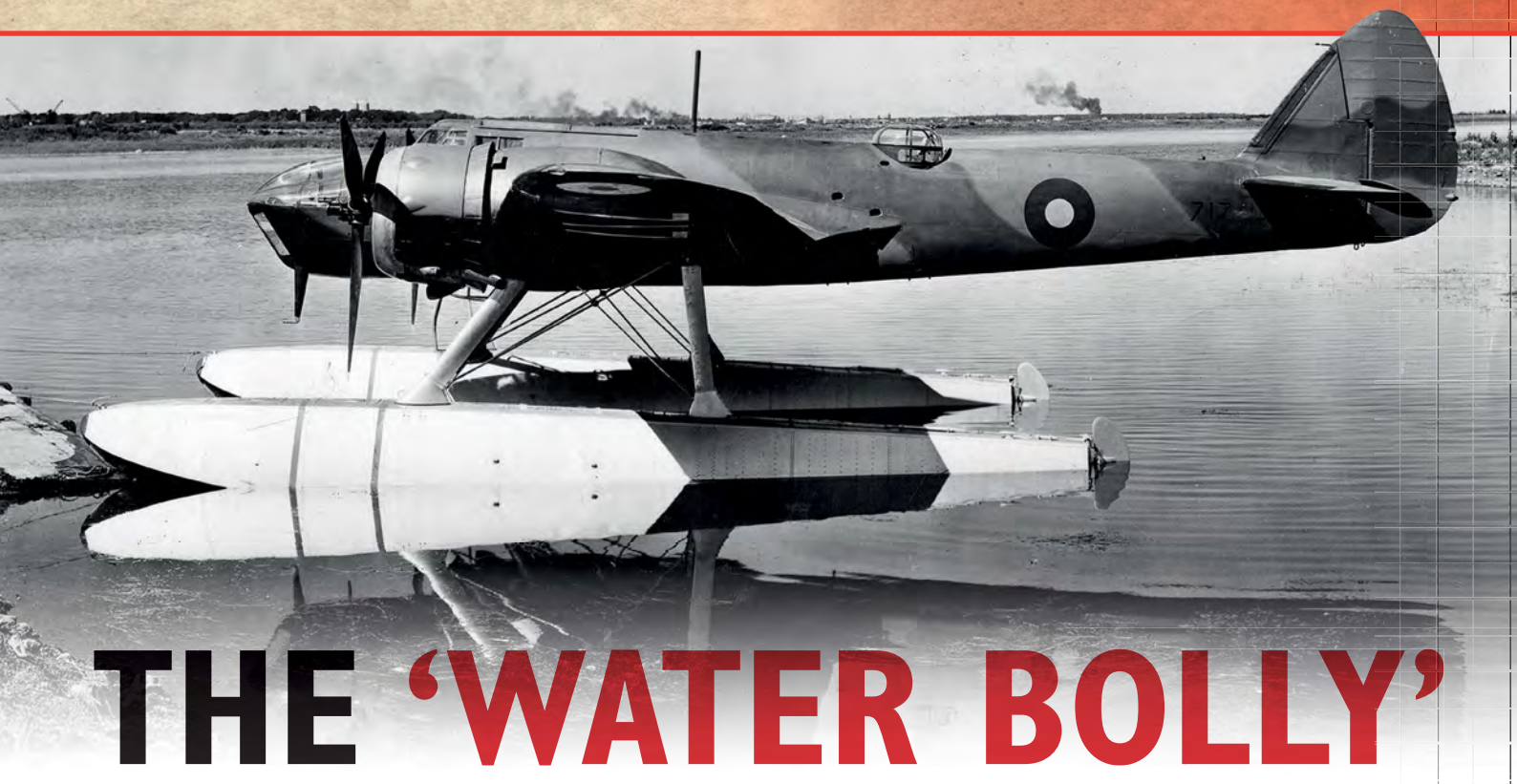


THE 'WATER BOLLY'

Robert S Grant reveals how an example of the Canadian-built Bristol Blenheim – the Bolingbroke – was temporarily converted for waterborne trials

It's strange how a British newspaper proprietor could affect seaplane operations in a faraway country such as Canada. This is exactly what happened when *Daily Mail* owner Harold Sidney Harmsworth, 1st Viscount Rothermere, decided to acquire a personal transport in 1934. The Bristol Aeroplane Company's Type 142, constructed to his specifications, drew RAF interest and eventually led to the newly designated Type 149 Blenheim Mk.I's maiden flight on June 25, 1936, at Filton, near Bristol. The light twin-engined bomber advanced to the Bolingbroke variant, which also flew its initial trip at Filton.

In November 1937, what was a leisurely peacetime workshop began steps that would turn the company into one of the largest aircraft builders in Canada. Hubert M Pasmore, president of Fairchild Aircraft's Canadian subsidiary in Longueuil near Montréal, Québec knew the Royal Canadian Air Force (RCAF) was seeking a

maritime patrol aircraft. An astute businessman and pioneer pilot, Pasmore lobbied on both sides of the Atlantic for an agreement to licence-build an initial batch of 18 Bolingbrokes. Thanks to influence from Canadian Prime Minister William Lyon Mackenzie King, the British-built example became a pattern for the first all-metal stressed skin aircraft manufactured in the country. In return, Fairchild despatched technical personnel to England to study the machine's intricacies. Within two years, the first Canadian unit took flight under the command of RCAF honorary group captain and test pilot James Harold Lymburner. A total of 626 Bolingbrokes had entered service by the time production ceased in 1943. None served overseas, although 115 and 8 Squadrons were deployed to Alaska's Aleutian Islands.

The right design

Somewhere within British and Canadian military hierarchies, the 'top brass' remembered that Canada possessed the world's longest coastline of 136,755 miles (220,080km) with bays, sounds and sheltered areas. Further inland, the country's vast lakes and rivers had already enjoyed the touch of seaplanes and skiplanes. It seemed natural for a wilderness nation to call upon bushplane types to patrol saltwater coasts, leading to proposals to convert Bolingbrokes to seaplane configuration. Unfortunately, few knew the difference between metal-crunching ocean swells and gentle rippling brooks.

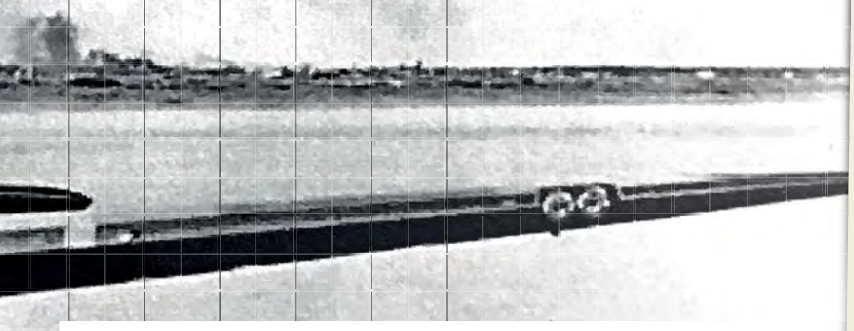
Questions rose as to which manufacturer would build the 'seaplane alighting gear and its associated supports'. Bristol submitted recommendations that its British-built aeroplane would be satisfactory in strength and performance, suggesting that structures should be designed before stress studies were conducted. Ireland's Short Brothers assembled its offering, but RCAF engineers did not approve the narrow float track and consequent instability.

Fairchild became the next to analyse structural strength and torsional stiffness, followed by RCAF Defence Headquarters' decision to place orders with MacDonald Brothers Aircraft in Winnipeg, via Fairchild. The colonial organisation produced floats under licence from New York's Edo Corporation, including some for the US Army's Martin YB-12 bomber. Units completed to Fairchild's specifications would be transported east by rail from Winnipeg to Longueuil.

"In view of the present industrial situation in England, it is believed that better results will be obtained if the Edo Company or MacDonald Brothers is given an opportunity to do this work," said Fairchild's general manager N F Vanderlipp, who added: "In our estimation, the Edo float and gear is sturdier than the Short, and this contractor is in a position to work with the Edo Company to produce the best results."

Structural conundrum

On September 16, 1938, RCAF Flt Lt Al James pointed out that no drawings existed for a twin-float installation. It could not be determined whether the seaplane chassis should be attached directly to the underside of the fuselage or beneath the engines. Designers also needed to address crew visibility, water spray damage and bomb-dropping clearance. Most float aircraft depended on spreader bars for rigidity but, in this case, such arrangements were impractical as released ordnance could explode on contact with the bars. Since the Blenheim/Bolingbroke aircraft



"A total of 626 Bolingbrokes had entered service by the time production ceased"

FAR LEFT **The RCAF's Flt Lt A O Adams expressed his belief that the Bolingbroke's wing centre section would need strengthening, as well as an increased fin area for directional control. His view was later justified by installation of a ventral fin below the horizontal stabiliser.** KEY COLLECTION

BOTTOM LEFT **Fairchild general manager N F Vanderlipp suggested the Bolingbroke 717 have extra buoyancy forward during operations in rough ocean conditions. The factory complied and the Edo 37-15750s floats appear bulged in the front section.** LIBRARY AND ARCHIVES CANADA

BELOW LEFT **Test pilot James Lymburner received his commercial pilot's licence in January 1931, later joining two Ellsworth Antarctic Expeditions and enjoying years as a bush pilot with Canadian Airways. He also test-flew the first Canadian-built Handley Page Hampden. He died on August 5, 1990.** CANADA AVIATION AND SPACE MUSEUM

BOTTOM CENTRE **Photographed in 1941 at Dartmouth, Nova Scotia, Bolingbroke 717 awaits its fate in company with RCAF Stranraer flying boats. Reports stated how ocean landings stretched the metal covering and the RCAF was displeased with the magnesium alloy flap trailing edges.** LIBRARY AND ARCHIVES CANADA

ABOVE **A November 6, 1939, letter demanded that it should "be possible for a crewman to gain access to either float from the cockpit or cabin and make fast the anchor lines while the airscrews are turning." Clearly, anyone standing forward of the propellers would be in grave danger from wind and wave movement.** LIBRARY AND ARCHIVES CANADA

were in active service, authorities would provide just enough information without divulging military secrets.

On water, explained Flt Lt E H Higgins, drag from struts and supports could increase porpoising and loss of control during take-off. Access to underside hatches created further danger to personnel – the standard front entry could not be used with engines running since clearance between the propeller and fuselage measured just 12in (30.4cm). Higgins raised the possibility of openings beside props or behind bomb doors.

"The objection of the first position is again the danger of falling forward into the airscrew disc," Higgins reported. "This danger, however, could be minimised by means of a detachable ladder running from the float to the aft end of the walkway on the centre section wing. It is not very difficult to move from one wing to the other over the top of the fuselage, by wing or ladder from the float to the wing on each side."

In January 1939, the RCAF Equipment, Development and Staff Division handed over 52 specifications for what became the solitary Mk.III version. Naturally, specialised landing gear would be "built entirely within the Dominion of Canada" and all alloys and steel required anti-corrosion protection. Watertight compartments, with nose bumpers and towing bridles for mooring, provided buoyancy and surface handling. The specifications also stated that, when taxiing, "floats must not submerge in 40-knot winds". The writer naively underlined: "Calm water must be assumed."

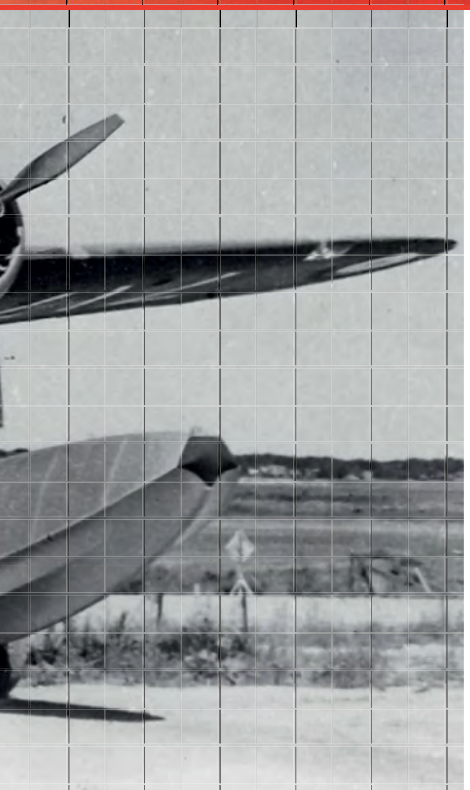
On January 20, 1939, Fairchild estimated that one pair of Edo 37-15750 floats would cost C$20,470. This grandiose figure included bilge pumps, crew steps and water rudders constructed from weld-wood (plywood) to save weight. Anchors and ropes did not come as part of the package, but adequate mooring eyes did. Fairchild's secretary-treasurer R B Irvine quoted an October delivery subject to orders within 30 days and contingent upon no embargoes, accidents, strikes or delays beyond the company's control.

The RCAF questioned the price and Fairchild re-tabled C$13,507.50 for an initial pair and C$11,483.08 per set with an order for 23 pairs. Within days, Air Cdre Ernest Stedman approved a construction contract. Each pair weighed 1,636lb (742kg) upping the type's gross weight to 13,500lb (6,124kg). Track measured approximately 18ft (5.49m) and skin coverings of each unit cmprised five longitudinal and 16 transverse sections of Alclad (metallurgically bonded layers of corrosion-resistant aluminium sheet), fastened to a welded frame with dural rivets. Two footsteps on each side of the inboard steps provided entry to the cockpit.

With orders confirmed, MacDonald Brothers submitted preliminary drawings. Critics quickly highlighted that signed provisions for drain plugs had not been incorporated and just 5in (12.7cm) handhole covers were intended instead of the stipulated versions greater than 7in (7.7cm). Draughtsmen somehow overlooked anti-corrosion treatment and it was noted that joining dissimilar metals would hasten corrosion. Fairchild engineering staff went back into their offices and the floor workers cut more metal. Everyone looked forward to the completion of the floats as the European war had erupted on September 1, 1939.

Finished floats

On May 18, 1940, MacDonald Brothers advised that two pairs of Edo 37-15750s were available for acceptance and delivery to Fairchild. Pasmore's company was in the process of producing 15 wheels-only Bolingbrokes and intended to assign the 16th off the line for seaplane experiments. In the interim, Ottawa's National



Research Council (NRC) carried out wind tunnel testing on model aircraft. Results tabulated positive and cost Fairchild C$1,443.11.

"It is therefore concluded that the longitudinal stability of the Bolingbroke seaplane normally loaded will be perfectly satisfactory, and it is further concluded that the rearmost permissible centre of gravity position for the seaplane should be taken as 15 inches behind the centre line of the front spar," reported NRC acting president Chalmers 'Jack' Mackenzie.

Numbered Bolingbroke 717, the subject aircraft had flown on July 25, 1940, fitted with wheels before transfer to RCAF Station Rockcliffe's Test and Development Establishment on the Ottawa River. Locals already recognised the flying machine from newspaper publicity. Slower bush planes had been operated from the river for decades, but the new bomber was state-of-the-art.

"The Bolingbroke which streaked across Rockcliffe Field at 300 miles an hour is a Canadian version of the Bristol Blenheim, which has the top performance of all [twin-engined] Royal Air Force types," read the November 22, 1939, issue of *Ottawa Journal*. "Streamlined as a barracuda, the Bolingbroke carries all its bombs within the fuselage. When the [bomb aimer] lying prone in his position in the very nose of the airplane gets his sights on the target and presses the bomb triggers, spring-loaded doors open."

Added strength

When 717 made its public debut as the world's only Bolingbroke seaplane, spectators could not have been aware of modifications incorporated into the airframe. Life in 'heavy' waters was not gentle. In this case, the 56ft 4in (17.17m) wing required special box ribs integral with the centreline where the fuselage was joined. Strengthened spar joints received extra tube bracing, and front and rear struts were cross braced with wire. Covered wells where wheels were previously stowed remained unsealed – not for streamlining or aesthetic reasons, but those of practicality. The rounded nacelle fairing panels afforded cut-outs for float struts and reduced water exposure to electric lines and various tubing.

As test pilot Lymburner slipped and slid down the grassy banks of the Ottawa River towards 717 on August 28, 1940, the only noise came from the thump of his boots on the floats, while fitters primed bilge pumps and secured inspection panels. He knew the

"The so-called answer to Canada's maritime patrol requirements did not 'cut it' militarily"

first flight would be anti-climactic without military bands and little more than a few orange-beaked seagulls surveying the proceedings. Rivet punchers in wartorn Filton could never have predicted that Lord Rothermere's basic design would lift away from a distant Canadian river. "Powered by 995hp Bristol Mercury XV radial engines, the flying machine intended for monitoring Canada's 'yawning vastitudes' contained more than 80,000 separate pieces and 900 bolts," boasted *Canadian Aviation* in the December 1941 edition. Curiously, the aircraft designed for war carried only one Eclipse generator and a single Pesco hydraulic pump.

Both starters turned the three-bladed de Havilland propellers easily and 18 cylinders nourished by 87 octane fuel came to life. In 12mph (19km/h) surface winds, Lymburner selected the four-panel flaps to 15°. Highly experienced in pre-war bush flying, he knew how to 'feel' his way off the water and began the first of three take-offs. No porpoising occurred. With the Bolingbroke's high wing loading of 31 1/2 lb/sq ft, runs lasted half-a-mile with cowl gills open for cooling. The last occurred with +7lb boost. At 2,500ft and 2,200rpm, airspeed showed 175mph (282km/h) with reduced power. Wheeled four-crew versions with drag-free retractable undercarriages averaged 220mph (354km/h) with the same settings. Task completed, Lymburner rounded out for landing. As the floats contacted the river and

ABOVE **The cockpit of a land-based Bristol Bolingbroke Mk.IV restoration at Quebec's Montreal Aviation Museum in Ville de Sainte-Anne-de-Bellevue shows what test pilot James Lymburner faced on August 28, 1940.** ROBERT S GRANT

RIGHT **De Havilland DHC-3 Otter CF-ODK at Sault Ste. Marie, Ontario, has been pushed from hangar to river side on the same beaching gear used for the 717 'Water Bolly'.** ROBERT S GRANT

splashed the surface, float bottoms took the load from the wings and he lowered the water rudders before returning dockside. Above the crinkling of cooling Mercury engines, Lymburner pointed out that the Edo-equipped Bolingbroke was the only aircraft he had flown "that would take off at near gross weight on cruising power." As elated as the Fairchild Aircraft's 3,900 employees in Longueuil, 128 miles (207km) east of Ottawa, he pronounced the project a success.

In follow-up reports, Lymburner suggested introducing a hydraulic mechanism for raising and lowering the heavy water rudders in order to improve steering. Technicians installed a 1,000cu ft (28.3m³) air bottle to reduce pull-up load and provide a 35° steering range on either side of centre. Lymburner's notes also mentioned poor longitudinal stability, so a steel and fabric ventral fin was developed.

Initial proposals specified seaplane fittings on all production Bolingbrokes, but caution narrowed the number to 23, not including 717. With RCAF staff, Fairchild workers and Edo designers working nearly non-stop, a morale-breaking edict was delivered when Air Cdre Stedman said that "equipping these aircraft as seaplanes is not urgent." Nevertheless, during November 1940, Bolingbroke 717 was ferried to Eastern Air Command 5BR in Dartmouth, Nova Scotia, for service trials in the remaining ice-free 1940-41 season.

Delivery delays and unsatisfactory weather hindered operations, but Wg Cdr Herbert Carefoot stated on November 22 that his pilots performed 15-second take-offs and landings in 2 1/2ft (76cm) waves of "fairly rough chop" and that despite "considerable weaving of the floats" no structural damage occurred. However, although the outlook seemed positive, in-depth investigations revealed intensive metal corrosion and cracked fittings. Magnesium alloy components were so badly affected by saltwater that technicians recommended grounding the aircraft, because flaps and wing trailing edges became unserviceable.

By the numbers

By the time 717's smart new floats had splashed away from Ottawa and toward Nova Scotia's Halifax Bay, performance data had been posted. According to an undated table, figures showed a 9,370lb (4,250kg) 'bare' weight. With 468 imp gal short-range fuel tanks, aircrew could expect 200mph (322km/h) or a 990mile (1,593km) range carrying one 250lb (113kg) bomb. Input from Bristol on February 6, 1941, claimed evidence of approved 16,000lb (7,258kg) overload take-offs. Two days later, another communication recommended 15,200lb (6,895kg) take-off with zero bombload. Confident RCAF upper echelon staff stated that "reasonable guesswork, water condition and care exercised by the pilot" would do the job. Lymburner's take-offs occurred at 14,100lb (6,396kg).

On March 11, 1941, chief of staff Francis Heakes ordered Eastern Air Command to release 717 when the Ottawa River opened to navigation. Before departure from Dartmouth to Rockcliffe, service trials should be continued and, if possible, crews should participate in actual patrols, but defective flaps kept the aircraft grounded. Although no descriptions of single-engine capabilities have surfaced, power failures undoubtedly meant open ocean emergency landings, with predictable results. In February 1941, 717 went onto wheels again with the Mk.III designation unchanged. The so-called answer to Canada's maritime patrol requirements did not 'cut it' militarily.

On June 26, 1941, this memorandum sealed 717's fate. "It will be noted that the bomb load with full fuel capacity is 500lb and as this can only be used under the most favourable weather conditions, it is suggested that the Bolingbroke seaplane will not be a useful type," concluded Gp Capt Alan Ferrier.

A glimmer of hope remained: AVM Stedman remarked that perhaps two sets of beaching gear might be exported to the UK. The possibility of operating a ferry service in the aircraft's ancestral country existed, but no further word came. Instead, 717 underwent overhaul in September 1941 until the dreaded 'reduced to spares' order arrived on June 21, 1944.

Perhaps a patch of farmland or a backwoods shed in the Dominion of Canada holds the remains of the world's only Bristol Bolingbroke seaplane... **FP**