Avro Lancaster

Avro Lancaster

Royal Air Force Avro Lancaster B I *PA474* of the Battle of Britain Memorial Flight.

Type	Heavy bomber
Manufacturer	Avro
Designed by	Roy Chadwick
Maiden flight	8 January 1941
Introduced	1942
Retired	1963 (Canada)
Primary user	Royal Air Force
Number built	7,377
Unit cost	£45-50,000 when introduced ≈£1.3-1.5 million in 2005 currency
Developed from	Avro Manchester
Variants	Avro Lancastrian Avro Lincoln Avro York

The **Avro Lancaster** was a British four-engine Second World War bomber aircraft made initially by Avro for the British Royal Air Force (RAF). It first saw active service in 1942, and together with the Handley-Page Halifax it was one of the main heavy bombers of the RAF, the RCAF and squadrons from other Commonwealth and European countries serving within RAF Bomber Command. The "Lanc" or "Lankie," as it became affectionately known,[1] became the most famous and most successful of the Second World War night bombers, "delivering 608,612 tons of bombs in 156,000 sorties."[2] Although the Lancaster was primarily a night bomber, it excelled in many other roles

including daylight precision bombing, and gained worldwide renown as the "Dam Buster" used in the 1943 Operation Chastise raids on Germany's Ruhr Valley dams.

Design and development


Side profile of a Lancaster front turret


Tail turret of an RCAF Lancaster

The origins of the Lancaster lie in a twin-engined bomber design powered by Rolls-Royce Vulture engines submitted to meet *Specification P.13/36* which was for a new generation of twin-engined medium bombers. The resulting aircraft was the Avro Manchester, which, although a capable aircraft, was troubled by the unreliability of the Vulture and withdrawn from service in 1942, at which point 200 aircraft had been built.

Avro's chief designer, Roy Chadwick, was already working on an improved Manchester design using four of the more reliable but less powerful Rolls-Royce Merlin engines on a larger wing. The aircraft was initially designated Avro Type 683 Manchester III, and later re-named the Lancaster. The prototype aircraft *BT308* was assembled by Avro's experimental flight department at Manchester's Ringway Airport from where test pilot H.A. "Bill" Thorn took the controls for its first flight on Thursday, 9 January 1941. The aircraft proved to be a great improvement on its predecessor, being "one of the few warplanes in history to be 'right' from the start." [3] Its initial three-finned tail layout, a result of being converted from a Manchester I, was quickly changed on the second prototype *DG595* and subsequent production aircraft to the familiar twin-finned specification used on the later Manchesters (below).

Some of the later orders for Manchesters were changed in favour of Lancasters; the designs were very similar and both featured the same distinctive greenhouse cockpit, turret nose and twin tail. The Lancaster discarded the stubby central third tail fin of the early Manchesters and used the wider span tailplane and larger elliptical twin fins from the later Manchester IA.

The majority of Lancasters built during the war years were manufactured by Avro at their factory at Chadderton near Manchester and test flown from Woodford Aerodrome in Cheshire. Other Lancasters were built by Metropolitan-Vickers and Armstrong Whitworth. The aircraft was also produced at the Austin Motor Company works in Longbridge, Birmingham later in the Second World War and postwar at Chester by Vickers-Armstrongs. Only 300 of the **Lancaster B II** with Bristol Hercules engines were constructed. The **Lancaster B III** had Packard Merlin engines but was

otherwise identical to contemporary B Is, with 3,030 B IIIs built, almost all at A.V. Roe's Newton Heath factory. The B I and B III were built concurrently, and minor modifications were made to both marks as new batches were ordered. Examples of these modifications were the relocation of the pitot head from the nose to the side of the cockpit, and the change from de Havilland "needle blade" propellers to Hamilton Standard or Nash Kelvinator made "paddle blade" propellers.[4]

Of later variants, only the Canadian-built **Lancaster B X** manufactured by Victory Aircraft in Malton, Ontario was produced in significant numbers. A total of 430 of this type were built, earlier examples differing little from their British-built predecessors, except for using Packard-built Merlin engines and American-style instrumentation and electrics. Late-series models replaced the Frazer Nash mid-upper turret with a differently configured Martin turret mounted for weight balance in a slightly farther forward location. A total of 7,377 Lancasters of all marks were built throughout the duration of the war, each at a 1943 cost of £45-50,000 (approximately equivalent to £1.3-1.5 million in 2005 currency).[5]

The test pilot Alex Henshaw is the only known pilot to have barrel rolled a Lancaster bomber, a feat considered almost impossible because of the slow speed of the aircraft.

Crew Accommodation

In a standard Lancaster as used in the war, the crew were accommodated as follows: Starting at the nose, the bomb aimer had two positions to man. His primary location was lying prone on the floor of the nose of the aircraft, where he had access to the controls for the bomb sight head in front, with the bomb sight computer on his left and bomb release selectors on the right. He would also use his view out of the large transparent perspex nose cupola to assist the navigator with map reading. To man the Frazer Nash FN5 nose turret, he simply had to stand up and he would be in position behind the triggers of his twin Browning .303 guns. The bomb aimer's position contained the nose parachute exit in the floor.

Moving backwards, on the roof of the bomb bay the pilot and flight engineer sat side-by-side under the expansive canopy, with the pilot sitting on the left on a raised portion of the floor. The flight engineer sat on a collapsible seat to the pilot's right, with the fuel selectors and gauges on a panel behind and to the right of him.

Behind these crew members, and behind a curtain fitted to allow him to use light to work, sat the navigator. His position had him facing to port with a large chart table in front of him, and an instrument panel showing the airspeed, altitude and other details required for navigation was mounted on the side of the fuselage above the chart table.

The left hand end of the chart table had the radios for the wireless operator mounted on it, facing towards the rear of the aircraft. Behind these radios, facing forwards, on a seat at the front of the main spar sat the wireless operator. To his left was a window, and above him was the astrodome, used for visual signalling and also by the navigator for celestial navigation.

Behind the wireless operator were the two spars for the wing, which created a major obstacle for crew members moving down the fuselage even on the ground. On reaching the end of the bomb bay, the floor dropped down to the bottom of the fuselage, and the mid upper gunner's Frazer Nash FN50 or FN150 turret was reached. His position allowed a 360° view over the top of the aircraft, with two Browning .303 guns to protect the aircraft from above and to the side. To the rear of the turret was the side crew door, on the starboard side of the fuselage. This was the main entrance to the aircraft, and also could be used as a parachute exit. At the extreme rear of the aircraft, over the spars for the

tailplane, the rear gunner sat in his exposed position in the FN20, FN120 or Rose Rice turret. In the FN20 and FN120 turrets he had four Browning .303 guns, and in the Rose Rice turret he had two .50 Brownings. Neither of the mid upper or rear gunner's positions were heated, and the gunners had to wear electrically heated suits to prevent hypothermia and frostbite.

Armament

While eight .303 in machine guns were the most common Lancaster armament, twin .50 turrets were later available in both the tail and dorsal positions. A Preston-Green mount was available for a .50 cal mounted in a ventral blister, but this was mostly used in RCAF service. This blister was later the location for the H2S radar. A Nash & Thomson FN-64 periscope-sighted twin .303 ventral turret was also available but rarely fitted as it was hard to sight. (Similar problems afflicted the ventral turret in the North American B-25C, for example). Some unofficial mounts for .50 cal or even 20 mm guns were made, firing through ventral holes of various designs.

An important feature of the Lancaster was its extensive bomb bay, at 33 feet (10.05 m) long. Initially the heaviest bombs carried were 4,000 lb (1,818 kg) "Cookies." Towards the end of the war, attacking special and hardened targets, the B1 Specials could carry the 21 foot (6.4 m) long 12,000 lb (5,448 kg) "Tallboy" or 25.5 foot (7.77 m) long 22,000 lb (9,979 kg) "Grand Slam" "earthquake" bombs, which required modification of the bomb bay doors.[6]

Bomb sights used on Lancasters included:[7]

Mark IX CSBS.
: This was an early preset vector bomb sight that involved squinting through wires that had to be manually set based on aircraft speed, altitude and bomb load. This sight lacked tactical flexibility as it had to be manually adjusted if any of the parameters changed and was soon phased out in favour of the sights below.

Mark XIV bomb sight
: A vector bomb sight where the bomb aimer input various details of the bomb load, target altitude and wind direction, and the analogue computer then continuously calculated the trajectory of the bombs and projected an inverted sword shape onto a sighting glass on the sighting head. Assuming the sight was set correctly, when the target was in the cross hairs of the sword shape, the bomb aimer would be able to accurately release the bombs.

T1 bomb sight
: A Mark XIV bomb sight modified for mass production and produced in the USA. Some of the pneumatic gyro drives on the Mk XIV sight were replaced with electronic gyros and other minor modifications were made.

Stabilizing Automatic Bomb Sight
: Also known as "SABS", this was an advanced bomb sight mainly used by 617 Squadron for precision raids. Like the American Norden bomb sight it was a tachometric sight.

Radio, Radar and Countermeasures equipment

The Lancaster had a very advanced communications system for its time. Most British-built Lancasters were fitted with the famous R1155 receiver and T1154 transmitter, whereas the Canadian built aircraft and those built for service in the Far East had American radios. These provided radio direction-finding, as well as voice and Morse capabilities.

H2S

Ground looking navigation radar system - eventually, it could be homed in on by the German night fighters' NAXOS receiver and had to be used with discretion.

Monica

A rearward looking radar to warn of night fighter approaches - a notable disaster, since it could not distinguish between attacking enemy fighters and nearby friendly bombers. Much worse, it inadvertently served as a homing beacon for suitably equipped German night fighters, who would then use *Schräge Musik* to attack the bombers. Once this was realised, it was removed altogether.

Fishpond

An add-on to H2S that provided additional (aerial) coverage of the underside of the aircraft to display attacking fighters on the main H2S screen.

GEE

A receiver for a navigation system of synchronized pulses transmitted from the UK - aircraft calculated their position from the time delay between pulses. The range of GEE was 3-400 miles.

Boozer

A system of lights mounted on the aircraft's instrument panel that illuminated when the aircraft was being tracked by Würzburg ground radar and Lichtenstein airborne radar. In practice it was found to be more disconcerting than useful, as the lights were often illuminated with false alerts in the radar signal-infested skies over Germany.

Oboe

A very accurate navigation system consisting of a receiver/transponder for two radar stations transmitting from the UK - one determining range and the other the bearing on the range. As the system could only handle one aircraft at a time it was only fitted to Pathfinder aircraft which marked the target for the main force. Later supplemented by GEE-H, similar to Oboe but with the transponder on the ground allowing more aircraft to use the system simultaneously. GEE-H aircraft were usually marked with two horizontal yellow stripes on the fins.

Village Inn

A radar-aimed gun turret fitted to some Lancasters in 1944.

[edit] Operational history

Avro Lancaster B I

Avro Lancaster over Hamburg

Avro Lancasters of No. 50 Squadron (No. 5 Group), based at Skellingthorpe, Lincolnshire, UK

The first RAF squadron to convert to the Lancaster was No. 44 Squadron RAF in early 1942.

In 1942-45, Lancasters flew 156,000 sorties and dropped 608,612 tons of bombs. Just 35 Lancasters completed more than 100 successful operations, and 3,249 were lost in action. The most successful survivor completed 139 operations, only to be scrapped in 1947.

The most famous use of the Lancaster was probably the 1943 mission, codenamed Operation Chastise, to destroy the dams of the Ruhr Valley. The mission was carried out by the 617 Squadron in modified Mk IIIs carrying special drum shaped bouncing bombs designed by Barnes Wallis. The story of the mission was later made into a film, *The Dam Busters.* Another famous action was a series of attacks using Tallboy bombs, including one carried out by No. 617 Squadron from a temporary base at Yagodnik in the Soviet Union against the German battleship *Tirpitz*, which ended with the sinking of the *Tirpitz.*

Lancasters from Bomber Command were to have formed the main strength of Tiger Force, the Commonwealth bomber contingent scheduled to take part in Operation Downfall, the codename for the planned invasion of Japan in late 1945, from bases on Okinawa.

RAF Lancasters dropped food into the Holland region of the occupied Netherlands, with the acquiescence of the occupying German forces, to feed people who were in danger of starvation. Named after the food Manna which miraculously appeared for the Israelites in the book of Exodus, the aircraft involved were from 1, 3 and 8 Groups, and consisted of 145 Mosquitoes and 3,156 Lancasters, flying between them a total of 3,298 sorties. The first of the two RAF Lancasters chosen for the test flight was nicknamed "Bad Penny" from the old expression: "a bad penny always turns up." This bomber, with a crew of seven men (five Canadians including pilot Robert Upcott of Windsor, Ontario), took off in bad weather on the morning of 29 April 1945 without a ceasefire agreement from the Nazis. Bad Penny succeeded completing her mission and dropping her precious cargo.

A development of the Lancaster was the Avro Lincoln bomber, initially known as the Lancaster IV and Lancaster V. These two marks became the Lincoln B1 and B2 respectively. There was also a civilian airliner based on the Lancaster, the Lancastrian. Other developments were the York, a square-bodied transport and, via the Lincoln, the Shackleton which continued in airborne early warning service up to 1992.

In 1946, four Lancasters were converted by Avro at Bracebridge Heath, Lincolnshire as freighters for use by British South American Airways, but proved to be uneconomical and were withdrawn after a year in service.

Four Lancaster IIIs were converted by Flight Refuelling Limited as two pairs of tanker and receiver aircraft for development of in-flight refuelling. In 1947, one aircraft was flown non-stop 3,355 miles from London to Bermuda. Later the two tanker aircraft were joined by another converted Lancaster and were used in the Berlin Airlift, achieving 757 tanker sorties.

During its Argentinian service, Lancasters were used in several military coups.

Variants

Lancaster B I *NG128* dropping its load over Duisburg on 14 October 1944. The aircraft is carrying Airborne Cigar (ABC) radio jamming equipment, as shown by the two vertical aerials on the fuselage.

Avro Lancaster B II

B I

The original Lancasters were produced with Rolls-Royce Merlin XX engines and SU carburettors. Minor details were changed throughout the production series - for example the pitot head design was changed from being on a long mast at the front of the nose to a short fairing mounted on the side of the fuselage under the cockpit. Later production Lancasters had Merlin 22s and later Merlin 24s. No designation change was made to denote these alterations.[8]

B I Special

Adapted to take first the super-heavy "Tallboy" and then "Grand Slam" bombs. Upgraded engines with paddle-bladed propellers gave more power, and the removal of gun turrets reduced weight and gave smoother lines. For the Tallboy, the bomb bay doors were bulged — for the Grand Slam, they were removed completely and the area faired over. Two airframes (*HK541* and *SW244*) were modified to carry a dorsal "saddle tank" with 1,200 gallons mounted aft of a modified canopy for increasing range. No. 1577 SD Flight tested the aircraft in India and Australia in 1945 for possible use in the Pacific, [9] but the tank adversely affected handling characteristics when full and flight refuelling was later chosen instead.

PR 1

B 1 modified for photographic reconnaissance, operated by RAF No. 82 and No. 541 Squadrons, wartime. All armament and turrets were removed with a reconfigured nose and a camera carried in the bomb bay. The type was also operated by 683 Squadron from circa 1950 for photographic reconnaissance based at Aden and subsequently Habbaniya in Iraq until disbanded 30 November 1953.

B I (FE)

In anticipation of the needs of the Tiger Force operations against the Japanese in the Far East (FE), a tropicalized variant was based on late production aircraft. The B I (FE) had modified radio, radar, navaids and a 400 gallon tank installed in the bomb bay. The mid-upper turret was also removed.

B II

Bristol Hercules (Hercules VI or XVI engines) powered variant, of which 300 were produced by Armstrong Whitworth. One difference between the two engine versions was the VI had manual mixture control, leading to an extra lever on the throttle pedestal. These aircraft were almost invariably fitted with an FN.64 ventral turret and pronounced step in the bulged bomb bay.

B III

These aircraft were fitted with Packard-built Merlin engines and produced in parallel with the B I, the two marks being indistinguishable externally. The minor differences between the two variants were related to the engine installation, and included the addition of slow-running cut-off switches in the cockpit: a requirement due to the Bendix Stromberg pressure-injection carburettors fitted to the Packard Merlin engines.

B III Special

Variant built to take the "Upkeep" (bouncing) bomb for the dam busting raids. The struts and mechanism to take the cylindrical bomb were fitted below the bomb bay, and search-lights fitted for the simple height measurement system which enabled the accurate control of low-flying altitude at night. The mid-upper turret was removed to save weight – the gunner was moved to the front turret to allow the bomb aimer to assist with map reading.

ASR III/ASR 3

B III modified for air-sea rescue, with three dipole ventral antennas fitted aft of the radome and carrying a lifeboat in the re-configured bomb bay. The armament was often removed, especially in postwar use and the mid-upper turret faired-over. Observation windows added either side of rear fuselage, port window just forward of the tailplane while starboard window was fitted into the rear access door. A number of ASR 3 conversions involved swapping the rudders with a Lincoln-style rudders. [10]

GR 3/MR 3

B III modified for maritime reconnaissance.

B IV

The B IV featured an increased wingspan and lengthened fuselage and new Boulton Paul F turret (2 X 0.5in) with re-configured framed "bay window" nose glazing. The prototypes (*PW925*, *PW929* and *PW932*) were powered by two-stage Merlin 85s inboard and later, Merlin 68s on the outboard mounts. The prototypes became the basis of the renamed Lincoln B 1.

B V

Increased wingspan and lengthened fuselage. Two-stage Merlin 85s - later renamed Lincoln B 2

B VI

Nine aircraft converted from B IIIs. Fitted with Merlin 85s which had two-stage superchargers, giving improved high altitude performance. These aircraft were only used by Pathfinder units, often as "Master Bomber". The dorsal and nose turrets were often removed and faired-over.

B VII

The B VII was the final production version of the Lancaster. The Martin 250CE mid-upper turret was re-positioned slightly further forward than on previous Marks, and the Nash & Thomson FN-82 tail turret with twin Browning 0.5 in machine guns replaced the four-gun 0.303 Browning machine guns-armed FN.20 turret.

B X

The B X was a Canadian-built B III, differing in having Canadian/US made instrumentation and electrics. Also on later batches, the Martin 250CE was substituted for the Nash & Thomson FN-50 mid-upper turret. The greater weight of this turret necessitated moving the turret forward for C-of-G balance reasons. Canada was a long term operator of the Lancaster, utilizing modified aircraft in postwar maritime patrol, search and rescue and photo-reconnaissance roles until 1963.

Surviving Aircraft

Lancaster B I *W4783* G for George

Battle of Britain Memorial Flight Lancaster at RIAT 2005

The Lancaster Mk X *FM213* of the Canadian Warplane Heritage Museum painted as "VR-A" and called the "Mynarski Memorial" Lancaster

There are 17 known largely complete Avro Lancasters remaining in the world, two of which remain in airworthy condition, although limited flying hours remain on their airframes and actual flying is carefully rationed. One is *PA474* of the Battle of Britain Memorial Flight and the other is *FM213* of the Canadian Warplane Heritage Museum recreated as "VR-A," the "Mynarski Memorial Lancaster" in honour of Canadian VC winner, Andrew Mynarski.

There are only three surviving Lancasters (all non-flying) that actually saw operational service in the Bomber Command campaign over Europe:

Lancaster B I *R5868* "S-Sugar"
: The oldest surviving Lancaster flew 137 operations, originally as "Q-Queenie" with No. 83 Squadron RAF from RAF Scampton and then as "S-Sugar" with No. 463 and No. 467 RAAF Squadrons from RAF Waddington. This aircraft was the first RAF heavy bomber aircraft to complete 100 operations (going on to fly 137 sorties [11]) and is now on display at the RAF Museum, Hendon.

Lancaster B I *W4783* "G-George"
: Was operated by No. 460 Squadron RAAF and completed 90 sorties. It was flown to Australia during the war for fundraising purposes, and was assigned the Australian serial A66-2. The aircraft was later placed on display at the Australian War Memorial, Canberra, and underwent a thorough restoration between 1999 and 2003.

Lancaster Mk 10AR *KB839*
: Built by Victory Aircraft and delivered to 419 Squadron RCAF in January 1945. The aircraft completed 26 sorties, wearing the code letters VR-D. It was returned to Canada after the end of the war in Europe, and modified to Mk 10AR Arctic Reconnaissance specification. After being struck of charge, the aircraft was preserved at Greenwood Military Aviation Museum, Nova Scotia, where it is currently displayed outside.[12]

The following surviving Lancasters were used as training aircraft or were constructed too late to see operational service in the Second World War:

Lancaster B VII *NX611* "Just Jane"
: Served with the Aeronavale until the 1960s, when it was flown back to Britain. At one stage the aircraft was kept at Blackpool, and following the removal of R5868, served as gate guardian at RAF Scampton. NX611 now resides at the Lincolnshire Aviation Heritage Centre at the former RAF East Kirkby, and is frequently taxied at high speed along a length of the wartime runway.

Lancaster B VII *NX622*
: Served with the Aeronavale until 1962, when it was donated to the RAAF Association. It is now beautifully restored and displayed at the RAAF Association museum in Bullcreek, Western Australia

Lancaster B VII *NX664*
: This aircraft served with the Aeronavale until it suffered a heavy landing at Wallis Island. It was recovered in 1984 to Le Bourget and has been under restoration since.

Lancaster B VII *NX665*
: Equipped with H2S radar, is preserved at Auckland's Museum of Transport and Technology. This aircraft served with the Aeronavale until the 1960s, when it was presented to the museum. The airframe originally lacked the mid-upper turret, having been built with the mountings for a Martin 250CE. An earlier FN50 was retrofitted in the late 1980s which required modifications to the aircraft's structure as the turret mounts had to be moved rearwards.

Lancaster B X *FM104*
: Was donated to the City of Toronto in 1964 and placed on a pedestal on Lakeshore Drive. After sitting outside for 36 years, the aircraft was removed from the pedestal and placed on loan to the Toronto Aerospace Museum,[13] in Toronto, Ontario, Canada. The aircraft is now under long-term restoration to static display condition. With spare parts from the remainder of FM118, it is slated to be complete as a museum quality piece in 2015.

Lancaster B X *FM159*
: Arrived in Europe after the fighting ended and thus never saw combat. After returning to Canada and being placed in storage, it served from 1953 to 1955 with the No. 103 Search and Rescue Unit in Greenwood, Nova Scotia before being transferred to Comox, British Columbia to serve as a maritime and ice patrol aircraft. It was withdrawn from RCAF service in 1958 and purchased in 1960 by a trio of men from Nanton, Alberta with a view to building a war museum in their town. The aircraft is currently on display at the Nanton Lancaster Society Air Museum and is one of only two surviving Lancasters to offer guided tours of its interior, the Canadian Warplane Heritage Museum also offers guided tours of the Mynarski Lancaster by appointment.[14]

Lancaster Mk 10P *FM212*
: Withdrawn from RCAF service in 1962 and placed in storage. The City of Windsor, Ontario purchased the aircraft for use as a memorial and mounted it on a pedestal in Jackson Park in 1965. Unfortunately, weather and poor maintenance took their toll on the aircraft and it was removed on 26 May 2005 and replaced by Spitfire and Hurricane replicas. Currently being restored by the Canadian Historical Aircraft Association, this Lancaster has been renamed "**Bad Penny**" to commemorate the first RAF **Avro Lancaster** into Holland during Operation Manna to save the Dutch from starvation in the closing days of World War II, April 29, 1945. [15] On 29 April 2007 (to coincide with the 62nd anniversary of Operation Manna) FM212 was removed from storage in Jackson Park and towed to the Sears parking lot of Devonshire Mall where it was on display and open for tours through the aircraft. On 13 May 2007, FM212 was towed from Devonshire Mall to Windsor Airport where it will again be placed in storage and undergo extensive restoration to return the aircraft back to a taxiable condition over the next few years.

Lancaster B X *KB 944*

Built in Canada in 1945 by Victory Aircraft, later the same year, after briefly serving overseas, it was put into stored reserve in Canada where it went on to spend most of the following years, except for a brief period in 1952 serving with 404 Maritime Patrol Squadron at Greenwood, Nova Scotia. In 1964, the RCAF refurbished this aircraft and placed it in the Armed Force's historical aircraft collection where it is now on display in the Canada Aviation Museum.

Lancaster B X *FM 136*

Manufactured in 1945 by Victory Aircraft Ltd., assigned to No. 20th and 30th Maintenance Units in England, never issued to active Squadron. Returned to Canada and converted to Maritime Reconnaissance . Taken on strength by No.404 'Buffalo' (MP) Squadron (Greenwood, Nova Scotia)[4] as RX-136. Transferred to No.407 'Demon' (MP) Squadron (Comox, BC)[5]. Struck off strength April 1961. Acquired by the Lancaster Club of Calgary and mounted on a pedestal in April, 1962. Moved to Aerospace Museum of Calgary [6] in 1992. New shelter built for it in 2007. Owned by The City of Calgary.

See the link under *External links* for details of the known survivors.

Operators

See also: List of Avro Lancaster operators:

- Argentina
- Australia
- Canada
- Egypt
- France
- New Zealand
- Poland
- Sweden
- United Kingdom

Specifications (Lancaster)

General characteristics

- **Crew:** 7: pilot, flight engineer, navigator, bomb aimer, wireless operator, mid-upper and rear gunners
- **Length:** 69 ft 5 in (21.18 m)
- **Wingspan:** 102 ft (31.09 m)
- **Height:** 19 ft 7 in (5.97 m)
- **Wing area:** 1,300 ft² (120 m²)
- **Empty weight:** 36 828 lb (16,705 kg)
- **Loaded weight:** 63,000 lb (29,000 kg)
- **Powerplant:** 4× Rolls-Royce Merlin XX V12 engines, 1,280 hp (954 kW) each

Performance

- **Maximum speed:** 240 knots (280 mph, 450 km/h) at 15,000 ft (5,600 m)
- **Range:** 2,700 NM (3,000 mi, 4,600 km) with minimal bomb load
- **Service ceiling:** 23,500 ft (8,160 m)
- **Wing loading:** 48 lb/ft² (240 kg/m²)

- **Power/mass:** 0.081 hp/lb (130 W/kg)

Armament

- **Guns:** 8× 0.303 in (7.70 mm) Browning machine guns in three turrets
- **Bombs:**
  - **Maximum:** 22,000 lb (10,000 kg)
  - **Typical:** 14,000 lb (6,400 kg)
  - **For Comparison see:** Maximum Reported B-17 & B-24 Bomb Loads

Noted Lancaster pilots and crew members

Victoria Cross awards

Many Lancaster crew members were highly decorated for actions while flying the aircraft. Amongst those who received the Victoria Cross were:

- Squadron Leader Ian Willoughby Bazalgette
- Wing Commander Guy Gibson
- Warrant Officer Norman Cyril Jackson
- Pilot Officer Andrew Mynarski
- Squadron Leader John Dering Nettleton
- Squadron Leader Robert Anthony Maurice Palmer
- Flight Lieutenant William Reid
- Flight Sergeant George Thompson

Popular culture

The Avro Lancaster featured prominently in the 1954 film, *The Dam Busters* and in a 1989 British commercial for Carling Black Label lager which reused footage in a parody sequence where a wily German sentry on top of a dam was catching the bombs in the manner of a football goalkeeper. The pilot of the attacking Lancaster then delivers the brand slogan: "I bet he drinks Carling Black Label!" The commercial ran for many years, frequently appearing in commercial breaks for both the 1954 film and documentaries about Operation Chastise. [16]

Video of Avro Lancasters

- Video of Lancaster take-off - filmed from inside the aircraft
- Video of Lancaster engine start
- Video of a Lancaster taxying
- Video of a Lancaster taking off
- Short video describing the Avro Lancaster
- Video #1 of Avro Lancaster
- Video #2 of Avro Lancaster
- Video #3 of Avro Lancaster

External links

- RAF Avro Lancaster 60th Anniversary article
- Photo Gallery of Lancaster landing in Coventry for repairs
- The Longest Lancaster Operation - 10 Hours 25 Minutes

- The Avro History
- Surviving Birmingham and Manchester made Avro Lancasters
- Battle of Britain Memorial Flight - Flypast Croome Park 2007
- PA474 of the Battle of Britain Memorial Flight
- FM 213 of the Canadian Warplane Heritage Museum
- Lancaster Drawings online
- Lancaster FM159 - The Nanton Lancaster
- The Australian War Memorial G for George page
- R1155 radio receiver
- Video-Lancaster Bomber Taxi Run at Aviation Museum
- Warbird Alley: Lancaster page - Information about Lancasters still airworthy today
- Photo gallery of Avro Lancaster B I R5868
- Last Flight of Lancaster A2-C of 514 Squadron
- Lancaster Bomber Crews and Their Experiences
- The Lancaster's electronic equipment
- The Lancaster FM212 Restoration Project
- RAAF Association Aviation Heritage Museum

Related development

- Avro Manchester
- Avro York
- Avro Lancastrian
- Avro Lincoln

Comparable aircraft

- B-17 Flying Fortress
- B-24 Liberator
- Focke-Wulf Fw 200
- Handley-Page Halifax
- Heinkel He 177
- Junkers Ju 290
- Petlyakov Pe-8
- Piaggio P.108B
- Short Stirling
- Vickers Windsor

Designation sequence

- 652A - 679 - 683 - 685 - 688 - 689 - 691

Related lists

- List of aircraft of the RAF