= Handley Page Victor =

The Handley Page Victor is a British jet @-@ powered strategic bomber , developed and produced by the Handley Page Aircraft Company , which served during the Cold War . It was the third and final of the V @-@ bombers operated by the Royal Air Force (RAF) , the other two V @-@ bombers being the Avro Vulcan and the Vickers Valiant . The Victor had been developed to perform as part of the United Kingdom ? s airborne nuclear deterrent . In 1968 , the type was retired from the nuclear mission following the discovery of fatigue cracks , which had been exacerbated by the RAF 's adoption of a low @-@ altitude flight profile to avoid interception .

A number of Victors had received modifications to undertake the strategic reconnaissance role , employing a combination of radar , cameras , and other sensors . As the nuclear deterrence mission was given to the Royal Navy 's submarine @-@ launched Polaris missiles in 1969 , a large V @-@ bomber fleet was deemed surplus to requirements . Consequently , many of the surviving Victors were converted into aerial refuelling tankers . During the Falklands War , Victor tankers were notably used in the airborne logistics operation to repeatedly refuel Vulcan bombers on their way to and from the Black Buck raids .

The Victor was the last of the V @-@ bombers to be retired , the final aircraft being removed from service on 15 October 1993 . In its refuelling role , the type had been replaced by the Vickers VC10 and the Lockheed Tristar .

= = Development = =

= = = Origins = = =

The origin of the Victor and the other V bombers is heavily linked with the early British atomic weapons programme and nuclear deterrent policies that developed in the aftermath of the Second World War . The atom bomb programme formally began with Air Staff Operational Requirement OR.1001 issued in August 1946 , which anticipated a government decision in January 1947 to authorise research and development work on atomic weapons , the U.S. Atomic Energy Act of 1946 (McMahon Act) having prohibited exporting atomic knowledge , even to countries that had collaborated on the Manhattan Project . OR.1001 envisaged a weapon not to exceed 24 ft 2 in (7 @.@ 37 m) in length , 5 ft (1 @.@ 5 m) in diameter , 10 @,@ 000 lb (4 @,@ 500 kg) in weight , and suitable for release from 20 @,@ 000 ft (6 @,@ 100 m) to 50 @,@ 000 ft (15 @,@ 000 m) .

At the same time , the Air Ministry drew up requirements for bombers to replace the existing piston @-@ engined heavy bombers such as the Avro Lancaster and the new Avro Lincoln which equipped RAF Bomber Command . In January 1947 , the Ministry of Supply distributed Specification B.35 / 46 to aviation companies to satisfy Air Staff Operational Requirement OR.229 for " a medium range bomber landplane capable of carrying one 10 @,@ 000 lb (4 @,@ 500 kg) bomb to a target 1 @,@ 500 nautical miles (1 @,@ 700 mi ; 2 @,@ 800 km) from a base which may be anywhere in the world . " A cruising speed of 500 knots (580 mph ; 930 km / h) at heights between 35 @,@ 000 ft (11 @,@ 000 m) and 50 @,@ 000 ft (15 @,@ 000 m) was specified . The maximum weight when fully loaded ought not to exceed 100 @,@ 000 lb (45 @,@ 000 kg) . The weapons load was to include a 10 @,@ 000 lb " Special gravity bomb " (i.e. a free @-@ fall nuclear weapon) , or over shorter ranges 20 @,@ 000 lb (9 @,@ 100 kg) of conventional bombs . No defensive weapons were to be carried , the aircraft relying on its speed and height to avoid opposing fighters .

The similar OR.230 required a " long range bomber " with a 2 @,@ 000 nautical miles (2 @,@ 300 mi ; 3 @,@ 700 km) radius of action at a height of 50 @,@ 000 ft (15 @,@ 000 m) , a cruise speed of 575 mph (925 km / h) , and a maximum weight of 200 @,@ 000 lb (91 @,@ 000 kg) when fully loaded . Responses to OR.230 were received from Short Brothers , Bristol , and Handley Page ; however , the Air Ministry recognised that developing an aircraft to meet these stringent requirements would have been technically demanding and so expensive that the resulting bomber could only be purchased in small numbers . As a result , realising that the majority of likely targets

would not require such a long range , a less demanding specification for a medium @-@ range bomber , Air Ministry Specification B.35 / 46 was issued . This demanded the ability to carry the same 10 @,@ 000 lb bomb @-@ load to a target 1 @,@ 500 nmi (1 @,@ 725 mi , 2 @,@ 800 km) away at a height of 45 @,@ 000 ? 50 @,@ 000 ft (13 @,@ 700 ? 15 @,@ 200 m) at a speed of 575 mph .

= = = HP.80 = = =

The design proposed by Handley Page in response to B.35 / 46 was given the internal designation of HP.80. To achieve the required performance , Handley Page 's aerodynamicist Dr. Gustav Lachmann and his deputy , Godfrey Lee developed a crescent @-@ shaped swept wing for the HP.80 ; the sweep and chord of the wing decreased in three distinct steps from the root to the tip , to ensure a constant limiting Mach number across the entire wing and consequently a high cruise speed . Early work on the project included tailless aircraft designs , which would have used wing @-@ tip vertical surfaces instead ; however as the proposal matured a high @-@ mounted , full tailplane was adopted instead . The profile and shaping of the crescent wing was subject to considerable fine @-@ tuning and alterations throughout the early development stages , particularly to counter unfavourable pitching behavior in flight .

The HP.80 and Avro 's Type 698 were chosen as the best two of the proposed designs to B.35 / 46 , and orders for two prototypes of each were placed . It was recognised , however , that there were many unknowns associated with both designs , and an order was also placed for Vickers ' design , which became the Valiant . Although not fully meeting the requirements of the specification , the Valiant design posed little risk of failure and could therefore reach service earlier . The HP.80 's crescent wing was tested on a ? -scale glider , the HP.87 , and a heavily modified Supermarine Attacker , which was given the Handley Page HP.88 designation . The HP.88 crashed on 26 August 1951 after completing only about thirty flights and little useful data was gained during its brief two months of existence . By the time the HP.88 was ready , the HP.80 wing had changed such that the former was no longer representative . The design of the HP.80 had sufficiently advanced that the loss of the HP.88 had little effect on the programme .

Two HP.80 prototypes , WB771 and WB775 , were built . WB771 was broken down at the Handley Page factory at Radlett and transported by road to RAF Boscombe Down for its first flight ; bulldozers were used to clear the route and create paths around obstacles . Sections of the aircraft were hidden under wooden framing and tarpaulins printed with " GELEYPANDHY / SOUTHAMPTON " to make it appear as a boat hull in transit . GELEYPANDHY was an anagram of " Handley Pyge " marred by a signwriter 's error . On 24 December 1952 , piloted by Handley Page 's chief test pilot Hedley Hazelden , WB771 made its maiden flight , which lasted for a total of 17 minutes . Ten days later , the Air Ministry announced the aircraft 's official name to be Victor .

The prototypes performed well ; however , several design failings led to the loss of WB771 on 14 July 1954 , when the tailplane detached whilst making a low @-@ level pass over the runway at Cranfield , causing the aircraft to crash with the loss of the crew . Attached to the fin using three bolts , the tailplane was subject to considerably more stress than had been anticipated , and the three bolts failed due to metal fatigue . Additionally , the prototypes were considerably tail heavy due to the lack of equipment in the nose ; this was remedied by large ballast weights being fitted upon the prototypes . Production Victors had a lengthened nose that also served to move the crew escape door further from the engine intakes . The fin was shortened to eliminate the potential for flutter while the tailplane attachment was changed to a stronger four @-@ bolt fixing .

= = = Victor B.1 = = =

Production B.1 Victors were powered by the Armstrong Siddeley Sapphire ASSa.7 turbojets rated at 11 @,@ 000 lbf (49 kN) , and was initially equipped with the Blue Danube nuclear weapon , re @-@ equipping with the more powerful Yellow Sun weapon when it became available , although Victors also carried U.S.-owned Mark 5 nuclear bombs (made available under the Project E

programme) and the British Red Beard tactical nuclear weapon . A total of 24 were upgraded to B.1A standard by the addition of Red Steer tail warning radar in an enlarged tailcone and a suite of radar warning receivers and electronic countermeasures (ECM) from 1958 to 1960 .

On 1 June 1956 , a production Victor XA917 flown by test pilot Johnny Allam inadvertently exceeded the speed of sound after Allam let the nose drop slightly at a higher power setting . Allam noticed a cockpit indication of Mach 1 @.@ 1 and ground observers from Watford to Banbury reported hearing a sonic boom . The Victor maintained stability throughout the event . Aviation author Andrew Brookes has claimed that Allam broke the sound barrier knowingly to demonstrate the Victor 's superiority to the earlier V @-@ bombers . The Victor was the largest aircraft to have broken the sound barrier at that time .

= = = Victor B.2 = = =

The RAF required a higher ceiling for its bombers , and a number of proposals were considered for improved Victors to meet this demand . At first , Handley Page proposed use of the 14 @,@ 000 lbf (62 @.@ 4 kN) Sapphire 9 engines to produce a " Phase 2 " bomber , to be followed by " Phase 3 " Victors with much greater wingspan (137 ft (42 m)) and powered by Bristol Siddeley Olympus turbojets or Rolls @-@ Royce Conway turbofans . The Sapphire 9 was cancelled , however , and the heavily modified Phase 3 aircraft would have delayed production , so an interim " Phase 2A " Victor was proposed and accepted , to be powered by the Conway and having minimal modifications .

The " Phase 2A " proposal was accepted by the Air Staff as the Victor B.2 , with Conway RCo.11 engines providing 17 @,@ 250 lbf (76 @.@ 7 kN) . The new Conway engines required redesigned enlarged intakes to provide the greater airflow required . The wingtips were extended , increasing the wingspan to 120 ft (36 @.@ 6 m) . The B.2 featured distinctive retractable " elephant ear " intakes not found on the B.1 , located on the rear fuselage forward of the tail fin . These scoops fed ram air to Ram Air Turbines (RAT) which could provide electrical power during emergency situations , such as engine failure , during flight .

The first prototype Victor B.2 , serial number XH668 made its maiden flight on 20 February 1959 . It had flown 100 hours by 20 August 1959 , when , while high @-@ altitude engine tests were being carried out by the Aeroplane and Armament Experimental Establishment (A & AEE) , it disappeared from radar screens , crashing into the sea off the coast of Pembrokeshire . An extensive search operation was initiated to locate and salvage the wreckage of XH668 to determine the cause of the crash . It took until November 1960 to recover most of the aircraft ; the accident investigation concluded that the starboard pitot head had failed inflight , causing the flight control system to force the aircraft into an unrecoverable dive . Only minor changes were needed to resolve this problem , allowing the Victor B.2 to enter service in February 1962 .

= = = Further development = = =

A total of 21 B.2 aircraft were upgraded to the B.2R standard with Conway RCo.17 engines (20 @,@ 600 lbf or 92 kN thrust) and facilities to carry a Blue Steel stand @-@ off nuclear missile . Their wings were modified to incorporate two " speed pods " or " Küchemann carrots " . These were anti @-@ shock bodies ; bulged fairings that reduced wave drag at transonic speeds (see area rule) , which were also used as a convenient place to house chaff dispensers . Handley Page proposed to build a further refined " Phase 6 " Victor , with more fuel and capable of carrying up to four Skybolt (AGM @-@ 48) ballistic missiles on standing airborne patrols , but this proposal was rejected although it was agreed that some of the Victor B.2s on order would be fitted to carry two Skybolts . This plan was abandoned when the U.S. cancelled the whole Skybolt programme in 1963 . With the move to low @-@ level penetration missions , the Victors were fitted with air @-@ to @-@ air refuelling probes above the cockpit and received large underwing fuel tanks .

Nine B.2 aircraft were converted for strategic reconnaissance purposes to replace Valiants which had been withdrawn due to wing fatigue , with delivery beginning in July 1965 . These aircraft

received a variety of cameras , a bomb bay @-@ mounted radar mapping system and wing top sniffers to detect particles released from nuclear testing . Designated Victor SR.2 , a single aircraft could photograph the whole of the United Kingdom in a single two @-@ hour sortie . Different camera configurations could be installed in the bomb bay , including up to four F49 survey cameras and up to eight F96 cameras could be fitted to take vertical or oblique daylight photography ; nighttime photography required the fitting of F89 cameras .

= = = Aerial refuelling conversion = = =

The withdrawal of the Valiant fleet because of metal fatigue in December 1964 meant that the RAF had no front line tanker aircraft , so the B.1 / 1A aircraft , now judged to be surplus in the strategic bomber role , were refitted for this duty . To get some tankers into service as quickly as possible , six B.1A aircraft were converted to B (K) .1A standard (later redesignated B.1A (K2P)) , receiving a two @-@ point system with a hose and drogue carried under each wing , while the bomb bay remained available for weapons . Handley Page worked day and night to convert these six aircraft , with the first being delivered on 28 April 1965 , and 55 Squadron becoming operational in the tanker role in August 1965 .

While these six aircraft provided a limited tanker capability suitable for refuelling fighters , the Mk 20A wing hosereels could only deliver fuel at a limited rate , and were not suitable for refuelling bombers . Work therefore continued to produce a definitive three @-@ point tanker conversion of the Victor Mk.1. Fourteen further B.1A and 11 B.1 were fitted with two permanently fitted fuel tanks in the bomb bay , and a high @-@ capacity Mk 17 centreline hose dispenser unit with three times the fuel flow rate as the wing reels , and were designated K.1A and K.1 respectively .

The remaining B.2 aircraft were not as suited to the low @-@ level mission profile that the RAF had adopted for carrying out strategic bombing missions as the Vulcan with its strong delta wing . This , combined with the switch of the nuclear deterrent from the RAF to the Royal Navy (with the Polaris missile) meant that the Victors were considered to be surplus to requirements . Hence , 24 B.2 were modified to K.2 standard . Similar to the K.1 / 1A conversions , the wing was trimmed to reduce stress and the bomb aimer 's nose glazing was plated over . During 1982 , the glazing was reintroduced on some aircraft , the former nose bomb aimer 's position having been used to mount F95 cameras in order to perform reconnaissance missions during the Falklands War . The K.2 could carry 91 @,@ 000 lb (41 @,@ 000 kg) of fuel . It served in the tanker role until withdrawn in October 1993 .

= = Design = =

= = = Overview = = =

The Victor was a futuristic @-@ looking , streamlined aircraft , with four turbojet engines buried in the thick wing roots . Distinguishing features of the Victor were its highly swept T @-@ tail with considerable dihedral on the tail planes , and a prominent chin bulge that contained the targeting radar , cockpit , nose landing gear unit and an auxiliary bomb aimer 's position . It was originally required by the specification that the whole nose section could be detached at high altitudes to act as an escape pod , but the Air Ministry abandoned this demand in 1950 .

The Victor had a five @-@ man crew , comprising the two pilots seated side @-@ by @-@ side and three rearward @-@ facing crew , these being the navigator / plotter , the navigator / radar operator , and the air electronics officer (AEO) . Unlike the Vulcan and Valiant , the Victor 's pilots sat at the same level as the rest of the crew , thanks to a larger pressurised compartment that extended all the way to the nose . As with the other V @-@ bombers , only the pilots were provided with ejection seats ; the three systems operators relying on " explosive cushions " inflated by a CO2 bottle that would help them from their seats and towards a traditional bail out in the event of high g @-@ loading , but despite this , escape for the three backseaters was extremely difficult .

While assigned to the nuclear delivery role , the Victor was finished in an all @-@ over anti @-@ flash white colour scheme , designed to protect the aircraft against the damaging effects of a nuclear detonation . The white colour scheme was intended to reflect heat away from the aircraft ; paler variations of RAF 's roundels were also applied for this same reason . When the V @-@ bombers were assigned to the low @-@ level approach profile in the 1960s , the Victors were soon repainted in green / grey tactical camouflage to reduce visibility to ground observation ; the same scheme was applied to subsequently converted tanker aircraft .

= = = Armaments and equipment = = =

The Victor 's bomb bay was much larger than that of the Valiant and Vulcan , which allowed heavier weapon loads to be carried at the cost of range . As an alternative to the single " 10 @,@ 000 lb " nuclear bomb as required by the specification , the bomb bay was designed to carry several conventional armaments , including a single 22 @,@ 000 lb (10 @,@ 000 kg) Grand Slam or two 12 @,@ 000 lb (5 @,@ 500 kg) Tallboy earthquake bombs , up to forty @-@ eight 1 @,@ 000 lb (450 kg) bombs or thirty @-@ nine 2 @,@ 000 lb (900 kg) sea mines . One proposed addition to the Victor were underwing panniers capable of carrying a further 28 1 @,@ 000 lb bombs to supplement the main bomb bay , but this option was not pursued .

In addition to a range of free @-@ fall nuclear bombs , later Victor B.2s operated as missile carriers for standoff nuclear missiles such as Blue Steel ; it had been intended for the American Skybolt missile to be introduced ; however , development of Skybolt was cancelled . Target information for Blue Steel could be input during flight , as well in advance of the mission . It was reported that , with intensive work , a B.2 missile carrier could revert to carrying free @-@ fall nuclear weapons or conventional munitions within 30 hours .

Like its sibling V @-@ Bombers , the Victor made use of the Navigational and Bombing System (NBS) ; a little @-@ used optical sight had also been installed upon early aircraft . For navigation and bomb @-@ aiming purposes , the Victor employed numerous radar systems . These included the H2S radar , the first airborne ground @-@ scanning radar , and the Green Satin radar . Radar information was inputted into the onboard electromechanical analogue bomb @-@ aiming apparatus . Some of the navigation and targeting equipment was either directly descended from , or shared concepts with , those used on Handley Page 's preceding Halifax bomber . Operationally , the accuracy of the bomb @-@ aiming system proved to be limited to roughly 400 yards , which was deemed sufficient for high @-@ level nuclear strike operations .

= = = Avionics and systems = = =

The Victor had fully duplicated powered controls ; many of the flight controls and flight surfaces were designed with redundancies . Pilot control movements were transmitted via a low @-@ friction mechanical system . This setup was developed to provide , amongst other capabilities , a level of artificial feel to the pilot . Eight separated hydraulic circuits were present on the aircraft , which comprised the alighting gear , flaps , nose flaps , air brakes , bomb doors , wheel brakes , nose @-@ wheel steering , and the ram @-@ air turbine scoops . An AC electrical system and auxiliary power unit were significant additions upon the later Victor B.2 , electrical reliability being noticeably improved .

To evade enemy detection and interception efforts , the Victor was outfitted with an extensive electronic countermeasures (ECM) suite which were operated by the air electronics officer (AEO) , who had primary responsibility for the aircraft 's electronics and communication systems . The ECM equipment could be employed to disrupt effective use of both active and passive radar in the vicinity of the aircraft , and to provide situational awareness for the crew . Enemy communications could also be jammed , and radar guided missiles of the era were also reportedly rendered ineffective . The Victor B.2 featured an extended area located around the base of the tail fin which contained cooling systems and some of the ECM equipment .

Some of the ECM equipment which initially saw use on the Victor , such as the original chaff

dispenser and Orange Putter tail warning radar , had been developed for the earlier English Electric Canberra bomber and were already considered to be near @-@ obsolete by the time the Victor had entered service . Significant improvements and alterations would be made to the avionics and ECM suites , as effective ECMs had been deemed critical to the Victor 's role ; for example , the introduction of the more capable Red Steer tail warning radar . The introduction of the Victor B.2 was accompanied by several new ECM systems , including a passive radar warning receiver , a metric radar jammer and communications jamming equipment . Streamlined fairings on the trailing edges of the wings that could house large quantities of defensive chaff / flares were also new additions . While trials were conducted with terrain @-@ following radar and a side scan mode for the bombing and navigation radar , neither of these functions were integrated into the operational fleet .

= = = Engines = = =

The Victor B.1 was powered by an arrangement of four Armstrong Siddeley Sapphire turbojet engines . The engines were embedded in pairs into the aircraft 's wing root ; because of the high mounted position of the wing , the tail had to adopt a high mounting to maintain clearance of the jet turbulence , however the airbrakes were ideally situated to take advantage of this phenomenon . Difficulties were encountered with the Sapphires when stationed in tropical environments ; several engines were destroyed by the turbine blades striking the outer engine casing . The Victor B.2 adopted the newer Rolls @-@ Royce Conway turbofan ; the Conway at one point held the distinction of being the most powerful non @-@ afterburning engine outside of the Soviet Union , and were significantly more powerful than the preceding Sapphire engines employed upon on the B.1.

The Victor B.2 featured a distinct change in the aircraft 's engine arrangements ; incorporated into the right wing root was a Blackburn Artouste airborne auxiliary power unit (AAPU) , effectively a small fifth engine . The AAPU was capable of providing high @-@ pressure air for starting the main engines , and also providing electrical power on the ground or alternatively in the air as an emergency back @-@ up in the event of main engine failures . The AAPU also acted to reduce the need for external specialist support equipment . Turbine @-@ driven alternators , otherwise known as ram air turbines (RATs) , had been introduced on the B.2 to provide emergency power in the event of electrical or hydraulic power being lost . Retractable scoops in the rear fuselage would open to feed ram air into the RATs , which would provide sufficient electrical power to operate the flight controls . In the event of engine flameout RATs would assist the crew in maintaining control of the aircraft until the main engines could be relit .

= = = Flight profile = = =

The Victor was commonly described as having good handling and excellent performance , along with favourable low speed flight characteristics . During the flight tests of the first prototype , the Victor proved its aerodynamic performance , flying up to Mach 0 @.@ 98 without handling or buffeting problems ; there were next to no aerodynamic changes between prototype and production aircraft . Production aircraft featured an automated nose @-@ flap operation to counteract a tendency for the aircraft to pitch upwards during low @-@ to @-@ moderate Mach numbers . At low altitude , the Victor typically flew in a smooth and comfortable manner , in part due to its narrowness and flexibility of the crescent wing . One unusual flight characteristic of the early Victor was its self @-@ landing capability ; once lined up with the runway , the aircraft would naturally flare as the wing entered into ground effect while the tail continued to sink , giving a cushioned landing without any command or intervention by the pilot .

The Victor has been described as an agile aircraft , atypical for a large bomber aircraft ; in 1958 , a Victor had performed several loops and a barrel roll during practices for a display flight at Farnborough Airshow . Manoeuverability was greatly enabled by the light controls , quick response of the aircraft , and the design of certain flight surfaces such as the infinitely @-@ variable tail @-@

mounted airbrake . The Victor was designed for flight at high subsonic speeds , although multiple instances have occurred in which the sound barrier was broken . During development of the Victor B.2 , the RAF had stressed the concept of tactical manoeuverability , which led to much effort in development being given to increasing the aircraft 's height and range performance .

= = Operational history = =

The Victor was the last of the V bombers to enter service , with deliveries of B.1s to No. 232 Operational Conversion Unit RAF based at RAF Gaydon , Warwickshire before the end of 1957 . The first operational bomber squadron , 10 Squadron , formed at RAF Cottesmore in April 1958 , with a second squadron , 15 Squadron forming before the end of the year . Four Victors , fitted with Yellow Astor reconnaissance radar , together with a number of passive sensors , were used to equip a secretive unit , the Radar Reconnaissance Flight at RAF Wyton . The Victor bomber force continued to build up , with 57 Squadron forming in March 1959 and 55 Squadron in October 1960 . At its height , the Victor was simultaneously operating with six squadrons of RAF Bomber Command .

According to the operational doctrine developed by the RAF , in the circumstance of deploying a large scale nuclear strike , each Victor would have operated entirely independently ; the crews would conduct their mission without external guidance and be reliant upon the effectiveness of their individual tactics to reach and successfully attack their assigned target ; thus great emphasis was placed on continuous crew training during peacetime . Developing a sense of a crew unity was considered highly important ; Victor crews would typically serve together for at least five years , and a similar approach was adopted with ground personnel . In order to maximize the operational lifespan of each aircraft , Victor crews typically flew a single five @-@ hour training mission per week . Each crew member was required to qualify for servicing certificates to independently undertake inspection , refuelling and turnaround operations .

In times of high international tension , the V @-@ bombers would be dispersed and have been maintained at a high state of readiness ; if the order was given to deploy a nuclear strike , Victors at high readiness would have been airborne in under four minutes from the point the order had been issued . British intelligence had estimated that the Soviet 's radar network was capable of detecting the Victor at up to 200 miles away , so to avoid interception , the Victor would follow carefully planned routes to exploit weaknesses in the Soviet detection network . This tactic was employed in conjunction with the Victor 's extensive onboard electronic countermeasures (ECM) to increase the chances of evasion . Whilst originally the Victor would have maintained high altitude flight throughout a nuclear strike mission , rapid advances of the Soviet anti @-@ aircraft warfare capabilities (exemplified by the downing of a U2 from 70 @,@ 000 ft in 1960) led to this tactic being abandoned : a low @-@ level high @-@ speed approach supported by increasingly sophisticated ECMs was adopted in its place .

The improved Victor B.2 started to be delivered in 1961 , with the first B.2 Squadron , 139 Squadron forming in February 1962 , and a second , 100 Squadron in May 1962 . These were the only two bomber squadrons to form on the B.2 , as the last 28 Victors on order were cancelled . The prospect of Skybolt ballistic missiles , with which each V @-@ bomber could strike at two separate targets , meant that fewer bombers would be needed , while the government were unhappy with Sir Frederick Handley Page 's resistance to their pressure to merge his company with competitors . While Skybolt 's development would be terminated , Victor B.2s were retrofitted as carrier aircraft for the Blue Steel standoff nuclear missile . The introduction of standoff weapons and the switch to low @-@ level flight in order to evade radar detection was said to be decisive factors in the successful penetration of enemy territory .

In 1964 ? 1965 , a series of detachments of Victor B.1As was deployed to RAF Tengah , Singapore as a deterrent against Indonesia during the Borneo conflict , the detachments fulfilling a strategic deterrent role as part of Far East Air Force , while also giving valuable training in low @-@ level flight and visual bombing . In September 1964 , with the confrontation with Indonesia reaching a peak , the detachment of four Victors was prepared for rapid dispersal , with two aircraft loaded with

live conventional bombs and held on one @-@ hour readiness , ready to fly operational sorties . However , they were never required to fly combat missions and the high readiness alert finished at the end of the month .

Following the discovery of fatigue cracks , developing due to their low @-@ altitude usage , the B.2R strategic bombers were retired and placed in storage by the end of 1968 . The RAF had experienced intense demand upon its existing aerial refuelling tanker fleet , and its existing fleet of Victor B.1 tankers that had been converted earlier were due to be retired in the 1970s , thus it was decided that the stored Victor B.2Rs would be converted to tankers also . Handley Page prepared a modification scheme that would see the Victors fitted with tip tanks , the structure modified to limit further fatigue cracking in the wings , and ejection seats provided for all six crewmembers . The Ministry of Defence delayed signing the order for conversion of the B2s until after Handley Page went into liquidation . The contract for conversion was instead awarded to Hawker Siddeley , who produced a much simpler conversion than that planned by Handley Page , with the wingspan shortened to reduce wing bending stress and hence extend airframe life .

While the Victor was never permanently based with any units stationed overseas , temporary deployments were frequently conducted , often in a ceremonial capacity or to participate in training exercises and competitions . Victor squadrons were dispatched on several extended deployments to the Far East , and short term deployments to Canada were also conducted for training purposes . At one point during the early 1960s , South Africa showed considerable interest in the acquisition of several bomber @-@ configured Victors ; in the end , the Victor would not serve with any other operator other than the RAF .

Several of the Victor B.2s had been converted for Strategic Reconnaissance mission following the retirement of the Valiant in this capacity . In service , this type was primarily used in surveillance of the Atlantic and Mediterranean Seas , capable of surveying 400 @,@ 000 square miles in an eight @-@ hour mission ; they were also used to sample the fallout from French nuclear tests conducted in the South Pacific . Originally reconnaissance Victors were equipped for visual reconnaissance ; however , it was found to be cheaper to assign Canberra light bombers to this duty and as such the cameras were removed in 1970 . Subsequently , radar @-@ based reconnaissance was emphasised in the type 's role . The reconnaissance Victors remained in use until 1974 when they followed the standard bombers into the tanker conversion line ; a handful of modified Avro Vulcans assumed the maritime radar reconnaissance role in their place .

Two of the V @-@ bombers , the Victor and the Vulcan , played a high @-@ profile role during the 1982 Falklands War . In order to cross the vast distance of the Atlantic Ocean , a single Vulcan required refuelling several times from Victor tankers . A total of three bombing missions were flown against Argentine forces deployed to the Falklands , with approximately 1 @.@ 1 million gal (5 million L) of fuel consumed in each mission . At the time , these missions held the record for the world 's longest @-@ distance bombing raids . The deployment of other assets to the theatre , such as the Hawker Siddeley Nimrod and Lockheed Hercules , required the support of the Victor tanker fleet , which had been temporarily relocated to RAF Ascension Island for the campaign . The Victor also undertook several reconnaissance missions over the South Atlantic . These missions provided valuable intelligence for the retaking of South Georgia by British forces .

Following the invasion of Kuwait by neighbouring Iraq in 1991 , a total of eight Victor K.2s were deployed to Bahrain to provide in @-@ flight refuelling support to RAF and other coalition aircraft during the subsequent 1991 Gulf War . RAF strike aircraft such as the Panavia Tornado would frequently make use of the tanker to refuel prior to launching cross @-@ border strikes inside of Iraq . Shortly after the Gulf War , the remaining Victor fleet was quickly retired in 1993 , at which point it had been the last of the three V @-@ bombers in operational service ; retiring nine years after the last Vulcan , although the Vulcan had survived longer in its original role as a bomber .

= = Variants = =

HP.80
Prototype , two aircraft built .

Victor B.1
Strategic bomber aircraft , 50 built .
Victor B.1A
Strategic bomber aircraft , B.1 updated with Red Steer tail warning radar and ECM suite , 24 converted .
Victor B.1A (K.2P)
2 point in @-@ flight refuelling tanker retaining bomber capability , six converted .
Victor BK.1
3 point in @-@ flight refuelling tanker (renamed K.1 after bombing capability removed) , 11 converted .
Victor BK.1A
3 point in @-@ flight refuelling tanker (renamed K.1A as for K.1) , 14 converted .
Victor B.2
Strategic bomber aircraft , 34 built .
Victor B.2RS
Blue Steel @-@ capable aircraft with RCo.17 Conway 201 engines , 21 converted .
Victor B (SR) .2
Strategic reconnaissance aircraft , nine converted .
Victor K.2
In @-@ flight refuelling tanker . 24 converted from B.2 and B (SR) .2 .
HP.96
Proposed military transport of 1950 with new fuselage carrying 85 troops . Unbuilt .
HP.97
1950 civil airliner project . Not built .
HP.98
Proposed pathfinder version with remotely operated tail guns and powered by Conway engines . Rejected in favour of Valiant B.2.
HP.101
Proposed military transport version of HP.97. Not built .
HP.104
Proposed " Phase 3 " bomber of 1955 powered by Bristol Olympus or Sapphire engines . Not built .
HP.111
1958 project for military or civil transport , powered by four Conway engines . Capacity for 200 troops in military version or 145 passengers in airliner in a double @-@ decker fuselage .
HP.114
Proposed " Phase 6 " bomber designed for standing patrols carrying two or four GAM @-@ 87 Skybolt ballistic missiles .
HP.123
Proposed military tactical transport based on HP.111 and fitted with blown flaps . Rejected in favour of Armstrong Whitworth AW.681.

= = Operators = =

Royal Air Force
No. 10 Squadron RAF operated B.1 from April 1958 to March 1964 at RAF Cottesmore .
No. 15 Squadron RAF operated B.1 from September 1958 to October 1964 at RAF Cottesmore .
No. 55 Squadron RAF operated B.1 and B.1As from RAF Honington from October 1960 , moving to RAF Marham and receiving B.1 (K) A tankers in May 1965 . These were replaced by K.2 in July 1975 , with the squadron continuing to operate Victors in the tanker role until disbanding in October 1993 .
No. 57 Squadron RAF operated B.1As , K.1 & K.2s from March 1959 to 1992 .
No. 100 Squadron RAF operated B.2s at RAF Wittering from May 1962 to September 1968 .
No. 139 (Jamaica) Squadron RAF operated B.2s from February 1962 to December 1968 .

No. 214 Squadron RAF operated K.1 tankers from July 1966 to January 1977 .
No. 543 Squadron RAF operated B (SR) .2s from December 195 to May 1974 .
No. 232 Operational Conversion Unit RAF .
Radar Reconnaissance Flight RAF Wyton .

= = Accidents and incidents = =

14 July 1954 : WB771 the prototype HP.80 crashed during a test flight at Cranfield , England . All four crewmen died . Witnesses reported the entire tail assembly had " ripped away " at a height of about 100 feet .
16 April 1958 : XA921 a B.1 undertaking Ministry of Supply trials experienced a collapse of the rear bomb bay bulkhead while cycling the bomb bay doors , damaging hydraulic and electrical systems ; the aircraft successfully returned to base . Following the incident , in @-@ service Victors had restrictions put in place on the opening of the bomb doors until Modification 943 was applied to all aircraft .
20 August 1959 : XH668 a B2 of the A & AEE lost a pitot head and dived into the sea off Milford Haven , Pembrokeshire .
19 June 1960 : XH617 a B1A of 57 Squadron caught fire in the air and was abandoned near Diss , Norfolk .
23 March 1962 : XL159 a B2 of the A & AEE stalled and dived into a house at Stubton , Lincolnshire .
14 June 1962 : XH613 a B1A of 15 Squadron lost power on all engines and was abandoned on approach to RAF Cottesmore .
16 June 1962 : XA929 a B1 of 10 Squadron overshot the runway and broke up at RAF Akrotiri following an aborted takeoff .
2 October 1962 : XA934 a B1 of ' A ' Squadron , 232 OCU had an engine fail on takeoff from RAF Gaydon after which two engines failed on approach . The aircraft crashed into a copse several miles from RAF Gaydon . Of the four crew on board only the co @-@ pilot survived .
20 March 1963 : XM714 a B2 of 100 Squadron stalled after takeoff from RAF Wittering .
29 June 1966 : XM716 a SR2 of 543 Squadron was giving a demonstration flight for the press and television at RAF Wyton . The aircraft had made one high @-@ speed circuit and was flying low in a wide arc to return over the airfield when the starboard wing was seen to break away and both it and the rest of the aircraft burst into flames . All four crew were killed . The aircraft was the first SR2 to enter service with the squadron , and released evidence suggests that it was overstressed .
19 August 1968 : Victor K1 XH646 of 214 Squadron collided in midair near Holt , Norfolk in bad weather with a 213 Squadron English Electric Canberra WT325 ; all four crew members of the Victor died
10 May 1973 : XL230 a SR2 of 543 Squadron bounced during landing at RAF Wyton and exploded .
24 March 1975 : Victor K1A XH618 of 57 Squadron was involved in a midair collision with Hawker Siddeley Buccaneer XV156 during a simulated refuelling . The Buccaneer hit the Victor 's tailplane causing the Victor to crash into the sea 95 mi (153 km) east of Sunderland , Tyne and Wear , four crew killed .
29 Sept 1976 : XL513 a K2 of No 55 Squadron aborted take off and overshot the runway at RAF Marham after a bird strike . The crew escaped with no serious injuries . The aircraft caught fire and was damaged beyond repair .
15 October 1982 : XL232 a K2 of No 55 Squadron suffered an uncontained turbine failure early in the take off run . The aircraft was stopped and the crew evacuated the aircraft with no injuries . Debris from the turbine penetrated a fuselage fuel tank , starting an uncontrolled fire , destroying the aircraft and damaging the runway .
19 June 1986 : XL191 a K2 of 57 Squadron undershot approach in bad weather at Hamilton , Ontario .
3 May 2009 : During a " fast taxi " run at Bruntingthorpe Aerodrome , XM715 made an unplanned

brief flight , reaching a height of about 30 ft (9 m) at maximum . The aircraft did not have a permit to fly ; however , the Civil Aviation Authority (CAA) stated that they would not be conducting an investigation . The co @-@ pilot had failed to reply to the command " throttles back " ; the pilot then had to control the throttles himself , the confusion temporarily disrupting firm control of the aircraft .

= = Survivors = =

A total of five Victors have survived and are on display in museums . None are flightworthy as of 2013 .

Victor B.1A

XH648 : a B.1A (K.2P) at the Imperial War Museum Duxford , Cambridgeshire . This is the sole B.1 to survive .

Victor K.2

XH672 : Maid Marian , at the Royal Air Force Museum , Cosford , Shropshire , in the National Cold War Exhibition .

XH673 : Gate guardian at RAF Marham , Norfolk , the Victor 's last home .

XL231 : Lusty Lindy , at the Yorkshire Air Museum , York . The prototype for the B.2 to K.2 conversion . XL231 is one of two Victors currently in taxiable condition .

XM715 : Teasin ' Tina / Victor Meldrew , at the British Aviation Heritage Centre , Bruntingthorpe , Leicestershire . XM715 is also one of two Victors currently in taxiable condition .

= = Specifications (Handley Page Victor B.1) = =

Data from Handley Page Aircraft since 1907

General characteristics

Crew : 5

Length : 114 ft 11 in (35 @.@ 05 m)

Wingspan : 110 ft 0 in (33 @.@ 53 m)

Height : 28 ft 1 ½ in (8 @.@ 57 m)

Wing area : 2 @,@ 406 sq ft (223 @.@ 5 m ²)

Empty weight : 89 @,@ 030 lb (40 @,@ 468 kg)

Max. takeoff weight : 205 @,@ 000 lb (93 @,@ 182 kg)

Powerplant : 4 × Armstrong Siddeley Sapphire A.S.Sa.7 turbojets , 11 @,@ 050 lbf (49 @.@ 27 kN) each

Performance

Maximum speed : 627 mph (545 knots , 1 @,@ 009 km / h) at 36 @,@ 000 ft (11 @,@ 000 m)

Range : 6 @,@ 000 mi (5 @,@ 217 nmi , 9 @,@ 660 km)

Service ceiling : 56 @,@ 000 ft (17 @,@ 000 m)

Armament

Up to 35 × 1 @,@ 000 lb (450 kg) bombs or

1 × Yellow Sun free @-@ fall nuclear bomb

= = Notable appearances in media = =

A 1964 Gerhard Richter painting titled XL 513 depicts Victor K.2 , which was lost in a 1976 accident at RAF Marham .