the English Channel: 'the St Lawrence river, at the point furthest inland where an attack was made last year, is thirty miles wide. This is almost like the open sea. It is wider than the straits of Dover between England and France. If the great British navy with all its experience and skill and strength and devotion to duty has not succeeded in making the straits of Dover absolutely safe from submarines – indeed only a year ago it was unable to prevent certain great enemy ships from going through the straits – if that cannot be done there, is it to be wondered at that we cannot guarantee complete immunity to ships in the river St Lawrence?'[80] Macdonald also tried to silence the government's critics by divulging a good deal of information. He named all of the ships that had been sunk in 1942, including *Charlottetown* and *Raccoon*, revealed that aircraft had made eight depth-charge attacks, admitted there was no confirmation that a U-boat had been destroyed, and went a considerable way towards confessing that communications had gone wrong on 15 September 1942. At the same time, he explained in some detail the offensive capabilities of U-boats and the difficulties of anti-submarine operations, including the undependability of most reports from shore observers.[81]

Even though there was no further serious controversy about the defence of the gulf, because of the low level of U-boat activity, the services were now fully alive to the importance of public relations in the areas around the gulf. As in 1942, the military attempted to soothe nerves and gain useful assistance by enlisting citizens in such organizations as the Reserve Army and the Aircraft Detection Corps, but that was not all. The government emphasized the need for close co-operation with the provincial and local authorities. On 12 March Anderson's committee met in Ottawa with representatives of the Quebec Provincial Police, the Royal Canadian Mounted Police, and the Air Raid Precaution organization to co-ordinate the work of those agencies, particularly in educating and winning the co-operation of the public. Later in the month, Air Commodore K.M. Guthrie, deputy air member for air staff, who had chaired the

Ottawa meeting on Anderson's behalf, travelled to Quebec City for a conference with the provincial and local service authorities on 26-7 March. Although Guthrie spoke little French, he had lived and served in Quebec and was sensitive to the language issue. He and his staff assured the conference that all members of the expanded Aircraft Detection Corps organization who had to work with the public would be bilingual, and that publicity would be conducted in both French and English. Commissioner Marcel Gaboury of the Quebec Provincial Police persuaded the conference that the Aircraft Detection Corps should have a highly visible liaison office in Quebec City, as Eastern Air Command Headquarters was too remote from the province. Aware of the central place of the Roman Catholic church, especially in rural Quebec, Guthrie also met with Cardinal Villeneuve, who confirmed that the clergy would support the various volunteer defence organizations.[82]

The Chiefs of Staff Committee agreed that an ADC liaison office should be set up in Quebec City, and nominated Wing Commander E.B. Goodspeed, deputy director of the ADC at AFHQ, for the task.[83] The Cabinet War Committee, however, asked the chiefs of staff to reconsider the appointment in light of 'language as well as technical qualifications.'[84] As a result, Squadron Leader J.P. Desloges, who had served in Canada since being injured in combat during the Battle of Britain while flying with 1 (F) Squadron, RCAF, was appointed 'Defence Co-ordination Officer.' Desloges was responsible for supervising the expansion of the ADC, and reporting to the chiefs of staff on co-operation between the services and provincial authorities 'in the Gaspe and lower St Lawrence River districts.'[85] His office also became the centre for publicity by all three services through radio broadcasts, press releases, and other publications.[86]

Experience showed that only through personal contact could citizens be interested in defence work. From the early spring through the fall of 1942, field parties of ADC officers travelled the Atlantic coast and Newfoundland giving talks illustrated by slides and distributing literature. By 30 September there were over 15,000 observers in the Maritimes, Quebec, and Newfoundland. Although no specific figures are available, Eastern Air Command must have come close to realizing its objective of increasing the number of observers in the gulf area from 3968 in December 1942 to 9943 by the end of 1943.[87]

In May 1943 the RCN started again the system of gulf convoys that had been developed in 1942. To escort the SQ-QS series and the Newfoundland convoys, three Bangor minesweepers and eight anti-submarine trawlers were based at Sydney. At Quebec City were four corvettes which escorted the NL-LN convoys to Goose Bay. Naval policy, however, was to take the offensive against the U-boats, using a support force of five Bangors, and a striking force comprising four flotillas of six Fairmile motor launches each. The Bangors, based at Gaspé, patrolled in pairs along routes which enabled them rapidly to reinforce a convoy under attack, or to pursue a submarine contact. With limited sea endurance, Fairmiles patrolled less often but were held ready to strike at a contact. One flotilla was based on Sydney, the other three at Gaspé.[88]

While staff officers worked out the last details of the plans, aircraft rushed to the gulf somewhat earlier than had been anticipated. In the late morning of 24

April a reliable observer – he was described as a 'broadcasting engineer' – at New Carlisle, PQ, sighted something suspicious about a mile out on the Baie de Chaleur. He checked with binoculars and was sure he saw a submarine. The ADC reported the sighting to Eastern Air Command, which diverted a Canso from 117 Squadron, Dartmouth, then on ice patrol, to the area. The Canso arrived two hours and thirty-nine minutes after the sighting, and was soon relieved by a Hudson of 11 Squadron which had flown direct from Dartmouth to perform a thorough search.[89]

Nothing turned up. Staff officers at Halifax judged that the sighting had to be 'viewed with reserve.'[90] Nevertheless, within an hour and a half, they ordered 119 Squadron at Sydney to send two Hudsons to Mont Joli and two to Chatham. Ice was clearing from the St Lawrence more quickly than had been expected, and therefore Eastern Air Command decided that personnel for the group organization and the rest of the squadron should move into the gulf as soon as possible. The Gulf Group controller began to operate at Gaspé on 1 May, and on 3-5 May the main body of 119 Squadron travelled to its new stations by rail. Mont Joli, where more accommodation was available than at Chatham, became squadron headquarters.[91]

By 11 May 113 Squadron's move from Yarmouth to Sydney was nearly complete and on 14 May 117 Squadron began to migrate from Dartmouth to North Sydney, establishing a detachment of three Cansos and a Catalina at Gaspé on 18-21 May. At the end of the month the operational aircraft at the gulf stations included No 119's twelve Hudsons at Mont Joli and Chatham, No 113's thirteen Venturas and five Hudsons (the latter were slated for disposal, in part to 119 Squadron) at Sydney, and No 117's four Cansos and eleven Catalinas at North Sydney and Gaspé.[92]

The build-up had been hastened by intelligence received from Naval Service Headquarters on 29 April, derived no doubt from decrypted German signals, that a U-boat would enter the gulf during the first week in May, 'presumably to land or pick up enemy agents.'[93] Unfortunately, there was no hint as to the boat's specific destination. Sighting reports on 30 April by fishermen at the northern entrance to the Northumberland Strait and by an Anson trainer to the east of Prince Edward Island's North Point – both, in fact, false – suggested that the submarine had come in early. Operational and training aircraft scoured the area, and during the following days, as squadrons earmarked for the gulf arrived at their stations, regular sweeps from the mouth of the St Lawrence River to the Cabot Strait were mounted. U-262 had entered through the Cabot Strait on the night of 26/27 April, and after a harrowing journey through pack ice that seriously damaged the boat, arrived off North Point, PEI, before dawn on 2 May, where, paradoxically, aircraft had been searching three days before. Here U-262, surfacing for only brief periods at night, waited in vain to pick up German prisoners of war who had failed to escape from their Canadian camp, and then left through the Cabot Strait on the night of 8/9 May.[94]

The air and sea forces in the gulf were active through the summer escorting convoys and responding to false alarms, but a second submarine, U-536, did not enter until 24 September. Its task, like that of U-262, was to rescue escaped

prisoners of war. Alerted to the scheme by excellent intelligence, the navy made elaborate, though ultimately unsuccessful plans to trap the boat with a hunting group at the pick-up point in the Baie de Chaleur, but did not bring the RCAF into the picture. On 26 September a Catalina from 117 Squadron's Gaspé detachment did carry out a special sweep in the area at the navy's request, but during the following ten days the Gaspé and Chatham aircraft carried on with their normal sweeps in the central gulf.[95] Both U-262 and U-536 had failed in their missions, but their success in evading detection demonstrated that if submarines did not press attacks against shipping and did not operate on the surface they were as good as invisible to aircraft and warships.

Air sweeps and convoy escort operations continued until shipping stopped in mid-November for the freeze up. Eastern Air Command and Air Force Headquarters had continued to argue about the deployment of squadrons until late in the season. Headquarters' intention of quickly transferring 162 Squadron to the gulf, and thereby bringing the 1943 plan into effect, was frustrated by equipment and personnel problems that made the recently organized 160 Squadron unable to take over operations at Yarmouth until September. At that time 1 Group urgently needed reinforcements to support embattled ocean convoys; on 24 September 162 Squadron detached aircraft for operations from Gander and the American base at Stephenville, Nfld, and then on 5 October dispatched all available aircraft to Goose Bay, Labrador.[96] Important as the gulf was to Canada, the critical fight was on the ocean routes, and it was here that Eastern Air Command made its greatest contribution to Allied victory in the Battle of the Atlantic.

14
Ocean Operations, 1942

Although the scale of Eastern Air Command's commitment to shipping protection increased during 1942, the geographical scope of its northwest Atlantic operations remained within the agreements reached with the Americans the previous fall. Nova Scotia-based aircraft ranged southward to the limits of the US Eastern Sea Frontier and northeastwards to the Western Ocean Meeting Point off Newfoundland, where the naval escorts exchanged convoys. From Newfoundland to the north and east as far as its Douglas Digbys and Consolidated Cansos could reach, 1 Group took charge, while wedged in between the two Canadian zones was a pie-shaped sector to the southeast of Argentia where US Navy aircraft guarded shipping. The Boeing B-17 Flying Fortresses of the US Army Air Forces at Gander remained committed solely to the role of reconnaissance rather than defence of shipping and, because U-boat density was so low, made few detections. Their contribution to the anti-submarine battle was therefore only marginal. Although fewer U-boats hunted close in to Nova Scotia and Newfoundland after July, when Dönitz shifted his main effort to mid-ocean, Eastern Air Command could not let down its guard in coastal waters, or in the Gulf of St Lawrence, while the enemy continued to pick off victims in both theatres. The RCAF had to stretch its meagre resources to the limit to meet all these threats in the second half of the year, but its problems were certainly made worse by the failure to adopt Coastal Command's proven and more economical tactics until the end of October.

In the summer of 1942 the gap between effective land-based airpower on either side of the Atlantic had not yet been bridged. Coastal Command aircraft pushed patrols and escorts westward to about 600 miles from their British and Icelandic bases, while aircraft of No 1 Group in Newfoundland ranged eastward to somewhat lesser distances. The intervening 'air gap' ran in a funnel shape from its neck in the north, where air patrols from Newfoundland and Iceland left a relatively short distance uncovered, broadening to the south where a great expanse of ocean lay beyond the limits of land-based aircraft. Several factors complicated 1 Group's efforts to support shipping moving through this gap. In the prevailing westerly winds Cansos and Digbys lumbering home after a patrol were frequently reduced to desperately slow ground speed, thus reducing the operational radius even more than usual. Airmen of 1 Group learned to fly in

conditions that were well below the minimums tolerated in Coastal Command.[1] Weather, both at the airfields and over the operational area, limited the effectiveness of Newfoundland-based aircraft in other ways as well. The mixing of warm Gulf Stream water and the icy Labrador Current produced almost perpetual fog on the Grand Banks, and the fog zone extended to about the maximum range of I Group aircraft. Thus U-boat packs were able to begin and continue attacks on convoys which were technically within an area where constant air patrols might otherwise have eliminated pack operations entirely. The story of the group's operations in the latter half of 1942 is one of inability to close the air gap and stop the carnage in that area, and also to prevent fog-shrouded submarines from operating with impunity even within range of its Cansos, Digbys, and Lockheed Hudsons.

These problems first manifested themselves in May and June, when Group *Hecht* moved into the northwest Atlantic to mount attacks on ocean convoys at the very limits of Newfoundland-based airpower. The RCAF responded by flying sweeps whenever the patrol line came within range, and by making attempts to escort threatened convoys. But the heavy fog which blunted *Hecht*'s persistent efforts to attack westbound convoys as they passed the Grand Banks also severely hampered flying operations. None of I Group's sweeps made contact with the wolf pack; indeed few of the aircraft flying escort missions were able to find the convoys they had been assigned to protect. The westbound slow convoy ONS 94 was located in the danger area by two Digbys on 20 May, and ONS 96 by a single aircraft eleven days later. But in both instances the U-boats' operations were hindered by heavy fog and the convoys were never attacked. On 11 June ONS 100 arrived off the Grand Banks, having already lost a corvette and two merchantmen and with the pack on its heels. For the next three days dense fog over the area prevented Catalinas from Botwood and US Navy aircraft from locating the convoy. Two more ships were lost before *Hecht* became embroiled with ONS 102 on the 16th. On the 18th, as a Botwood Catalina tried unsuccessfully to find the convoy in the fog, U-124 torpedoed *Seattle Spirit*. Heavy reinforcements, including effective air cover, arrived the next day and the enemy abandoned the chase. In all, the group was able to sink twelve ships during its brief stay on the main trade routes without loss or serious damage to its U-boats.[2] Much worse was yet to come, but for the moment the action shifted southward, where a handful of submarines cruising independently south and west of Nova Scotia were creating havoc.

On 30 May U-432 sank the small steamer *Sonia* south of Yarmouth. Three days afterwards Flying Officer J.M. Greer of 113 (BR) Squadron, escorting BX 23, a Boston-to-Halifax coastal convoy, depth-charged the same submarine while it was in pursuit of the convoy. The U-boat reported it had been 'Driven off by a strong air escort.'[3] Another Yarmouth Hudson and a USN 'blimp' airship were less successful on 9 June when U-432 attacked the Boston-to-Halifax convoy BX 23A, torpedoing the cargo ship *Kronprinsen*, which reached Shelburne under tow. A week later, in a night encounter with the Halifax-to-Boston convoy XB 25 off Cape Sable on 16 June, U-87 sank *Port Nicholson* and *Cherokee*. She then moved northeastward towards Halifax and was spotted on

22 June by a Hudson of 11 Squadron, whose depth-charge attack was far too late to have any effect. From first light on 23 June the squadron mounted an extensive five-aircraft search. A few hours later Pilot Officer W. Graham sighted U-87, surfaced and stopped. Upon sighting the aircraft the U-boat dived, but the conning tower and stern were still visible when Graham straddled the hull with four 250-lb depth charges. The U-boat log recorded the effects of Graham's attack:

Aircraft comes directly out of the sun which is just rising above the layer of fog and has a very strong dazzle effect. Submerged, as the Diesel is ... not working.

After 25 seconds three well-placed aerial bombs drop astern below the U-boat. Boat falls steeply down by the head and drops rapidly. Checked fall by blowing out diving tank 3. Boat rises up to A-65 (65 metres below periscope depth). The electric motors won't start because, as was later established a number of spare parts and tools fell from their mountings into the electric motors. By means of trimming by the head U-boat brought up to depth. Went to A ± 0 (periscope depth) and made repairs. The boat is not leaking too badly ... Both compressor supports are cracked. The port compressor bearing bracket has been torn off. The flange of torpedo tube V is leaking. Torpedo tube V is warped. In the electric torpedo lying in this tube the battery has been pushed backward, the bolts on the thrust bearings are either broken or loosened; the port-side diesel engine-bed bolts are for the most part broken, the engine has been shifted sideways. The electric engine-bed bolts have been loosened; the shaft flange port-side bolt heads have been ripped off in some cases; 5 cells of the after battery have leaked out; most of the spare parts fastened to the overhead deck have been sprung out of their mountings (a hazard for the crew). Injuries: Machinist's Mate Haferbier a bruised foot. When the door between the electric engine room and the diesel compartment was ripped off he fell into the diesel compartment.[4]

This description is adequate testimony to the toughness of a U-boat and its crew. Only perfectly placed and powerful depth charges were likely to destroy such a target.

Aircraft continued to hunt for one or more submarines suspected of being off Halifax, and on 28 June Squadron Leader W.C. Van Camp, the officer commanding 11 Squadron, found what was probably U-215 whilst on patrol with two other Hudsons of his unit. It was not the kind of night favoured by U-boat commanders, the sea being flat calm under a bright moon. Three of Van Camp's crew thought they saw 'The silhouette ... of something on the water up the moonbeam ... too short to be a ship.'[5] Turning and slipping off height he headed towards it. Four depth charges were dropped from the Hudson at 100 feet, spaced sixty feet apart, and set to explode at twenty-four feet. If the target was U-215 only her crew would have known how close the charges detonated, for the boat was lost with all hands on 3 July, sunk by the British trawler HMS *Le Tigre* during an attack on BX 27.

Except in the St Lawrence River, there were no more sinkings of merchantmen or attacks on U-boats in the Canadian zone for some three weeks, but the first six months of 1942 had been disastrous. The magnitude of losses in the

Western Hemisphere in the first half of 1942 – a staggering 505 ships, 95 per cent of them steaming independently and for the most part in US waters, had been lost in exchange for only eleven U-boats – was never repeated, thanks to the progressive extension of the coastal convoy system.[6]

Declining U-boat successes eventually brought Dönitz to redeploy his forces. On 19 July he began to withdraw submarines from the US seaboard, instructing those that were able to do so to operate further south; a few continued to operate off southern Nova Scotia. Dönitz had also become aware that convoys along the main mid-Atlantic route adhered closely to the great circle route and could therefore be readily intercepted by wolf packs. On 9 July he had initiated a duplication of *Hecht*'s successful operation, ordering outward-bound boats to form Group *Wolf*, in the air gap, beyond the range of Allied aircraft.[7]

ON 113 was the first victim. It had just crossed the meridian of 40 degrees west when Group *Wolf* made contact on 25 July. Fog had grounded the Catalinas at Botwood, and although HMCS *St Croix* destroyed U-90, the submarines sank one ship and damaged another. A Digby from Gander arrived the next day and met the convoy far beyond the normal operational limits of that aircraft with the aid of radar, while USN aircraft from Argentia provided air escort from 26 to 28 July. One more ship from the convoy was sunk in this period, and another on 29 July south of Sable Island by U-132, operating off Nova Scotia after her victories in the St Lawrence. A Hudson crew of 11 Squadron on task in the poor visibility and gathering darkness 'had the rather harrassing experience of seeing a ship (*Pacific Pioneer*) torpedoed before their eyes ... without being able to make reprisals.'[8]

The next convoy to come under attack, ON 115, was intercepted by U-boats as it left the range of Coastal Command air cover on 29 July. It was harried all the way across the gap but the RCN escort was able to prevent losses and break contact. However, Group *Pirat* was placed ahead of ON 115 just outside the range of 1 Group aircraft and on 1 August re-established contact. *Pirat* pursued the convoy to well within reach of Eastern Air Command but under the cover of dense fog. The convoy lost two ships and had a third damaged in what should have been protected waters. The same bad weather allowed *Steinbrinck* and remnants of *Pirat* to locate the eastbound SC 94 northeast of St John's on 5 August. Without air support and lacking modern radar, the Canadian escort group was unable to break up the U-boat concentration or shake it off. On 6 August, when beyond range of Catalinas and Cansos, SC 94 began to suffer heavy losses – ten ships in exchange for two U-boats – until Coastal Command aircraft drove off the wolf packs and brought the engagement to a close on 10 August.[9]

While 1 Group was being frustrated in its attempts to influence the battle on the ocean routes, the Hudson squadrons in Nova Scotia struck at every one of the four boats still operating inshore. Pilot Officer Graham opened the run of attacks when he unsuccessfully depth-charged U-89 off Halifax on 30 July. Eastern Air Command knew that the submarine was in the vicinity, but Graham's crew only detected the boat because they kept a sharp lookout in pouring rain while making a routine harbour entrance patrol. Command Headquarters had in fact failed to pass on information confirming U-89's presence that had been provided by a new system for promulgating naval intelligence.[10]

Since the introduction of the *Triton* cipher (known to British cryptanalysts as *Shark*) in February 1942, which Bletchley Park could not immediately penetrate, Allied intelligence had been largely dependent on high frequency direction finding [HF/DF], and Canadian capabilities with this technique were improving dramatically. The RCN's Operational Intelligence Centre [OIC] in Ottawa, using the HD/DF organization developed in co-operation with the Department of Transport, and to a lesser extent the RCAF, had become one of the two U-boat plotting centres for the Western Atlantic in April 1942. (The other was the US Navy's OP-20-G in Washington.) However, until July 1942 HF/DF information transmitted by signals tended to arrive in Halifax too late to have any operational value. Air Force Headquarters [AFHQ] in Ottawa therefore set up a system of passing immediate DF information received from the OIC to Eastern Air Command's operations room by commercial telephone, using a simple plain language 'Vitamin' code (words like 'pear,' 'apple,' 'grapefruit') to identify U-boats and the word 'ripe' to indicate warships or raiders.[11] At the same time, because of powerful new transmitters provided by the RAF at St John's and Halifax, it was now possible to maintain contact with aircraft at great distances and to communicate directly with Coastal Command in the United Kingdom.[12]

Within twenty-four hours of Graham's attack on U-89, the telephone link brought success for 113 Squadron at Yarmouth. Squadron Leader N.E. Small, who had assumed command of the unit only five weeks before, was an enthusiastic proponent of naval intelligence, designing patrols to cover probable U-boat locations and maintaining aircraft at base on immediate alert to respond to 'hot' DF bearings. As mentioned in the preceding chapter, Small was also the first squadron commander in Eastern Air Command to introduce white aircraft camouflage and high patrol altitudes in accordance with the latest British methods.[13]

All of these elements came together on 31 July when Small himself surprised U-754 south of Yarmouth. He and his crew, Pilot Officer G.E. Francis, observer, and Sergeants R.A. Coulter and D.P. Rogers, wireless operators (air gunner), were on a special sweep at an altitude of 3000 feet in response to fresh intelligence. The weather was ideal, a slight summer haze making visibility poor from the surface of the water. Three miles ahead the U-boat, quietly cruising along, was taken quite unawares as the Hudson dived to the attack. Sailors were seen scrambling for the hatch, and most of the boat was still visible when the depth charges went tumbling down around it. Small stayed over the spot for almost an hour. On the third circuit the front gunner opened fire when the conning tower briefly reappeared. Large air bubbles continued to surface until a heavy underwater explosion brought a large quantity of oil swirling up to mark the grave of U-754 – Eastern Air Command's first kill.[14]

A few hours later Pilot Officer G.T. Sayre of 113 Squadron attacked U-132, and Small also attacked U-458 on 2 August and U-89 on 5 August. None of these strikes was successful, but all had resulted from recent DF bearings on U-boat transmissions.[15] The chief of the air staff immediately began to dispatch the navy's daily estimates of submarine locations to Eastern Air Command Headquarters and No 1 Group so that airmen on the east coast could plan patrols

on the basis of the fullest possible picture of enemy movements. AFHQ also organized a course on U-boat intelligence at the navy's OIC for those airmen most initimately concerned with bomber-reconnaissance operations. The air officer commanding [AOC], Air Vice-Marshal A.A.L. Cuffe, in the meantime, posted Small to Eastern Air Command Headquarters as controller to ensure that the staff in the operations room never again failed to promulgate intelligence as they had done on 30 July. Yet Cuffe's eminently sensible suggestion for a closed and secure telephone line between Naval Service Headquarters and Eastern Air Command operations switchboards, with connections to other air force and navy exchanges, was not acted upon for four months.[16] Despite 113 Squadron's success off Yarmouth, moreover, the Coastal Command techniques that the unit had adopted were not generally applied throughout Eastern Air Command until mid-autmnn.

An experiment that enjoyed much less success than the new methods for employing intelligence came to an abrupt halt in August. Because of sightings and DF reports of submarines in the vicinity of Sable Island, a Royal Navy Fleet Air Arm detachment with a radar-equipped Supermarine Walrus had been sent there in May, the RCAF providing a work party to build the 'station' and, later, an observer for the aircraft. The Walrus, affectionately known as the 'Shagbat,' was an amphibian biplane of prewar vintage that derived its motive power from a single pusher propeller. During flight, 'She wallows in the trough of the rough airs like a heifer knee deep in a boggy meadow,' wrote one Fleet Air Arm pilot. Under the orders of the Dartmouth controller, the Walrus flew daily patrols from a small lake on the island whenever the weather permitted, which was not often, until 20 August when it came to grief. After spending three days floating around, the crew was rescued by ships of convoy HX 204; the aircraft subsequently sank whilst under tow by the corvette *Napanee*. It was then decided to abandon the Sable Island patrol for the rest of the 1942 season and the detachment withdrew.[17]

For the rest of August Eastern Air Command only heard the faint echoes of convoy battles beyond the reach of its aircraft. Not until the end of the month did three Type IX U-boats, on passage south of Iceland, move westward to test the summer traffic in the Belle Isle Strait, an area previously left in peace. Two of them, U-517 and U-165, entered the Gulf of St Lawrence, an episode discussed in Chapter 13. The other, U-513, patrolled southeast of Newfoundland and on 5 September sank *Saganaga* and *Lord Strathcona* in short order as they lay off Bell Island, in Conception Bay. Gunfire was directed at U-513 and she reported having her 'conning-tower damaged as a result of ramming.'[18] A Hudson of 145 Squadron and two Digbys of 10 Squadron were quickly on the scene, but with a ceiling of only 200 feet over the anchorage they could do little to assist in the counterattack. U-513 made its presence felt again by damaging the freighter *Ocean Vagabond* in a torpedo attack a few miles off St John's on 29 September.

No 1 Group meanwhile ordered patrols at extreme range to reach convoys threatened by large U-boat groups. On 10 September the westbound ON 127 passed the southern end of a long line of thirteen submarines, Group *Vorwärts*, and there ensued an orgy of sinkings. At 1605 hours GMT on 13 September,

Flying Officer R.M. MacLennan, piloting a Catalina from Botwood, spotted the partially surfaced U-96, unfortunately too far away to attack before she submerged. Three-quarters of an hour later in 'the farthest east sighting' yet made, 550 miles east of St John's, the Catalina made contact with the beleaguered ON 127. A second Catalina picked up the convoy and its RCN escort at 2050 hours GMT and commenced a radar patrol around it in the darkness. Meanwhile, the ships responded to a U-boat alarm by firing illumination rockets, the standard procedure during night attack. The aircraft tried to help the escorts but 'due to faulty connection the parachute flares which were dropped ... failed to light,' and 'no attack could be made.'[19] At 0400 hours GMT on 14 September the Catalina had to depart thirty-five minutes after helplessly watching the destroyer *Ottawa*, stationed five miles ahead of the convoy, being torpedoed and sunk by U-91. Dönitz took note, for the first time and with some surprise, of the existence of long-range aircraft based in Newfoundland.[20]

What the RCAF really wanted was very long-range [VLR] Consolidated B-24 Liberators, such as those now being developed and operated from Iceland by 120 Squadron, RAF. In fact, on 11 September a 120 Squadron Liberator, benefiting from modifications that gave it extended endurance, had penetrated further into the air gap than any of its predecessors, although with no discernible result. Because the VLR Liberator came to play such an important part in the fortunes of Eastern Air Command, and because it is easy to confuse the various types of long and very long-range Liberators, it is important to understand what 120 Squadron was doing with its aircraft to obtain such greatly enhanced performance. The standard Liberator heavy bomber of the day had a maximum operational range of about 1700 nautical miles, which gave it an operational radius of about 700 miles. Modifications begun in 1942 eventually took two forms. Class 'A' VLR aircraft were to be Mark V Liberators from which the rubberized self-sealing compounds had been removed from inside the main wing tanks, and which were fitted with auxiliary wing tanks. Class 'B' conversions took various forms, the first of which was a modification of the Mark III Liberators whose delivery to Coastal Command had begun in late 1942. This type was not equipped with auxiliary wing tanks, nor was it possible to remove the self-sealing material from the main tanks. Extended range was therefore obtained by placing two fuel tanks in the bomb bay and removing equipment not strictly necessary for anti-submarine work including the tail and mid-upper gun turrets, much of the armour, oxygen equipment,bomb winches, all but the barest minimum of de-icing equipment, and the auxiliary power unit. These were probably the modifications done by 120 Squadron to give its Mark I Liberators a total range of 2300 miles with a depth-charge load of 1500 pounds and enable them to operate 700-1000 miles from shore bases. In 1943 the class 'B' conversions had the same capabilities, and, with a total range of 2600 miles, the class 'A' conversions had a somewhat greater endurance in the air gap.[21]

When asked by the British in the late summer of 1942 to extend air patrols to 800 miles from Newfoundland, Air Marshal L.S. Breadner, the chief of the air staff, pointed out the need for VLR aircraft in Eastern Air Command. Why neither the United States nor the United Kingdom would spare Liberators for the

RCAF, even after the need became obvious, is a complicated question that will be discussed in the next chapter.

The organization and performance of existing anti-submarine forces on the east coast still left much room for improvement, however. The first visitors to point this out, in July 1942, were Wing Commanders S.R. Gibbs and P.F. Canning of the RAF, who had recently spent eight months advising the USAAF on the organization of operational control, the creation of combined operations rooms, and the establishment of an anti-submarine command along the lines of RAF Coastal Command. Gibbs found two principal matters of concern in the organization of Eastern Air Command. First, he thought the organization was far too complex 'due to responsibility ... for [the] total air defence of Eastern Canada.'[22] Second, although liaison with the navy seemed to be as good as the system allowed, the lack of a combined services headquarters was a severe limitation.

In October Commander P.B. Martineau, RN, a staff officer from Coastal Command HQ, also on the last leg of a long advisory tour in America, found more to criticize in his report: 'Generally speaking the Eastern Air Command is a very long way behind any other place I visited in either Canada or the United States ...'[23] First and foremost, he recommended the adoption of Coastal Command's 'Offensive Tactics'; Eastern Air Command's efforts to escort every convoy whether it was threatened or not followed the tactical practice that the RAF had abandoned eighteen months before.

Martineau was not the first to acquaint Canadian air force authorities with offensive methods. As early as November 1941, Air Chief Marshal P.B. Joubert de la Ferté had described the new tactics to Air Vice-Marshal N.R. Anderson, then commanding Eastern Air Command, in a personal letter. Thereafter, RCAF headquarters in both Ottawa and Halifax had received memoranda and studies that evaluated the success of offensive methods in pushing the U-boats back 350 miles from Coastal Command bases. In March 1942 J.P.T. Pearman of the Coastal Command operational research section had visited Eastern Air Command to make statistical analyses of the RCAF's effort. Reports he completed for the Canadians in March and August showed that most of Eastern Air Command's flying was within 200 miles of base, thereby failing to strike at U-boats until they had actually reached focal areas of trade and coastal routes, where they could to the most damage. However, perhaps because the RCAF was not yet attuned to mathematical analysis – Eastern Air Command's own operational research section began to organize only in November 1942 – the personal arguments of Commander Martineau were required in order to bring a change. His advice was accepted immediately, perhaps because changes were in the offing anyway. When, in July, Naval Service Headquarters had begun to provide timely U-boat intelligence to Eastern Air Command, airmen had seen that operations ought to be concentrated on the probable locations of U-boats, if this could be done without unduly prejudicing the safety of convoys. Indeed, the RCAF's 'offensive' in the central Gulf of St Lawrence in late September had been an attempt at implementing this principle.[24]

With the concurrence of the RCN, Eastern Air Command applied offensive

tactics off the Newfoundland coast for the first time on 30 October 1942. Coverage of areas where intelligence reported U-boats was to have a high priority. Convoy protection would now take the form of sweeps along parallel tracks fifty miles on either side of the mean line of advance, fifty miles to the rear and one hundred miles ahead, preferably in the last hours of daylight or immediately after sunrise when submarines were manoeuvring for attack or shadowing positions. Close escort was to be provided only to convoys known to be in danger and to shipping in confined waters such as the Gulf of St Lawrence. To make this new system work properly Martineau persuaded Ottawa to install what Cuffe had suggested in August, a direct telephone line from Naval Service Headquarters to Eastern Air Command. The 'Vitamin' code was also improved so that more than just the simple details of a DF fix could be passed quickly to the coast.[25]

Other criticisms concerned general procedures. There appeared, Commander Martineau reported, 'to be no decided policy of how to carry out A/S warfare from aircraft.' And in the same context, he 'was horrified to find on visiting the various airports how backward the pilots were.'[26] The Canadians emphatically denied the first charge: the command's squadrons were directed by the 'Manual of Eastern Air Command Operational Control,' and Coastal Command material, they said, was promulgated regularly thoughout the organization. This was true up to a point. Initially, tactical memoranda and instructions from overseas were sent around with a general order that they were to be followed. Subsequent instructions, however, circulated in their original Coastal Command format and never took the form of Eastern Air Command operational orders. The initial general order to adopt practices outlined in the memorandum and instructions was quickly forgotten and squadrons believed that the material was being circulated for 'information only.' Moreover, circulation among aircrew was slow and the adoption of the new tactics was totally dependent on the initiative of individual squadron commanders. In 1942 Squadron Leader Small's 113 Squadron was the only one in Eastern Air Command successfully applying the latest Coastal Command tactics. Martineau blamed the senior officers of Eastern Air Command for this general lack of leadership, and with that it is hard to disagree.[27]

On the second point regarding the backwardness of pilots, Cuffe did admit that standards were low in some of the operational squadrons because the command was still being 'bled' of experienced pilots and their replacements in many cases came straight from service flying training schools [SFTS]. The real problem, he felt, was that 'we have not enough aircraft and crews either for training or operations.'[28] To prove his point, a spot check on 15 October showed that only eighty-nine of the command's establishment of 135 bomber-reconnaissance aircraft were actually on strength. Of these aircraft, nine were allotted to training duties. Serviceability among the eighty remaining aircraft was about 60 per cent (a not unreasonable figure by the standards of the time), which left only about fifty aircraft normally available for operations on the whole east coast of Canada and off Newfoundland.[29] Ironically, the adverse effects of the lack of aircraft for operations and training might have been far less if the

offensive method, which was designed to save hours of wasted flying, had been adopted earlier.

A paper by Martineau outlining all his findings and proposals was discussed at interservice staff meetings in Ottawa on 1 and 3 November. The Canadian officers present, Wing Commander C.L. Annis and, from Naval Service Headquarters, Captain H.N. Lay, director of Operations Division, Captain H.G. DeWolf, director of Plans Division, Commander G.A. Worth, director of Signals Division, and Lieutenant-Commander J.S. Stead, staff officer (air), urged that the northwest Atlantic finally be upgraded to the status of an important war zone for the allocation of equipment and well-trained personnel and that it be 'recognized as a joint commitment of the RCN and RCAF.'[30]

While the Canadians accepted most of the recommendations made by Martineau, Gibbs, and Canning, they balked at giving anti-submarine operational control on the east coast to one single authority. Senior officers cited as their reason the present 'excellent co-operation between C.O.A.C. [commanding officer Atlantic Coast], F.O.N.F. [flag officer Newfoundland], and A.O.C., E.A.C.,'[31] ignoring the well-established need for a still closer relationship. There was excellent co-operation between air force and naval authorities on the other side of the Atlantic, but they still found it necessary to place their anti-submarine resources under one operational commander. On the more specific points raised by Martineau, the meeting was in full agreement with the adoption of an offensive/defensive policy, based on anti-submarine intelligence, joint operations being conducted from a temporary facility until a new combined operations room could be provided in Halifax.

Despite the agreement in Ottawa, the creation of a combined operations room in Halifax was still fraught with difficulties. Air Vice-Marshal Cuffe, noting that several British area combined headquarters were located at some distance from naval dockyards, invited Rear-Admiral L.W. Murray, commanding officer Atlantic Coast, to move to Eastern Air Command's operations room. Murray responded that his broad responsibilites for naval operations and the control of merchant shipping made it impossible for him to do so, and he in turn invited Cuffe to come to the dockyard. Thus the manoeuvres begun in 1939 continued, with positions now so entrenched that the vice-chief of the naval staff urged that the whole question had to be approached 'most tactfully.'[32]

The development of further interservice co-operation in Ottawa was stalled as well. Commander C. Thompson, RN, a destroyer captain in the RCN's Western Local Escort Force who had had extensive experience in air operations and accompanied Martineau on his tour, emphasized the need for standard and comprehensive instructions to guide co-operation between aircraft and warships. For this purpose, and to address related interservice questions of tactics, equipment and training, the chiefs of the air and naval staffs agreed in January 1943 to the formation of a joint RCN-RCAF anti-submarine warfare committee with representatives from the interested divisions and directorates at Naval Service and Air Force Headquarters. Neither service took any action.[33]

More encouragingly, an RCAF operational research organization was taking shape. Impressed with the achievements of the RAF operational research

sections, such senior officers as Air Marshal H. Edwards, Air Vice-Marshal N.R. Anderson, and Air Vice-Marshal E.W. Stedman promoted similar ideas in Canada. During his tour of duty in North America, J.P.T. Pearman, the Coastal Command operational researcher, lent assistance, and advised the USN on the organization of its Anti-Submarine Warfare Operations Research Group [ASWORG] as well. In August 1942 Professor J.O. Wilhelm, a physicist from the University of Toronto, established an operational research centre at AFHQ and Professor Colin Barnes, another University of Toronto physicist, organized an operational research section in Halifax at the end of November. Barnes, and the two other scientists who joined his staff, had visited the United Kingdom to learn RAF methods, and in August 1943 Ottawa posted a scientific liaison officer to RCAF Overseas Headquarters in London. Such was British leadership in the field that the USN researchers also depended upon advice and data from the United Kingdom. Like their American and British counterparts, Barnes and his colleagues at Eastern Air Command Headquarters worked closely with the intelligence staff to produce analytical statistical reports on air operations, and also undertook special studies in such areas as bombing accuracy, the employment of airborne radar, and sea-air radio homing to improve the command's effectiveness.[34]

However haltingly the Canadians adopted British models for command and control, the new anti-submarine tactics quickly proved themselves in the northwest Atlantic. During October 1942 No 1 Group participated in the defence of two eastbound convoys, SC 104 and SC 107, which were intercepted by submarine wolf packs. In the first case air support took the old form of close escort by aircraft flying at an altitude of around 1000 feet and had little effect. In the second, aircraft patrolling at high altitudes also covered areas where intelligence had located U-boats, and swept the tracks of the convoy in accordance with the new offensive methods. The result was the first successes by the RCAF in Newfoundland.

By the second week in October 1942 the Germans realized that convoys were no longer strictly following the great circle route. Group *Wotan* lay in wait 300 miles northeast of Newfoundland. Further east eight boats had just been detached from another line to form a new Group *Leopard* to hit ONS 136, an attack which failed. The *Leopard* line then came around to a westerly course in search of the luckless SC 104.

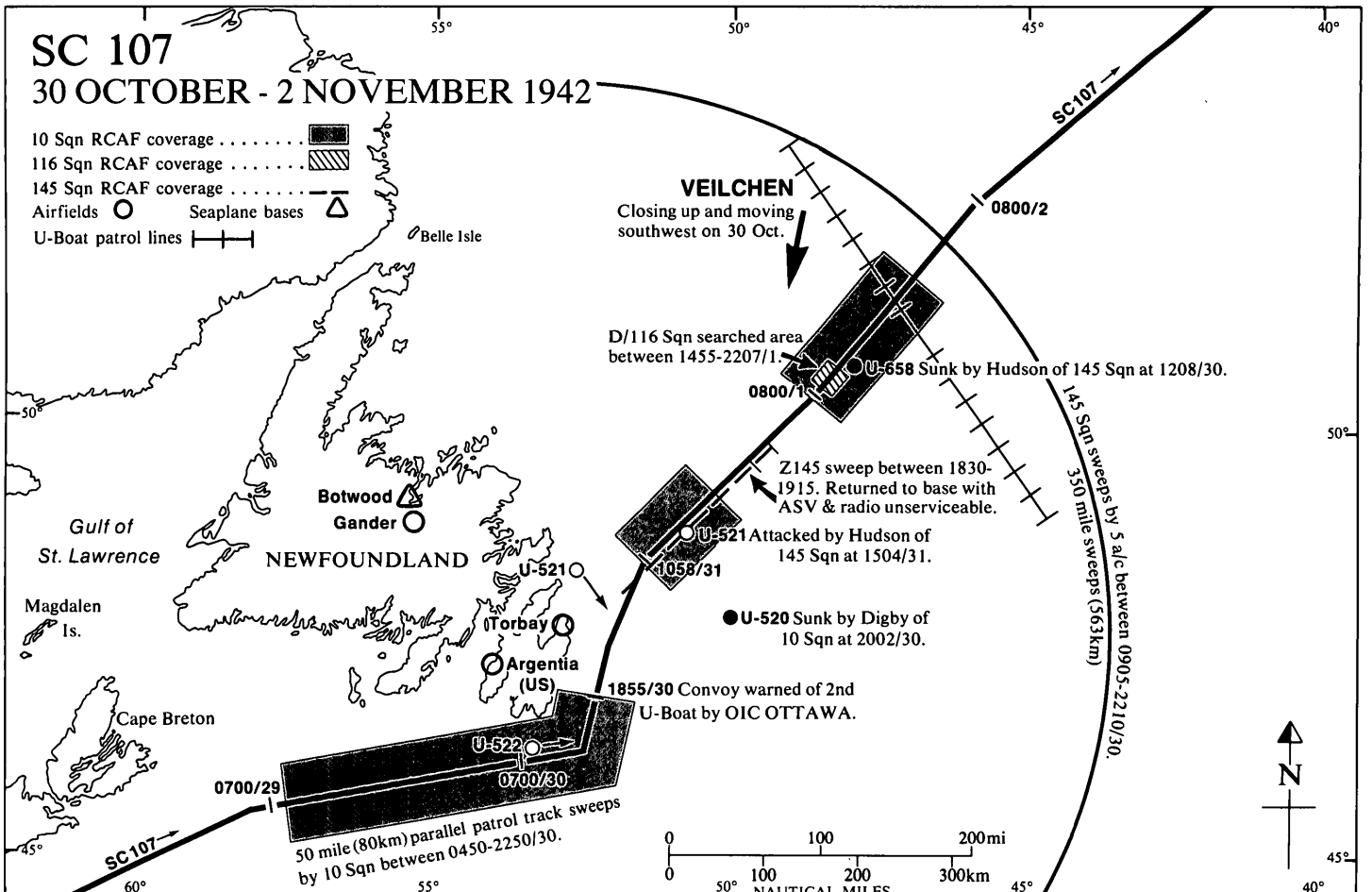
Air protection for the convoy was provided by US Navy PBYs from Argentia on 9 October, and the next day by two Hudsons from 145 Squadron, Torbay. On 11 October, as shore authorities attempted to edge the convoy around the northern tip of Group *Wotan*, Digbys of 10 Squadron provided continuous coverage for over fourteen hours. Unfortunately, they did not prevent U-258 catching sight of one of the escort vessels slipping away to the northeast, although in a failure of German communications the boat's report was delayed for twelve hours. In the meantime, attempts by 1 Group to renew air support on the 12th were frustrated by bad weather, and the lone 116 Squadron Catalina to reach SC 104 failed to make contact and was reduced to flying sweeps in the general area. On the same day the first member of *Wotan* drawn northward by the sighting report, U-221,

made contact and over the next two nights, as U-607 and U-661 joined in the attack, eight ships were sunk. By the time RCAF aircraft were once again able to reach the scene of the battle, on the 14th, the airmen could only drop emergency kits to survivors as SC 104 steamed out of range into the air gap, through seas whipped up by a westerly gale, which sharply reduced the efficacy of escort vessels' radar and ASDIC equipment. Moreover, by now SC 104 was also in contact with Group *Leopard*. Improving weather enabled naval escorts to prevent any further losses until the convoy came under the protection of 120 Squadron Liberators from Iceland. The combined air and sea escorts accounted for three U-boats in the last days of the battle, and the remaining U-boats finally turned westward again on 19 October to form Group *Veilchen*, 400 miles east of Newfoundland.[35]

By 29 October the thirteen U-boats of *Veilchen* were on station on the Grand Banks. In addition, three large Type IX boats, U-522, U-520, and U-521, bound for the St Lawrence and Halifax areas, were south of Newfoundland. That day the southernmost boat of *Veilchen* sighted a westbound convoy and the line was shifted slightly to the southwest. Dönitz also received a decryption from German naval intelligence indicating that the eastbound SC 107 would be steering northeast from the Western Ocean Meeting Point off Cape Race.[36]

The gathering concentration of U-boats off Newfoundland provided Eastern Air Command with an opportunity to put offensive tactics to the test. At 0905 hours GMT on 30 October, 1 Group sent out two Hudsons of 145 Squadron on an anti-submarine sweep ahead of SC 107 to cover an area identified in NSHQ's routine U-boat forecast of the previous day.[37] Almost at the limit of their endurance, some 290 miles northeast of Torbay, they sighted a conning tower breaking surface two miles ahead at 1205 hours GMT. Flying Officer E.L. Robinson immediately began his run in from 2000 feet. It was one of those rare occasions when everything clicked into place: 'at the time the depth-charges were released the U-boat was almost fully surfaced. Four 250-lbs Mk. VIII depth-charges with Mk. XIII pistol set to 25 feet at an angle of 30 [degrees] across the U-boat from port astern to starboard bow. All the charges functioned correctly and explosions were noted bracketing the U-boat, the center two charges on opposite sides of the hull and very close to it. The explosion raised the U-boat in the water and 60 feet of its stern raised on an angle of 40° to the horizontal. The U-boat then settled and a large oil slick and air bubbles merging with the rough sea appeared immediately.'[38] Both Hudsons remained over the spot for fifty minutes before they had to fly home, a relief aircraft being on its way. Robinson and his crew had sent U-658 to the bottom in 2000 fathoms,[39] a feat which brought the pilot the Distinguished Flying Cross.

Another success was only hours away. At 2002 hours GMT a Digby of 10 Squadron, on the way back to Gander from an outer anti-submarine patrol with ON 140, came upon U-520 115 miles due east of St John's. Flying Officer D.F. Raymes made his approach directly along its track from astern, descending from an altitude of 3200 feet. After the explosion of the four 450-lb Mark VII Amatol-filled charges, the co-pilot, Pilot Officer J. Leigh, watched huge air bubbles and large quantities of oil come to the surface until darkness fell some



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thirty minutes later. His conclusion that 'the submarine was at a dead stop directly below' was only too true; they had destroyed U-520.[40]

Unfortunately for SC 107, the destruction of two U-boats did not materially alter the course of the battle. On 31 October 145 Squadron had four Hudsons sweeping the track of SC 107 between 0915 hours GMT and 2155 hours GMT in steadily deteriorating weather conditions of rain squalls and high wind. An object sighted after a radar detection by one of them, flying parallel to the convoy and eleven miles to port of its track, appeared at first to be a destroyer. But from 5000 yards Pilot Officer L.T. Ross recognized it to be a fully surfaced submarine and as he passed close over it, too quickly to deliver an attack, a single oilskin-clad member of the crew was seen on the conning tower. Turning steeply to port Ross came at the submarine again while it was taking a 90 degree evasive turn to starboard so that he attacked at right angles to its starboard beam. At 1505 hours GMT the depth charges appeared to explode within lethal range; it was, the assessors later observed, an 'excellent attack deserving of more concrete evidence of damage.'[41] U-521, however, survived. A hunt by other Hudsons and the corvette *Moose Jaw* on her way to join SC 107 found only streaks of oil, probably squeezed out of the compression valves on the U-boat's fuel tanks.

Meanwhile, SC 107 was approaching the U-boat concentration with HX 213 also steaming into danger not too far behind. The first of two 116 Squadron Catalinas from Botwood sent out on 1 November to support SC 107 and its RCN escort group briefly contacted the convoy in the dark and then lost it when the aircraft's radar broke down.[42] The convoy crossed the German line through the gap left by the sinking of U-658 two days earlier, but it did not go unseen. Nine miles away U-381 surfaced to send off her first sighting report, which was intercepted by the DF operators in HMCS *Restigouche* and the rescue ship *Stockport*; because the Catalina on task could not find the convoy, no aircraft was on hand to drive off the submarine. On the following days weather conditions prevented the Catalinas from flying, and since no other aircraft had the range to cover the convoy, it found itself effectively in the air gap when only 400 miles from Newfoundland. On the night of 1/2 November the U-boats began to pick off merchantmen and by the time Liberators from Iceland finally drove them away on 5 November they had sunk fifteen out of the forty-two ships originally in SC 107.[43]

Although the battle for SC 107 had ended in a defeat it marked an important turning point in the fortunes of Eastern Air Command. In contrast to the recent battle for SC 104, Canadian airmen had demonstrated that when properly directed they were more than a match for U-boats that ventured within range. Hudsons sweeping ahead of the convoy in search of *Veilchen* had sunk one submarine and driven off a key shadowing U-boat. As a bonus, one U-boat had also been sunk along the main convoy lanes by a Digby returning from a distant patrol.

The fundamental change in RCAF methods that occurred at the end of October 1942 caused repercussions in the complex Canadian-American air operational control system in Newfoundland. In accordance with the agreements reached in late 1941, Rear Admiral R.M. Brainard (who had taken command at Argentia after the death of Admiral Bristol in April 1942) controlled air forces in the

northwest Atlantic by means of a daily signal covering flying activities from Newfoundland bases for the following day. His wording deferred to the niceties of the situation. There were 'orders' for Brainard's own USN squadrons, 'proposals' for I Group, RCAF, and, from October onwards when the US Army made available four B-17s for convoy duty, 'requests' for the employment of USAAF aircraft. The three commands then replied that they would comply, or comply with exceptions or additions.[44]

Operations by I Group during the period 30 October-2 November satisfied both American demands and the new Canadian tactics: Hudsons and Catalinas took care of SC 107 while Digbys of 10 Squadron supported other threatened convoys.[45] But once the *Veilchen* boats moved out beyond the reach of aircraft and were no longer a menace to shipping in the Newfoundland area, the RCAF increasingly failed to provide all the patrols proposed by the American admiral. The matter came to a head on 12 November when I Group refused to supply air cover for SG 12 as Brainard had asked because there were 'no submarines within 200 miles according to NSHQ estimates.'[46] Brainard believed that the Canadian's problem was simply a shortage of aircraft. The American command at Argentia was in fact becoming an obstacle to Canadian efforts to introduce proven British methods.

Brainard, however, was right about the shortage of aircraft in I Group. By the second week of November three of the four Catalinas of 116 Squadron's Botwood detachment were unserviceable. Even after the arrival of two relief aircraft from Dartmouth, severe winter weather precluded operations, and on 19 November the detachment was recalled. Its responsibilities were assigned to 145 Squadron Hudsons from Torbay, but the Hudsons also suffered from a shortage of spares and unserviceable aircraft as did 10 Squadron's Digbys at Gander. Not surprisingly, then, Brainard had asked that he 'be advised daily as to the number and type of aircraft ... available the following day for air coverage assignment thus permitting ... proposals being ... issued in a form that permits of accomplishment.'[47] The matter rested there for the moment.

As SC 107 departed, German pressure eased on ocean convoys in the Canadian zone. Four submarines only, U-518, U-106, U-43, and U-183, remained, with roving commissions inshore and operations by the first three of these boats included patrols in the Gulf of St Lawrence, described separately in Chapter 13. Outside the gulf, U-518 struck first. In the early morning of 2 November the submarine dodged a Bangor class minesweeper and two Fairmiles on patrol in the Wabana anchorage to sink two vessels and slightly damage a third alongside the loading wharf. Unscathed, U-518 continued its cruise down the east coast of Newfoundland to an unexpected rendezvous a day later with a Digby on an offensive sweep from Gander. Flying Officer J.H. Sanderson came in across the submarine's starboard bow at eighty feet, dropping four Mark VII charges spaced twenty feet apart.[48] But, as so often happened, the U-boat had spotted the aircraft first and was well out of danger in the depths.

On 17 November aircraft found two more of the U-boats operating inshore. An offensive sweep in support of ON 142 by a Digby of 10 Squadron revealed what appeared to be a Fairmile motor launch throwing up a strong wake. The fact

that there were no binoculars on board the aircraft did not help identification and U-183 was well submerged before six Mark VIII depth charges hurtled down on its final swirl. The aircraft had nevertheless done what was required; ON 142 was not attacked. A Canso 'A' from 5 Squadron, recently deployed to Gander, had already prevented U-boats from establishing firm contact with another convoy off Newfoundland earlier in the day by forcing U-43 to submerge ten miles astern of SC 109.[49] Unfortunately, U-43 regained contact and torpedoed the freighter *Brilliant* the following morning, but the RCN escort was able to hold the U-boats at bay after that.

No air cover, however, had been provided when U-518 fell in with convoy ON 145 a few days later, and that unhappy fact demonstrated the weakness of divided Canadian and American control in the northwest Atlantic. In the early hours of 21 November, the submarine sank one ship in the convoy and damaged two others about 200 miles south of Placentia Bay. This almost certainly could have been avoided if aircraft had provided cover all day on the 20th, especially during the vital period at dusk. Argentia, in whose flying area the convoy was travelling, was fog-bound; three aircraft from Sydney, NS, carried out an offensive sweep as far east as 55 degrees west, but the USAAF's Gander-based B-17s allocated to convoy defence failed to respond to RCAF requests for assistance. This lamentable lack of co-operation between US and Canadian forces gave further impetus to the campaign, now underway in Ottawa and discussed in Chapter 15, to have all sea and air anti-submarine forces on the east coast brought under one Canadian authority.[50]

Autumn ended with the inconclusive depth-charging of an unidentified U-boat by a Hudson of 145 Squadron on 26 November.[51] The last, scattered clashes of the year were fought as the command deployed its squadrons to their winter stations. From Botwood the flying boats of 116 Squadron again moved to Dartmouth while their headquarters was set up at the new RCAF station in Shelburne, NS. The early icing over of the harbour quickly proved Shelburne to be useless for flying-boat operations and the whole squadron was then relocated at Dartmouth, using moorings in Eastern Passage, at the southeast extremity of Halifax harbour.

The closing down of flying-boat operations in Newfoundland left 1 Group with accommodation for only one, land-based, long-range squadron. No 10 Squadron's aging and often unserviceable Digbys occupying that billet at Gander were therefore replaced by the Canso 'A's of 5 (BR). The Digbys joined the pilgrimage to Dartmouth, which, by early December, included the Cansos of 117 Squadron when Gaspé and Kelly Beach, North Sydney, cut back to winter establishments. The movement brought an influx of men and aircraft to the command's main base, whose complement of anti-submarine operational squadrons now consisted of 10 (BR), 11 (BR), 116 (BR), and 117 (BR). By contrast, 1 Group's maritime patrol strength had been reduced to only 145 Squadron's Hudsons at Torbay and 5 Squadron's Canso 'A's at Gander, which, at the end of December, were reinforced by a small detachment of similar aircraft from the still incomplete 162 Squadron.[52]

The unbalanced winter deployments, dictated as they were by the limitations

of available equipment rather than the course of the war at sea, highlighted Eastern Air Command's most critical shortcoming: a lack of land-based aircraft able to reach the mid-ocean air gap where U-boats intercepted and attacked convoys. Now that RAF VLR Liberators from Iceland were able to patrol to 35 degrees west, closing the eastern part of the gap, the danger lay in the western portion, between 35 and 50 degrees west, as the battles for SC 104 and SC 107 had demonstrated. Only the twelve Canso 'A's of 5 and 162 Squadrons had the potential – and that at the extreme limits of endurance – to reach the zone of heavy U-boat activity. RCAF aircrews coaxed their amphibians to extraordinary performance, but the only truly effective answer was to station VLR aircraft in Newfoundland.

Any lingering doubt about the crucial importance of the converted Liberators should have been swept away by events in early December. During the first week of the month convoy HX 217 was harried by twenty-two U-boats during its passage of the air gap. The naval escort was able to keep the pack at bay until 8 December, when three RAF VLR Liberators arrived to support it 800 miles from their Iceland base. The aircraft forced thirteen U-boats to submerge, attacked eleven, and broke German contact with HX 217. Weather prevented flying on the 9th and, although the Germans regained contact, the RN escort vessels were able to keep losses down to one ship. The assault ended on the 11th in the face of increasingly effective air cover. Nevertheless, debates in the Allied high command about the allocation of air resources continued to delay the assignment of additional Liberators to the north Atlantic convoy routes.[53]

By December 1942 Eastern Air Command had completed its first year of direct contact with U-boats. On the eve of a new phase, when the advantage of having full decryptions of German Enigma radio traffic was soon to be restored, it is a suitable moment to assess the campaign thus far.

The Hudson made up the bulk of Eastern Air Command's anti-submarine strength and had proved itself in the role. A comparatively heavy aircraft, it was light to handle on the controls, highly manoeuvrable, and had a clear, all-round view from the pilot's seat that made it very suitable for low-level depth-charge attacks in a period when 'eyeballing' was still the method of aiming.[54] Shortness of range was the Hudson's main handicap. The Catalina/Canso flying boat, although it had better range and had flown approximately 35 per cent of the hours flown by all types combined, did not perform well in the Canadian conditions of 1942. For a start, it could only carry 1000 lbs of depth charges with a regular seven-man crew and a full load of fuel. It was said about flying the noisy Catalina that the pilot 'required good training, much practice and plenty of muscle.'[55] Stamina was also important, because of the length of time it took to get out to the patrol area; efficiency was likely to suffer by the time the aircraft arrived on station. The flying boat also had a poor rate of climb so that it often could not get through the fog quickly enough to avoid wing icing. Consequently, a forecast of heavy 'icing' conditions meant that the Catalina could not be sent out above the overcast to rendezvous with convoys that were themselves beyond the fog belt. Once in the operational area the pilot's view of the ocean forward and downward was obstructed by the nose of the aircraft while, below, the U-boat's look-outs

had plenty of time to give the alarm on spotting the large silhouette of the slow-moving flying boat.[56]

Until the advent of the Canso 'A' amphibian, the ungainly Digby was the only aircraft in Eastern Air Command able to make sustained patrols at ranges of over 300 miles that could operate during the winter from Newfoundland. As a result, it had formed the backbone of No 1 Group for nearly two years. Although Digbys made only five confirmed attacks on U-boats, one of these destroyed U-520 in October 1942. By that time, nine of the original twenty Digbys had either been written-off in crashes or had disappeared over the north Atlantic, and the remaining aircraft were no longer reliable enough for sustained long-range operations. Slated for transport duties, the surviving Digbys were actually passed to the newly formed 161 Squadron in the spring of 1943 as an interim measure pending the arrival of the squadron's Canso 'A's. And so the Digby flew on, in declining numbers, until the end of 1943 when it was finally withdrawn from operational employment.[57]

Looking at the general tactical situation in late 1942 it is clear that Eastern Air Command made full use of naval intelligence and that the majority of sweeps were organized on the basis of DF positions and estimates of U-boat locations derived from this and other sources of information. In addition, the command now had its own Operational Research Section to monitor and assess the efficiency of its operations as well as to make recommendations for more effective methods. These innovations quickly proved their worth, but the same could not be said of locating submarines with airborne radar. 'We can draw a very definite conclusion,' wrote the chief of the air staff two years later, 'which is that so far as the detection of submarines is concerned it would have made little difference if our aircraft had not been fitted with ASV Mark II.'[58] Indifferent serviceability, the fact that the equipment had to be switched off when radio transmissions were being made, and suspicions that U-boats were able to detect emissions had all combined to restrict the optimum use of radar. Aerial photography, to confirm U-boat sightings and record depth-charge attacks both for the assessment of results and as an aid to training in accurate bombing, was another matter requiring great improvement. Still, these were domestic air force problems, and the means existed within the service to find solutions. That was not true of the most serious shortcoming of Canadian anti-submarine operations: the failure of the RCN and RCAF to co-ordinate various instructions for co-operation between aircraft and escort ships into a common system understood by all. The requisite interservice co-operation was notable by its absence, belying Canadian claims that relations between the navy and the air force were all that could be desired.

The primary responsibility and main task of the anti-submarine air and sea forces during the five-and-a-half-year war of attrition on supply lines known as the 'Battle of the Atlantic' was the safe passage of merchant shipping. In that light, 1942 was by far the most perilous year for the Allies. Almost 1000 ships totalling more than 5 million tons were destroyed by U-boats. The losses in the northwest Atlantic (north of 40° north and west of 40° west) and including the Gulf of St Lawrence accounted for a shade under 12 per cent of those figures.

Eastern Air Command responded with some 8000 sorties. Aircraft logged approximately 50,000 flying hours (including those flown over the Gulf of St Lawrence and Strait of Belle Isle), starting with 591 hours in December 1941, rising to a high mark of 6448 hours in October 1942, before declining to 4602 hours in November after the command had adopted offensive tactics.[59] The defensive tactics involved in providing air cover to coastal convoys established early in the year had been an effective response to the heavy sinkings among independently sailed shipping, and had limited the extent of the German victory in the Gulf of St Lawrence. The problem with these tactics was that they made such heavy demands that it was impossible to provide constant air escort for all shipping. Nor, under these circumstances, could aircraft intervene when U-boats took up submerged attack positions on well-travelled routes or struck on dark nights and when weather prevented flying. Had the RCAF adopted offensive methods earlier, the German thrust into coastal waters could almost certainly have been blunted three to four hundred miles out to sea, and with significantly less wear on aircrew and aircraft than resulted from the policy of indiscriminate close escort.

For the assault on shipping the Germans had twenty-two U-boats directed to the north Atlantic at the start of Operation *Paukenschlag* out of a total of 248 submarines in commission on 1 January 1942. By 1 December the respective figures had grown to ninety-five and 582.[60] From Canadian and German records an educated guess would be that a total of thirty-five U-boats operated in waters covered by Eastern Air Command over the twelve-month period starting 1 December 1941. RCAF aircraft struck back with forty depth-charge attacks. The presence of a U-boat can be confirmed from German records as positive in twenty-six cases, possible in five, and unlikely in nine. Canadian aircrew attacked three boats twice, and one, U-517 in the Gulf of St Lawrence, six times. They destroyed three U-boats, half of the total Allied score in the northwest Atlantic; USN aircraft accounted for two and a Royal Navy trawler sank one.

The RCAF's ratio of kills to attacks, 7.7 per cent, was comparable to that of Coastal Command whose aircraft made 26.5 kills in 381 attacks during 1942,[61] although the resulting ratio of 7 per cent is unrepresentatively low because the British statistics included many strikes with machine-guns only. Undoubtedly, several Eastern Air Command attacks that were close to the mark would have resulted in serious damage or kills if the Canadian aircraft had carried the latest armament. Most of Coastal Command's sinkings were achieved between July and December with Torpex depth charges; the Mark XIII Star and Mark XVI shallow-depth pistols that became available through the fall further increased the effectiveness of the RAF attacks by about 25 per cent over those made with the Mark XIII pistols.[62] The RCAF must be given credit for achieving two of its successes with the inadequate 250-lb Amatol charge, one with the more effective 450-lb version, and all with the Mark XIII pistol. Torpex charges only became available for the last two attacks in November, in neither of which can the presence of a U-boat be confirmed, and the improved pistols did not arrive at RCAF squadrons until the beginning of 1943. That many attacks were marred by faulty tactics despite Coastal Command's prompt promulga-

tion of more effective methods, reflected less on aircrew than on the senior commanders.

There were also fewer opportunities for attack, because Eastern Air Command did not match Coastal Command's operational performance in the number of sightings made – the Canadian average of one U-boat sighting for every 134 aircraft sorties was only about a quarter of the Coastal Command ratio of one to thirty or forty – yet this should not be taken to reflect discredit on the RCAF. In 1942 U-boats in the Canadian zone averaged about one every 40,000 square miles, 'often much less.'[63] Dönitz, speculating from the German side why there was more harassment from the air in the east than in the west, wrote: 'Reasons for this are probably the small number of air bases in Newfoundland and Greenland and the fact that fewer U-boats have operated in this area,' and he expected 'if U-boats were transfered to the West Atlantic, there would shortly be a stronger air patrol there ...'[64]

The second significant difference between operational conditions in the two commands was that the weather was generally far worse for air operations off the Canadian coast. Again, Dönitz, after his U-boats had had a particularly frustrating encounter with a convoy off Newfoundland, pointed out the problem: 'It has again been proved that the weather situation which is affected by seasonal and local conditions, permits only chance successes.'[65] That was as true of one side as it was of the other. Fog, as we have seen, frequently disrupted air searches off the Grand Banks. Amongst the hazards for pilots flying in overcast conditions was the difficulty of knowing how far their aircraft were from the surface of the water; altimeter readings, accurate at the point of departure, could vary significantly over a long flight because of changes in atmospheric pressure. Even if the altimeter was reading correctly, the radar operator could receive an echo that might be a surfaced U-boat, but might equally be an iceberg 100 feet or more in height so that it was impossible for the pilot to make the low attack approach essential for success if the contact was indeed the enemy.[66] Although the fogs and icebergs were seasonal, there was another danger always at the back of the minds of pilots on long patrols. A slow Digby or Canso struggling back against the prevailing westerly wind from far out in the Atlantic could easily run out of fuel, particularly if it had to divert to another airfield because of a sudden weather change at the home base. This factor, perhaps more than any other, restricted RCAF aircraft in their attempt to find submarines.

Difficult operating conditions still did not excuse Eastern Air Command for being slow in adopting Coastal Command tactics. Canadian experience showed that British methods were effective in the northwest Atlantic. Of the twenty-six attacks where the presence of a U-boat can be confirmed, half were made by aircraft patrolling at altitudes of 2000 feet and over. Significantly, 113 Squadron was responsible for the first successful attack shortly after adopting the higher altitudes and white camouflage advocated by the RAF, and made more attacks than the rest of the squadrons combined. In October and early November 10 and 145 Squadrons added to the RCAF's total of U-boat sinkings shortly after those squadrons belatedly employed the new methods. The RCAF's record also proved Coastal Command's conclusion that close escort of unthreatened convoys was

the least effective way to make contact with the enemy. Only four confirmed attacks were made by aircraft on escort missions; by contrast, sweeps of suspected U-boat positions and over convoy tracks yielded seventeen attacks, two of which destroyed the U-boats. The third kill was made by an aircraft returning from escort duty, confirming British experience that sweeps to and from convoys were often more likely to locate submarines than patrols around the convoy itself. Had the RCAF followed Coastal Command's methods sooner and with greater care, the achievements of Eastern Air Command, both in strikes against the enemy and the defence of trade, would have been more impressive.

Contemporary British critics, who laid the blame for Canadian shortcomings squarely on senior officers for failing to provide adequate leadership, were undoubtedly right. Rather than ensuring the application of improved techniques and doctrines, senior officers were preoccupied with mundane day-to-day needs and the requirement simply to find enough men and equipment to fly the necessary number of sorties. A dearth of specialist knowledge compounded the problem. No one in senior command had any first-hand experience of anti-submarine operations. Until late 1942 that restriction also applied to senior staff officers. Wing Commander C.L. Annis, who took over as director of (BR) operations at AFHQ in August 1942, was the first man in that office who had such experience.[67] The excellent RAF suggestion in November 1942 to send four senior pilots at a time on a four-week course with Coastal Command, to benefit from British expertise, was not taken up. Instead, the RCAF had to depend on the ability of Canadian airmen themselves to rise above their difficulties.

15
Defeating the Wolf Packs

The RCAF renewed its agitation for Liberator aircraft in late 1942. It was necessary to bypass the normal procurement process because the Anglo-American Combined Munitions Assignment Board refused to consider the question, and the Canadian government was not prepared to pursue the matter through political channels (see Chapter 9). RCAF requests were, however, unceremoniously rejected in London and Washington. The British Air Ministry, supported by Winston Churchill, rebuffed repeated attempts by the Admiralty and Coastal Command to divert aircraft from strategic bombing to anti-submarine work. The US Army Air Forces, which had a virtual monopoly on long-range types in the United States, similarly objected to the allocation of heavy bombers to other roles in its determination to 'keep the mass of air striking power in the hands of one force.'[1]

It was an important step forward for the advocates of very long-range [VLR] operations when the British Cabinet's Anti-U-Boat Committee finally addressed the problem, and in November 1942 formally selected the Consolidated B-24 Liberator – a type already operating successfully in the depth of the air gap with 120 Squadron, RAF – as the most suitable heavy bomber for conversion to the VLR role. Even then, emphasis on operations in the Bay of Biscay delayed the conversion of Liberators for VLR convoy protection on the northern Atlantic routes.[2]

Within range of both medium- and long-range aircraft, the bay was an attractive and apparently logical killing ground for Coastal Command. The density of U-boats there was always high, since their bases lay along the French Atlantic shore. Moreover, because the Germans still relied on the old *Hydra* code for coastal operations, which included support for U-boats in transit, it was possible to direct operations with the aid of special intelligence. Enigma intercepts could provide precise U-boat positions in the bay, something which was not possible in mid-ocean areas in 1942 because the code for Atlantic U-boats remained unbroken. Perhaps understandably, therefore, great things were expected from these operations. The Admiralty and Coastal Command preached the doctrine that constant attacks on U-boats in the bay would break the morale of U-boat crews and defeat the enemy attack on shipping. Operational researchers in Coastal Command had also established a positive correlation

between the speed of aircraft and the number of U-boat sightings. It was that principle that made the Liberator, with its speed and endurance, a much desired aircraft for the Bay of Biscay.[3]

Only after convoy losses became desperate in late 1942, and the USAAF reluctantly provided replacement aircraft for the bay offensive in January 1943, did the British Anti-U-Boat Warfare Committee decide to convert some of the Liberators that had been operating off the French coast to a VLR configuration for work in the mid-ocean gap. Nonetheless, even though there were more sightings in relation to hours flown by convoy escort than bay patrols – one every twenty-nine hours compared to one every 312 hours – the British clung to their preference for operations in the transit area. In early February 1943 the arguments of the British operational researcher P.M.S. Blackett, that shipping losses in the Atlantic could be reduced by a startling 64 per cent simply by closing the air gap, still failed to convince the decision-makers.[4] They saw the role of airpower as that of taking the war to the enemy – as in the bay offensive. In the meantime, the fledgling operational research team in Eastern Air Command was also demonstrating with 1942 statistics the links between U-boat density, the number of sightings, and the speed and endurance of an aircraft.[5]

On 11 November 1942, just after the battles for SC 104 and SC 107 which began with great losses less than 600 miles from Newfoundland, the chief of the air staff, Air Marshal L.S. Breadner, had instructed Air Vice-Marshal G.V. Walsh of the Canadian joint staff in Washington to ask for fifteen Liberators that had been superseded by an improved type. Walsh wrote on 18 December, and again on 5 January, to General H.H. Arnold, the chief of the US Army Air Forces. The replies from Arnold and his chief of staff, Major General George E. Stratemeyer, made it quite clear that the United States would not allocate any of these aircraft to Canada.[6]

After this rebuff Ottawa tried, without much success, to obtain a contact in Washington who might persuade senior American officers to change their minds. It was decided in February to let Wing Commander Clare Annis, director of (BR) operations, write a report based on his own extensive first-hand knowledge of anti-submarine warfare, spelling out the need for an aircraft with minimum cruising speed of 150 knots, an endurance of at least twenty hours, and a depth-charge load of at least one-and-a-half tons. A persuasive document, it found its way to Dr E.L. Bowles, a special assistant to the secretary of war, engaged in analysing the anti-submarine problem in the north Atlantic. Whether this report had the desired effect is impossible to say. Bowles was said to have been extremely impressed, and if so may well have passed on his views to his superiors; but by the time Annis heard that the report had reached Bowles, other and much more significant influences had come to bear on the American chiefs of staff.[7]

Between November 1942 and March 1943 Allied shipping losses reached their highest levels. Even though in statistical terms Admiral Dönitz had failed to win his tonnage war when new ship construction overtook the number of ships lost at sea in November 1942, he had not suffered the U-boat losses which might force him to give up his efforts.[8] Moreover, although Allied shipbuilding as a whole

had well surpassed the loss rate, the German effort was directed primarily at shipping assigned to Britain. The U-boat campaign therefore struck at British war industry, and seriously threatened 'Bolero,' the Allied build-up in Great Britain for the eventual invasion of Europe.[9] The Allies needed to overcome the alarming losses to north Atlantic shipping and, at the same time, ensure that an ever-increasing flow of war materials reached Britain in 1943. Not surprisingly, then, at the Casablanca Conference in January President Roosevelt, Prime Minister Churchill, and the Anglo-American combined chiefs of staff placed defeat of the U-boat at the top of Allied priorities for 1943. Soon afterwards the British Admiralty and the United States Navy agreed to form the Allied Anti-Submarine Survey Board to examine the problems of anti-submarine forces in the Atlantic and make recommendations for improvement. Moreover, in February Admiral E.J. King, commander-in-chief of the US fleet, responded to the RCN's campaign for control of shipping protection operations in the northwest Atlantic by calling an Allied conference on command and control in the whole of the Atlantic.[10] Events were therefore moving very quickly in early 1943. The deepening crisis in the Atlantic added weight to the RCAF's pleas for VLR aircraft and forced a review of the command relationships in the northwest Atlantic. It also brought Allied war leaders to realize that the successful conduct of all future operations in Europe ultimately depended on securing the main trade routes.

These developments focussed attention on the efficacy of the escort forces engaged, including the RCAF, and during 1943 the Canadians would come under close scrutiny by their senior partners. The evaluation process began in February when two exceptionally qualified young aircrew officers in Coastal Command, Squadron Leader T.M. Bulloch, RAF, and Flying Officer M.S. Layton, RCAF, visited and reported on Eastern Air Command. Their orders had been not only to examine communications, aircraft control, and other support facilities for operations by RAF Liberators from Newfoundland as had been agreed to by the Canadian government in late 1942, but also to survey the state of the command as a whole. To the air staff in Ottawa the selection of such junior officers had almost looked like a calculated snub. 'We thought,' said Breadner and Anderson in a draft signal they decided not to send, 'more senior RAF representation might possibly be sent to discuss any policy questions involved,' but there is no evidence a snub was intended. More accomplished veterans of the anti-submarine war in the north Atlantic could not have been found. Layton had been Bulloch's navigator in 120 Squadron, RAF, in Iceland, and together they had sunk two U-boats and damaged several others. Both were members of the Distinguished Service Order and Layton had been awarded the DFC as well.[11]

These two very experienced airmen thought that existing facilities and personnel could handle VLR squadrons. They seem to have shared the local opinion that Eastern Air Command should have had a Liberator squadron long before. Like earlier visitors they saw much that was wrong, but an important difference was that they saw it through the eyes of aircrew rather than staff. RCAF aircrew they found capable and keen, even though inadequately briefed on the latest requirements. Partly because of a breakdown in communication between

instructors at general-reconnaissance [GR] schools and operational personnel, Coastal Command tactical memoranda had not been getting through to the people who needed them. Airmen in Eastern Air Command were unaware of the latest doctrine, and the navigational syllabus in GR schools tended to push tactics into the background. Instructors believed the situation was aggravated because too many pupils were being selected who did not have the inclination for this type of work. Graduates of the schools went to squadrons which for the most part used outdated procedures and often suffered from a desperate shortage of adequate weapons and equipment.

For example, there was apparently still only one squadron, 113 (BR), consistently flying at the recommended search height of 4000-5000 feet or just below the cloud ceiling, although other squadrons had used it on occasion with marked success. Nor had white camouflage been widely adopted in Eastern Air Command. When radar was fitted (still not always the case), there was too much reliance on it, so that U-boats, using search receivers, got ample warning to dive before being detected. Visual lookouts, moreover, often merely scanned the horizon instead of searching the sea up to ten miles ahead of aircraft where there was the best chance of sighting a submarine in time to make an attack. When aircraft did strike, there was still little use of photography to analyze the accuracy and effect.

According to Bulloch and Layton, Eastern Air Command placed too much emphasis on distant anti-submarine sweeps, and not enough on searches near convoys. 'Most of the work they do is searching for a U-boat which has been D.F'd from shore stations and this they manage to carry out in bad visibility, in which we would consider an A/S patrol a waste of time.' This reflected Bulloch and Layton's specialized experience in VLR operations at mid-ocean. As Coastal Command Headquarters later explained, with only a handful of modified Liberators available close escort of threatened convoys had of necessity to take precedence over sweeps of convoy tracks and areas where intelligence located U-boats. The Canadian command's shortcoming was in fact very nearly the reverse of that identified by the visiting airmen: a tendency to escort unthreatened convoys at the expense of offensive sweeps.[12]

Bulloch and Layton's other criticisms, however, were undoubtedly on target. There was excessive reliance on the square search, a patrol usually of thirty- to forty-mile legs in the shape of a box, and the crews in one squadron had got hold of the extraordinary idea that they were not supposed to leave their track to identify suspicious objects. There was no policy for operational fatigue, no standard signals procedures, and no standard enemy reporting system.[13]

The most glaring problem of all was the lack of material. In 10 Squadron Digby pilots had a home-made device for releasing depth charges, and navigators had no astrodomes from which to take star shots, relied on an old type of compass not accurate within less than five degrees, used home-made 'Tail Drift Sights,' and only enjoyed the luxury of radar in three of their aircraft. Throughout the command there was a need to replace outdated depth charges, marine markers, sextants, photography and radio equipment. Radio telephone sets were an urgent necessity for communication with warships and airmen had

to have better flying clothing. It astonished Bulloch and Layton that Cansos, which were particularly cold, were not equipped with electrically heated flying suits.[14]

For their part aircrew in Newfoundland and the Canadian Maritime provinces benefited from exchanging information with the two visitors from the other side of the ocean. 'Gen,' the air force slang for information, from brothers in arms is always more credible than staff memoranda, and it is likely that Bulloch and Layton also instilled some badly needed confidence.[15] That was important, because the RAF was bound to take Canadian operational efficiency into account before deciding on the allocation of Liberators.

Whatever faults Bulloch and Layton were able to find in Canadian anti-submarine operations, in the winter of 1942-3 (the worst on record for the war years) No 1 Group did well to fly at all. In January and a good part of February, weather exerted more influence than warfare on operations; it impeded flying, battered the convoys, and left U-boats almost helpless. Dönitz recalls in his memoirs that 'the elements seemed to rage in uncontrolled fury ... Systematic search for shipping became impossible; and when it was located by luck the weather gravely hampered attack.'[16] So he bided his time and built up his strength.

During this period Eastern Air Command endeavoured, with the resources available, to improve both the scale and the range of 1 Group's operations in an attempt to affect events in the air gap. In the process they went some way towards demonstrating the results they might have achieved with Liberators. At the end of December 1942 Canso 'A's of 5 (BR) were joined at Gander by two similar aircraft from 162 Squadron based in Yarmouth. Along with the 162 (BR) detachment came Eastern Air Command's most capable officer and the squadron's new CO, Squadron Leader N.E. Small. In order to extend the operational range of the Cansos beyond their normal 500 miles, 5 Squadron personnel, under Small's direction, began to strip some aircraft of excess weight, including extra guns, ammunition, and stores. In all, about 1200 lbs was removed, which permitted the Cansos to operate out to about 700 miles. Thus, as officers of 5 Squadron readily admitted, it was largely due to the efforts of Small that Gander-based Cansos were able to make a series of promising attacks at maximum range during the early weeks of February. Tragically, Small was killed when his Canso crashed while taking off on 8 January, a result of equipment failure.[17]

By the end of January there were no fewer than 100 U-boats at sea, more than forty in the mid-ocean gap. In Group *Haudegen* twenty-one boats formed a line attempting to intercept convoys south of Greenland, twenty in Group *Landsknecht* remaining further to the east. On 1 February ten of these boats moved west, some of them eventually to form Group *Pfeil* in mid-ocean, south of *Haudegen*. Dönitz then ordered Group *Haudegen* to move southwest and form a line as close as possible to the Newfoundland Bank. This brought the group within range of Gander, Torbay, and Argentia. On 4 February sightings and attacks by RCAF, USN, and USAAF aircraft began to take place with the assistance of special intelligence, which at this time was usually no more than one day old,

the *Triton* code used by submarine headquarters for north Atlantic operations having at last been broken by Bletchley Park at the end of 1942.[18]

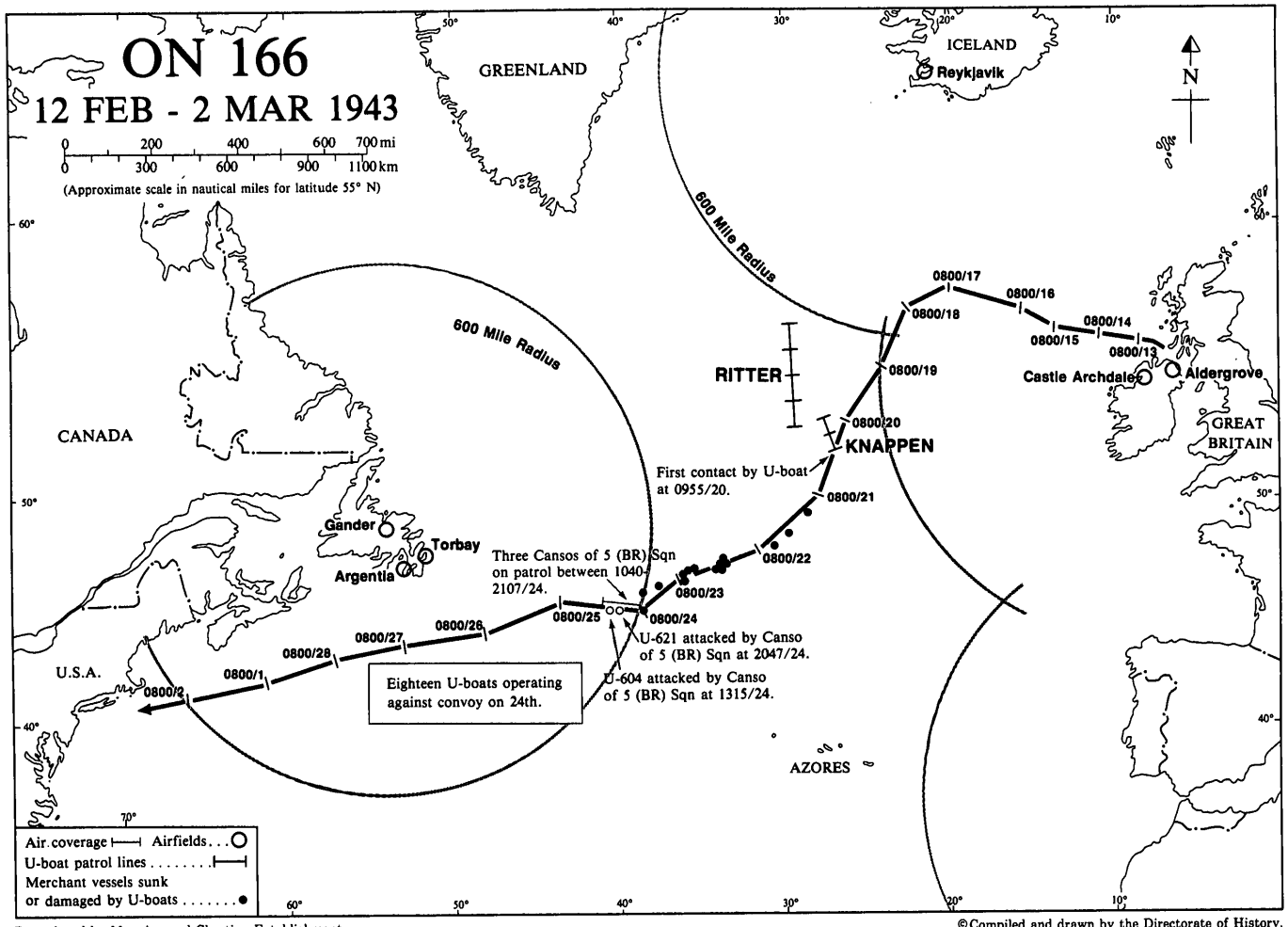
A Canso 'A' of 5 Squadron based on Gander made the first sighting, on 4 February. Flight Lieutenant J.M. Viau attacked what was probably U-414 with inconclusive results. Two days later a USN PBY from Argentia and a Canso 'A' from 5 Squadron flown by Flight Lieutenant F.C. Colborne both appear to have attacked U-403, a couple of hours apart. Neither attack caused significant damage; the Canso scarcely made an impression, presumably because the U-boat had dived in plenty of time. Several other sightings that day, though they produced no conclusive results, had a noticeably beneficial effect on squadron morale. More important, the U-boats did not attack any convoys within aircraft range of Newfoundland.[19]

There was, in fact, little enemy activity in the area in mid-February. Several convoys ran into U-boat attacks, but only after they steamed out of range of Canadian aircraft. Several others received complete air cover to the limits of Eastern Air Command resources under difficult circumstances, but there is no evidence that this had a direct effect on German attempts to intercept and attack. Convoy SC 118 had fought its way eastward through the air gap in early February, losing eleven ships before Liberators of 120 Squadron, RAF, were able to reach it and drive off the submarines.

The battle for SC 118 proved decisive in the Royal Navy's efforts to reorganize and strengthen escort forces operating in the air gap. It resulted in the Admiralty's approval for the formation of support groups, comprised of escorts drawn from existing groups and destroyers from the Home Fleet. These groups were to range the mid-ocean, reinforcing threatened convoys and chasing down submarine contacts with a determined hunt, something which convoy escorts could not do without endangering the merchant ships in their charge. This development, coupled with the extension of air support from land bases and escort aircraft carriers, ultimately decided the issue. But there were many more battles to fight before these forces could be deployed.[20]

The westbound convoy ON 166, escorted by the only American group left on the main trade route, had already lost nine of its forty-eight ships by the time it reached the outer limits of 1 Group's coverage on 23 February. Early on the 24th two more ships were torpedoed; of the eighteen U-boats concentrated against the convoy, seven were in contact that morning. Some confusion on the German side had interfered with co-ordination of the wolf pack, but air support was still urgently needed. No 1 Group had issued instructions for air coverage from Gander to tie in with USN coverage from Argentia, and USN PBYs swept towards the convoy, but it was beyond their range. Consequently, only the Cansos sent from 5 Squadron, their ranges significantly increased by Small's modifications, managed to provide some help. The first to arrive met the convoy and successfully completed a patrol; the second attacked a U-boat ahead of the convoy; the third failed to meet the convoy and made no sightings or attacks; and the last made an attack at dusk astern of ON 166.[21]

The two attacks on the 24th blunted the U-boat onslaught. The first incident involved the same crew flying the same aircraft that had encountered U-403



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earlier in the month. Flight Lieutenant F.C. Colborne, approaching his rendezvous with fresh information from group headquarters that one of the ships in the convoy had been torpedoed and six U-boats sighted, came upon U-604 on the surface. From an altitude of 3000 feet, and in perfect visibility, he sighted the U-boat about six miles ahead. Colborne immediately applied throttle and put the nose down. At 800 feet and with an air speed of 200 knots he cut the throttles and began a steep diving attack as the U-boat began to submerge.[22]

A series of colourful accounts from the crew members describe the last moments of the run in. It seemed to them a complete success, several recalling with Colborne 'what appeared to be the conning tower wallowing through the swirling water – it sank and then came air bubbles a large boiling mass of them! These lasted for about ten minutes, then oil spread over the area with bits of debris.' In inimitable comic book style the second engineer, Leading Aircraftman John Watson, reported: 'The danger was all over and Hitler's little pet was blown to peases [sic].'[23] In fact, U-604 survived. *Kapitänleutnant* Holtring described the damage to his boat in calm professional language: 'Both compressors torn off. Shafts displaced in axial direction. Diesel clutches are pounding hard. Main clutches cannot be fully disengaged. Main ballast tank V has 50 cm long crack. Tank vents air very rapidly. Moved off ... to make repairs.' He arrived at Brest on 9 March after a slow journey home, out of action for the time being.[24] Colborne received the Distinguished Flying Cross later in the year.

Some seven hours after the first attack, a Canso flown by Flying Officer D.G. Baldwin sighted U-621. The navigator's account describes the action that followed. The aircraft, flying at 1000 feet just below a heavy bank of cumulus cloud, arrived over the convoy at dusk.

> Its track had been searched forward 20 miles and 20 miles to starboard and now the aircraft was approaching from a position 30 miles behind it, maintaining an alert watch at all station[s] for the possible shadower. A long intercom silence was broken by [second pilot] F/O [L.J.] Murray, who was sweeping ahead and to starboard with the binoculars, reporting a streak in the water ahead about 5 miles. F/O Baldwin immediately made slight course adjustment and commenced to dive ... At 200 feet the binoculars clouded and the wake was lost. F/O Baldwin jumped from 100 feet to 300 feet and resighted the wake, by this time about 60° to starboard and still noticeably moving – and turned on to attack. Not wanting to make a straight beam attack he turned again, up the submarine's track, just as he approached the swirl dropping the four depth charges in the turn where they were observed to land in close diamond pattern 50-60 feet ahead of the swirl ...[25]

The light was fading fast and photography was impossible. All that could be done was to inform the escort commander by radio telephone, while setting course for base 'and opening another bottle of champagne.'[26] U-621, which had been frustrated in attempts to get at the convoy during the afternoon by some or all of the other Cansos, suffered slight damage, enough to put it out of action for the moment. Both attacks had been achieved at the extremity of Canso endurance.[27]

The next day fog grounded all aircraft and U-boats were again able to close the convoy. They sank one more ship, then Dönitz ordered them to withdraw before they came within range of further air coverage from Newfoundland. Liberators based at Gander might have been able to force such a withdrawal much earlier, almost certainly before the U-boat attacks of 22 and 23 February, which caused such severe losses. As the USN official historian subsequently noted, it was because of this shortfall that 'the wolf packs got in their dirty work.'[28] The increasing effectiveness of RAF Liberators of 120 Squadron in the eastern portion of the air gap confirms his opinion, and the subsequent heavy losses in the western part focused attention on the need to base VLR aircraft in Newfoundland.

The Canadians realized that even the aircraft they had were not being used to their best advantage because efforts were not properly co-ordinated with other air and naval forces. 'As matters now stand,' wrote Wing Commander Clare Annis, from his perspective in Ottawa, 'each service [the RCN and RCAF] is publishing a set of operational instructions and including in them their interpretation of the role the other service will play in the conduct of the joint operation of convoy escort.' He went on:

> Neither set of instructions carries executive authority in the other's Service. Each Service has depended only on liaison with the other to ensure that their interpretation of the other Service's function will not conflict with its own ideas. This has resulted, it seems, in the issuing of two sets of orders which are neither complete in themselves nor even when combined. Moreover, as our control and administrative machinery now stands, it is necessary for the service wishing to introduce a new order or alter an old one to raise a special memorandum and/or arrange for a special conference. This allowed for delay, oversight, misunderstandings and considerable inefficiency.[29]

There were a number of possible solutions. The most obvious was to adopt, with amendments as necessary, the Admiralty's *Atlantic Convoy Instructions*. These already governed RN and RCN escorts and, through the Air Operations Section, Coastal Command as well. Or the RCN and RCAF could develop and adhere to their own joint tactics under the aegis of the Joint RCN-RCAF Anti-Submarine Warfare [ASW] Committee, a body which had been established but not yet convened. Some published doctrine, promulgated simultaneously through each service, was definitely needed.[30]

What made this co-ordination particularly urgent was the plethora of methods and ideas governing air operations in Newfoundland by USN and USAAF as well as RCAF forces. The American naval commander at Argentia, inhibited by inadequate telephone links with St John's and the Canadian mainland, had suggested a conference to discuss standard operating procedures between the USN, RCN, USAAF, and RCAF, and in doing so had in fact prompted Annis to offer his appreciation of the problem. From 26 to 29 February a meeting was held at Argentia between senior air authorities during which Air Commodore F.V. Heakes and key personnel from all three separate air commands thrashed out a great number of differences. Largely technical in nature, they were by no means resolved during the conference, but they pin-pointed the problems and contained the germ of fundamental reforms.[31]

Perhaps the most important outcome of the meeting was the further integration of USAAF operations with those of the USN and RCAF. Although the US Army's Newfoundland Base Command had made its four Boeing B-17 Flying Fortresses at Gander available for shipping defence in October 1942, control of these aircraft had in mid-February 1943 passed to the 25th Anti-Submarine Wing of the USAAF Anti-Submarine Command, a change that heralded a great expansion of the army air forces in Newfoundland. But the Anti-Submarine Command's mission, summed up in its motto 'to seek and to sink,' sharply contrasted with that of the USN and the RCAF. The latter services agreed that the protection of shipping was the principal task of anti-submarine squadrons; the location and destruction of U-boats, however necessary, took second place. It was therefore a remarkable concession when, at the Argentia conference, the USAAF representative announced the army would 'join in on the change of mission to agree with yours.' The USAAF in Newfoundland did make a significant effort to support convoys, but the late arrival of additional squadrons, all of which had to become acclimatized to the difficult operating conditions of the north Atlantic theatre, the fact that none of their aircraft had VLR capability, and a continued preference for the search and strike role limited the contribution of army aviation to the critical convoy battles of the early spring of 1943.[32]

In the meantime, the air officer commanding [AOC] Eastern Air Command, now Air Vice-Marshal G.O. Johnson, responded to the good work done at the Argentia meeting by bringing up the old problem of operational control or direction again, a reflection of the constant Canadian obsession with maintaining national control of their own forces, even at the expense of operational efficiency. In the flurry of signals that passed between St John's and Halifax after the Argentia meeting in late February the principal concern was a Canadian fear of subordinating Eastern Air Command to the USN task force commander [CTF 24]. Acting in the role of peacemaker, as he had done on a similar occasion in 1941, Heakes 'earnestly suggested' to Johnson, on 6 March, that the question not be raised again, because Eastern Air Command had enjoyed 'more than one years experience of satisfactory coordination ...' Heakes had 'rationalized' the co-ordination procedure from 'a haphazard method to a reasoned daily study of the situation insofar as RCAF is concerned.'[33]

A fundamental restructuring of command relations was, however, on the brink of achievement. In December 1942 the RCN had launched a campaign to assume control of convoy and anti-submarine operations in the northwest Atlantic. The intention of Naval Service Headquarters [NSHQ] was to elevate the commanding officer Atlantic Coast to commander-in-chief status, superseding the American admiral at Argentia in all matters relating to trade defence. Now that the RCN was supplying nearly 50 per cent of the escorts on the north Atlantic routes and all but a handful of USN warships had long since been withdrawn, CTF 24's responsibility for convoy protection not only needlessly complicated command but offended Canadian sensibilities.

Admiral King reluctantly agreed to the Canadian request for an interallied conference on Atlantic convoy arrangements, but the scope of the planned gathering soon expanded as a result of the crisis at sea and the priority given to

the anti-U-boat war at the Casablanca conference. From the latter meeting emerged a proposal for a supreme Atlantic command, in order to rationalize the situation in the northwest part of the ocean where there were at least eight Canadian and US operational authorities. Because of the sensitive national interests involved, the supreme command was never realized; Anglo-American agreement in February 1943 on the creation of the purely advisory Allied Anti-Submarine Survey Board was the modest outcome of these efforts. Another, albeit indirect, result was the RCAF's retreat from its long-standing refusal to place Eastern Air Command under naval direction.[34]

Air Force Headquarters [AFHQ] became aware that great changes were in the making at the beginning of February. After the Casablanca conference, a subcommittee of the Anglo-American Combined Staff Planners in Washington had hurriedly prepared a preliminary report that envisioned a three-stage integration of command in the Atlantic. The air and sea anti-submarine forces of each nation would first be unified under a single national commander, all forces in the eastern Atlantic would then be placed under a British commander-in-chief, and those in the western ocean under an American officer; these steps would set the stage for the organization of a supreme command. The Canadian air attaché in Washington summarized this paper in a wire to Ottawa on 2 February. At that same time Wing Commander Clare Annis, who had recently returned from the American capital, reported that there were splendid opportunities for Canada in the rapidly developing situation if the RCAF would place Eastern Air Command under the RCN. The US services, Annis learned, might be willing to forego the installation of an American commander-in-chief if the Canadians were able to create a unified command (Admiral King, in fact, dispatched a signal to NSHQ and the Admiralty late on 2 February that proposed the removal of the Argentia command from convoy operations). In addition, the USN and the US Army would be more favourably disposed towards the allocation of Liberators to the RCAF.[35]

These exciting possibilities broke down the RCAF's resistance to naval direction with dizzying speed. Eastern Air Command's responsibility for the general defence of the Atlantic coast, including fighter operations and strikes against enemy landings as well as anti-submarine duties, had always proved an insuperable barrier to the subordination of maritime patrol aircraft to a naval command. Yet within forty-eight hours of the arrival of the news from Washington, AFHQ had found a solution. Anti-submarine squadrons would normally operate under the general direction of the naval commander-in-chief, though under the tactical control of the air officer commanding Eastern Air Command, as was the case in Coastal Command. The RCAF commander would, however, retain full control of other types of squadrons, and in the case of a major attack requiring a concentrated air effort, would also resume complete charge of the anti-submarine units. On 4 February officers from AFHQ and NSHQ began to work out the details of a unified command along these lines. Air Council gave its approval that same day, and on the 6th the chief of the naval staff, Admiral P.W. Nelles, was able to inform Admiral King of the speedy progress. Air Marshal Breadner, who was in London at this time, gave his assent

to the proposed arrangements by signal the next day. Later in the month, NSHQ took the first step towards integration on the east coast by making flag officer Newfoundland, hitherto an independent command, subordinate to commanding officer Atlantic Coast with effect from 1 March, the opening day of the Atlantic Convoy Conference in Washington.[36]

As the delegates gathered in the American capital it was patently obvious that major changes were needed to check the U-boat offensive in mid-Atlantic. By the end of February, British intelligence was again encountering serious delays in its reading of north Atlantic U-boat signals. On 10 March German submarine headquarters compounded the problem by introducing a new code for weather reports, which effectively closed the cryptanalysts' 'back-door' into the more complex – and vital – operational cipher *Triton*, which had been broken only in December 1942. The cryptanalysts at Bletchley Park grimly predicted a two to three month delay in cracking this latest problem. In the event, Bletchley Park mastered the new *Triton* settings by 20 March, but in the meantime the lack of special intelligence proved disastrous. With a hundred U-boats at sea, and most of them in mid-ocean, the Germans were able to intercept every north Atlantic trade convoy, mount attacks against 54 per cent, and sink 22 per cent of ships convoyed in the first three weeks of March. Despite the presence of the auxiliary aircraft carrier USS *Bogue*, between 6 and 12 March westbound convoys lost fifteen of 119 ships and an escorting destroyer. Hard on the heels of these disasters came the wolf pack attacks on SC 122 and HX 229, which lost sixteen out of 149 ships, at the cost to Germany of only two U-boats. U-91 made the initial detection of HX 229 on 16 March about sixty miles east of 5 (BR) Squadron's most distant patrol, about 600 miles from Gander. As in the February battles, even one VLR Liberator, able to extend that patrol by another 200 miles, might have made a crucial difference.[37]

It was against this backdrop, the most serious crisis of the north Atlantic campaign, that the decisions at Washington were made. By closing ranks, the RCAF and the RCN had greatly strengthened the case for Canadian command. The conference approved the scheme the two services had worked out: there would be a separate Canadian Northwest Atlantic theatre, with Rear-Admiral L.W. Murray, RCN, at Halifax assuming the appointment of commander-in-chief. With respect to command relationships, it was agreed that anti-submarine air operations were now to be under the operational direction of the naval commander responsible for protecting shipping in any given area, the air officer commanding exercising general operational control. Canada was to be responsible for air cover of HX, SC, and ON convoys to the limit of aircraft range from Labrador, Newfoundland, and the Canadian Maritime provinces. The Washington conference's subcommittee on command, control, and responsibilities of air forces further explained in its report of 11 March: 'All ASW aviation of the Associated Powers based in this region to be under general operational control of the Canadian AOC EAC Halifax who, under general operational direction of Commander in Chief Northwest Atlantic, shall be responsible for the air coverage of all shipping within range including Greenland convoys and other shipping under US control.'[38] The new command structure came into force on 30

April when Admiral Murray took over responsibility for the defence of shipping from CTF 24.

Although the Canadian services had modelled their new organization on the relationship between the Royal Navy and Coastal Command, efforts to give substance to the framework were extremely tentative. While travelling to Washington, the Canadian delegates to the Atlantic Convoy Conference had realized they would be seriously embarrassed if the British or Americans asked precisely how the RCN and RCAF achieved co-operation. AFHQ and NSHQ therefore hurried the Joint RCN-RCAF ASW Committee into existence, and it met for the first time on 23 March. Although a valuable channel for sharing information, the committee did not realize its potential as a co-ordinating body for many months. Meanwhile, Eastern Air Command had attempted to resolve the problem of diverse instructions for co-operation between air and sea escorts by adopting the Admiralty's Atlantic Convoy Instructions on 16 March but, as will be seen, the requisite orders were not properly promulgated. More striking was the continued failure to form a joint operations room at Halifax. In February the two services had immediately agreed that such a facility would play a central role in the new Canadian command, and this requirement had been set down in the proceedings and conclusions of the Atlantic Convoy Conference. The naval staff had decided that Admiral Murray should go to Eastern Air Command Headquarters where better accommodation was available than in the dockyard, and where he would be free from routine administration. Still, Murray refused to move, believing that he could exercise direction over air operations through enlarged liaison staffs.[39]

Newfoundland, as always, posed some of the thorniest problems. The changeover in operational authority took place while the expansion of the US Army Air Forces on the island was under way. At the end of March a squadron of eleven B-17s joined the four B-17s already at Gander, and was followed in early April by another squadron equipped with B-24s (Liberators), although these were not converted to VLR and therefore restricted to an operational radius of about 650 miles, no better than the RCAF's modified Cansos. They were, however, a good deal faster and more powerful. In the meantime a team from the 25th Anti-Submarine Wing arrived at St John's and joined the Canadian combined headquarters. A liaison staff from the USN's air headquarters at Argentia was subsequently installed in the combined headquarters in early May, after the AOC I Group, Air Vice-Marshal Heakes, had assumed control over all air operations from Newfoundland related to the defence of shipping, under the direction of the flag officer Newfoundland Force and the air and naval commanders-in-chief in Halifax. Faced with the daunting problem of bringing together three air forces, each with it own operational procedures, Heakes adapted the system for co-operation that he had helped to develop under CTF 24. No I Group assigned missions to the American services, but left the execution – 'takeoff times, planes used, crews used, armament carried, diversions, or recall of planes on account of weather' – in the hands of the USN and USAAF staffs at the combined headquarters, and in Argentia and Gander.[40]

By accepting naval direction, the RCAF expected not merely to direct

American Liberator operations, but to advance its own bid for VLR aircraft. Canadian airmen seized the opportunity afforded by the Atlantic Convoy Conference to raise the issue once again at the highest levels. Just as the USN and RN were prepared at this time to support the Canadian naval case, both the RAF delegation in Washington and General Arnold had now accepted the reasonableness of the Canadian air force argument, but the RAF refused to support a proposal that would cut into British allocations from the United States, and Arnold, constrained by interservice disputes with the US Navy, refused to break previous agreements.[41]

Air Vice-Marshal N.R. Anderson, who represented Canada on the air forces subcommittee, in arguing for a Canadian VLR capability under the new command arrangements could find no documentary backing other than a memorandum of agreement with the combined chiefs of staff concerning allocations in which the United States undertook 'to assist in the equipping and maintaining of the RCAF.'[42] As he reported on 9 March, however, there was still cause for optimism:

> Speaking to me privately AVM [A.] Durston [head of the RAF delegation, Washington] has more than once stated that UK might consider letting RCAF have twenty Liberators for GR [general reconnaissance] patrols North Atlantic and before yesterday's meeting stated that he would support our claim for VLR aircraft yet said nothing once the meeting had started. Allotment of Liberators to UK for 1943 is 398 of which 20 per month are modified in USA to VLR. These VLR aircraft are now going through Dorval en route UK. If UK would divert 5 per month to RCAF until squadron completely equipped we could collect them from Dorval at once with our experimental crews [and] establish VLR patrols in the Northwest Atlantic immediately in an effort to stop now the heavy ship losses being suffered. Proposal at yesterday's meeting that US Army Air Corps [sic] put VLR squadron at Gander in April is too indefinite. US Army Air Corps aircraft have still to be modified to VLR. Their crews do not know Northwest Atlantic weather conditions, are not familiar with GR operations and do not use our UK Canada communications procedure. Doubtful if they would be operational within one month of arrival at Gander.[43]

Breadner signalled immediately to the British chief of the air staff, Sir Charles Portal, 'I urge you to authorize the diversion at Dorval and re-allocation [of VLR Liberators] to the RCAF ... on the basis of 5 aircraft in March, 10 in April and 5 in May.' He informed Air Vice-Marshal Johnson in Eastern Air Command that Portal would agree.[44]

At first glance that seems to have been too optimistic. When in January the first sea lord, Admiral Sir Dudley Pound, had suggested at a British chiefs of staff meeting that Liberators should be allocated to Canada, the vice-chief of the air staff, Sir John Slessor, had been adamant that the RAF, not the RCAF, should take on the responsibility in the western Atlantic. The RAF's own need for VLR Liberators, and the reports received about Eastern Air Command's inefficiency, made him reluctant to spare any for the Canadians. Portal had agreed. Breadner, however, even if he was aware of this attitude, accurately sensed a softening in the British view. Portal replied on 11 March, after the bitter convoy battles of

February and as Allied fortunes in the air gap plummeted, that the Canadian proposal was under urgent examination.[45]

There now followed a series of negotiations between the RAF and General Arnold. Before deciding in favour of Breadner's request, the RAF entered into conversations with Washington. The RAF delegation there was instructed to find out:

a. When the United States think they would be in a position to allot G.R. Liberators to Canada and in what quantity.

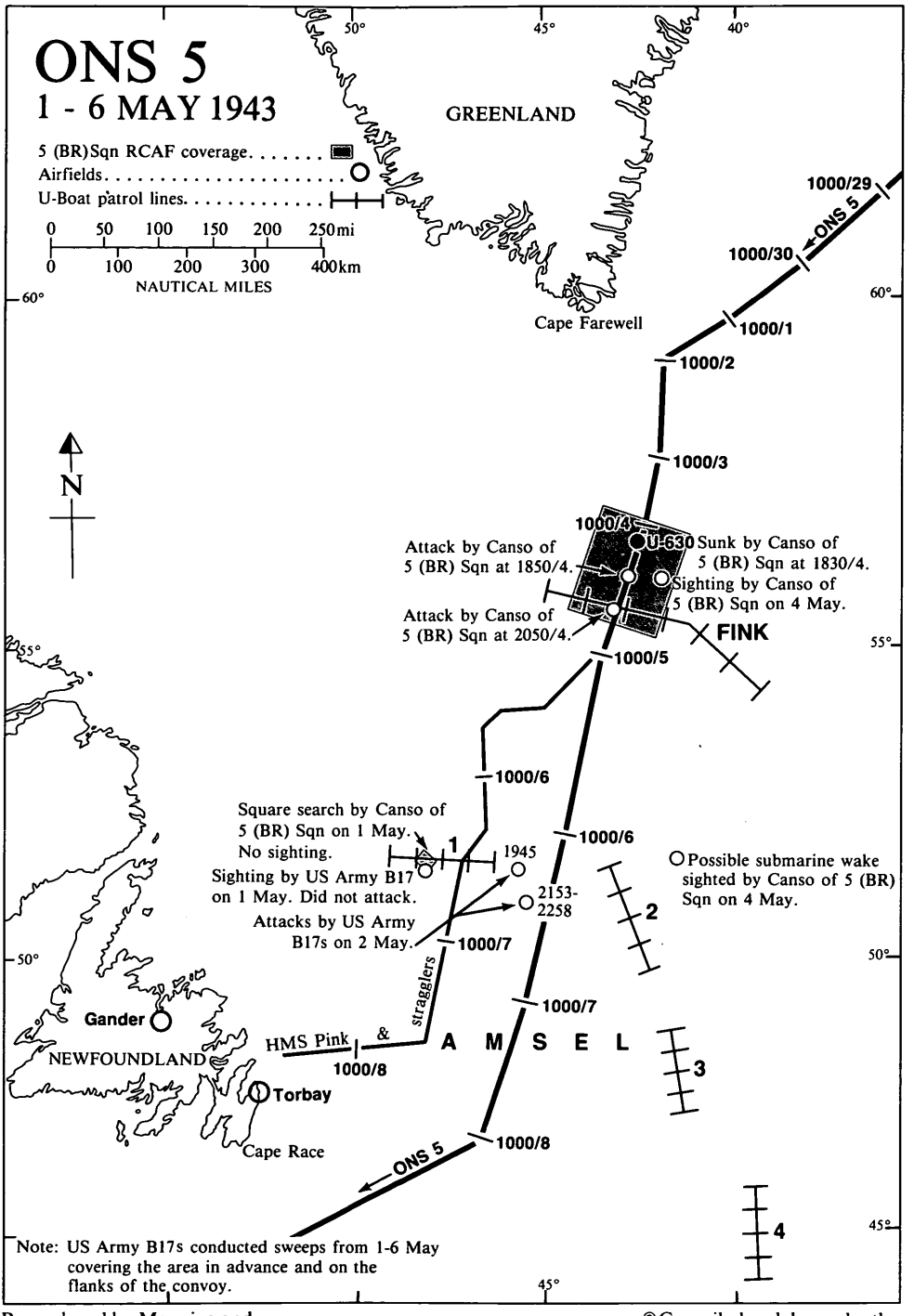
b. Whether in your opinion diversions from current R.A.F. allocations as proposed ... would in fact be earlier than US allocations.

c. Whether US would be prepared to make good to us later in the year what we gave Canada and also provide attrition for the Canadian squadrons.[46]

The answers from Washington explained that there was no longer a shortage of aircraft (there were 653 Liberators then in the United States), but that the 'domestic difference of opinion' between the USAAF and USN continued to tie Arnold's hands. After the RAF delegation cabled on 23 March that Arnold had refused to alter his stand, the Cabinet Anti-U-Boat Warfare Committee met and 'In order to take advantage of experienced GR crews now available in Canada ... decided to divert from the RAF allocation to the RCAF the equivalent of one Coastal Command Liberator Squadron ... 5 Liberators will be made available this month, 5 in April and 5 in May.'[47] It is difficult to see how the British could have come to any other decision than it did.[48] It was eminently sensible – not to say urgently necessary – to put VLR aircraft into the hands of the RCAF. If the combined chiefs of staff had agreed at any time between November 1942 and February 1943 to base VLR Liberators in Newfoundland, there is little doubt the terrible north Atlantic convoy losses of March 1943 would have been dramatically reduced. In the event, the timely repenetration of the U-boat cipher *Triton* in late March, the advent of naval support groups and escort aircraft carriers, the onset of fairer spring weather, and the diversion of aircraft from the Bay of Biscay to the mid-ocean all combined to initiate an Allied offensive in the air gap and to reduce losses dramatically.

Unfortunately, the designated RCAF Liberator squadron, 10 (BR), did not complete conversion until June, by which time the battle had passed its peak. The only increment to 1 Group's strength in March was the dispatch of two 10 (BR) Digbys to Gander to augment the Cansos of 5 (BR) and the small 162 (BR) detachment. In the meantime, most of the decisive action took place well beyond the range of 1 Group's aircraft. The RCAF made few sightings and attacks in March and April, and it was only in the first week of May that a large number of German submarines once again came within range of Gander and Torbay. That provided a test which, on the eve of acquiring the new long-range capability, revealed both new strengths and old weaknesses.

With his usual tenacity Dönitz was using every resource, including excellent radio intelligence of Allied convoy movements, to force contact on the northern convoy routes. This had resulted in several hard-fought battles in mid-Atlantic



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during April. Ultimately, ONS 5, a storm-battered forty-three-ship westbound convoy that neither the Admiralty nor the Operational Intelligence Centre [OIC] in Ottawa were able to divert clear of two large patrol lines, *Fink* and *Amsel*, came under attack by forty U-boats within 400 miles of Newfoundland. During a co-ordinated Canadian and American sweep northeast of Newfoundland, one B-17 attacked three submarines in advance of the convoy on 2 May. A similar sweep on 3 May produced no results, but on 4 May a Canso 'A' of 5 Squadron sent out to cover the convoy at maximum range from the Torbay detachment – occasionally established to take advantage of better flying conditions when Gander was closed down – sank U-630 about thirty miles astern of the convoy, more than 650 miles from base.[49]

The destruction of U-630 resulted from an initial radar contact followed up by visual sighting at less than three miles. The pilot, Squadron Leader B.H. Moffit, AFC, apparently achieved total surprise, having 'just pushed the nose down and the throttles open' and experiencing 'the fastest ride I have ever had in a Canso ... Coming in straight on we let our depth charges go, and as the aircraft passed over the sub I could see two of the Jerries still on the conning tower platform. After that part of the show was over I was out of the picture, but the lads in the blister could see the depth charges striking ... two of them landed on the port side of the U-boat and one just off the conning tower. The fourth one ... missed as I attempted to bank to take another quick look.' The explosion in fact blew the submarine, which had crash-dived, back into a fully surfaced position for about ten seconds, before it finally sank. 'A thick oil slick immediately appeared, accompanied by a strong smell of oil ... Oil slick grew to 200 by 800 feet and wood in debris showing fresh breaks could be seen in it.'[50]

Moffit sighted another U-boat which escaped attack, but, some three hours later, Flight Lieutenant J.W.C. Langmuir in a second Canso flying at an altitude of 5500 feet, spotted what was probably U-438 fully surfaced about fifteen miles distant.[51] He placed himself up sun and also surprised the U-boat captain who, in this instance, decided to fight it out on the surface, a decision that saved him for the time being. (U-438 was sunk on 6 May by HMS *Pelican*.) Langmuir pressed on twenty feet above the waves and claimed a straddle with his depth charges: 'Jerry kept firing at us spasmodically while we hurriedly prepared the forward gun for a second attack. This time we came in on the starboard beam and the submarine opened fire at about 600 yards. He again missed us but explosives were coming mighty close ... Our front gunner ... held his fire until we were within 300 yards. Three of the sub crew were bowled over with this barrage ... Two other members could be seen seeking shelter of the conning tower ... In order to avoid further shellfire, I manoeuvred the aircraft well out of range taking slight evasive action. On taking a turn to take another look there was no sub.'[52] Both Moffit and Langmuir later received the Distinguished Flying Cross, the former in November 1943 for thirty-two months of outstanding service on anti-submarine patrols in which the destruction of a U-boat had been only the crowning achievement, and the latter, who subsequently served overseas in 422 Squadron, RCAF, in March 1945.

Unfortunately, the convoy was standing into further danger, in conditions that

at first favoured the U-boats and which made it difficult for 5 Squadron to repeat its performance of 4 May. As a result, twelve merchant ships were lost over the next two days (5-6 May) in exchange for one submarine. One of the two aircraft scheduled to support ONS 5 on 5 May crashed on take-off, killing all but one of the crew. The other, apparently not where it should have been, did not see either the convoy or any of the submarines around it. One RAF VLR Liberator from 120 Squadron in Iceland, more than a thousand miles from base, actually met the convoy but the crew saw nothing through the fog patches for the short time they were on task. On 6 May thick fog, although it grounded all aircraft in the region, also brought an end to U-boat attacks. The low visibility enabled radar-equipped surface escorts to turn the tables and sink four more of their tormentors.

Weather and the modern radar of the naval escorts proved the decisive factors in this battle, while inadequate sea/air co-operation procedures by RCAF pilots lost them opportunities. This was clear from the failure to meet the convoy on 5 May, and even from the successful operation on 4 May. As the escort commander in HMS *Tay* pointed out, although he had heard Moffit's Canso reporting his attack on 4 May, and although he had continually attempted to establish communications with the Canso, not once had he been able to do so. Langmuir's machine, it is true, had co-operated quite well, employing standard searches ordered by the escort commander, but the aircraft 'arrived just too late.'[53]

Ever since aircraft have been used in military and naval operations the mental barrier between airmen and seamen, or soldiers, has weakened the effectiveness of the air weapon. It is noteworthy that nowhere in the operations record book, daily diary, or aircrew debriefings of 5 (BR) Squadron is there any reference to the threat posed by the U-boats to ONS 5. The weekly intelligence reports from 1 Group Headquarters in St John's show a great deal of concern for the convoys, but by comparison with entries several weeks later there was an absence of the kind of detailed information about convoy coverage, such as the close escort searches carried out, which indicates close co-operation with the ships. On 16 March Eastern Air Command, in a message to air controllers, ordered squadrons to comply with Atlantic Convoy Instructions, which governed the actions of naval escorts and Coastal Command as well, and the squadrons in Canada complied. However, 1 Group Headquarters in Newfoundland did not receive word until 18 May. The first tangible evidence of regular adherence to the instructions in Group intelligence reports did not appear until late June, fully ten months after the Admiralty had introduced them as the basis for north Atlantic convoy operations.[54]

A closer look at long-range operations, in which 5 Squadron and the B-17 squadrons from Gander had distinguished themselves on the few occasions that opportunity offered, shows that although ONS 5 benefited from the ability of Cansos, and to a lesser extent B-17s, to strike hard at great distances from base, this convoy may have suffered from a disposition of air power that resulted from faulty intelligence. As in late March, Ottawa was providing a good picture of submarine movements in the mid-ocean area. In spite of a brief Enigma 'blackout' that occurred at the end of April, the OIC knew of the arrival of Group

Amsel northeast of Newfoundland, athwart the tracks of several convoys. B-17 searches on 1 and 2 May paid off with the three positive sightings on 2 May already mentioned, but on 3 May the aircraft made no detections. Dönitz had ordered the U-boats in *Amsel* to split into four separate sections, leaving the impression there were no gaps in the patrol line.[55] Possibly this was why the search on 3 May, ordered to take place roughly in the gap between *Amsel* I and *Amsel* II, produced no results.

When deception succeeds in war it usually means the victim has a predisposition to believe what he sees; the battle for ONS 5 was no exception. The belief persisted until at least early June that Dönitz had stationed a permanent line of submarines northeast of Newfoundland as pickets to report on convoy movements. Logical so far as they went, these conclusions rested on partial and therefore dangerous information. As the OIC should have known from Enigma decrypts, there was no permament patrol line of the kind postulated. And as British codebreakers came to realize before June, German naval intelligence was reading Allied convoy signals; Dönitz had no need of a picket line that would have placed his U-boats at constant risk. Consequently, too much emphasis may have been placed on area searches for phantom U-boats, and too little on efficient co-operation with naval escorts to ensure the safe and timely arrival of convoys. The idea that some U-boats would be less likely to attack because they were on picket duty could even have led to the tragic assumption on 5 May that the westbound ONS 5 was past its greatest danger. Even if that was not in the minds of controlling authorities, the analysis of squadron activities recorded in weekly intelligence reports tends to support a conclusion that incomplete intelligence led to misemployment of air forces. Available evidence is not sufficiently complete to allow a firm opinion in this regard, but there is so much precedent for relating bad command decisions to faulty intelligence that the idea simply cannot be dismissed.[56]

On the German side it seems unlikely in May 1943, even had Dönitz been aware of a flaw in local intelligence, that he would have been able to exploit it further. U-boat losses that month, principally the result of convoy battles fought by naval escort and support groups (including some with auxiliary aircraft carriers) in the mid-ocean gap, continued at the rate set by ONS 5. Shaken on 7 May by the unacceptable exchange rate of seven submarines for what he believed were no more than sixteen merchant ships, Dönitz finally called off his mid-ocean boats on 21 May after losing a total of thirty-one in the first three weeks of the month.

The infusion of powerful new air and naval forces into the mid-Atlantic eliminated the last theatre where U-boats enjoyed the freedom of movement so essential to pack operations. In May 1943 these old tactics had brought stunning losses and ultimately collapse to the German campaign. The mystique of the wolf pack was shattered. Although British and American forces had scored the kills which prompted Dönitz's withdrawal, Canadians, too, celebrated the Allied victory in the early weeks of June. In the event, the final telling defeat of the U-boat packs did not come until September, and then Canadians would play a very prominent role. In the meantime the centre of gravity in anti-submarine

warfare shifted to the Bay of Biscay transit routes. There and in the central Atlantic, using accurate intelligence to advantage, RAF Coastal Command and the Royal Navy, with elements of US Army anti-submarine command and US Navy land- and carrier-based aircraft, mounted an offensive against U-boats transiting from their Biscay bases.[57]

While operations to the south and east were achieving highly satisfactory results – between June and September Allied ships and aircraft accounted for twenty-one U-boats in the bay itself, and thirty-eight more in the central Atlantic – British and Canadian forces consolidated their position on the northern convoy routes, with more naval support groups, improved tactics and new methods of operational control, and additional US air units. As well, during the late spring and early summer 10 Squadron, RCAF, became fully operational at Gander with its new Liberators.[58]

To convert aircrews from the old twin-engine Digbys to heavy four-engine aircraft the RCAF brought in two experienced Trans Canada Air Lines pilots, J.L. Rood and G. Lothian. Between them these airmen put in 705 hours of air instruction from May to July, themselves learning the peculiarities and overcoming the problems of local flying in Newfoundland. In his memoirs Lothian described the treacherous conditions to be found in Newfoundland. 'Most Canadian airports are subject to the onslaughts of lows and fronts, usually predictable and short lived, but Gander was different than most ... For when the wind veered into the easterly quadrants at Gander and began to flow in from the ocean, carrying moisture-laden air toward the land, things could get gummed up with remarkable rapidity, often blotting out the place completely.' While training continued, 10 Squadron had already begun to fly operations, carrying out its first Liberator missions on 10 May.[59]

It was on that day that the Admiralty began to issue a daily message allocating four separate categories to convoys at sea: first those under attack or definite threat; second, those possibly in need of air cover in the near future; third, troop convoys or 'monsters' (fast independently routed ocean liners like the *Queen Elizabeth*) not under direct threat; and fourth, convoys that were standing out of danger. After dispatch of the message, prefixed with the word 'Stipple,' Coastal Command sent another with the prefix 'Tubular.' The Tubular messages outlined U-boat probability areas on the basis of the latest intelligence, especially Ultra, and was intended to help co-ordinate the air patrols by 15 Group, RAF (headquarters at Liverpool, England), Eastern Air Command Headquarters at Halifax, and 1 Group in Newfoundland. Based on the latest British intelligence – and it is important to remember that this system could only work so long as Bletchley Park continued to break the enemy's code – the Stipple and Tubular messages from now on governed Eastern Air Command's operations.[60]

As visiting staff authorities pointed out, however, Canadian organization and operating methods left a great deal of room for improvement. The Allied Anti-Submarine Survey Board came to Ottawa and then toured the east coast during the second week of May. The board's president, Rear Admiral J.L. Kauffman, USN, and the British naval member, Rear-Admiral J.M. Mansfield,

RN, had had extensive experience in Atlantic escort operations, as had the air representatives, Commander J.P.W. Vest, USN, and Group Captain P.F. Canning, RAF; Canning, it will be recalled, had already made a detailed report on Eastern Air Command in 1942. The board advised that NSHQ's role in co-ordinating anti-submarine operations should be strengthened by giving the assistant chief of the naval staff direct authority over Eastern Air Command, on the model of the relationship between the Admiralty and Coastal Command Headquarters. NSHQ and AFHQ rejected the suggestion, noting that Eastern Air Command already came under the direction of Admiral Murray; no useful purpose would be served by giving Air Vice-Marshal Johnson a second naval master. This argument would have been more persuasive if the Joint RCN-RCAF ASW Committee had been providing effective inter-service co-ordination.[61]

On the need for a combined headquarters at Halifax, the board was adamant. Admiral Murray should go to Eastern Air Command Headquarters 'with a minimum of delay,' certainly within the fortnight, the Allied officers urged, emphasizing 'most strongly that full operational efficiency cannot be realized until this is done.' Already losing patience with the slow progress in Halifax, NSHQ undoubtedly pressed Murray as a result of the board's report. He completed his move to the air headquarters on 20 July.[62]

As Group Captain Canning privately suggested to Air Chief Marshal Slessor, now air officer commanding-in-chief, [AOCinc] Coastal Command, the basic problem really lay with the RCN, which did not 'understand or appreciate the Air problem.'[63] Slessor was inclined to agree. In June he received a copy of Admiral Murray's operational directive to Eastern Air Command from the air member for air staff at AFHQ, Air Vice-Marshal Anderson, who observed that it appeared to assert excessive naval control over the employment of aircraft.[64] Slessor's 'candid opinion' was that the directive:

> goes a very long way beyond anything which I could expect to receive from the Admiralty. I think that, in practically every paragraph, it encroaches on the sphere of tactics which, in Coastal Command, is entirely a matter for me or my group commanders. As I understand it (and I think the Admiralty now understand it) the definition of operational control is that the sailor tells us the effect he wants achieved and leaves it entirely to us how that result is achieved. For instance, I consider it entirely wrong for Murray to tell us that he wants close escort of any convoy; what he should tell us is that he wants that convoy protected; and he should give us an order of priority for the convoy; and he should tell us whether, in his view, convoy protection at any given place or time should have priority over offensive sweeps or patrols; but *how* you protect that convoy is entirely a matter for Johnson ...
>
> How you deal with this matter is of course ... entirely for yourself [to decide]; if I may presume to advise on the basis of a certain amount of experience of dealing with the sailors, I should be inclined not to raise it as a policy issue in the first instance; but rather to gradually try and get the thing on the right lines by the ordinary informal day-to-day discussions which will become a matter of course as soon as Murray has been winkled out of his dock yard and put in the Combined H.Q. at Halifax.[65]

The RCAF followed this good advice, with the favourable results Slessor predicted.

The complicated situation in Newfoundland permitted no such straightforward settlement of command relations. The anti-submarine board was extremely critical of the latitude Heakes allowed the Americans: 'Mutual Co-operation' was not an adequate substitute for the centralized 'Operational Control' envisaged by the Atlantic Convoy Conference. Although gladly accepting the board's detailed recommendations for improving the layout and procedures in the combined operations room at St John's, Heakes maintained that 'with such a mixed bag of tricks as we have the decentralized control has been fully justified ... Certain factors have tended to make this possible here,' he argued, 'namely, we have not the problem of enemy aircraft to contend with, nor the liability of our convoys being jumped by enemy sea forces other than submarines. Hence, we have a greater time factor to play with than they have on the other side. This gives us a working margin.'[66]

Air Vice-Marshal Johnson in Halifax shared Heakes's belief that the system in Newfoundland was 'working out very well.' Johnson's only concern was a lingering tendency in the USAAF squadrons to make anti-submarine sweeps unrelated to convoy protection when tasking from I Group did not fully employ the available aircraft. Nevertheless, the army airmen had readily complied when Heakes, on assuming control, endeavoured to employ additional aircraft on missions to support shipping. From 3 April to 2 May, the USAAF in Newfoundland flew 454 hours on convoy protection as compared to 588 hours on U-boat search patrols; by contrast, in the period 3-31 May, under the new Canadian régime, the squadrons flew 1161 hours in support of convoys and only 235 hours on search patrols. The problem had arisen, in part at least, because the army, in Johnson's words, 'have plugged Gander with three squadrons of long range aircraft which are more than really necessary.' When the AOCinC offered this opinion in mid-May the build-up was continuing with the replacement of the USAAF'S B-17S at Gander by Liberators, and the arrival of a USN Liberator squadron at Argentia (although none of these aircraft had been modified to VLR). The extent of the Allied victory and of Dönitz's withdrawal from the north Atlantic was, however, quickly becoming evident. At the beginning of June two USN Lockheed Ventura squadrons returned from Newfoundland to the United States, and in late June to mid-August all three army squadrons and the USN Liberator squadron moved to England to join the Bay of Biscay offensive, leaving only a handful of PBYS at Argentia and solving the problem of divided control by default.[67]

The anti-submarine board's thorough investigations extended beyond the broad principles of organization to the details of tactics, equipment, and procedures, and here too there was much to criticize. Although impressed by the keenness and quality of the Canadian aircrews, Canning was dismayed by their ignorance of recent tactical innovations in Coastal Command and, especially, of the method for radio homing of aircraft to escorts. The latter, known as 'Procedure "B",' was laid down in Atlantic Convoy Instructions. Naval escorts were to take DF bearings on wireless signals from aircraft arriving on task, and

then broadcast the information so that the aircrews could correct their courses; short-range, medium-frequency radio transmissions were used to reduce the chance of the enemy intercepting the signals. In their efforts to impress both Canadian services with the importance of sea-air radio homing, the members of the board were assisted by Commander Peter Gretton, one of the Royal Navy's outstanding escort commanders, who lectured on the subject and organized exercises in Newfoundland. The Allied officers also arranged for AFHQ to obtain immediately copies of Coastal Command tactical instructions and memoranda that were not readily to hand and urged the necessity, once again, of quickly distributing the material to squadrons. Eastern Air Command further benefited from a visit by Air Chief Marshal Slessor in early June to discuss means for improving the interchange of information between the RCAF and RAF, and increasing the range of 10 Squadron's new Liberators.[68]

Scrutiny by Allies and their good advice contributed to the efforts made by the RCN and RCAF during the summer months of 1943 to perfect the new organization in preparation for Dönitz's next onslaught. The schedule of exercises for co-operation between ships and aircraft was stepped up, with particular emphasis on radio homing; in addition, aircraft assigned to convoys were invariably to carry out Procedure 'B,' whether necessary or not, and establish communication with the senior officer of the naval escort before commencing sweeps in the area. Ashore, the naval and air commanders at Halifax and St John's began to hold daily conferences, with further consultation by signal between the two combined headquarters, to plan the programme of air coverage on the basis of the Tubular and Stipple signals from Coastal Command and other intelligence.

From 18 July, the OIC at NSHQ also provided the east coast commanders with a daily forecast of U-boat positions in or near the Canadian Northwest Atlantic. Called 'Otter' messages, they were designed to complement Stipple and Tubular information by providing more data about the Canadian coastal area, especially to assist in the planning of offensive sweeps by VLR aircraft based in Newfoundland. The signal gave an area of maximum probability for U-boats on patrol, and the likely course for the next twenty-four hours of U-boats on passage. Possibly trying to discourage decisions based on local intelligence estimates, besides tailoring information designed primarily for air searches to the needs of the navy, NSHQ decreed that 'No other authority is to originate a similar signal, except that C.-in-C., C.N.A., is authorized to promulgate a paraphrased version of relevant information contained in OTTER to sub- commands, if necessary, for establishment of searches for Naval Vessels.'[69]

Certainly there was marked progress in the Canadian organization for anti-submarine warfare. Commander P.B. Martineau made another tour, as the survey board had recommended, and on 6 August reported that 'The general situation has improved out of all recognition since my visit in October-November 1942 ... The co-operation between the RCN and the RCAF is excellent.' He did, however, emphasize two continuing weaknesses: the absence of any naval officer with a 'thorough understanding of air operations,' and a tendency

on the part of the RCAF, despite its adoption of the offensive method, to waste flying time on the protection of unthreatened convoys.[70]

There were equally necessary technical developments. Having a squadron of VLR Liberators was one thing; maintaining and using it to best advantage was another. The first transatlantic flights by 10 (BR) Squadron did not occur until July, largely because, although modified in the United States, the aircraft still carried too much weight to achieve their required range of 2300 miles. Fortunately, 19 Sub Repair Depot at Gander had built up an excellent third-line maintenance team, and the friendly generosity of the USAAF personnel, so long as they remained at Gander, ensured there was never any want for spares. Consequently, when the Allied anti-submarine survey team visited in May and recommended removing tail turrets and armour from Liberators, it was possible to make modifications on the spot, although there is no evidence that the armour was ever removed.[71]

New equipment further improved Eastern Air Command's capabilities. No 10 Squadron's Liberators were fitted with American ASG radar; operating on a short wave-length of ten centimetres, it could locate surfaced submarines at ranges of fifteen miles and more. Unlike the ASV Mark II, which presented its data with 'blips' on a simple range scale that were very difficult to interpret accurately, the ASG 'scope' mapped all contacts precisely as the aerial scanned through 360 degrees, making it far more useful then the older sets for navigation and the location of shipping as well as U-boat hunting. The Ventura aircraft that were replacing the Hudsons in 113 and 145 Squadrons (see Chapter 13) carried another new American radar, the more compact 3 cm-band ASD, which, in theory, was capable of locating surfaced submarines at even greater ranges than ASG. The antennae, however, scanned only ahead of the aircraft, and although the scope mapped contacts, it distorted their relative positions. Serviceability problems, moreover, made the equipment unpopular with aircrews during its first months in service. ASD, like ASG, had the great advantage that its emissions could not be detected by search receivers that the Germans had developed to counter metric-band ASV radar.[72]

Another important acquisition was the 600-lb American homing torpedo that enabled aircraft to attack submarines which had already disappeared beneath the surface. Known affectionately as 'Fido' or 'Wandering Annie,' and by a number of code names (Project 'Z,' the Mark XXIV Mine, and, later, 'Proctor'), the first of these torpedoes arrived in June 1943. Maintenance crews at Dartmouth, Sydney, North Sydney, Torbay, and Gander adapted Digbys, Venturas, Cansos, and Liberators to carry one and, in the case of the Liberator, two torpedoes, together with three or four depth charges. On 3 September a Digby of 161 (BR) Squadron based at Dartmouth made the first action drop, and a Ventura of 113 (BR) Squadron from Dartmouth made another the next day, but there is no evidence that a U-boat was present. The Liberators of 10 Squadron had their first opportunities later in the month. Like all new and complex weapons, this torpedo proved temperamental in its early stages, and these drops were unsuccessful.[73]

The United States Navy had developed the aerial homing torpedo in

conjunction with the expendable radio sono-buoy. Dropped from aircraft in patterns of five, the radio-equipped buoys automatically deployed a hydrophone on a 24-foot cable and transmitted any sounds that were picked up. Using a multi-channel receiver, the aircrew could, with experience and luck, follow the track of a submerged U-boat, dropping a homing torpedo near the buoy that gave the strongest signals or directing surface escorts to the position. Because the non-directional hydrophones gave no indication of the position of the submarine relative to the buoy, however, they were very inaccurate, and if the submarine was running deeply or quietly it could not be detected at all. Even a moderate sea, moreover, could mask the sound of the U-boat with water noise. The equipment began to arrive at Eastern Air Command squadrons only at the end of 1943; technical problems and delays in the provision of training devices increased the inherent difficulty of using the buoys properly.[74]

In contrast to the teething troubles of the sophisticated underwater weapons systems, the RCAF's new Liberators and centimetric radars quickly demonstrated their effectiveness. When the eastbound convoy SC 135 sailed from Halifax on 27 June 1943, only a half-dozen U-boats remained in the north Atlantic, distributed in individual attack areas in the central and western portion of the ocean. To create the illusion that packs were still at large, they regularly broadcast messages on many wave-lengths. Even though Bletchley Park was encountering prolonged delays in breaking the *Triton* cipher during this period, Allied intelligence authorities were not deceived. That SC 135 nevertheless received massive land-based air protection was some measure of the surplus of long-range and very long-range aircraft now available in Newfoundland. In addition, the 1st Escort Group, a support group that included the escort carrier HMS *Biter*, reinforced the mid-ocean naval escort.[75]

On 3 July, when the convoy was some 500 miles northeast of Newfoundland, five 10 Squadron Liberators provided cover. During the afternoon, Liberator 'B,' with Pilot Officer R.R. Stevenson at the controls, made an ASG radar contact at a range of eighteen miles. As Stevenson closed, he dipped beneath the heavy cloud cover only long enough to make a quick visual contact at seven miles. The tactic worked. U-420 was caught completely by surprise as the bomber swept down through the clouds to make three attack runs. Dropping sticks of six, three, and one depth charges (the whole of the Liberator's load), the aircrew also poured machine-gun fire into the submarine. The U-boat's log describes the result: 'water columns dash together over the conning tower. Very violent vibration in the boat. On the second attack run upper MG [machine-gun] was destroyed ... Bosun's Mate Grosser killed, either by shell or bomb splinter. Able Seaman Noeske overboard ... Able Seaman Winn bullet entered right half of buttocks and a splinter in the upper thigh ... Crash dive! ... Large amount of water entered via the upper conning-tower hatch ... Damage ... Main periscope (bullet holes). Tubes I-IV mechanisms hard to work. Breech door tube IV broken off. Electric compressor, Junker compressor limited working capability. Forward horizontal rudder sticks ...'

Stevenson alerted the senior officer of the naval escort who dispatched the 1st Escort Group to the scene. Searches by the warships and *Biter*'s aircraft came up

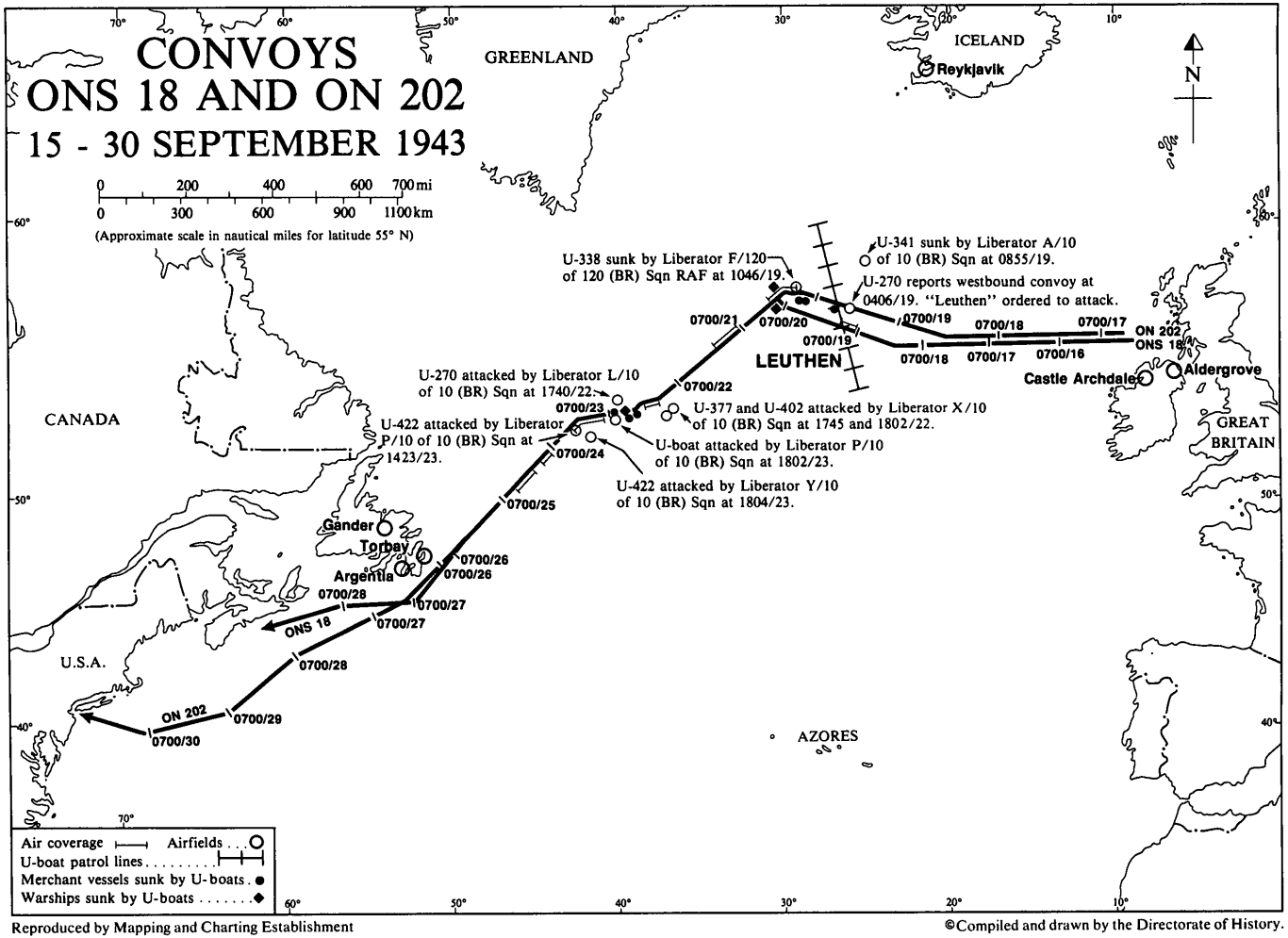
empty-handed, but Stevenson and his crew had knocked U-420 out of action; having scarcely begun its patrol, the submarine now limped back to port.[76]

Coverage of the convoy from Newfoundland continued until late on 5 July. RCAF, USN, and USAAF Liberators (the American aircraft having been converted to VLR) operated as far as 30 degrees west, some 1000 miles from base; one 10 Squadron aircraft was diverted to Iceland and another to Northern Ireland.[77] This was a convincing demonstration of the transatlantic support land-based aircraft could now provide, through such protection was still the exception rather than the rule.

Despite the quiet that settled over the north Atlantic during the rest of the summer as Dönitz withdrew the last of his boats, a renewed campaign at mid-ocean was expected.[78] 'The Battle of the Atlantic,' Heakes told the squadrons of 1 Group at the beginning of September, 'is of such importance to the German that he will make the most tremendous effort to regain control ... It is almost axiomatic to assume he will try again to catch the convoys in the western and middle part of the Atlantic ...' Months of fruitless patrol had sapped morale, and he tried to ginger up his aircrew: 'Let us get rid of this sense of frustration which has been growing through lack of action ... For though we have won the Battle, there undoubtedly, in my opinion, is another battle to be fought and won in these waters. And, beyond that battle, there is a long, long lane, branching out into many theatres, in which all will have the opportunity of their complete fill of action in this war.'[79]

Dönitz of course did not disappoint these expectations. Armed with the new *Zaunkönig* homing torpedo, or 'gnat' as it was called by the Allies, quadruple 20mm anti-aircraft cannons, and improved equipment for the detection of Allied radar transmissions, twenty-nine U-boats, including a 'milch cow' submarine tanker, sailed in the first weeks of September from bases in Norway, Germany, and the Bay of Biscay. By 19 September nineteen of them had formed Group *Leuthen* and lay seventeen miles apart on a north-south line west of the British Isles waiting for two westbound convoys, ONS 18 and, some distance astern, the fast convoy ON 202. However, Enigma intercepts enabled the Admiralty to order a diversion of the convoys to the northwest, take steps to reinforce their surface escort, and ensure the availability of air escort.[80]

It so happened that on 19 September three Canadian Liberators of 10 (BR) Squadron were at Reykjavik, Iceland, after providing the air escort for HMS *Renown*, bringing home Winston Churchill and the British chiefs of staff from the 'Quadrant' conference of Allied leaders at Quebec. Two of the aircraft covered ONS 18 on their return flight to Gander that day and the crew of Liberator A/10, piloted by Flight Lieutenant J.F. Fisher, sighted U-341 500 miles south of Iceland and 160 miles west of the convoy. On his first pass, Fisher was too high but the U-boat remained to fight it out on the surface and, on the second run, a straddle with six depth charges blew U-341's bow out of the water. As the conning tower disappeared four more charges were followed by a great eruption of oil and bubbles, which marked the end of the submarine. Fisher, who proceeded to Gander after remaining in the area for twenty-five minutes, was to die in a flying accident a month after achieving this first kill in a Canadian VLR aircraft.[81]



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During the next twenty-four hours ON 202 and ONS 18 gradually closed the distance between them until, on 20 September, they combined to form one large convoy. The night before the junction ON 202 had been successfully attacked, losing two ships. But throughout the 20th RAF Liberators from 120 Squadron provided air cover, attacking eight U-boats and sinking one, U-338. During the night of 20/21 September the escorts HMCS *St Croix* and HMS *Polyanthus* were sunk by 'gnats' before fog clamped down to restrict the activities on both sides. In the meantime, *Empire MacAlpine* – a grain ship fitted with a lightly built flight deck and known as a merchant aircraft carrier or MAC ship – launched a Fairey Swordfish to provide air cover for a few hours. Liberators were also sent to escort the convoy from both sides of the ocean: the air gap could now be closed at will. When the fog cleared more than 800 miles east of Newfoundland on the afternoon of 22 September, 'the air was filled with Liberators' of the RCAF's 10 Squadron.[82]

With the improved visibility, Liberator L/10 flown by Warrant Officer J. Billings, sighted and attacked U-270 with four depth charges in the face of accurate flak. One enemy round shot out an engine and another 'parted the hair above the Navigator's left eye and came to rest protruding half an inch out of one of the instruments in front of the Captain.' The Liberator circled the submarine, returning machine-gun fire and calling for assistance, but the convoy escorts were heavily engaged and Liberator X/10 some forty miles away replied 'I have a U-boat of my own on my hands.' Damaged, reaching the prudent limit of endurance, and unable to use his homing torpedo, the only main armament remaining, because the boat would not submerge, the aircraft left for home. U-270, however, had been badly damaged by Billings' near miss. A break in the pressure hull made it impossible for her to dive, so she retreated on the surface for port in France.[83] Billings was awarded the Distinguished Flying Cross in 1944.

Liberator X/10, flown by Flight Lieutenant J.R. Martin, who also received a Distinguished Flying Cross the next year, did indeed have a handful when her sister aircraft called for help. Dispatched by the senior officer of the naval escort to search an HF/DF bearing, Martin located U-377 on his radar and attacked through flak with machine-guns and four depth charges. The Liberator circled around the jinking U-boat and dropped two homing torpedoes twenty seconds after it disappeared beneath the surface. Neither the depth charges nor the acoustic torpedoes inflicted damage, but the machine-gun attack had left U-377's commander bleeding profusely from wounds in both arms. The boat therefore had to retreat from the battle and rendezvous with a second submarine for medical assistance en route to port.[84]

During the second attack on U-377 Martin sighted another U-boat, probably U-402, seven-and-a-half miles away. Having expended its main armament, the Liberator could only trade gunfire with the boat until it disappeared in a fog bank. Martin alerted the naval escort commander and maintained a patrol between the submarine's position and the ships he was protecting during the rest of his time on station. Shortly after this aircraft's departure in the late afternoon, Swordfish from *Empire MacAlpine* attacked an unidentified U-boat ahead of the

convoy. Meanwhile, Liberator N/10 had been hampered by radio interference in its efforts to carry out homing procedure, possibly the result of German jamming. The aircraft was therefore only able to stay for an hour, when the pilot found the ships after twilight. In that brief time, the crew sighted a wake in the darkness and encountered anti-aircraft fire that confirmed the presence of U-275 some way ahead of the convoy. The escort commander, however, firmly refused permission to drop flares for a night attack, so the Liberator carried on with his orders to sweep around the convoy at visual distance to strengthen the inner defences against the closing pack. The aircraft had forced the submarine to submerge, but during the night at least seven U-boats which had escaped damage slipped through the screen, sinking four merchant ships and the escort HMS *Itchen*.[85]

The arrival before sunrise of a Liberator piloted by Flight Lieutenant J.F. Green undoubtedly prevented further losses. This was a flight of some note because the deputy inspector-general of the RCAF, Air Vice-Marshal A.E. Godfrey, whose most recent combat experience had been as a fighter 'ace' on the Western Front in 1918, was the 'acting waist gunner.' In the morning twilight Green sighted and briefly engaged with gunfire a U-boat that escaped in the low visibility. During the next six hours the aircraft succeeded in keeping the enemy submarines submerged. On the way back to base Green sighted U-422, giving Godfrey the opportunity to become the most senior RCAF officer to open fire directly against the foe during the Second World War. After a twenty-seven minute engagement the submarine dived. Green's attack with two homing torpedoes, like many other attempts to employ this temperamental weapon, was unsuccessful. Nearly four hours later Flight Lieutenant R.R. Ingrams, while on a close escort search in Liberator Y/10, attacked U-422, forcing it to submerge and inflicting casualties on the crew that demanded medical assistance from another submarine. Ingram's homing torpedoes missed their mark, but Dönitz ordered the U-boats to withdraw because of the onset of fog.[86]

Thus ended one of the most significant convoy battles of the war. The RCAF Liberators had acquitted themselves well. There was still room for improvement, especially in the technique of attacking surfaced submarines (there seems to have been a tendency, no doubt exaggerated by the U-boats' 20mm quad anti-aircraft cannon, to come in too high on the first run), and in perfecting the employment of homing torpedoes. The effectiveness of VLR Liberators at night was severely hampered without the Leigh Lights now available to Coastal Command aircraft operating in the Bay of Biscay. Nevertheless, the Canadians had been effective in protecting the convoys (there were no losses while aircraft were present), and had enjoyed notable success in sighting, attacking, and sinking U-boats. The senior officer with the naval escort group was highly impressed:

The dense fog which prevailed for such a large part of the passage made flying near the convoy very unpleasant, and at times I wondered if the aircraft were serving any really useful purpose in risking their lives to come so far, only to find nil visibility on arrival. I

think this doubt was well answered when the instant the fog lifted three Liberators were not 'on the way' or 'expected in two hours,' but actually flying around the convoy and giving it valuable protection ...

On reaching St John's I learnt that aircraft had been taking off in dense fog at very great risk in order to provide us with full cover all the time. I can only say 'Thank you,' and assure them that their work is appreciated to the full, and their mere presence has an effect on the morale of both convoy and escorts which is invaluable.[87]

The exchange rate of three U-boats sunk for the loss of six ships and three escorts was a satisfactory result from the Allied point of view. Assessments based on inflated claims at first persuaded Dönitz that the battle was a German victory, but events of the next two months shattered the illusion. No more convoys were intercepted by U-boats until 7 October, when U-645 made contact with SC 143. In the early hours of 9 October this submarine sank one ship but was forced to remain submerged and lost contact, so that Dönitz had to call off the operation. From 15 to 17 October Group *Schlieffen* made contact with ONS 20 and ON 206, losing four U-boats to RAF Liberators and two more to the RN escort ships in exchange for one merchant ship in the latter convoy. Dönitz withdrew from this disastrous battle and formed a group, *Siegfried*, which, without even sighting the convoys it was supposed to attack, lost three U-boats.[88]

A Liberator of 10 Squadron was responsible for the destruction of one of the *Siegfried* boats on 26 October. Six Liberators flew close escort patrols for ON 207 and ONS 21 that day, and two others flew supporting sweeps. Flight Lieutenant R.M. Aldwinkle, just as he began his joining procedure with the convoy in Liberator A/10, sighted and attacked U-420, the same boat that had been so roughly handled by another squadron aircraft on 3 July. On the first run five of the six depth charges dropped failed to explode. There followed a protracted gun duel, after which the U-boat dived and Aldwinkle dropped his homing torpedo. Its explosion apparently forced U-420 back up to periscope depth, at which point the last two remaining depth charges caused another explosion that 'shot up like an oil gusher as though under great pressure and rose to a height of fifty or sixty feet' as the submarine was destroyed, probably by sympathetic detonation of torpedoes.[89] Aldwinkle received the Distinguished Flying Cross.

Groups *Jahn* and *Koerner*, formed from *Siegfried*, were taking up positions about 400 miles northeast and east of Newfoundland. On 29 October one of the boats joining up from the east was sunk by escort vessels about twenty miles ahead of convoy ON 208, and a few days later Dönitz adopted new tactics to deal with this menace of ubiquitous Allied sea and air forces. He dissolved existing groups, forming five small groups named *Tirpitz* 1-5 on the arc of a circle about 450 miles east of the southern tip of Newfoundland. By 8 November they had sighted no convoys and lost two U-boats to attack by a support group with an escort carrier, so Dönitz sent the *Tirpitz* boats in groups of three to a diamond-shaped patrol area southeast of Greenland. A Canso of 116 Squadron with convoy ON 209 sighted U-714 in one of these groups but did not make an attack owing to anti-aircraft fire; an investigation by No 1 Group concluded that

there had been a serious failure of leadership in the unit and resulted in the relief of the squadron commander.

Two days later a discouraged Dönitz changed the disposition of the submarines yet again; the enemy, he said, 'has all our secrets and we have none of theirs.'[90] On 12 November he ordered another vain move, this time about 350 miles in a southeasterly direction.[91] Equally futile manoeuvres went on until the end of the year,

16
Securing the Lifeline, 1943–4

The defeat of the wolf packs in the fall of 1943 thrust Canadian airmen into a new era of anti-submarine warfare. During the last eighteen months of the war single U-boats returned to North American waters for inshore operations markedly different from those of 1942. Submariners were now cautious, sometimes to the extreme, intent upon a quick kill and getaway. No longer aggressively pursuing shipping on the surface, they employed 'ambush' tactics: lying submerged for extended periods, awaiting targets of opportunity. The U-boats also carried search receivers that could now detect radar transmissions on all Allied wave-lengths in time to dive before an aircraft was within visual range. Eastern Air Command's improved equipment – Lockheed Ventura and Consolidated Liberator aircraft, its first Leigh Lights, and the sonobuoy and acoustic torpedo – was in no sense a decisive answer to the new threat. For the aircrews, then, there were even more hours than before of tedious and exhausting patrols over vast expanses of ocean in search of an increasingly elusive enemy. Because the Germans initiated their 'ambush' methods in the northwest Atlantic, moreover, Canadians for the first time had to work out solutions to a tactical problem without the benefit of extensive British experience. How they responded to this challenge is an interesting measure of RCAF capabilities in the final months of the Second World War.

Although Admiral Dönitz had sustained a crushing defeat, the U-boat fleet was still formidable and a menace to the north Atlantic lifeline. In December 1943 there were 163 operational U-boats available, as compared to a peak strength of 239 in May, and new construction was making good the losses. Locating single U-boats scattered over large areas required just as many aircraft and ships as operations against whole wolf packs concentrated in the vicinity of convoys. It was possible, however, with the help of adroit intelligence, to keep the size of search areas within limits that could be saturated by the ships and aircraft to hand. Indeed, the new situation created opportunities to hunt U-boats at length, something which anti-submarine commands on both sides of the Atlantic had long desired, but had not been possible with the resources available. How long hunts should continue, and how far they should be allowed to interfere with routine convoy escorts – and therefore the number and disposition of ships and aircraft – were still matters for debate.[1]

Eastern Air Command's operational research section [ORS] had begun to examine the question of hunting submarines to exhaustion in February 1943. Canadian practice had been to abandon searches after losing contact, but Coastal Command aircraft had in some cases persisted for about six hours, and had achieved second sightings about 25 per cent of the time. Observing that most of Eastern Air Command's attacks had taken place within 200 miles of base, two-thirds of them in good flying weather, the ORS argued that extended searches would have been possible in most previous cases. British studies had concluded that a U-boat attempting to escape quickly was likely to surface and present a good target, and that when submerged the submarine's absolute limit of endurance was forty-eight hours.[2]

In mid 1943 the submerged U-boat could be expected to maintain a speed of about two knots, which meant that over two days it could not be more than one hundred miles from the last known position. Four aircraft on task at a time could, with the assistance of radar, cover such an area constantly for the whole period. Given good weather, a squadron of twenty aircraft could perform three 48-hour searches a week without extraordinary effort. This would prevent the submarine from surfacing to escape at speed, and ensure that naval forces could sweep the probability area thoroughly with ASDIC and radar.[3]

Hunts to exhaustion – quickly codenamed 'Salmons' in the Canadian environment – could only be carried out once a submarine had actually been sighted. Good intelligence was the key to making the initial contact and, in the northwest Atlantic, this was supplied by the daily Otter signals the Operational Intelligence Centre [OIC] at Naval Service Headquarters began to promulgate to the air authorities in Ottawa and on the east coast in July 1943. These signals, it will be recalled, contained the submarine tracking room's forecasts of the areas where U-boats would most probably be found on the following day; if further information became available the signal was amended immediately. The predicted locations were classified 'A,' 'B,' and 'C' in descending order of certainty. 'A' category estimates were based on fresh intelligence; a sighting, an attack on shipping, accurate direction-finding [DF] bearings, or German signals decrypted at Bletchley Park in England that revealed the boat's precise position. Air sweeps over 'A' areas had a priority second only to the defence of shipping at risk in the immediate vicinity. Predictions classified 'B' (and these were the vast majority) were based on contacts or DF bearings a few days old, and often on decrypted German signals that gave the route or destination of a boat. They also warranted air searches, provided threatened shipping was protected. There lay the essential difference between the old and the new offensive methods, for previously Eastern Air Command had generally made special sweeps only on the basis of information in the 'A' category. Class 'C' estimates were derived from information so old or vague that air searches were generally not worthwhile.[4]

Bletchley Park's speed in decrypting German wireless traffic by late 1943 enabled Naval Service Headquarters to make estimates of U-boat locations that were often as good as, or better, than BdU's own. Even forecasts based on recent information, however, had to allow for a wide margin of uncertainty: during the

hours required to process the intelligence and dispatch aircraft to the position, the submarine could make off in any direction at an unknown speed. The submarine trackers in Ottawa therefore drew on their experience to pare down the area where, in theory, the boat might be located, to a smaller area where the boat was most likely to be found and which could be swept in a patrol by one or two radar-equipped aircraft.

Nevertheless, searching for single U-boats was still very much a game of chance. Otter areas were normally at least 15,000 square miles in size and often much larger, an area which a single aircraft could sweep only once during a patrol. If the air crew failed to maintain a sharp lookout at all times, a lapse that was inevitable during long and exhausting flights, if the ASV radar was not working properly or if the U-boat submerged, it would not be found. False, but convincing radar or visual contacts amidst the fog, ice-floes, and flotsam off the Canadian coast could put an air search on the wrong track for days. No matter how sound the intelligence, moreover, estimates could be wrong. Depending upon the weather, the state of a submarine's equipment, and the boldness of the commander, it could be several days ahead or behind the expected rate of advance, or even far off the course ordered by U-boat headquarters.[5]

Air searches that failed to sight the enemy were not necessarily wasted. As Coastal Command's offensive sweeps of 1941-2 that were based on much less complete intelligence had demonstrated, the constant presence of aircraft sapped the offensive spirit of all but the most extraordinary U-boat commanders, and rendered the submarine virtually immobile by forcing it to run submerged.

Otter signals enabled Eastern Air Command to take the initiative when in late 1943 single U-boats returned to Canadian waters in some numbers, but calculating the amount of effort that should be expended on the new offensive tactics was tricky. The tendency in Coastal Command and the Admiralty to overrate the value of offensive operations in the Bay of Biscay had, until September 1943, deprived convoys of adequate air coverage in the air gap. This was never the case in the northwest Atlantic. Offensive operations during the last nineteen months of the war seldom interfered with convoy defence. If Eastern Air Command were to err, it would be on the side of caution.

Naval co-operation, which was essential for hunts to exhaustion and became increasingly important for sweeping Otter areas once U-boats began to run submerged in daylight when within range of regular land-based air patrols, was a fundamental problem in the northwest Atlantic. Thorough coverage of a large expanse of ocean by combined air and sea forces required a higher degree of more sophisticated interservice co-operation than did the comparatively straightforward task of convoy escort. Unfortunately, because the RCN sent as many ships as possible to serve under British command in the eastern Atlantic after mid-1943, no permanently organized and well-trained naval group was available for offensive operations in the Canadian zone until the summer of 1944. All too often the RCN could provide only *ad hoc* groupings cobbled together from ships that had never worked as a team, let alone gained experience in co-ordinating their efforts with aircraft.

Quite aside from the shortage of ships neither the air nor the naval staffs in

Halifax enthusiastically embraced the new offensive methods. This hesitation reflected the same conservatism that brought the senior commanders to give a higher priority to convoy escort than did their British counterparts. Significantly, Air Force and Naval Service Headquarters in Ottawa took the initiative when Canadian forces first tried out the tactics; despite many months of discussion, little effort had been made on the coast to adapt the relevant British instructions for use in the northwest Atlantic.[6] When, on 29 October 1943, U-537's presence in the theatre became apparent, Ottawa seized upon the opportunity to put those instructions to the test.

The OIC had been unaware of U-537's specific destination or mission. This large Type IXA boat had already, on 22 October, visited Martin Bay, Labrador, where its crew had erected an automatic weather station that functioned for several months and remained undetected for thirty-seven years.[7] U-boat headquarters subsequently revealed the boat's position by ordering it to patrol within 150 miles of St John's to observe convoy traffic, information enough for naval headquarters to issue class 'A' Otter signals.[8] The OIC reminded Eastern Air Command that 'the highest possible priority' should be given to sweeps in 'A' areas,[9] while the air and naval staffs in Ottawa urged the east coast commanders to attempt their first hunt to exhaustion.

1. Code word 'Salmon' allotted this operation. Decision to execute at discretion CINC CNA [commander-in-chief Canadian Northwest Atlantic] and yourself but recommended as having strong chance of success under present favourable conditions. Conditions may remain suitable several days but operations should begin without fail on first sighting made in or near area ...
2. General principle is if S/M [submarine] not attacked and killed on first sighting a/c [aircraft] continuously patrol area embracing all possible positions S/M. This area obviously increases steadily till next sighting when process begins again. Realize visual sighting or a/c attack impossible at night but ASV [radar] contact will fix position and surface vessels will co-operate. Time of first sighting will be zero hour and position will be datum position 'A.' Search area is circle with radius in nautical miles of twice number of hours since zero hour. During first eight hours cover area three times per hour. Next eight hours twice per hour. Third eight hours three times in two hours. Thereafter once per hour. Arrangements to be made for continuous intercommunication a/c and surface vessel by R/T [radio telephone] and also listening out for signals on convoy wave. R/T silence unnecessary after first sighting. Reckon this coverage will require for first eight hours one a/c. Next four hours two a/c. Next three hours three a/c and so forth. Second sighting when obtained ... will bring operation back to zero hour. Position of second sighting to be datum point 'B' ... Search is worthwhile up to 36 hours between sightings if sufficient a/c available ... If operation Salmon seems profitable after executing it we must consider repeating it under same code name whenever similar favourable conditions arise in future.[10]

The commander-in-chief Canadian Northwest Atlantic, Rear-Admiral L.W. Murray, could not very well disregard such insistent pressure, and he sent out the necessary orders, with which the air officer commanding-in-chief [AOCinC]

Eastern Air Command, Air Vice-Marshal G.O. Johnson, complied. After sunrise on 31 October, the third day of the search, a Lockheed Hudson of 11 Squadron, flown by Flying Officer F.L. Burston (accompanied by his brother as navigator), sighted U-537 and carried out an unsuccessful attack. This was the only time rocket projectiles were used in action by an Eastern Air Command aircraft. The rockets, with solid steel semi-armour piercing warheads, had been delivered to 11 Squadron and 119 Squadron the month before. The Hudsons, fitted with eight of these projectiles, were supposed to aim twenty yards short of the submarine to hole it below the waterline, and in this instance the pilot probably undershot. No 1 Group dispatched or diverted three aircraft to carry out a Salmon, but the Hudson, its crew unaware of the importance of continual air coverage to keep the U-boat down and immobilize it until naval forces could reach the position, left the area after making its unsuccessful attack. Thus the operation had already been seriously compromised, even before deteriorating weather prevented further air support after warships arrived late in the day. Still, the effort had not been without effect. Mystified as to how he had been located and taken completely by surprise, U-537's captain concluded that 'this part of the coast has been made unhealthy' and retreated to the south.[11]

There was no further evidence as to the submarine's whereabouts until dusk on 10 November when a 5 Squadron Canso 'A,' escorting convoy HX 265 about 200 miles south of Cape Race, sighted the boat and made an unsuccessful depth-charge attack in the face of brisk flak. Admiral Murray promptly ordered another Salmon, but once again everything went wrong. The Canso thoroughly confused the warships escorting HX 265 by incorrectly reporting the position of the attack, and then departed before relief aircraft arrived. As a result, U-537 was able to escape by making a fast run on the surface for five-and-a-half hours.[12]

Nevertheless, another Canso 'A' participating in the Salmon search found U-537 on the surface, eighty miles to the south, the next morning. Despite accurate flak that blew a large hole in the leading edge of one of the wings, Pilot Officer R. Duncan placed four depth charges close enough to damage the boat slightly. He then lingered in the area to home in a relieving Canso, which in turn homed warships searching the vicinity of the previous evening's attack. The aircraft did not, however, perform a proper sweep of the expanding area where the submerged boat might be located prior to the arrival of the first surface escorts four-and-a-half hours after the attack. Fortunately, the senior ship was a British destroyer, HMS *Montgomery*, with an experienced captain and an Eastern Air Command pilot on board for a routine naval liaison cruise, who was able to advise the captain on communications with the aircraft. The ships searched within a radius of fifteen miles from the position of the attack, and the two 5 Squadron Canso 'A's now on task swept at radii of about five and twelve-and-a-half miles. Although the aircraft should have searched out to a twenty-mile radius, the operation did approximate a proper hunt to exhaustion. Within two hours, however, heavy fog rolled in, forcing the Cansos to return to base. A single relief aircraft was only able to make a few searches of specific areas before it too had to depart. The ships continued to hunt for three days in the swirling murk. With great effort two 5 Squadron Canso 'A's attempted to provide support

for the ships on 13 November, while three 10 Squadron Liberators swept the whole Otter area, but the weather thwarted all further efforts.[13]

U-537 continued quietly to patrol east of Newfoundland, dropping out of sight until making a signal on 19 November that shore stations intercepted. Misinterpreting this signal as evidence that the submarine was homebound, the OIC plotted its track to mid-Atlantic, where 10 Squadron Liberators made four sweeps on 20-1 November, a week before U-537 actually departed.[14]

Although the air sweeps of the Otter 'A' areas had yielded the gratifying result of two attacks that effectively suppressed U-537, the attempts to trap the boat with Salmon operations on 31 October and 10 November had gone badly. The absence of Canadian orders for hunts to exhaustion was a large part of the reason, for the British instructions were unclear in some respects and, in others, inapplicable to practices in the northwest Atlantic. The only specific instructions had been suggested by the naval and air staffs in Ottawa on 29 October; these directions never reached the ships that made the search on 31 October, and it is clear that the aircrews that participated had been briefed poorly if at all. More generally, as Admiral Murray commented, air-sea communications were much worse than they should have been given the long time that Eastern Air Command and the RCN had worked together. Had fog not intervened, the Salmon on 11 November might have accomplished more, but the successful co-operation between ships and aircraft on that occasion had depended upon the presence of an exceptionally capable ship with an airman on board.[15] Circumstances would not always be so favourable.

The next U-boat to enter the Canadian zone, U-543, lingered in the vicinity of Flemish Cap from late December 1943 to early January 1944 to make weather reports and attack shipping. Decrypted German signals and DF bearings enabled the Operational Intelligence Centre to follow her with Otter 'A' signals.[16] A determined search for a boat some 400 miles out to sea was an ambitious undertaking, but the headquarters in Ottawa and Halifax decided it was worthwhile attempting to convince Admiral Dönitz that Canadian waters were not a soft spot. From 23 December to 6 January, 1 Group covered the area with twenty-one Liberator and seven Canso 'A' flights, including sweeps made in support of convoys in the area, none of which sighted the boat.[17] The OIC's estimates were accurate, however, for U-543 was in contact with the naval group that joined the search, made two unsuccessful attacks on the ships, and was detected on radar by one of the frigates, during the night of 2/3 January, when the weather had grounded 1 Group.[18]

The inexperience of the warships – most had only recently been commissioned and were still working up – largely accounted for the failure of the operation, but the air force had not done well either. In a blistering critical analysis of the search, Captain J.M. de Marbois, head of the OIC, found that 1 Group had devoted nearly twice as much flying time to protecting convoys, most of them not threatened, as to hunting for U-543. Only three night sweeps had been completed, despite the OIC's warning that the boat would likely submerge during daylight, and should therefore be pursued around the clock. On average, in fact, 1 Group covered only 76 per cent of the Otter area each day, and in most cases

covered that portion no more than once. De Marbois calculated that a full commitment of resources could have produced three complete sweeps of the Otter area daily and one each night.[19]

A general review of Eastern Air Command's operations by the command's operational research section had brought Air Force Headquarters to much the same conclusion.[20] On 3 February Air Commodore K.M. Guthrie, acting air member for air staff, expressed the air staff's concern to Air Vice-Marshal Johnson that routine convoy escort was interfering with the imaginative use of air forces. Guthrie saw that the object was the safe and timely arrival of convoys, and placed this ahead of all other aims. When convoys were known to be clear of danger, however, and the position of U-boats could be fixed, convoy escort became a purely defensive mode of warfare. 'If we could give 100% protection to convoys so that no ships were ever sunk at all ... this, it is true, would render the enemy's submarines useless, and there would be no need to kill them. In fact, however, we can never give 100% protection and therefore we must fight the submarine and not merely try to ward it off.' Guthrie followed this sound piece of logic with another: 'It follows that we must try to improve our methods of seeking out and attacking submarines, and that wherever these methods have any chance of success, we should use for this purpose every aircraft that can be spared (with due regard to training requirements, etc.) from convoy escort. It is felt that serious consideration should be given to whether aircraft escort is sometimes wasted on convoys which are not threatened.' Thus setting forth the argument, but not intending 'to dictate operational policy, which must lie in the hands of yourself as the operational Commander ...' Ottawa left the decision for or against more offensive tactics in Air Vice-Marshal Johnson's hands.[21]

The arrival of Guthrie's missive just as another offensive operation was getting under way may have helped to spur Eastern Air Command on to greater efforts. Admiral Dönitz had ordered U-845, with U-539 following, to hunt close in to the southeastern coast of Newfoundland in the expectation that the boats would catch the Canadians by surprise. In fact, Bletchley Park knew at least the broad outline of the plan immediately through decrypted signals. On 23 January two Liberators from 10 Squadron flew out to mid-ocean at 38 degrees west to catch U-845 as it entered the Canadian zone, and from 29 January the squadron dispatched as many as five flights a day to sweep the Otter 'B' area.[22]

During the first week of February the trail grew cold and weather grounded aircraft on several days, but on the 6th a DF bearing that placed U-845 near Flemish Cap encouraged Admiral Murray to launch a strong naval search. When 1 Group was able to fly again on the 9th, the hunt had followed the estimated track into the vicinity of Cape Race. However, an estimated track was not an actual one, and the OIC had warned Halifax that U-845 might strike anywhere about the shores of the Avalon peninsula. That, in fact, was what happened. The U-boat had moved some eighty miles north of the estimated track and was lurking about ten miles off St John's on the morning of 9 February. By remaining submerged it had evaded aircraft, while the density layering of inshore waters greatly reduced the chance of surface vessels making an ASDIC contact. U-845 was thus able to torpedo the British steamer *Kelmscott*. The damaged ship was

able to return to port but her attacker escaped unscathed despite a prompt air and sea search that included constant day and night coverage by 1 Group until the weather closed in on the 12th.[23] The same thing would happen many times again on the British and American as well as the Canadian seaboards. Although powerful anti-submarine forces had driven the wolf packs from the ocean routes, ships and aircraft were no more successful in detecting submerged boats in coastal waters than in the early years of the war.

During the hunt for U-845 from 9 to 12 February, 1 Group had also swept for U-539 as it came in south of Flemish Cap, but by the time the weather cleared on the 14th the locations of both boats were becoming uncertain, requiring the promulgation of four Otter areas. At dusk on 14 February Liberator 'Q' of 10 Squadron, flown by Flying Officer A.P.V. Cheater, was completing a sweep in one of these areas when the wireless operator was alerted by what appeared to be jamming from a nearby transmitter. In the failing light the crew spotted U-845; the boat put up heavy flak and the aircraft responded with accurate fire of its own. This was the first time the new low-level bomb sight that had recently been installed in 10 Squadron's aircraft was used in action, and the bomb aimer subsequently claimed that smoke from the nose gun blinded him, putting the six depth charges off target. On a second run he placed the remaining two depth charges close enough to lift the submarine in the water. Cheater made a third run to pour more machine-gun fire into the conning tower, and then released a homing torpedo without apparent result when U-845 dove. The depth charges had inflicted superficial damage at most, but the Liberator's guns had killed one member of the crew and slightly wounded two others.[24]

It proved impossible to organize a hunt to exhaustion on a contact so far out to sea. The relief aircraft could not reach the position until six hours after Liberator Q/10 at its prudent limit of endurance, had had to return to base; warships sweeping to the south of Newfoundland immediately made for Flemish Cap, but were ordered back by Admiral Murray as they were a full day's steaming from the position.[25]

Analysis of the Liberator's attack at Air Force Headquarters criticized the crew for not initially detecting the submarine with radar, a weakness that suggested the operator was not efficient, and for failing to drop radio sonobuoys as soon as U-845 dived. Although Group Captain C.L. Annis, now the station commander at Gander, admitted the crew had not been adequately briefed about sonobuoys, he properly commended the crew for their 'determination and coolness' in the face of heavy fire. Cheater and his navigator-bomb aimer, Flying Officer P.C.E. Lafond, received the Distinguished Flying Cross for the action.[26]

Air searches for U-845 and U-539 continued until the end of February in deteriorating weather. Without the benefit of any further intelligence, the Otter areas became increasingly inaccurate. The Nova Scotia squadrons participated in the last part of the operation, guarding against the possibility that one of the boats had made for Halifax. Like U-845, U-539 hunted close in to St John's, but left empty-handed, while U-845 made no more successful attacks and on 10 March was sunk by Canadian warships as it attempted to strike at a convoy in the eastern Atlantic.[27]

The operations of late January and February 1944 had marked the beginning of a stalemate in the northwest Atlantic which, despite the introduction of more sophisticated equipment and tactics by both protagonists, was to continue until the last days of the war. Eastern Air Command had for the first time made a whole-hearted commitment of its resources to the new offensive methods, at the expense of the effort devoted to protecting unthreatened convoys, as the following table of the crucial anti-submarine patrols flown out of Newfoundland demonstrates. Yet only once, on 14 February, had there been an opportunity to attack a U-boat.

U-Boat Searches, Canadian Northwest Atlantic
October 1943–February 1944[28]

		Convoy Protection		Offensive Sweeps	
	U-boat	No of missions	Flying hours	No of missions	Flying hours
1 Group					
29 Oct.–					
18 Nov. 1943	U-537	93	1035	60	555
24 Dec. 1943–					
6 Jan. 1944	U-543	36	302	20	180
28 Jan.–	U-845				
24 Feb. 1944	U-539	42	440	103	783

Although German signals provided timely information about a submarine's general course and destination, the OIC was still dependent upon aircraft sighting reports and DF bearings to pinpoint its position and accurately plot its movements. Cautious tactics, which included a policy of signalling as infrequently as possible from operational areas, and improved radar search receivers enabled U-boats to evade detection. At the same time, because the boats now submerged frequently and for extended periods while on patrol, they lost mobility and were seldom able to attack; hence the meagre result – one steamer damaged – of the long patrols by U-845 and U-539.

The frustrations suffered in pursuit of these two submarines were matched between early March and mid April, when U-802 arrived off Halifax. No 1 Group swept the estimated course soon after the submarine entered the northwest Atlantic, and 3 Group took over the search as the Otter areas approached Nova Scotia, but the intelligence picture remained cloudy as the boat began to patrol without betraying its position. A two-day Salmon triggered by false radar and radio sonobuoy contacts reported by a 161 Squadron Canso 'A' about 140 miles south of Halifax on 18 March did not locate the submarine. U-802 was in fact close in to the harbour and before dawn on the 22nd sank the small British steamer *Watuka* in the immediate eastern approaches.[29]

Admiral Murray immediately laid on an intense air and sea hunt that continued for four days, but a series of lapses and a bad guess by the shore command helped U-802 to escape unscathed. The boat surfaced about fifty miles southeast of

Halifax to make a victory signal during the night of 22/23 March, eighteen hours after sinking *Watuka*, and the OIC promptly plotted the submarine's track. One of the warships participating in the hunt, some twenty-five miles to the northeast, also obtained a bearing that would have fixed the position more precisely than had the shore DF stations but, failing to appreciate the importance of the information, was slow to pass it on. Meanwhile, a 145 Squadron Ventura had hastily taken off from Dartmouth to search the area, and it was probably this aircraft that, according to U-802's log, challenged the boat with a signal flare, forcing it to crash dive. Unfortunately, without the Leigh Light, which was never fitted on the command's Venturas, it was difficult to confirm night sightings, and the aircraft flew on unawares; the encounter is not mentioned in Canadian records. Soon after, promising but false radar and sonobuoy contacts by a 161 Squadron Canso 'A' brought Admiral Murray's headquarters to set the search onto the wrong track, to the west, for a critical four-and-a-half hours, while the submerged boat continued its southerly run.[30]

The squadrons at Yarmouth, Dartmouth, and Sydney continued to sweep day and night off southern Nova Scotia until 9 April without result. Eastern Air Command did, however, unknowingly score a notable success in defending HX 286, a convoy bound for the United Kingdom, that U-802 located on 8 April while departing from Nova Scotian waters. Venturas from 145 Squadron forced the boat to crash dive six times; when it was finally able to strike the next day the torpedoes were so far wide of the mark that none of the ships noticed the attack. DF bearings on U-802's convoy report signal enabled the OIC to promulgate fresh Otter areas for air searches of the boat's homebound track.[31]

During the hunt off Halifax, decrypted signals and DF bearings revealed the entry of U-550 and U-856 into the northwest Atlantic en route to patrol areas in American waters. From 20 to 27 March as many as four Liberator flights a day from Gander swept the Otter areas, with Canso 'A's from Yarmouth later picking up the trail after several days of bad weather. The only promising contact was by Liberator 'G' of 10 Squadron which, following a radar contact, claimed to have sighted a periscope about 450 miles south of St John's on 26 March. When the periscope disappeared before an attack could be made, the aircraft dropped sonobuoys and received positive returns, but further searches in the area brought no result. U-856 was in the general vicinity and U-550 may have been as well, but neither boat reported the incident, and since neither submarine survived its cruise, the encounter cannot be confirmed.[32]

Because both U-boats were headed south, on 26 March the USN detached the escort aircraft carrier USS *Croatan* and her five destroyer escorts from North African convoy routes to pick up the trail. Two additional destroyer groups joined. Before first light on 7 April one of *Croatan*'s Avengers closed on a radar echo about 250 miles southeast of Sable Island and U-856 gave itself away by putting up anti-aircraft fire. Destroyers later arrived, hunted the contact for ten hours, blew the submarine to the surface, and sank it by gunfire and ramming. Nine days later, on 16 April 1944, U-550 made a submerged attack on the tanker *Pan Pennsylvania* as convoy CU 21 formed up 200 miles off New York. Within two-and-a-half hours the three destroyer escorts