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Ferry Command – Swim in the Deep End or Sink

Air Commodore D. F. H. Grocott

This Anderson Memorial Lecture was given to the Boscombe Down branch of the Institute on 19 February 2004. In the lecture Pinky Grocott, a distinguished navigator and past President of the Institute, recounts the history of the formation of Ferry Command set up to ensure the safe and efficient delivery of aircraft from North America to the UK during World War II. He then provides personal insights into his role as a young first-tour RAF navigator employed in the Command and describes the contemporary navigation practice.

KEY WORDS

1. Ferry Command. 2. History. 3. Atlantic Bridge. 4. Air Navigation.

1. INTRODUCTION. How can justice be done to the subject of Ferry Command in 45 minutes? The Command was unique. It had no Operational Training Unit, crews were a mixture of civilian and service personnel and the enemy was a combination of icing and the lack of navigation aids. To give a balanced picture would leave no lasting impression. And a lecture confined to bare statistics would soon produce a sea of glazed eyes. My lecture will therefore comprise a series of snapshots, starting with the background to the formation of Ferry Command, followed by the scene that existed over the North Atlantic when the Command was set up. The problems experienced in setting up the network of airfields in the Arctic and in Greenland will then be addressed before mention is made of my experience in Ferry Command. I shall conclude with a few words about the navigational problems. Extra-mural activities can only be mentioned when above 10 000 feet.

2. BACKGROUND TO FORMATION OF FERRY COMMAND.

Act 1 is set in the year 1936.

2.1. *Plan to Establish a Fast Trans-Atlantic Airmail Service.* In 1936 Britain was keen to establish a fast airmail service from the UK to Canada/USA to compete with the planned American trans-Atlantic mail service. Accordingly, an order was placed for a number of De Havilland 91 Albatross aircraft, designed to meet the Air Ministry requirement for an aircraft capable of carrying a 1000 lb payload of airmail items for a range of 2000 miles against a 40 mph headwind. Aircraft need airfields – and few existed across Canada. Only in 1936 did Canada authorise the construction of a network of airfields from coast to coast, with the main aim of a Canadian airline, instead of an American airline, connecting with the planned Imperial Airways airmail flights across the North Atlantic.

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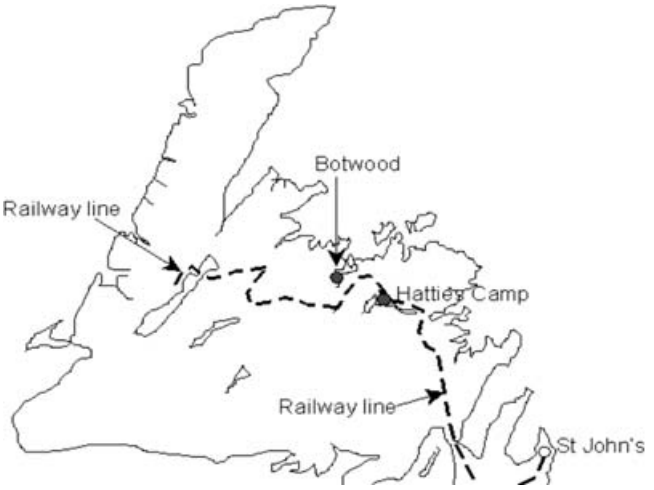


Figure 1. Newfoundland.

2.2. *The Origin of Gander Airfield.* The Canadian Civil Aircraft Branch, as part of their coast-to-coast exercise, had completed a survey of fifteen possible airfield sites in Newfoundland. They came to the conclusion that the best location from a weather viewpoint was at a place called Hattie's Camp, about 250 miles west of St. John's on the Gander River, in the midst of the Newfoundland wilderness, but accessible by the main branch of the Newfoundland Railway. Nearby Gander Lake was noted as being suitable for flying boats. The British accepted the conclusion of the Canadian Civil Aircraft Branch and construction work started in 1936. The airfield was usable early in 1938 and the construction crews doubled the width of the runways and wrapped up all building construction by the end of October 1939. At about Christmas time 1938 Patrick McTaggart-Cowan, the leading North Atlantic met forecaster, with the nickname 'McFog', moved his team from the Imperial Airways and Pan American flying boat base at Botwood to Gander. Though Imperial Airways immediately moved their flying boat operations from Gander Lake, Pan American decided to stay at Botwood.

With war clouds looming in Europe, the expected large use of Gander for the airmail service did not materialise. Instead, the DH 91 aircraft were used initially by Imperial Airways on the more profitable European routes and were commandeered by the RAF at the beginning of the war. The total fleet of aircraft based at Gander in 1938 and 1939 amounted to four aircraft. Two Handley Page Harrows had been converted into air refuelling tankers to refuel the Imperial Airways transatlantic flying boats Cabot and Caribou, a single Fox Moth was used for weather observations and a Fairchild 71C was used for communications and rescue. It was not until the RCAF moved No. 10 (Bomber Reconnaissance) squadron of Douglas Digby aircraft to Gander on 17 June 1940 that Gander took on a significant military role.

2.3. *Air Ministry Orders for American Aircraft.* In July 1940 the outstanding balance of existing Air Ministry orders with American aircraft manufacturers was 9700 aircraft. To this total must be added 16 200 aircraft from the joint Anglo-French 1940 project and the new expansion scheme – a grand total of 25 900 aircraft,

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to be delivered at an initial rate of 1000 per month, building up to 3000 per month. In Churchill's 'Their finest hour' (8 November 1940; page 440) and I quote: 'That same day the US priorities Board approved a British request to order 12 000 more aeroplanes in the United States in addition to the 11 000 we had already booked'.

Aircraft do not readily fold up into neat packages like Black and Decker Workmates; in their assembled state you get very few of them on to the deck of a 1940 era freighter. Moreover, the sudden and tremendous surge in aircraft purchases in the USA coincided with considerable German U-boats successes, resulting in a heavy toll of the merchant ships transporting these aircraft as deck cargo across the North Atlantic. By the end of 1940 the Germans had sunk 1281 British, Allied, and neutral ships. The result was a severe shortage of shipping space and this, coupled with the alarming statistic that only 50% of the aircraft shipped by sea in 1940 reached the UK, caused officials in London to consider alternative ways and means to get the aircraft to the UK.

3. FORMATION OF FERRY COMMAND.

3.1. *Catalyst for Formation of Ferry Command.* It is hard to pinpoint a single catalyst for the formation of Ferry Command. As early as 1938 the Air Ministry sent a special mission to Canada with instructions to encourage the aviation industry to develop a capacity to produce two hundred bombers a year in peacetime and five hundred in the first year of a war, with subsequent delivery by air across the Atlantic. In April 1940 Air Commodore N. R. Anderson, the Canadian Air Officer Commanding Eastern Region RCAF, wrote to AFHQ in Ottawa stressing the importance of the embryonic Gander airfield in Newfoundland as the hopping-off point for bomber aircraft destined for the UK. He was quickly followed in the summer of 1940 by the Minister of Aircraft Production, William Aitken (who became Lord Beaverbrook), stating that aircraft ordered from the USA should be delivered by air across the Atlantic. At about the same time Mr. Yost, the Lockheed representative in London, persuaded his parent company in California to have long-range kits designed and ready for the outstanding Hudson aircraft under contract for the RAF. He proposed that factory engaged personnel should ferry them to the UK. And, finally, in June 1940, the recently retired Managing Director of Imperial Airways, Mr. George Woods-Humphrey, discussed with Air Commodore Pirie, the British AA in Washington, and Sir Henry Self, Chairman of the British Air Commission in Washington, the idea of forming a group to ferry medium range aircraft across the Atlantic. Wood-Humphrey suggested that the use of some of his retired transatlantic pilots, coupled with some management support on the western side of the ocean, should enable the group to deliver the medium range aircraft from Canada to Northern Ireland and Scotland. He thought that Canadian Pacific would be the logical company to provide the necessary support and subsequently he obtained their agreement to use both the company's offices and the operational and administrative organisation in Montreal. My personal view is that the true catalyst for the formation of Ferry Command was most probably a combination of the Air Ministry's mission to Canada in 1938, coupled with Beaverbrook's Canadian background and friendship with the chairman of Canadian Pacific, plus the high-powered meeting in Washington. These factors were interrelated and necessary to achieve quick results. Formal talks appear not to have been difficult and an agreement was reached that

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took effect on 30 July 1940. It just confirms the old adage that while few people wish to be associated with failure, success claims many sponsors.

As with any new idea put forward in the UK, the naysayers came out of the woodwork. They suggested that at least 50% of the aircraft would be lost over the North Atlantic in the winter months because of the severe icing conditions that existed when flying in cloud. And all was not apple pie and ice cream on the other side of the Atlantic. The American government had to respond to public sensitivity about the handing over of military aircraft to a civilian organisation in a foreign country – Canada. So for some time they resorted to landing at an airfield in the mid-west that straddled the American/Canadian border and then towed the aircraft across the border. Not until 20 July 1941, when the name changed to RAF Ferry Command, with headquarters established at Dorval Airport, were American aircraft delivery crews allowed to fly straight in to Montreal.

3.2. *The Embryonic Ferry Command.* In August 1940 the embryo that developed into Ferry Command started to be put together in Montreal. Don Bennett, and A. S. Wilcockson, both of whom had pioneered the North Atlantic route from 1937 to 1939 with Imperial Airways, were appointed as flying superintendent and superintendent of ferry operations respectively. Bennett and Wilcockson immediately headed for the Lockheed plant in California.

They demanded a test flight on a Hudson Mk 3, which took the company aback and caused consternation when their results showed an 8% deficiency in estimated range performance figures. After initial scepticism, Lockheed confirmed the performance figures and fitted an additional fuel tank, as well as meeting Bennett's demand for an improved magnetic compass and for radio equipment produced by the Bendix Company. They returned to Montreal in two Hudson Mk 2 aircraft, earmarked for use as trainers, and to conform to American Law they had to travel as passengers while over American airspace. They made a short stop at Pembina, North Dakota, on the Canadian border about sixty miles south of Winnipeg, where a horse was hitched on to the front of each Hudson to literally pull the aircraft across the border. They then took off again and headed for Winnipeg for a night-stop, before flying on to Kapuskasing, for a second night stop and thence on to St. Hubert, just east of Montreal.

3.3. *The Kick-Start of Ferry Command.* To kick-start the Ferry Command project, Canadian Pacific Air Services were told to assemble the necessary crews and support staff to deliver 21 Lockheed Hudson Mk 3 aircraft, fitted with long-range tanks. CP recruited American, Canadian, British and Australian aircrew. The first Hudson aircraft was delivered to St. Hubert on 8 October 1940. There followed a compass calibration, equipment checks and a flight endurance test flight, before flying on to Gander on 29 October. Six further Hudson Mk 3 aircraft reached Gander by 9 November 1940. To house and feed Ferry Command crews and operations staff at Gander, Squadron Leader Taffy Powell negotiated with Canadian Pacific Railway to position a rail dining car and two sleeping cars in a siding.

3.4. *The First Ferry Command Delivery.* On the evening of 10 November 1940 seven Hudson Mk 3 aircraft, led by Don Bennett, were flown via Gander to Aldergrove in Northern Ireland. It is worth noting that up to this time the Atlantic had not been flown during the winter months. The original intention was to fly the first group of aircraft at night in formation, for which the aircraft had been fitted with powerful formation lights. Bennett had appointed himself as the formation navigation leader.

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The idea of flying in formation had to be abandoned during the first flight when the aircraft entered an active front three quarters of the way across the ocean. All seven aircraft accumulated a lot of icing, and each captain decided to go his own way. Some went up, and were still picking up heavy icing at 22 000 ft; others went down where they were not free of icing but at least they could keep the flight deck warm. They coasted in at various points around Northern Ireland and some crews had difficulty deciding where they were. One reported being over Catlin Island, and this report appears in several books. Although I have checked ordnance maps and the Columbia World Gazetteer I have been unable to locate any such island, nor a Cathlin, Catrin, Katlin with a K, Kathlin, Ketlin, Kitlin, or Gatlin Island. I suspect that this aircraft was over Rathlin Island. Several aircraft orbited islands and headlands (one for 45 minutes) until there was agreement on their precise location and then decided whether to fly around the coast to Aldergrove or to make a beeline across Tyrone. Not surprising, their arrival times at Aldergrove were spread over a period exceeding one hour.

The second group of seven aircraft followed one week later and the third group followed in early December. One aircraft in the third group crashed but the crew survived. Bennett was unhappy with the navigation standard displayed by the first three groups and decided to lead the fourth group himself and then to go on to London to have words with Beaverbrook about the problem areas of formation flying and navigation. Only four of the seven aircraft in the fourth group made the Atlantic crossing to Aldergrove or Prestwick. We know that one crashed on take-off at Gander, one returned with engine trouble and one landed at Speke near Liverpool with dry tanks after flying for 12 hrs 43 min! Bennett headed up to London in early January 1941 and convinced Beaverbrook that Ferry Command should use RAF navigators graduating from the Canadian navigation training schools, after first undergoing a transatlantic navigation training course designed by Bennett in Montreal. He also convinced Beaverbrook that it was impractical to envisage formation flying across the Atlantic – far better to let each aircraft have a qualified navigator and fly independently.

4. THE FIRST YEAR OF THE ATLANTIC BRIDGE. Through the winter of 1940–41 a mixed bag of 185 aircraft, including Hudsons, B-24 Liberator and B-17 Flying Fortress aircraft set off for the UK from Montreal and 181 made it to the other side of the pond. Thus started the Atlantic Bridge which, by the end of the Second World War, saw 10 000 aircraft being moved from the North American to the European continents. The rate of aircraft being delivered steadily increased throughout 1941 and rapidly accelerated in 1942. Actual numbers despatched and lost on the North Atlantic are not contained in official records. I know from personal experience that two aircraft losses do not appear in the official records.

Return from the UK to Montreal was by the Return Ferry Service, a group of Liberators with converted bomb bays, operated by British Overseas Airways crews. This service had a disastrous start, losing three of its seven Liberators in the summer of 1941 and wiping out one third of the ferry captains. This caused much fluttering in the dove-cotes and made it necessary for Air Marshal Bowhill, the Commander-in-Chief, to have a meeting with the Trans-Oceanic Pilots Association and to give a

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personal commitment that in future all BOAC trans-Atlantic pilots would be properly checked out.

5. THE LACK OF DIVERSION AIRFIELDS. The only airfields available for use on the North Atlantic in the winter of 1940/41 were Gander, Reykjavik, Aldergrove and Prestwick. Thus there were no diversion airfields between the North American continent and Europe. In the event of a problem enroute, aircraft either returned to Gander with its unreliable winter weather or pressed on to Aldergrove or Prestwick.

5.1. *Goose Bay*. Goose Bay did not exist in the winter of 1940/41. A Canadian survey team, led by Eric Fry, a surveyor with the Dominion Topographic Survey, had gone to Labrador in June 1941 looking for possible airfield sites. He had worked with the RCAF on air surveys before the war and knew the area fairly well; he concluded that the best site was an extensive sandy plateau called Blake's Berry Patch along the shore of Goose Bay on the Hamilton River. On 2nd July 1941, as he was completing his preliminary survey, he met a party of American surveyors, sent there by Captain Elliott Roosevelt, the President's son. They had made an extensive aerial reconnaissance of the Labrador coastline and had concluded that there was no suitable location for an airfield. But on comparing notes with Fry they agreed on the Goose Bay site. The Americans pressed hard for work to start immediately on the airfield but the British and Canadians, while anxious for the development of airfields in Greenland and Iceland, were sceptical about a route through Labrador and the Arctic, where climatic conditions made construction very expensive. American pressure mounted. General Arnold, head of the US Army Air Corps said that if the Canadians and British would not construct the airfield, then his men would, a view reflected in Washington. That did the trick. On 29 July 1941 the Canadian-US Permanent Joint Board on Defence recommended that work should start, a decision endorsed by the War Cabinet on 13 August 1941. Notwithstanding the lateness in the season, ships arrived on the Hamilton River in September, with an icebreaker, the first landplane landed on 9 December 1941, the first Liberator flew in January 1942 and routine ferry flights through Goose Bay started in Spring 1942.

5.2. *Crimson Route*. The Americans were concerned in the winter of 1940/41 that the UK had won the Battle of Britain by such a very narrow margin and were appalled at the loss of aircraft being transported as deck cargo by sea, suspecting that the U-boats were deliberately singling out such ships. The US Army Air Corps also felt that the need to fit long range tanks to short-range aircraft simply to fly from Gander to Ireland was a waste of precious resources, so they put in train a project called Crimson Route to find a route from an assembly airfield at Presque Isle, Maine, to the UK that would be suitable for use by unmodified short range aircraft. They envisaged a network of airfields, spaced at no more than 700 miles, running from Presque Isle in Vermont through Gander, Goose Bay, the Canadian Arctic, Greenland, and Iceland, relying on data for the Arctic and Greenland airfields provided by American Arctic explorers who had been in the area immediately before the Second World War. The airfields in the Arctic were code-named Crystal, and the provisional plan called for airfields near Fort Chimo (Crystal One), in Frobisher Bay (Crystal Two), and on Padloping Island in the Davis Strait (Crystal Three). The Greenland locations for airfields were code-named Bluie, Bluie West 1 being at the

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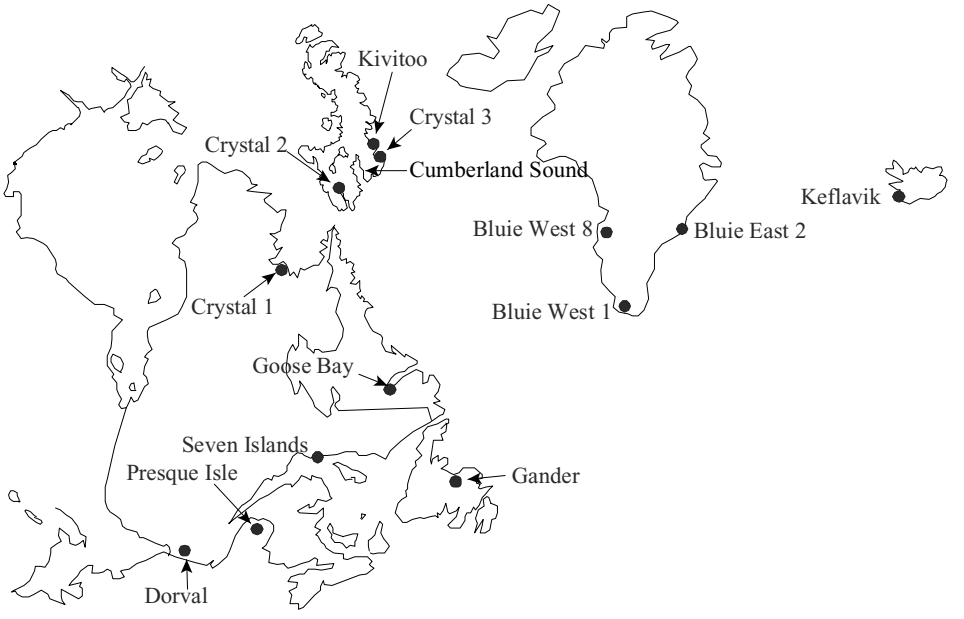


Figure 2. Crimson route airfields.

icecap end of the long Narsarssuaq Fjord, Bluie West 8 on the west side of Sondrestrom Fjord and Bluie East 2 near Angmassalik on the direct line between Bluie West 8 and Iceland. Only the Americans with their very large resources could consider building airfields in the Canadian Arctic, or in the fjords of Greenland where an overshoot would be into a rock face or 10 000 feet of ice. In typical American fashion, 1000 men were landed on the virgin rock at BW1 in July 1941 and the first aircraft landed on 24 January 1942. 1000 men were also landed at BW8 in October 1941 and 200 men at BE2, together with machinery, equipment and food to last from the autumn of 1941 to the spring of 1942. They even landed anti-aircraft guns because they knew that the Germans had established weather stations in Greenland. I want to spend some time talking about the Crimson Route because the story I shall relate brings home the strong message that if you want to survive in the inhospitable arctic you need to plan very carefully, to respect the arctic, and to take navigation seriously.

The weather in the Canadian Arctic can change rapidly; one minute there can be clear conditions and the next minute there can be a white-out or a blizzard that may last for days. You can be flying under visual flight rules, meet lowering cloud ahead, turn round to retrace your steps only to find that our friend Murphy has closed off your retreat. And this in an area where radio blackouts are commonplace and magnetic compasses are unreliable. The Americans had heard very colourful stories from their bush pilots operating in the North, so they prudently despatched 20 pressed US Navy men to each Crystal location to broadcast weather reports at regular intervals. They also decided to route check the feasibility of their proposed Crimson Route through the Canadian Arctic.

5.3. *USAAC Crimson Route Proving Flight*. The Americans acquired two Noordyne Norsemen aircraft, single engined planes that were popular with Canadian

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and American bush pilots and they tasked the Army Air Corps to carry out the feasibility task. Unfortunately, the American pilots had no arctic experience and were given poor navigation equipment with the result that they got completely lost and one aircraft was wrecked when carrying out a forced-landing in the bush. The second aircraft picked up the first pilot, returned southwards and called off that particular route proving exercise. But the Colonel who had planned the Crimson Route had been in Labrador before the war and was not easily put off by the initial failure. He headed for his masters in Washington, who went to Ottawa, who in turn went to AOC-in-C Ferry Command to see if they would carry out the proving flights at the Crystal locations and be the first to land at the Bluie locations. Air Marshal Bowhill said yes and decided to use Norsemen aircraft for the Crystal locations and a Hudson to make the first landing at the Bluie sites. He picked Louis Bisson, probably the most experienced Canadian bush pilot, as one pilot and Don McVicar as the other. Don had been a staff pilot at the Air Observer School at Edmonton, flying navigators under training. Don McVicar was fascinated with astro navigation and liked nothing better than to take and reduce star sights, realising that this was an excellent way to determine position in the Canadian Arctic.

5.4. *Ferry Command Crimson Route Proving Flights*. On 20 February 1942 Louis Bisson and Don McVicar picked up two ski-equipped Noordyne Norsemen at the Canadair plant at Cartierville on Montreal Island and flew them to Dorval. Ground and air compass swings were carried out on both aircraft. McVicar's aircraft showed good correlation with the correction curve, but Bisson's aircraft showed large errors, a factor that worried McVicar but did not concern the seat-of-the-pants bush pilot Bisson. To prepare for the route proving flight to the Crystal locations, Bisson, with his arctic experience, obtained the survival clothing and equipment and McVicar, with his navigation experience, got hold of two Mk IX sextants, a sun compass, an air almanac and sight reduction tables, plus a load of maps and charts – both Canadian and American. The sextants were included in case they got lost and had to land in the bush to determine their position. Some of the maps were less than helpful, with large blank spaces, elevations being rarely reported, and containing words such as *position uncertain*, *mountains have been reported in this area* and *compasses unreliable in this area*.

The aircraft were given an extra 110 gallon fuel tank (total fuel load increased from 245 to 355 gallons) plus an extra 5 gallon oil tank, these modifications increasing endurance from 8 to 12 hours. Bisson planned the rations based on 21 days at 6000 calories per man, carrying such delights as dried buffalo meat (pemmican), hardtack, bully beef, rolled oats and chocolate bars. General equipment was planned as for an arctic expedition and ranged from candles to guns, skis and crampons – the guns to get food and to deter any bears.

The two Norsemen and a Hudson took off from Dorval on 23rd February 1942 heading for Goose Bay. The Hudson made it but the Norsemen hit bad weather over Labrador and diverted to Seven Islands on the Gulf of St. Lawrence, where the primitive dirt airstrip was an extension of the main road. For the next three days they tried to take off but the snow was too sticky and both Bisson and McVicar damaged the fabric of their aircraft on jagged tree stumps. McVicar also had the misfortune to slip on the ice when restoring the emergency equipment and cracked two ribs. The doctor at Seven Islands patched up McVicar, and the engineer they carried with them patched up the aircraft; so they were airborne on 28th February heading for Goose

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Bay. McVicar formated on Bisson in the Norseman with the bad compass and they tried to maintain contact with the ground, but the weather deteriorated as they tried to head up valleys – and more by good luck than good judgement they eventually saw the Hamilton River a long way from Goose Bay and followed its path before sighting the rolled snow runway at Goose Bay.

The Met Office at Goose Bay had received few weather reports from the Crystal locations. None had been received from Crystal One for several weeks and the reports from Crystal Two and Three were spasmodic and always late. The Hudson decided to wait until a high-pressure system built up over Greenland and then have a go at landing at Bluie West One. But what about the Crystal locations? No weather reports and none expected, so Bisson decided to press on to Crystal One near Fort Chimo. After take-off from Goose Bay on 1st March Bisson set a course of 342°, but McVicar's compass read 000°. McVicar questioned this and Bisson, after checking with Colonel Hubbard, who had devised the Crimson Route and had been in Labrador before the war, thought there was nothing wrong. Some four hours after take-off Bisson realised that something was wrong and decided to land on a small lake and review the flight. They adopted the standard arctic survival procedures – namely to secure the aircraft, erect tents under the aircraft wings and to remove the batteries and stow them in someone's sleeping bag. The weather turned nasty and they had to stay at the lake for two nights. On the second night the weather cleared and McVicar took a series of sextant shots to position themselves 130 miles east of track, a track error of about 20°. On 3rd March they took off for Crystal One but again hit atrocious weather and had to carry out another forced landing and spend the night. The long overdue break came on 4th March, and after difficulty pinpointing with the poor maps they identified the mouth of the Koksoak River and followed the river quite a way upstream to Fort Chimo. After landing, Bisson and McVicar learned from the US Navy commander that his sailors had rebelled at being posted to the Arctic instead of to the Pacific, and had burned down the radio shack. They carried out a survey flight and decided the precise location for Crystal One. It is worth reflecting that this proving flight had so far taken ten days and they had only got to the first of the Crystal locations!

On 5th March they took off for Crystal Two, with McVicar leading because his compass was certainly more accurate than Bisson's. Prudently, McVicar headed first for the Cape at the NW corner of Ungava Bay (Cape Hope's Advance) and then headed for the only settlement on the south coast of Baffin Land – Lake Harbour. So far so good. But on leaving Lake Harbour they saw black mountains ahead just as they were about to enter cloud at 1000 feet. They turned around, Murphy's Law operated and the weather closed in again. Bisson immediately headed for the bush and McVicar followed him down just 10 minutes before a real Arctic white-out set in. At midday the weather cleared and they had an uneventful trip to Frobisher Bay, uneventful meaning no crisis.

En route from Crystal Two to Crystal Three on 6th March the weather deteriorated yet again and they turned back towards Crystal Two. As you can now guess, the decision was made too late and the weather had closed in over the entire route. Thinking that they were over the Cumberland Strait McVicar descended through the cloud and, surprise, surprise, he came into a valley surrounded by mountains. After getting a pinpoint McVicar climbed up through the clag to find Bisson and lead him back to Crystal Two.

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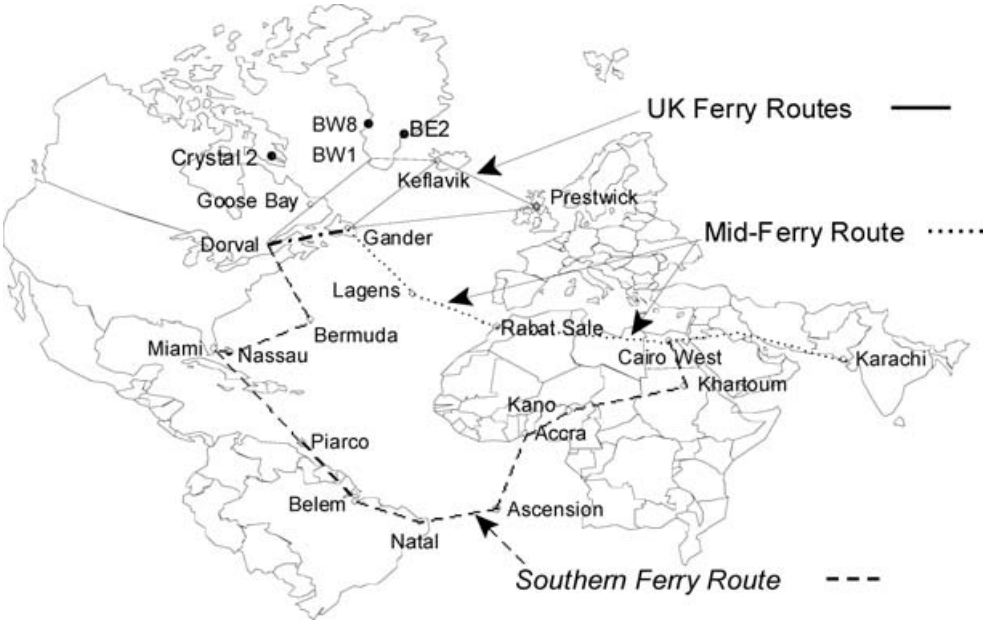


Figure 3. Atlantic Ferry Routes.

On 7th March they awoke to clear skies. Bisson managed to clear a rock ledge at the end of the short snow rolled runway, but McVicar ran out of runway and went over the rock ledge, and only saved his life by going into a 20 ft snowdrift and severely damaging the aircraft. The weather clearance was short lived and it was not until 13th March that it improved to the extent of allowing Bisson to take off in the remaining serviceable but grossly overloaded aircraft and to follow this hair-raising event with an uneventful journey to Padloping Island. This proved to be an unsuitable spot for an airfield and Bisson and McVicar recommended, following an airborne reconnaissance, that Crystal Three should be located at Kivitoo near Kangeak Point. This site was well and truly checked out during the 48 hours that yet another change in the weather forced them to stay there. The proving flights had taken 18 days. So much for the Crystal and Bluie airfields.

5.5. *Keflavik*. Work started on an airfield on the Keflavik Peninsula, Iceland in July 1941 and the airfield became fully operational on 23 March 1943.

6. OTHER FERRY ROUTES. We often think in terms of Ferry Command as an organisation created to deliver aircraft only from Canada to the UK. But in fact Ferry Command were also required to deliver aircraft through to the Middle East, to India, and westwards to the Far East. Short range aircraft were not keen on the Crimson Route and pilots were quite vocal about its problems. So for short range deliveries to the Middle East Ferry Command negotiated with the US Air Transport Command to use some of their new airfields which had been built by Pan American with US Treasury funds. The main route was from Montreal to Bermuda, thence to Nassau/Miami, Trinidad, Georgetown British Guiana, Belem and Natal in Brazil, across the South Atlantic to Ascension Island and on to Accra,

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Figure 4. Pacific Ferry Routes.

Kano, Khartoum and Cairo. 3527 aircraft were delivered via the Southern Ferry Route.

7. MY ENTRY INTO FERRY COMMAND. I was at No. 32 OTU Patricia Bay, Canada in 1943 learning about torpedo bombing from the flying coffin – the Hampden aircraft – when two significant events occurred that were to affect whatever plans the RAF had for me. First, three pilots were killed while converting on to the Hampden. As my pilot was one of these, I was teamed up with a staff pilot, thus my chances of passing the course in one piece improved dramatically. The second event took place half-way through the course when we heard that the unit was to re-equip with C47 and C45 aircraft and the role changed to transport flying. After two months learning to be navigators in the torpedo bombing role and one month learning to be transport navigators, three crewless twenty-year-old navigators were offered to Ferry Command at Dorval, while the rest of the course headed back to the UK.

I did not arrive at Dorval until the end of 1944, but as I had a grand total of 215:35 in my logbook, I was obviously well qualified to jump into any kind of aircraft and head across the North Atlantic. I presented myself to HQ at Dorval and was told that I would get a check-out the next day. If I failed to make the grade on this single flight I would be returned to the UK for posting to a Transport squadron. The check flight was from Dorval to Port Albert and return in a Hudson aircraft, a type I had not seen before. I must have passed the test because on landing I was told that I was now a fully qualified Ferry Command navigator and I would make my first flight across the ocean that week. My two fellow navigators also made the grade, so we decided to celebrate the event in downtown Montreal in the traditional RAF manner. But that is another story!

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7.1. *My First Aircraft Delivery*. My first flight across the ocean was in a PV-1 Ventura. It was a memorable flight, partly because I got great satisfaction from putting my navigation theory into practice and partly because the pilot had just been checked out as a captain and was embarking on his first flight in this role. So PV-1 JT 854 headed out from Dorval with a brand new civilian captain, a brand new RAF navigator, and a very experienced civilian radio operator on board.

The first leg was to Goose Bay and I was surprised that the captain said very little en route and appeared to have difficulty carrying out an instrument airfield approach and landing at Goose Bay. We made a heavy landing in a slight cross-wind and zig-zagged down the runway. I thought for a moment that I was back on Hampdens! The second leg was to Bluie West 1 and was free of problems. After identifying Bluie West 3 at the entrance to Narsarssuaq Fjord, I mapread our way past the sunken ship to make a direct landing on the metal PSP towards the rock face. The next morning we checked the weather and decided to head for Meek's Field (later named Keflavik), Iceland, where the weather was just above limits. We took off down the fjord exited via Bluie West 3, rounded Cape Christian and headed for Meek's Field. So far so good. But after about one hour the captain said that it was such a nice day that we should alter heading for Prestwick. I mentioned the deep low over Scotland that was on the weather chart and that the forecast for Prestwick was below limits but the captain said that Met men were always pessimistic – so we would press on.

We arrived over Prestwick in the clag and started to do a radio let-down and that is when the trouble began. The captain lacked instrument experience and after three attempts we were diverted to Nutts Corner in Northern Ireland. Although we were over land the pilot put the nose down and we broke cloud in a valley at about three hundred feet just south of Ayr as darkness was setting in. We altered heading for Nutts Corner and on crossing the coast at Carrickfergus the searchlights diverted us to Newtonards where we lost one wheel in a 70 mph crosswind and were then rediverted to Ballyhalbert for a crash landing after a flight lasting 7 hrs 50 min. I wondered whether all ferry flights would be so memorable!

On return to Montreal, I was most fortunate to team up with an American captain Merrill Phoenix. He had joined Ferry Command to help the UK, was an Anglophile, and a truly quiet and likeable American. Merrill Phoenix and I carried out Middle East deliveries of B-24s and Catalina deliveries to the UK (Figure 5). We also acted as the safety crew on one of the Russian Catalina formation flights from Elizabeth City to Iceland, and we delivered the first C87 to Northolt on the eve of D-Day. In July 1944, partly as a result of Merrill Phoenix's recommendation, I was transferred to the Communications Squadron at Dorval (later 231 Sqn) to team up with Tommy Thomlinson, an ex-BOAC captain, and we stayed together for most of 1944 and 1945, flying the Mid Ferry return route to Karachi and the Southern Ferry return route via Brazil to Accra.

In March 1945 I wanted to get to the UK to tell my parents that I was getting engaged to a Canadian girl, so I arranged to ferry a Lancaster (KB 971). On take off from Goose Bay with a full load of fuel the engineer pulled up the undercarriage before we had left the ground. Fortunately there was a great deal of snow on the runway and large drifts to either side, so we all managed to get out in one piece. The pilot and myself returned to Dorval, picked up another Lancaster (KB 989) and a different engineer and had an uneventful trip to the UK.

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Figure 5. Pinky Grocott with astro-compass aboard a Catalina in 1944.

On 11 November 1945 I took off from Dorval and headed towards the UK, knowing that I would go on the Staff Navigation Course and then on to VIP flying with No 24 (Commonwealth) Squadron from RAF Bassingbourn. Little did I know at the time that this path would lead to a permanent career in the Royal Air Force, a path heavily biased towards navigation, operations and future systems. So much for my role in Ferry Command. I shall now turn to the navigation issues and practices.

8. NAVIGATION AIDS. When Ferry Command was formed the radio aids for the North Atlantic sector were limited to a low power radio range at Gander, a radio beacon at Derrynacross and a radio range at Prestwick. From the spring of 1942 there was a radio beacon and radio range at Goose Bay and further radio beacons at Bluie West 3, Cape Christian and in Iceland. The radio beacon at Derrynacross was of medium to high power but was switched off whenever German aircraft were believed to be heading for Northern Ireland. Moreover, it was also subjected at times to meaconing from a station in Norway. So in practice crews had to rely on back bearings from Gander during the climb, astro and dead reckoning for the main crossing and a radio beacon for the descent. Bearings from Derrynacross were regarded as a bonus. Goose Bay airfield was never as popular as Gander because pilots had the mistaken belief that routeing via Goose Bay added a considerable distance to the crossing. And, while the airfields at Crystal One, Two and Three were avoided like the plague during wartime, they performed a vital community role in peacetime. Realising the importance of astro, I started out like a pre-war railway porter with a heavy navigation case and one sextant in one hand and a B4 canvas hold-everything-without-creasing-bag and a second sextant in the other hand. Inside the navigation bag were enough maps and charts for the route, the

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usual instruments, air almanac, navigation tables, and essential devices such as a tin opener and gyppy tummy tablets.

The US Army Air Force had a 1:3 m chart of the North Atlantic which was notable for several reasons. First, it was produced with a waxy surface almost resistant to pencils, secondly the locations of towns and airfields were unreliable and thirdly it showed what appeared to be an island called Flemish Cap, located to the SE of Newfoundland. No navigator ever found the Flemish Cap – which is not surprising because it is 28 fathoms beneath the surface. The chart problem was solved by Ferry Command producing their own chart of the North Atlantic and a separate one of the South Atlantic, the latter covering from Miami through to Accra via Trinidad and Brazil. The scale of these Mercator charts varied from about 1:3 m to 1:5 m, so you had to maintain very sharp pencils. The consolation factor was that astro fixes tended to have no cocked hats or at worst very small cocked hats.

9. THE WEATHER FACTOR. The visit to the Meteorological office was all important. Cloud cover is such on the North Atlantic in winter that almost invariably part of the crossing for piston-engined aircraft would be either in cloud or between cloud layers. The Met men were good in general but had difficulty in forecasting the speed and direction of movement of depressions, with the result that there would be a bias in the wind direction and/or speed. So when winds or weather different from forecast were obtained the navigator needed to guess what might happen to the wind in the next section of the crossing. If there was going to be a break in the cloud cover it tended to be in the 9000 ft to 11 000 ft region, generally referred to as the tunnel.

You may recall that after the January 1942 Washington meeting, Winston Churchill accepted Roosevelt's kind offer of a Boeing 314 to take him from Washington to Bermuda, where the Duke of York and accompanying destroyers were waiting to take him on to the UK. After talking to the captain of the Boeing, Churchill was attracted by the idea of going on to the UK in the Boeing. Portal tried to dissuade him but to no avail. The subsequent flight from Bermuda to Plymouth illustrates the kind of weather one can meet on the North Atlantic. After over ten hours flying in and out of cloud with only one star sight, there was no sign of the Scillies on ETA. Churchill became aware of the tension building up on the flight deck as the minutes ticked by. Churchill's book reports – *Presently Portal, who had been studying the position, had a word with the captain and then said to Churchill* '*We are going to turn north at once*'. *It was not until another half-hour had passed that the Scillies were sighted through a gap in the clouds. Six Hurricanes were scrambled to intercept this hostile bomber coming from Brest, but fortunately weather prevented a* '*Tally-Ho*'.

But icing rather than cloud was the real hazard. The air over the Atlantic is relatively free of pollution, so the old theory that severe icing only occurred from 0 °C to −7 °C and that only light to moderate icing was experienced from −7 °C to −18 °C was found to be a myth. Icing occurred whenever in cloud in the Western Atlantic in winter. And with freezing level on the surface there was no escape at low level. On one January flight from Gander to Lagens the aircraft that I was navigating received a last minute report that there would be light icing during the climb-out from Gander. In fact icing piled on at a tremendous rate and although we had Goodrich rubber

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pads along the leading edges and at intervals broke off the leading edge ice, the ice started to build up under the wing behind the leading edge. Gander suddenly closed and although we used climbing power of 45″ and 2100 revs we could not maintain height. We diverted to Goose Bay and broke cloud along the coast at 400 ft. On landing at Goose Bay we found that we still had 4 inches of ice under the wing hanging down like stalactites and leading edge ice inboard and outboard of the rubber pads. The depression deepened and we were stuck at Goose for three days.

Captain Charles MacDonald, an Australian check captain, used to warn new pilots 'Well I'll tell you something even you might not know. Even if Gander Lake doesn't freeze on the surface, the spray you kick up on take-off will freeze your wings and props and the airfoil will be destroyed. And you won't be able to see through the ice on the windscreen either.'

10. REFLECTIONS. My lasting impressions of Ferry Command are those of freedom of routeing and height to fly, the many anxious moments when we encountered heavy clear icing in the Western Atlantic, and the feeling of great elation when navigation techniques worked out and we arrived at a destination on time. I remember great aircraft captains like Merrill Phoenix who could move from landplanes to flying boats with great ease and bad captains like the one I experienced on my first ferry flight. I also remember my aircraft captain Tommy Thomlinson, who liked a drop of alcohol and who called for oxygen just after take-off from Rabat Sale at the start of a long night flight. But above all I remember the satisfaction I got from using the basic tools of the trade, namely a sextant, an astro-compass and a drift-measuring device. This proficiency stood me in good stead for later tours of duty with the RAF.

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