

Photograph album of aircraft at the Royal Air Force Museum Cosford



Michael Pierre de Villiers

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Title page: Inside Hanger 4 at the Royal Air Force Museum Cosford. From the bottom; Avro York, Handley Page Hastings, Douglas DC-3 and Gloster Javelin.

ABOUT THE AUTHOR

Michael Pierre de Villiers was born in Durban, South Africa. He was trained to World Meteorological Organization class one meteorologist and multi-discipline weather forecaster in the South African Weather Service where he reached the rank of Director. He served on a weather ship in the South Atlantic. He served on World Meteorological Organization expert teams and was World Meteorological Organization rapporteur for the Africa region. He was also a commercial pilot and flying instructor. More recently he was a weather forecaster in the United Arab Emirates, then in England. Now retired.

M. P. de Villiers
PhD MSc MDip (FRMetS CMet retired)
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INTRODUCTION

The aircraft photographs in the album/article are of military aircraft taken by the author at Royal Air Force (RAF) Museum Cosford seven visits spanning 2007 to 2025. Hereafter Royal Air Force (RAF) Museum will be referred to as Cosford.

The aircraft are chronologically ordered from around the time of World War I, in the early 1900s, to the most recent time for which aircraft are on display. There are a few exceptions where an aircraft evolved with time. These have been presented together, For example, the Gloster Meteor and the Hawker/BAe Harrier. The aircraft have been divided into the categories World War I, the inter World War years, World War II and post-Cold War period. Some aircraft are difficult to categorise because they were developed in one period while primarily used in a later period. Generally, they are placed in the period when most used (or famous).

Fortunately, the photograph quality is mostly good. The advantage of digital cameras. Although, unavoidable crowding of aircraft in the four halls to present as many aircraft as possible to visitors, has resulted in some less than favourable views of aircraft. This is a particular problem when photographing the English Electric Lightning, English Electric Canberra and the Canadair Sabre in the Cold War Hanger. Some photographs of aircraft engines have been included as well as a two of Martin-Baker ejector seats.

Rather than clutter the text with the many, admittedly deserved references, all references have been listed in the Bibliography. I hope this does not cause offence. The author is particularly indebted to information boards provided with the aircraft on display at Cosford, the 2000 The Royal Air Force Museum Cosford Guidebook edited by Francis, J. A. and the 2021 Royal Air Force Museum Cosford souvenir guide by Hall, Jo (project manager), as well as, in alphabetical order, the websites of BAE Systems (previously BAe), the Royal Air Force Museum, Sampson (Andrew) at the RAF Museum and Wikipedia. There were numerous instances when more than one reference was used for a particular aircraft. On odd occasions there were minor discrepancies and due to often numerous model variants, it was sometimes difficult to know whether the correct specifications for the variant were provided. The author apologies for any errors.

Aircraft specifications such as speed, distance, altitude and engine power have been given in metric and non-metric terms. Regarding speed and altitude, preference has been given to knots (kt) and feet (ft) in accord with common practise in aviation. Preference has also been given to nm (nautical miles) distance. Other abbreviations are; for speed kph and mph, for altitude m (metres), for distance km and mi (miles). Engine performance for jets kN (kilonewton) and lb (pounds), for engines driving a propeller, kW (kilowatt) and lb (pounds).

A brief glossary explaining aviation words or terms is provided after the Bibliography.

The 2021 Royal Air Force Museum Cosford souvenir guide makes mention that today's RAF "has its roots in the vision of Hugh Trenchard, 1st Viscount Trenchard (1873-1956)" and he is known as "The Father of the RAF". Without belittling his achievement, there is a fact to which it is worth drawing attention. During visits to Cosford in January and February 2007, on display

was a poster about the birth of the RAF and the Smuts Memorandum, the contents of which I was aware, but I think many people are not aware. South Africa's Field Marshall Jan Smuts, of Boer War Commando fame also a past prime minister (pre- and post-World War I), was a close advisor to Winston Churchill during World War I. He was asked to examine the organisation of the air services at the time. He concluded, to quote "As far as can at present be foreseen there is absolutely no limit to the scale of its future independent war use". Prophetic words. He recommended the "Amalgamation of the Royal Naval Air Service and the Royal Flying Corps" into a "New Air Service". Following the Air Force Act of 29th November 1917, the Royal Air Force was proclaimed on 7th March 1918 (The official History – War in the Air. Vol VI, H. A. Jones). On subsequent visits 3rd October 2012 and subsequently, I noticed that this poster had been removed.

WORLD WAR I (1914-1918)



Photograph 2023-11-07.

Sopwith 1½ Strutter (replica) A8226

Designed as a single-seat, high performance fighter, or two-seat, multirole biplane, the name 1½ Strutter is derived from the unusual arrangement of the central mainplane bracing struts. It first flew late in 1915. A notice board says that the model on display is a replica built to original Sopwith factory drawings. Flown briefly, it represents the Royal Flying Corps (RFC), C Flight, 45 Squadron 1½ Strutter A8226 in France in April 1917. It is fitted with an original 97kW (130hp) Clerget 9B nine-cylinder rotary engine on loan from the Science Museum. Large numbers were

produced. It was also in service with the Royal Naval Air Service, the French, Belgian and United States forces.

The Strutter was the first British aircraft to be fitted with a forward centreline machine gun synchronised to fire through the propeller disc. The gun in question being a 7.7mm (0.303in) Vickers. It was not entirely reliable, propellers being damaged or shot resulting in a forced landing. The rear cockpit gunner had a Lewis machine gun on a mounting ring. Two to four underwing bombs, depending on weight, could be carried. Maximum speed was 87kt (160kph, 100mph) at 6500ft (1980m). Maximum altitude was 13000 ft (~3960m).

Sopwith Pup N5182 RNAS

The single-seat, biplane fighter, according to a notice board, says "Pilots regarded the Pup as the perfect flying machine. The Royal Naval Air Service (RNAS) and the RFC used it extensively. It was the first aircraft to take-off and land on a ship test flight deck. Officialdom hated the name Pup, thinking it undignified. They decreed the aircraft should only be referred to as the Sopwith Scout. This order made it certain the name Pup was used.

This extensively rebuilt 1916 example was recovered from France around 1960. It last flew in 1976. It was in service with the RNAS on the Western Front, France, in 1916 to 1917. The Pup was powered by a 60kW (80hp) Le Rhone 9C nine-cylinder rotary engine. Maximum speed



Photograph 2023-11-07.

aircraft. Wing warping was an early method for lateral (roll) control patented by the Wright brothers. It consisted of pulleys and cables that twisted the trailing edges of the wings in opposite directions.

was 97kt (180kph, 112mph) at sea level. Maximum altitude was 20500 ft (6250m). Armament was one forward firing propeller synchronised 7.7mm (0.303in) Vickers machine gun. Up to four bombs could be carried on external racks.

Construction was wood with fabric covering. However, steel tubing was used in wingtips, elevator (horizontal up and down control), fin and rudder (yaw/directional control). Lateral (roll) control was initially by wing warping. Ailerons were fitted on later production



Photograph 2023-11-07.

kph, 5mph) slower. Consequently, only 130 were built, of which 125 were M.1Cs. It was relegated to operation in the Middle East and the Balkans.

Bristol M.1C C4994 replica

The Bristol M.1 Scout was a World War I wood and fabric fighter and the only monoplane to enter production during the war. It had an 82kW (110 hp) Le Rhône engine with a single forward-firing Vickers gun mounted on the centre-line firing through the propeller disc. Its first flight was in 1916, entering service with the RFC in 1917. Mistrust of monoplanes at the time and its landing speed of 43kt (79kph 49mph), considered too high to be safely operated at generally small airfields in France, made it unpopular. Biplanes were only about 5kt (8

INTER WORLD WARS I AND II (1919-1938)



Photograph 2023-11-07.

Hawker Hart Trainer K4972

The Hawker Hart was a two-seat, biplane light bomber, designed in the 1920s that entered service with the RAF in 1930 to 1943. It also served in other country forces such as Canada, India, South Africa and Southern Rhodesia. There were a number of versions of the model, including naval and tropical versions. Around 1000 were built. The observer, armed with a Lewis machine gun sat behind the pilot. When bomb aiming, he lay under the pilot's seat. The aircraft on

display is a trainer with a Rolls-Royce Kestrel engine with ramshorn exhausts. Top speed was 143kt (266kph, 165mph) at 3000ft.



Photograph 2023-11-07.

Hawker Cygnet G-EBMB

The Cygnet was a two-seat, single engine, light sporting biplane aircraft. It originated from a 1924 Royal Aero Club Light Aeroplane Competition with £3000 prizes. The aim being to produce a light aeroplane that would encourage private flying. The Cygnet, designed by the famous Sydney Camm, was the lightest at 170kg (370lb). This was achieved by refining the design of every component to its smallest while retaining its strength. To this day it is the aim of every aircraft designer and engineering in

general. It was not a RAF aircraft, but it did establish Sydney Camm's reputation.

Comper CLA.7 Swift G-ACGL



Photograph 2023-11-07.

The Swift was a 1930s single-seat, single engine, high wing, light sporting aircraft. Designed by Nicholas Comper, it was intended for air racing, popular at the time and the sporting market. It was available with three different engines and advertised as having space for golf clubs in the cockpit. Forty-one were built by the Comper Aircraft Company between 1930 and 1933. It was fast, reliable, with folding wings and could fit in a garage. It was popular, particular for air racing. In 1931 a Swift was flown from the UK to Australia in a record 9 days 2 hours

and 29 minutes. Another was flown to Cape Town, South Africa, in 10 days, just missing the record time.

Junkers JU52/3m CASA 352L



Photograph 2007-01-12.

The Junkers Ju 52/3m is a three engine, low cantilever wing monoplane transport aircraft that was designed and manufactured by the German Junkers Aviation Company. In production between 1931 and 1952, the distinctive aircraft has an engine on each wing and one on the nose. The wing midsection forms the lower part of the fuselage. Flaps extend along the length of the wings, the outer section of which is also the aileron. Two functions of a flap are to increase lift and lower stalling speed. Lateral control, that is roll, is by means of ailerons. It also has an unusual corrugated duralumin

metal skin. Many were used by the Luftwaffe in World War II as a troop and cargo aircraft and on the odd occasion, as a medium bomber. Post World War II it continued in production in Spain by Construcciones Aeronáuticas SA (CASA) as the 352 and 352L. In its civilian role it was widely used by numerous airlines. A few are still in use, mainly for aviation heritage displays and pleasure flights. The engine was commonly a 541kW (725hp) BMW 132A-3 nine-cylinder, air cooled, radial piston engine. Maximum speed 133kt (246kph, 165mph). Range 539nm (998km, 620mi). Service ceiling 19360ft (5900m).

The Ju 52 that was on display at Cosford was actually a CASA 352 with MBW-132 engines built under licence in 1954 for the Spanish Air Force. It last flew for the Spanish Air Force in 1976. It was bought by the RAF Museum in 1977. After inspection and engine runs, it was flown to Biggen Hill in the UK in 1978 and on to Cosford. Sponsored by British Airways (BA), it was painted in pre-war Imperial Airways colours as G-AFAP. During 2022/2023, it was acquired by the Kent Battle of Britain Museum.

de Havilland Tiger Moth Mk II T-6296



Photograph 2023-11-07.

The engine was a 97kW (130hp) de Havilland Gypsy Major driving a fixed pitch, two blade, wooden propeller. Maximum speed was 95kt (175kph, 109mph) and 1000ft (305m). Maximum altitude 13600ft (4145m).

The Tiger Moth was a fixed undercarriage, tail skid, two seat, initial (ab initio) training aircraft in the RAF from 1932 to 1951. The instructor sat in the forward cockpit. Nearly 9000 Tiger Moths were built serving with many air forces worldwide. Many are still flying privately. The display aircraft was built in 1941 serving with No. 1 Elementary Flying Training School at Hatfield and No. 7 Elementary Flying Training School at Desford 1942 to 1946. The yellow underside of the wings (not visible in the photograph) indicated that it is a training aircraft. The

Henri Mignet HM.14 G-AEEH



Photograph 2023-11-07.

wind tunnel tests showed that it could develop a steepening and uncontrollable dive. The aircraft on display is on loan from Mr. M Davies, son of the builder. It was renovated by members of the Aerospace Museum Society.

The Mignet (or Flying Flea) was a 1930s home built, tandem wing aircraft that could be flown with a variety of engines. Estimated building cost in the 1930s was £75. Around 500 were under construction in Britain in 1936. The display aircraft, built in a garage in Bath in 1935, has an AJS twin cylinder motorcycle engine. The owner said that the original Scott Squirrel engine was somewhat under powered, requiring firm ground and a fair breeze to get airborne. After a series of fatal accidents, the aircraft was banned by the French in 1936 and the British in 1937. Later

Hawker Hind



Photograph 2023-11-07.

Zealand, Portugal, Republic of Ireland, South Africa and Switzerland. The South African Air Force used them against Italian forces in East Africa. The Afghan government had 8 Hind aircraft that were used to suppress the 1944 to 1947 tribal revolts. The Hind on display has Afghanistan markings. It had a Rolls-Royce Kestrel V 12 piston engine with stub exhausts. Maximum speed was 162kt (299kph, 186mph) at 16500ft (5029m). There was a fixed forward firing Vickers machine gun while the observer/gunner in the rear seat had a movable Lewis machine gun.

The Hawker Hind was a two-seat, biplane, light bomber developed for the RAF from the Hawker Hart that was introduced in 1931. The Hind entered service in 1935. It was an interim aircraft to fill the gap between old aircraft types and newer monoplane aircraft that were still being developed. By 1937 it was already being phased out of frontline service to be used in training from 1938 and during World War II to 1943. It served with RAF bomber squadrons, as well as, among other countries, in Afghanistan, New



Photograph 2007-02-10. Rolls-Royce Kestrel XVI engine.

Gloster Gladiator Mk1 K8042



Photograph 2023-11-07.

start of World War II. The type saw service in France, Norway, Malta, Greece, North Africa and the Middle East. The aircraft on display, built in 1937, was used for trials and training

The Gladiator was a single-seat fighter with fixed undercarriage, powered by a 626kW (840hp) Bristol Mercury IX nine-cylinder, air cooled, radial engine. It was the last biplane fighter in the RAF and the first to have an enclosed cockpit for the pilot. First flight in 1934, it began service in the RAF in 1937, withdrawn from frontline defence in 1941, but continued to be used for training and with a ceiling of 33000ft (~10000m) it was suitable for metrological observation flights. With a top speed of 220kt (407kph, 253mph) it was already too slow and vulnerable by the

WORLD WAR II (1939-1945)

Fairchild Argus II FS628 G-AIZE

The Argus II was a four seat, high wing monoplane, general communications aircraft designed with a sturdy fixed undercarriage to operate from undeveloped grass airfields. It was a



Photograph 2023-11-07.

development of the civilian F-24 that first flew in 1932 and later the F-24W. The United States Army Air Force ordered 161 aircraft in 1941, which they named the Forwarder. However, under the World War II American Lease-Lend act the aircraft were sent to the RAF where they were known as the Argus II. In total the RAF obtained 600 aircraft. They were mostly and widely used by the Air Transport Auxiliary to ferry delivery pilots to and from factories and airfields. They were also used in the near and far East and South Africa.

The display aircraft was built in 1943. Delivered to the United States Army as 43-14601 and used in the USA, it was registered as G-AIZE in 1946 and shipped to the UK as one of 54 war surplus Argus aircraft. Flown by the company, it became privately owned around 1963. Its last flight in 1966. Restored by the Medway Aircraft Preservation Society Ltd in 1997 as FS628, one of the 161 Argus II aircraft delivered to the RAF in 1943 to 1944 and returned to the USA in 1947. The restored aircraft was delivered to Cosford in 1999, The engine is an air cooled, 123kW (165hp) Warner Super Scarab piston radial. Maximum speed was around 105kt (193kph, 120mph) and maximum altitude 12700ft (3960m).

Consolidated PBV 6A Catalina L-866



Photograph 2023-11-07.

The PBV 6A was the final version. The flying boat design was in response to a US Navy requirement for a long-range patrol air craft. It first flew in 1935, in service from 1936 to 1945. Maximum speed was 156kt (288kph, 180mph). It had a maximum range of 4442km (2760miles) at a typical cruising speed of 113kt (200kph, 130mph). In later commercial use its endurance was increased to over 6000km (~4000miles). More than 3000 were built. The RAF had over 600 during World War II in 18 squadrons where it was used in anti-submarine warfare, convoy escort. Also search and rescue a role in which

it was particularly useful, because its hull fuselage and extendable wing tip floats meant it could land on water. It had a retractable undercarriage for land use. It had two 895kW (1200hp) Pratt and Whitney radial engines. Armament was maximum six 7.7mm (0.303in) machine guns and carried bombs. It was also known to carry torpedoes. It was in service with many countries including Australia, Canada, India, Indonesia, Madagascar and South Africa.

Douglas Dakota C-47-B KN645

The Douglas C-47, civilian DC-3, or the Dakota as known in the RAF and Commonwealth air forces, can be accepted as the world's best known transport aircraft and World War II workhorse. The DC-3 first flew in 1935 and was ordered by America's airlines. Total production of all variants is believed to be around 13000. The RAF had more than 1900 Dakotas with most retired or sold by 1950. The last aircraft leaving the service in 1970.



Photograph 2023-11-30.

accepted on charge to the RAF under the lend-lease agreement as KN646 and sent to the Bukeburg, Germany, British Air Forces of Occupation Communication Squadron. Later the same year it was refurbished as a VIP aircraft, with armchairs, settees, cocktail cabinet, kitchen and toilet for the use of Lord Montgomery and in 1947 by a succession of lords, generals, governors and other VIPs while being based in various places in Europe and the UK. Also briefly, the Queen's Flight. In 1970, as the last Dakota in the RAF, it made its last flight. Moved to Cosford in 1975. In 2005 repainted in post-war Transport Command colours for display in 2007.

Douglas C-47-B (also known as Skytrain) specifications: Two 895kW (1200hp) Pratt & Whitney R-1830-90C Twin Wasp air-cooled, fourteen-cylinder (in two V rows of seven) .radial piston engines driving three-bladed constant speed propellers. Maximum speed 200kt (370kph, 230mph). Service ceiling 24000ft (7315m).



Photograph 2023-11-07.

where 1051 of a Mk V version were built with a moulded plywood fuselage, as well as 1832 of the conventional version. Later Ansons, some with metal wings, in production until 1947, were used as light transports. In total 11020 Ansons were built. The last surviving six aircraft were withdrawn from service in 1968. It had two 313kW (420hp) Armstrong Siddeley seven-cylinder, air-cooled, radial engines. Maximum speed 165kt (306kph, 190mph) at 5000ft (1525 m). Armed versions had two manually-operated Vickers K guns installed on port and starboard sides. One forward-firing 7.7mm (0.303in) Browning machine-gun on the port side of cockpit. It could carry two 45kg (100lb) bombs and eight 4.5kg (10lb) bombs, or one 113kg (250lb) bomb and eight 4.5kg (10lb) bombs. A prone bomb-aiming position was in nose.

operated approximately 60 aircraft until 1946. Many DC-3s/C-47s still fly today. Some recently undergoing major overhaul and modification by replacing the piston engines with turboprops driving five blade constant speed propellers and extending the fuselage forward of the wing root, as well as rewiring and new avionics.

The retractable main undercarriage, fixed tailwheel aircraft on display is a C-47-B, built in 1945, that was initially registered with the UAAF serial number 44-7703 but soon

Avro 652A Anson C.Mk.19, series 1 TX214

The twin engine, low wing monoplane, Anson started service in 1936 to fulfil a Coastal Command requirement for a reconnaissance attack aircraft. It was used in this role until 1942. It was the first aircraft in RAF service to have a retractable main undercarriage. The tailwheel was fixed. A trainer version went into production in 1939, 1500 of them. They were used to train World War II pilots, navigators, wireless operators and air gunners. To conserve vital material in the UK, the type was also built in Canada

The display model Anson 652A C.Mk.19 series 1, TX214, of Transport Command, was accepted by the RAF in 1946, in service until 1960, allotted to RAF Museum in 1963 and Cosford in 1979. It is a four or five crew/passenger commercial development for communications and transport with a slightly raised cabin roof to provide more headroom for passengers, as well as metal wings and tail.

Hawker Hurricane Mk IIC LF738



Photograph 2023-11-07.

Merlin XX engine with fishtail exhausts, it drove a three-bladed Rotol constant speed propeller. It was fitted with four 20mm (0.78in) cannons, two in each wing. Maximum speed was 289kt (534kph, 332mph) with maximum altitude 35800ft (10912m).

While essentially a fighter, the Hurricane had many other uses, such as fighter-bomber when it carried a bomb under each wing, tactical reconnaissance fighter and photographic reconnaissance. It also had limited use when a single aircraft was carried on a merchant ship for convoy protection. The aircraft, nicknamed a Hurricat, would be rocket-propelled catapult launched when the convoy was threatened by enemy aircraft. Afterward, the pilot would bale out, or ditch, near the convoy for recovery. The IIC model on display, was built in 1944, serving as a trainer with No. 1682 Bomber Defence Training Flight.

The Hurricane Mk I entered service with the RAF in 1937 as a single-seat fighter with retractable undercarriage, except the tailwheel. It was the RAF's first eight-gun, low wing monoplane. While the Spitfire has become symbolic as the saviour during the Battle of Britain, there were many more Hurricanes that accounted for ~60% of all enemy aircraft shot down.

The later developed displayed Hurricane Mk IIC was built in many more numbers than other versions. Powered by a Rolls-Royce



Photograph 2012-10-03. A Rolls-Royce Merlin 28 12 cylinder used in the Lancaster Mk.III and Curtiss Kittyhawk.



Photograph 2023-11-07.

Supermarine Spitfire Mk1 K9942

The world famous Spitfire first flew in 1936 with introduction to service in 1938. The single-seat, retractable undercarriage fighter aircraft on display is the oldest surviving Spitfire in the world. It has the early slab sided flat top canopy. Powered by a Rolls-Royce Merlin III engine with a de Havilland three bladed, two-pitch propeller, it first flew in 1939 with RAF 72 squadron. Maximum speed was 307kt (583kph, 353mph). Maximum altitude was 31900ft (9723m).

Armament was four 7.7mm (0.303in) machine guns mounted in each wing. Damaged in 1940, it was repaired and used for training with RAF 52 Operational Training Unit. The aircraft has SD-D 72 Squadron markings. There were many variant marks of Spitfires that served in many roles, the last mark being Mk XXIV. The Spitfire was in service into 1950s.

Messerschmitt Bf 109G-2 10639



Photograph 2023-11-07.

The Bf 109 was first used operationally by the Luftwaffe in 1937 during the Spanish Civil War and elsewhere in Europe to the end of World War II in 1945.

The Bf 109 was the Luftwaffe's primary fighter during the Battle of Britain. It could outclimb the RAF's Hurricanes and Spitfires and was better armed. Due to having to fly from the mainland, it was limited to at most 20 minutes over the south-east England battlefield. However, RAF aircraft could readily land and refuel. There was also the

advantage that RAF pilots shot down and parachuted to safety, or safely crash landed, could often be back in the air again later in the day. Not so Luftwaffe pilots shot down over England.

The aircraft on display was modified for desert operation in North Africa. For example, a sand filter for the supercharger air intake. Its engine was a supercharged inverted Daimler-Benz DB 605A driving a three-bladed, variable pitch propeller. Maximum speed was 335kt (619kph, 385mph), maximum altitude was 36000ft (10972m). Armament was one 20mm (0.75inche) cannon firing through the propeller hub and two 7.92mm (0.31inche) fuselage machine guns synchronised firing through the propeller disc. This aircraft was in action during the German retreat after the Battle of El Alamein in 1942. Found abandoned near Tobruk it was rebuilt and used by the RAF for flight testing and trails.

Bristol Bolingbroke IV L8756 restored as a Blenheim IV



Photograph 2023-11-07.

No RAF Blenheims have survived. The aircraft on display is a Blenheim IV built under licence by Fairchild-Canada as a Bolingbroke IV maritime patrol and trainer for the Royal Canadian Air Force (RCAF). The aircraft on display was a trainer with the RCAF. It has been restored to represent a Blenheim IV at RAF 139 Squadron in World War II.

The Blenheim was a light bomber that first flew in 1935. Introduced to the RAF in 1937 it was retired in 1944. After the first two years

of World War II, they proved to be too slow and vulnerable in daylight. They had more success as night fighters.

It was the first British all metal stressed skin aircraft, the first RAF aircraft to drop bombs during a raid in World War II (4th September 1939) and made the first successful radar interception of an enemy bomber.

The Blenheim was powered by two 686kW (920hp) Bristol Mercury XV nine-cylinder, air cooled, radial engines driving de Havilland three-bladed, variable pitch propellers. Maximum speed was 231kt (428kph, 266mph) at 11800ft (3600m). Maximum altitude was 22000ft (6700m). Armament consisted of 7.7mm (0,303in) machine guns. One fixed forward machine gun, one to two in the mid-upper turret and two optional in a blister below the nose. The bomb load was aimed and released from the nose navigator/bomb aimer position. The main undercarriage was retractable, the tailwheel fixed.

Vickers Wellington T-10 MF628



Photograph 2023-11-07.

The Wellington was a twin-engine, taildragger with retractable main undercarriage, long -range, medium bomber. In 1942 Wellingtons were the most numerous aircraft in Bomber Command. They began to be replaced by more capable four-engine heavy bombers such as Halifaxes and Lancasters. Wellingtons continued to operate in Bomber Command as training aircraft and served in North Africa, Italy, the Far East and coastal Command. Over 11000 were built. The Wellington served in the RAF from 1938 to 1953.

An innovative design feature was its geodetic airframe designed by Barnes Wallis. It consisted of a spirally crossing basket-weave in which the two helices at right angles to one another are mutually supporting and cancel each other's torsional load. Compared with other structural methods it was comparatively light and stronger. Furthermore, because it comprised the outer part of the airframe, it meant that internally it was essentially an uncluttered and empty space that could be better utilised for payload. Referring to the photographs of the display Wellington, the geodetic frame can be seen in the cross-hatching design through the aircraft side window and in the cutaway rear view inside the fuselage.



Photograph 2023-11-07.

The Wellington on display was constructed in 1944 and served with No. 1 Air Navigation Training School between 1949 and 1953. It was not operational in the Second World War, but represents the role Wellingtons played in the bombing campaign against Germany. On display since May 2023, it is one of two surviving Wellingtons in the world. It was powered by two 1249kW (1675hp) Bristol Hercules XVI radial engines. Maximum speed was 222kt (410kph, 255mph) at 13300ft (4054m). Maximum altitude was 22000ft (6706m). It had up to eight 7.7mm (0.303in) machine guns. Two in the front turret, four in the rear turret and one in each side waist position. Up to 1841kg (4000lb) bombs were carried internally. The bomb aimer position was below the nose turret.

Bolton Paul Defiant I C4994



Photograph 2023-11-07.

powered turret behind the pilot using a combination of four 7.7mm (0.303in) Browning machine guns. Needless to say, it was impractical and no match for Luftwaffe fighters. It was soon taken off daylight operations and assigned to the night fighter role. Later they were used in air-sea rescue operations. Also in anti-aircraft units, air observer and air gunnery training and target towing, as well as for radar jamming in support of night bombing raids.

The display aircraft is the sole surviving example of the Defiant Mk 1. Painted in all black scheme and EW identification, it served as a night fighter with 307 RAF Polish Squadron toward the end of the war.

The Defiant was a taildragger with retractable main undercarriage, low wing monoplane, two-seat, day and night fighter. It was used by the RAF from 1939 to 1943. It was powered by a Rolls-Royce Merlin 12-cylinder liquid cooled engine driving a three-bladed Rotol constant speed propeller. Maximum speed was 263kt (486kph, 303mph) and maximum altitude 28100ft (8565m).

The Defiant used a new concept in a fighter aircraft in that all the firepower was in a

Junkers JU 88R-1 360043



Photograph 2023-11-07.

(today's Aberdeen Airport). Well, two of the three crew defected. Two were anti-Nazi, the third was not and had to be held at gunpoint while one flew the aircraft. The intact aircraft with its FuG 212 Lichtenstein C-1 radar was studied by British scientists enabling them to develop countermeasures that were of benefit to RAF bombers.

The aircraft was powered by two 1193kW (1600hp) BMW 801MA fourteen-cylinder, air-cooled, radial engines driving three-bladed, variable pitch VDM propellers (VDM = Vereinigte Deutsche Metallwerke). Maximum speed was 296kt (549kph, 341mph). Maximum altitude 30000ft (9144m). Armament was three 7.92mm (.31in) forward firing machine guns in nose fairings and one 20mm (0.79in) cannon. The bomber version could carry up to 1400kg ordinance inside the fuselage.

The JU 88 was originally designed as a fast twin-engine fully retractable undercarriage bomber, it successfully developed into a multi-role aircraft. Roles included night fighters, intruders, dive and torpedo bombers and reconnaissance. Apparently, it was almost as good as the de Havilland Mosquito. The JU 88 was operational in the Luftwaffe from 1939 to 1945.

The Junkers JU 88R.1 on display was a night fighter. One night in May 1943, the Luftwaffe crew defected in this aircraft to RAF Dyce

Mitsubishi Dinah Ki-46



Photograph 2007-02-10.

radial engines. Later a ground attack version was developed, as well as a fighter version late in the war.

The Ki-46-III (Hei) Army Type 100 that was on display at Cosford is the only known survivor. It was probably built in 1943. It was flown in Malaya in 1945. At the end of the war, following British orders it was handed over to Allied Technical Air Intelligence Unit, South East Asia and flown to the UK in 1946. At Cosford from 1993, it is now on display at the RAF Museum Hendon.

North American Mustang B6-V 413573



Photograph 2007-01-21.

two-stage, intercooled supercharged engine tested by the RAF vastly improved performance above 15000ft (4600m) still with good range. Subsequently, RAF Mustangs were built with Packard (Rolls-Royce) V-1650 Merlin engines and known as Mk IIIs.

Specifications of the later D model are; a maximum 1280kW (1720hp) Packard (Rolls-Royce) V-1650-7 Merlin 12-cylinder, liquid cooled engine powering a four blade Hamilton Standard constant speed, variable pitch propeller; maximum speed 383kt (710kph, 440mph); range 1434nm (2660km, 1650mi). Armament was six 12.7 (0.5in) Browning machine guns, six or

The Mitsubishi Ki-46 was a twin crew, twin-engine, taildragger with retractable main undercarriage, unarmed, reconnaissance aircraft used by the Imperial Japanese Army in World War II. Its high speed and long range made it ideal for high-altitude photographic reconnaissance. It was able to cover the Pacific theatre of operations with little opposition. Maximum speed was around 348kt (544kph, 400mph), faster than the current Japanese fighters. Maximum altitude was 35000ft (10680m). The mass produced aircraft first flew in 1939. It was powered by two 783kW (1050hp) Mitsubishi Ha 102 air-cooled, two stage supercharger,

The North American Aviation P-51 Mustang was an USA World War II and Korean War single seat, taildragger with fully retractable undercarriage, single engine fighter. It was also used as a fighter bomber. Built initially for the RAF, it was one of the best fighters produced, probably best known for its long range, being able to escort bombers all the way from England to and from Germany.

Known in the RAF as the Mustang Mk 1, it had an Allison V-1710 engine without a turbosupercharger, or a multi-stage supercharger. This limited high-altitude performance. The Rolls-Royce Merlin 65,

ten 127mm (5.0in) T64 HVAR rockets or a bomb under each wing of 45kg (100lb), 110kg (250lb) or 230kg (500lb).

The display Mustang is a mixed bag rebuild. Original commercial company restoration was not up to standard. Thorough repair and correction, by mainly voluntary, work was done at RAF No.1 School of Technical Training at Halton. The aircraft was painted as 413573 in markings of the 8th United States 357th Fighter Group. It was delivered to RAF Museum Hendon in 1991 and to Cosford in 2003. The author photographed the aircraft on the 12th January 2007. The aircraft is no longer on display.

Focke-Wulf FW 190A-8



Photograph 2025-07-06.

The display aircraft was used in an early drone technology programme whereby the FW 190 was attached above a pilotless Junkers Ju 88 filled with explosives. The pilot of the FW 190 controlled the Ju 88 releasing it to hit a target.

The FW 190 was a single seat, single engine, low wing monoplane fighter with the Luftwaffe from 1941 to 1945. Its first flight was in 1939. Highly manoeuvrable and fast, it was on a par with the RAF Spitfire, in some aspects it was better. The wide and strong

retractable main undercarriage gave it greater stability when landing and ability to withstand hard landings. The tail wheel was semi retractable. An auxiliary fuel drop tank could be attached centrally beneath fuselage forward of the pilot to increase range. The tank being dropped before engaging in combat, because it reduced manoeuvrability and speed.

The FW 190 was used as a day fighter, fighter bomber and ground attack aircraft. It was very well armed with two 13mm (0.51in) machine guns in the nose synchronised to fire through the propeller disc, two 20mm (0.79in) cannon in the wing roots, also synchronised and another two cannon in the wings. It could carry up to 1000kg (2205lb) bombs on external wing racks or two Werfer-Granate 21 rockets. The engine was a 1250kW (1677hp) BMW 801 radial that powered most versions. It drove a three-bladed variable pitch, constant-speed propeller. Maximum speed was 352kt (652kph, 405mph) at ~19400ft (5920m).

de Havilland Mosquito TT.35 TA639



Photograph 2012-10-03.

The de Havilland DH.98 Mosquito was a fast British twin-engine, taildragger with fully retractable undercarriage, mid wing monoplane, two seat (pilot and navigator/bomb aimer sat side by side), multirole combat aircraft that served in the RAF from 1941 to 1963. Design work began in December 1939, its first flight was in November 1940.

Over 7000 were built between 1940 and 1950 in Britain, Australia and Canada.

It was an unusual and amazing aircraft. Unusual in that it was constructed mostly of wood frame with glued moulded plywood covering. Amazing because of the many roles it fulfilled better than many other specially designed aircraft. It was also one of the fastest operational aircraft at the time. Earning itself the nickname Wooden Wonder. It was originally designed as an unarmed bomber relying on superior speed to evade enemy fighters. Other roles were; fighter bomber, low to medium height daytime tactical bomber, high-altitude night bomber, pathfinder for bombing raids and fighter defence for the bombers, maritime strike (rocket attacks on enemy shipping) and especially photo-reconnaissance. British Overseas Airways Corporation (BOAC) used the Mosquito during World War II to carry small, high-value cargo through enemy air space to and from neutral countries. A single passenger could be carried in the bomb bay. The Mosquito remained in use as a fighter until 1952, then they were converted to tow targets for anti-aircraft gunnery practise.

The displayed Mosquito was built late in 1945 as a B.Mk.35 bomber before conversion a TT.35 target-towing version about 1952/1953 when it was in service with the No.3 anti-aircraft co-op unit RAF. On display at Cosford since 1970. It had two 1129kW (1535hp) Rolls-Royce Merlin V12 liquid cooled engines driving what appear to be de Havilland hydromatic (see Lincoln propellers), fully feathering "Paddle Blade" propellers. Maximum speed was 360kt (668kph, 415mph) at 28000ft (8534m). Maximum altitude 42000ft (12802m). Armament was 1814kg (4000lb) internal bomb load.

Fiesler FI-156-C-7 Storch VP746



Photograph 2008-08-24.

Built in 1944, the display Storch was one of 62 captured intact in May 1945. The aircraft was evaluated at RAF Farnborough as VP746. Delivered to Cosford in 1989.

Designed in 1935 for German army co-operation and liaison and casualty evacuation the Storch (Stork) was an exceptional Short Take-Off and Landing (STOL) aircraft. Flaps extended along entire length of the wing trailing edge and it is notable for the early use of slotted slats. This gave it a take-off run of 64m (210ft) and landing run of 18m (60ft). It could fly as slow as 28kt (51kph, 32mph) and hover in a strong headwind. It was ideal for

operation from very small, unprepared airstrips. A total of 2549 were built.

Messerschmitt Me163B Komet

The single seat Komet was the only rocket propelled interceptor ever to be used operationally. It was used late in World War II by the Luftwaffe in a desperate attempt to combat Allied strategic bombing. Borne of a research programme, started in the late 1930s, the first powered prototype flights began at the Peenemunde West rocket test centre later in 1941. The Walther rocket motor produced maximum speeds well in excess of any other fighter. However, the volatile rocket propellants required for the reaction to produce thrust often caused the aircraft to explode. The only Luftwaffe operational Me163 unit was the Jagdgeschwader (Fighter Wing) 400. Its mission was to protect the vital Leuna oil refineries near Leipzig with nine Eighth US Army Air Force B17 Flying Fortresses shot down. Severe fuel shortages and



Photograph 2007-02-10.

3.45 minutes. Maximum speed 490kt (900kph, 560mph) from sea level to maximum altitude 39000ft (12000m). Armament was two 30mm (1.181in) Rheinmetall Borsig MK 108 cannon with 60 rounds per gun. The B model, with a fixed tailwheel, used an unsprung jettisonable two-wheel dolly for take-off and an extendable skid for landing.

technical problems hampered operations and the unit suffered heavy casualties. All in all, an exercise in futility and too little too late.

The Me 163B Komet, Werknummer 191614, at Cosford since 1975, is now on display at the RAF Museum Hendon, London. It last flew on the 22nd April 1945, when it shot down a RAF Lancaster. It was powered by a 14.71kN (3307lb) thrust Hellmuth Walter Kommanditgesellschaft HWK 109-509A-2 bi-propellant liquid-fuelled rocket motor giving 7.5 minutes powered endurance. Climb from a standing start to 39000ft was

Messerschmitt Me 410A-1 U2 420430



Photograph 2023-11-07.

had two 1305kW (1750hp) Daimler Benz engines. Maximum speed was 337kt (624kph, 388mph) at 22000 ft (6700m). Maximum altitude 33000ft (10000m).

The Me 410A was twin-engine, fully retractable undercarriage, fast day bomber and bomber destroyer in operation with the Luftwaffe from 1943 to 1945. Unfortunately, manoeuvrability was poor making it very vulnerable to Allied escort fighters. Its six forward firing guns made it an effective bomber destroyer. These were; two 7.92mm (0.31in) machine guns, two 20mm (0.79in) cannon and two 20mm (0.79in) cannon in the bomb bay. In addition, it had a 13mm (0.51in) remote controlled machine gun on each side of the fuselage to the rear of the cockpit. It

Messerschmitt Me 262A-2A VK893



Photograph 2023-11-07.

The Me 262 Schwalbe (Swallow) was a single seat, retractable tricycle undercarriage, and heavily armed jet fighter. The first jet fighter to enter Luftwaffe service in April 1944. Armament consisted of four 30mm (1.2in) cannon and 24 55mm (2in) rockets.

Advanced jet engine technology gave the aircraft distinctly superior performance compared with Allied piston engined fighters. Its two 8.8kN (1980lbf) Junkers Jumo OO4B-1 turbojet engines provided a maximum speed of 487kt (900kph, 560mph)

at maximum altitude 37570ft (11450m). The Jumo OO4 was the first axial flow jet engine to enter production.

The aircraft could have been a severe threat to Allied air superiority but for the often unreliable engine due shortage of high quality materials and lack of fuel late in the war in 1945.

Avro York C.1 TS798



Photograph 2007-02-10.

The Avro York was a World War II four engine British long distance transport aircraft developed from the Avro Lancaster heavy bomber. It had the wings, tail, undercarriage and engines of the Lancaster bomber. Production between 1943 and 1946 produced 258 aircraft. They were operated by the RAF and BOAC. During the Berlin Airlift at the beginning of the Cold War, from June 1948 to May 1949, Yorks flew 58124 of the 131800 sorties conducted by the RAF while carrying 230000 tons of supplies. BOAC Avro York aircraft were used on the long routes to India, Cairo (Egypt) and to Durban (South Africa). British South American Airways (BSAA) were also operators of Avro York aircraft on their routes to South America.

The York was powered by four 1208kW (1620hp) Rolls-Royce T24 or Merlin 502 engines driving three bladed, constant speed propellers. Maximum speed was 259kt (480kph, 298mph). Service ceiling was 23000ft (7010m). Range was 2600nm (4800km, 3000miles).

The display Avro 685 York C1 (construction number 1223), was built in 1945 for the RAF, completed in silver paint with RAF roundels and TS798 serial number. However, within less than a month it was transferred to BOAC as G-AGNV. BOAC withdrew the Yorks in 1950. It was used by other operators in tour, charter and freighter roles until 1965. It was moved to Cosford in 1976.

Hawker Tempest Mk II PR536

The first flight of the Hawker Tempest was in 1942, entering RAF service at the beginning of 1944 as a replacement for the Hawker Typhoon. However, the Hawker Tempest Mk II represented the pinnacle of piston-engine fighter development. In service from 1945 to 1949, it was among the fastest and most powerful aircraft of World War II. It was fast enough to intercept V-1 flying bombs. It was also excellent at ground attack. All Mk IIs had extra dust filters for use in hot climates.



Photograph 2023-11-07.

The display Tempest served with the RAF in Pakistan, then still part of India. It was then transferred to the Indian Air Force, returning to the United Kingdom in 1979. The 1879kW (2520hp) Bristol Centurian V engine was

nearly three times more powerful than an early Spitfire's Rolls-Royce Merlin engine. The aircraft needed a large rudder to counter the engine torque. The Centurian V powered a Rotol four-bladed, variable pitch propeller. Maximum speed was 382kt (708kph, 440mph) at 15000ft (4570m) and maximum altitude 36500ft (11100m). It was armed with four 20mm (0.79in) Hispano Mk II cannon and carried 907kg bombs or eight 76.2mm (3in) RP-3 rockets. It had provision to carry two fuel drop tanks to increase range.

COLD WAR (1945 AND 1991)

The Cold War was a period of political tension between the United States and the Soviet Union and their respective allies. Known as a cold war because there was no large-scale fighting between the two countries, rather they supported opposing sides in major regional conflicts.

Gloster Meteor F9/40 DG202/G

The Gloster Meteor was the first British jet fighter and the Allies' only operational jet aircraft



Photograph 2008-08-24.

during the late part of World War II. It was only possible due to the invention and development of the ground-breaking turbojet engine, pioneered by RAF pilot, engineer and inventor, Sir Frank Whittle and his company, Power Jets Ltd. Work on the engine started in 1936, development of the aircraft in 1940, which first flew in 1943 and began operation use in July 1944. It proved to be a successful combat fighter and worthy of being remembered as a revolutionary aircraft. However, most of its operational use was in the earlier Cold War period.

DG202/G was one of eight prototypes, each one flew with a different engine. The G suffix to its serial number indicated a high security aircraft, to be guarded at all times when on the ground. It was constructed in 1941 undergoing numerous ground trials, testing and modifications before its first flight in 1943. Then further tests, modifications and engine changes, including on HMS Pretoria Castle to test suitability for carrier operation.

It entered storage in 1945. Subsequently used for technical training. After gate display and restoration, it was delivered to Cosford in 1965 with further restoration in 1998. In 2011 it was transferred to RAF Museum Hendon for display. The author was fortunate to photograph in in 2007 when it was still at Cosford. To the best of the author's knowledge, DG202/Gs final engine, in 1943, was the Rolls-Royce Welland using the Power Jets 7.58kN (1700lb) thrust W2B/23c. Its maximum speed was 362kt (670kph, 417 mph) at 9842ft (3000m) and a range of 874nm (1610km, 1006mi).

Gloster Meteor T7 WA634

The museums example of the T7 (WA634) never entered RAF service. Built in 1949 it spent its time being used for various tests, including snaking at high speed, tropical cockpit cooling and climate trials at Khartoum. Most of its time it was used by the British Martin-Baker Company to test its ejector seats. Several models, from early versions, were tested. This necessitated modification. The rear cockpit floor was strengthened, its flying controls removed



Photograph 2008-08-24.

escape from high speed aircraft at ground level and operational altitude). March 1962 the first test (of 50) was done by Squadron Leader Peter Howard which he described as very smooth. The aircraft, flown by John Fifiield at 250kt (467kph, 290mph) altitude 250ft (75m). The last ejection seat test flight was in December 1967.

The photographs of the 1950s Martin-Baker Mk4 and later 1960s Mk7 are shown. The Mk7 seat was developed from the Mk5 with the addition of a rocket pack for zero-zero capability. That is zero altitude, zero speed. Initiation of the ejection of the models is the same. Activation of a face blind by pulling it down in front of the face for protection, causes the cockpit canopy to be jettisoned. A gun, consisting of a telescopic tube, with two explosive charges fire in quick succession, While the seat rapidly accelerates up guide rails, leg restraints activate (the pilot is already attached to the seat by a sophisticated seat belt), all tubing and communication leads are disconnected and an emergency oxygen supply is activated. After the seat is clear of the aircraft, the drogue gun fires two small drogue parachutes to stabilise the seat's descent. A barometric pressure instrument prevents the main parachute from opening above 10000ft (3000m). The reason being to guarantee rapid descent to an altitude where breathable atmospheric air is available, without the risk of the on-seat oxygen supply finishing before reaching a safe altitude. A time delay mechanism then opens the main parachute protecting it from damage while opening at high speed. The seat then separates for a normal parachute descent. There is also a manual handle to separate the seat if it does not separate and a ripcord.



Photograph 2008-08-24. 4P and 7A ejection seats.

WA634 was delivered to Cosford in 1986. The author photographed the aircraft showing the cut away rear cockpit on the 24th August 2008. It is currently in storage.

Gloster Meteor F.8 Prone Position WK935

A modified Meteor F8 fighter, namely the display aircraft WK935, was used to evaluate the advantages, if any, of using a prone position to cope with the effects of gravity, known as g forces.



Photograph 2023-11-07.

As early as 1917 there were documented instances of pilots temporarily losing consciousness, or blackout, under higher g forces. High g forces cause the blood to pool in the lower part of the body when under acceleration, thereby depriving the brain of blood and partial loss of consciousness (greyout) or full loss of consciousness (blackout). Relaxing control of the aircraft, either consciously, or unconsciously as happens in a blackout when the body becomes automatically limp, allows the aircraft to adopt a more stable attitude, which

eases the blood pooling and fully recovering consciousness.

By World War II it became an increasing problem in much faster fighters and potentially fatal in dogfights. By the early 1950s, flying in a lying position in future combat aircraft appeared attractive for two reasons. Firstly, the position meant the airframe frontal area could be reduced thereby reducing drag, that is, more streamlined. Secondly, a body can tolerate higher g forces when not sitting upright, important when manoeuvring in jet aircraft being designed to go at ever increasing speed. Knowledge was particularly important in the short term, because the Bristol Aeroplane Company wanted to exploit these advantages by using a prone, face down, pilot position in its proposed rocket powered fighter the Bristol Type 178.

The RAF Institute of Aviation Medicine conducted fifty-five hours of testing using the modified Meteor F8 WK935 in the autumn of 1954. The aircraft was never flown solo from the front cockpit. It was found that the difficulties of operating the controls of the aircraft outweighed the advantages. In any event, the invention of suitably practical aviation clothing, namely the g suit solved the problem of counteracting g forces. The g suit automatically increases pressure in the abdomen and legs when g forces increase, thereby restricting the draining of blood from the brain. Pilots still need to practice tensing the abdominal muscles.

Avro 694 Lincoln II RF398

More of a Cold War aircraft than World War II, the Lincoln was a British four engine long range heavy bomber that first flew in June 1944 and was in RAF service from 1945 to 1963. It was an improvement and bigger version of the famous World War II Lancaster bomber. It was also



Photograph 2023-11-07.

the last British made piston-engine bomber. By the 1950s it was already being totally outclassed by newer jet aircraft. The display Lincoln B 24A, RF398, served with Bomber Command Bombing School until 1960 then it was used for electronic warfare and countermeasures trials at the Central Signal Establishment until 1963.

It was powered by different versions of the two-stage supercharged Rolls-Royce Merlin inline, liquid cooled, piston engine driving four-bladed propellers. The display Avro 694

Lincoln II had 1275kW (1710hp) Merlin engines driving four-bladed Rotol or de Havilland hydromatic, fully-feathering propellers. Hydromatic means powered by the force or pressure of water. It was used with larger blades of increased thrust to provide a faster pitch change rate and a wider range of pitch control. Maximum speed was 277kt (513kph, 319mph) at 19000ft (5791m), cruising at 187kt (346kph, 215mph) at 20000ft (6096m). Maximum range 2294nm (2640miles, 4249km). Maximum altitude 35000ft (11000m). Armament was two 13mm (0.50in) Browning machine guns in nose and tail turrets. The dorsal turret had either twin 13mm (0.50in) machine guns or twin 20mm (0.79in) Hispano cannon. Up to 6350kg (14,000lb) bombs were carried in an internal bomb bay. Typical crew was seven.

The much improved and larger Avro Shackleton, maritime patrol aircraft, was developed from the Lincoln for the RAF and the South African Air Force (SAAF). The SAAF opted for a tricycle undercarriage version.

Westland Dragonfly HR 3 G-AJOV WP495



Photograph 2007-01-21.

The Dragonfly HR3 was a licence built Sikorsky S 51 that first flew in February 1946. Westland built the Dragonfly, a civil version and a military version for the RAF and Royal Navy (RN). WP945 was built in 1953 for the RN Fleet Air Arm. During 1956 it was converted to a HR.5 with an Alvis Leonides 23/1 engine (probably 390kW, 520hp) and updated instruments and avionics. Hover ceiling was 7000ft (2100m). Maximum speed was around 83-90kt (153-166kph, 95-103mph), range 260nm (480km, 300mi). In 1976 it went to the Surry and Sussex Aircraft preservation Society. 1980 it went on loan to Cosford where it was restored

in the livery of British European Airways and registered as G-AJOV. Since 2017 it has been on static display at Morayvia Aviation Museum located in Kinloss, Moray, Scotland, near to Kinloss Barracks (the former RAF Kinloss) a frontline RAF station.

Lockheed SP-2H Neptune 204



Photograph 2023-11-07.

The display Neptune was a long-range, maritime patrol aircraft in service with the Royal Netherlands Navy. The RAF operated an earlier version, the P2V-5. Development of the Neptune began in 1941 with its first flight in 1945, entering service with the US Navy in 1947. More than 1000 were built, serving with countries such as the Argentina, Australia, Brazil, France, Netherlands and the Republic of China. It had two 2749kW (3700hp) Wright turbo-compound, radial engines with two 2759kW (3400hp) Westinghouse J-34 turbojets in wing pods.

Cruising speed was 180ks (333kph, 207mph). Internal stores included torpedoes, depth charges or bombs.

de Havilland Devon C Mk 2 2A VP952



Photograph 2023-11-07.

or nine passengers. The Devon C Mk 2 had two 246kW (330hp) Gipsy Queen 70-4 engines. Maximum speed was 174kt (322kph, 200mph). The display aircraft first flew in 1947, last flew in 1984, delivered to Cosford in 1986.

The Devon was a twin engine, low wing monoplane, retractable tricycle undercarriage aircraft designed for light transport and communications. The Devon was essentially the military version of the Dove which first flew in 1945 and was the first post World War II new build commercial aircraft to fly in the UK. Around 500 civil Doves were built and operated worldwide. Standard capacity was two crew with eight or nine passengers. The RAF had 30 Devon C Mk 1s and 2s while the RN had 13 Sea Devon C.Mk.20 s. Capacity was two crew with eight

Handley Page Hastings T.5 TG511

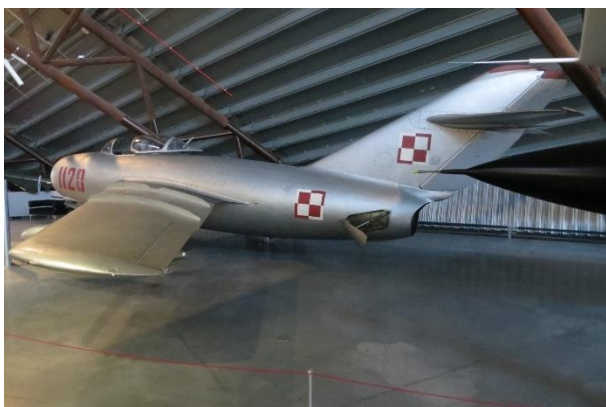


Photograph 2023-11-07.

at Cosford in 1977. The Hastings had four 1342kW (1800hp) 14-cylinder Bristol Hercules Mk.216 radial piston engines driving de Havilland-built hydromatic, four-blade, fully feathering propellers (see Lincoln propellers). Maximum speed was 308kt (570kph, 354mph).

The Hastings was a long-range, four-engine, transport aircraft. In accord with the British fixation with tail draggers it did not have a tricycle undercarriage. It was the RAF's first post war long-range transport to replace the Avro York. It was in service from 1948 to 1977. The Hastings took part in the 1948 Berlin Airlift and dropped paratroopers on Port Said during the 1956 Suez Crisis. From 1950 nineteen were converted for weather reconnaissance, of which eight became T5s at Bomber Command Bombing School. The Hasting T.5 TG511 was one of them, arriving

Mikoyan-Gurevich MiG-15bis 1120



Photograph 2023-11-07.

The MiG-15, in service from 1948, was an early and successful single-seat, retractable tricycle undercarriage, jet fighter using swept wings to achieve high transonic speeds. In the Korean War (1950 to 1953) it came as a surprise to opposing forces and outclassed their aircraft in aerial combat, until the arrival of the North American F-86 Sabre. It was powered by a jet engine that was copied from a stripped Rolls-Royce Nene turbojet that was given to the Soviet Union. The MiG-15bis, in service in the 1950s, is powered by

a more powerful engine with improved avionics.

The display MiG-15bis, 1120, of the Polish Air Force was powered by a Klimov VK-1 turbojet with 26.5kN (2700kg, 5955lb) static thrust. Maximum speed was 598kt (1107kph, 688mph).



Photograph 2023-11-30.

Canadair Sabre F.4 XB812

The North American F-86 Sabre was a single-seat, retractable tricycle undercarriage, transonic jet fighter aircraft. It was the United States of America's first swept-wing fighter that could compete with the swept-wing Soviet MiG-15 in jet dogfights in the Korean War of 1950 to 1953. Developed in the late 1940s, its first flight was in 1948, it was already outdated by the end of the 1950s. Total production was in the region of 9500, including nearly 2000 built by Canadair

The RAF needed to replace obsolete equipment, but new British swept wing fighters were not yet available. In the interim 430 Canadair licence-built Sabre F.4s were bought, being in service for a short period from 1953 to 1956. In 1955 Hunters began to replace the Sabres, which were then returned to America.

The display Canadair Sabre F.4 XB812 had a 23kN (5200 lb) thrust General Electric J47-GE-13 axial flow turbojet engine. Maximum speed was 582kt (1078kph, 670mph). Armament was six 1.27cm (0.5in) M-3 machine guns fixed in the nose with 1800 rounds.

English Electric Canberra PR.9 XH171



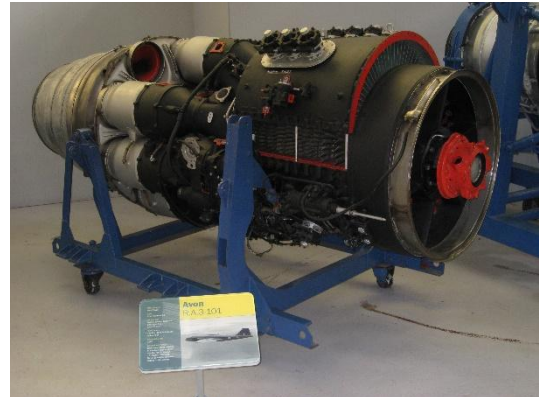
Photograph 2023-11-30.

The Canberra was the first British jet powered medium bomber flying higher than any other bomber in the 1950s and fast. It set point to point speed records and a record altitude height of 70310ft (21430m). Its first flight was in 1949, entering service in 1951, retired from the RAF in 2006. In total 1376 were built with exports to 15 countries.

Its high altitude and high speed made the Canberra an ideal platform for photo reconnaissance. Some aircraft, the B.2 for example, had wingtip fuel tanks to increase range. Example specification, for the B.2 were two Rolls-Royce Avon RA.3 Mk.101 engines 28.9kN (6500lb) thrust (see the photograph below), maximum speed 495 (917kph, 570mph) at high altitude, bomb payload 2720kg (6000lb) and range 2301nm (4280km, 2660miles).

The distinguishing difference between the B (bomber) and T trainer/PR photo reconnaissance versions being the cockpit. The B has an offset single pilot teardrop canopy while the T/PR has an oval two pilots side by side canopy. The bomber version had a glass nose to enable the

navigator/bomb-aimer to aim the bombs. Crew varied between two and three. Three crew being a pilot, a navigator and bomb aimer. The two crew configuration being a pilot and navigator/bomb aimer. The bomb aimer would be a camera operator in the reconnaissance role. The trainer would have two pilots. The non flying crew were seated within the fuselage aft of the pilot's position. The pilot, or pilots, had Martin-Baker ejection seats. However, the rest of the crew had to rely on an escape hatch and parachutes.



Photograph 2012-10-03. Rolls- Royce Avon RA.3 Mk.101 jet engine.

The display aircraft, XH171 of 39 SQN RAF, is a PR.9 photo reconnaissance version in service from 1960 to 2006. It was powered by two Rolls-Royce Avon Mk.206 turbojets. Maximum speed 475kt (676kph, 547mph).

de Havilland Canada Chipmunk T.10 WP912

Designed in Canada, the Chipmunk was a tandem, two-seat, single-engine, fixed taildragger undercarriage, low wing monoplane, ab initio trainer replacement for the Tiger Moth with rather new features such as flaps, brakes, radio and rear sliding enclosed cockpit. It entered RAF service in 1950. Over 700 were built for the RAF with some used by the RN and the Army. They were retired in 1999. It was powered by a 108kW (145hp) de Havilland Gipsy Major 8 air-cooled, inverted engine driving a fixed pitch propeller. Maximum speed 112kt (222kph, 138mph).



Photograph 2023-11-07.

The display aircraft first flew in 1952, withdrawn from service in 1974, displayed at

RAF Museum Hendon 1976, moved to Cosford in 1977.

Percival Provost T.1 WV562

The Provost was a single engine, two side by side seat, fixed undercarriage and castering tail wheel, low wing monoplane, basic primary (ab initio) trainer with and good aerobatic qualities. It had a 410kW (550hp) Alvis Leonides 25 engine. The Provost was also the last piston engined basic trainer.



Photograph 2023-11-07.

It was in service with the RAF from 1953 until replaced by the Jet Provost in 1961, although a few were still in use until 1969. Its first flight was in 1950. 397 were delivered to the RAF. Provost T.1 WV562 was built in 1954. It is believed its last flight was in 1959, delivered to Cosford in 2015.

Hunting Percival Jet Provost T.1 XD674



Photograph 2023-11-07.

that was followed by other air forces. Eventually it was realised this was not a good idea, because pilots did not get good all-round basic training. Propeller driven aircraft have not gone away. Consequently, air forces have returned to propeller driven aircraft ab initio training including the RAF. Between 1988 and 1993, the RAF replaced the Jet provosts with the two-seat, turboprop Short Tucano basic trainer a built under licence Brazilian Embraer EMB 312 Tucano.

In 1955 the T2 flew with minor modifications except hydraulic systems instead of pneumatic. It was purely a development variant. June 1958 an improved T3 flew. It had a more powerful engine, shorter undercarriage and wing tip tanks. It was followed by the T4.

Numerous military versions of the Jet Provost T3 and T4 were exported, known, respectively, as the Jet Provost T51 and T52. In 1967, to train pilots high altitude flying the final higher altitude pressurised British Aircraft Corporation (BAC) developed T5 and the BAC Strikemaster was introduced. It was an armed development of the Jet Provost T5, including a more powerful engine.

The T1 had a 5.3kN (1200lb) Armstrong Siddeley Viper 5 engine. The T5 an 11.1kN (2500lb) thrust Amstronng Siddeley Viper 202 engine, maximum speed 382kt (708kph, 440mph). The jet engine in the foreground of the photograph is a 12kN (2700lb) Rolls-Royce Viper II Mk.200 (ex Bristol, ex Armstrong Siddeley). Engine that powered the BAC Jet Provost.

Hunting Aircraft Jet Provost T3 XM351



Photograph 2023-11-07.

The Jet Provost trainer was a private venture adaptation of the piston Provost. The displayed XD674, the first prototype aircraft, first flew in 1954, entered storage in 1970, transferred to Cosford in 1985.

Initially it was a jet engine modification of the piston-engine Percival P.56 Provost, with its engine attached to a new fuselage. The two side by side seat, dual control, retractable tricycle undercarriage, T1 introduced all-jet training from pupil pilot (ab initio) in the RAF. The first air force to change. A trend

In 1957, the RAF stipulated requirements for an improved Jet Provost. The result was the T3, mentioned above, with an increased-power Armstrong Siddeley Viper engine, ejector seats, revised shorter undercarriage arrangement and wing tip fuel tanks.

The engine was an 8.9kN(2000lb) thrust Amstronng Siddeley Viper Mk.102 turbojet, maximum speed 382kt (708kph, 440mph) and maximum altitude 36750ft (11200m). 201 were built for the RAF between 1958 and 1962.

Bristol Britannia 312 BOAC G-AOVF wearing RAF XM497



Photograph 2007- 01-21 in BOAC livery and 2012-10-03 RAF livery.

The four engine Britannia was designed to a 1947 specification for a medium-range passenger airliner for BOAC. The prototype first flew in 1952. Eighty-five were built. The RAF used twenty-three (one source says twenty-four) as long-range troop and freight transports. The RAF ordered 23 mixed passenger/cargo aircraft for use by Transport Command. Three were Bristol Britannia 252s and twenty Bristol Britannia 253s, delivered in 1959 and 1960.

Promoted as the Whispering Giant, because of its quiet exterior noise due to its much quieter four 3356kW (4500ehp) Bristol Proteus 755 gas turbine engines compared with the then more common noisier piston engines. It was a successful and popular airliner for its speed, comfort and lack of vibration due to the new gas turbine engines. Unfortunately, it entered service not long before the pure jet airliners entered service. BOAC, for example, retired its Britannias after 5 years in favour of the newer jets. The Britannia became relegated to charter work and conversion to freighters.

The Briannia series 312 on display, was built by the Bristol Aeroplane company in 1957, registered as G-AOVF. It was delivered to BOAC in 1958, one of 18 312s ordered by the airline. Leased to British Eagle Airlines in 1964. Converted to a 312F freighter in early 1968. Repossessed by BOAC late in 1968. From 1970 it was purchased and or leased by various freight/passenger airlines. From 1976 it was exclusively a cargo aircraft. Stored in 1981. The 312 had a 310kt (574kph, 357mph) cruise speed and maximum range of 4614nm (8546km, 5310mi).

Sold to the Royal Air Force Museum in 1984 and flown to Cosford. Repainted in BOAC colours in 1985. In 2007, it was repainted in RAF colours as XM497 named Schedar. The paintwork looking faded in 2023 with some lettering obliterated.

The original XM497 first flew and delivered in 1960 to the RAF. In 1975 it was sold to Young Cargo as OO-YCF, used for spares and scrapped in 2007.

de Havilland Venom FB4 J1704

Closely resembling the Vampire, the Venom was a new design benefiting from a higher power de Havilland Ghost engine. Most obvious was the new wing with reduced thickness to chord ratio. That is, the ratio between the thickness if the wing and the line from the leading edge of the wing to the trailing edge. Long range wingtip fuel tanks resulted in aerodynamic efficiency. They reduced spanwise flow of air to the wingtip due to sweepback, thereby increasing lift and



Photograph 2012-10-03.

reducing drag. The Venom's first flight was in 1949. It was 89kt (160kph, 100mph) faster than the Vampire and climbed almost twice as fast. It entered RAF service in 1952 and the FB4 in 1955.

The display FB4 was built under licence in Switzerland in 1956 serial registration J-1704 and donated to the RAF Museum by the Swiss Air Force in 1979, delivered to Cosford in 1980. The author photographed it on the 3rd October 2012. It is no longer on display.



Photograph 2023-11-07.

Hunting Percival Pembroke C.1 WV746

The twin engine, high wing monoplane, retractable tricycle undercarriage Pembroke entered service with the RAF in 1953 as a successor to the Anson in the light transport and communications role. It was developed from the Percival Prince civil transport. The high wing and reversible pitch propellers gave it a shorter landing distance than the Anson. It also had a bigger passenger cabin. In accord with other RAF transports, it had rear facing passenger seats for safety. Rear facing seats give better head, neck and spine

support. Impact and deceleration forces are spread over a larger surface, because your entire back is in contact with the seat. The aircraft could also be fitted with dual controls for pilot training and as inflight training for navigators and wireless operators. Six photo reconnaissance aircraft were produced.

Modifications to extend their fatigue life were made in 1970, finally being withdrawn for service in 1988. It had two 400kW (540hp) Alvis Leonides 127 air cooled, nine-cylinder radial engines. Maximum speed was 190kt (350kph, 185mph). Service ceiling was 22000ft (6700m).



Photograph 2007-01-21.

Vickers Varsity T.1 WL679

Derived from the Vickers Valetta transport aircraft, the Varsity was a twin engine, low wing, retractable tricycle undercarriage, aircraft, designed as a flying classroom for pilots, flight engineers, navigators and air electronics operators. There was a small external pannier for practise bombs, or flares and a prone position for a bomb aimer. The engines were 1454kW (1950hp) Bristol Hercules 264 fourteen-cylinder radials. Maximum speed was 250kt (463kph, 288mph). Range 2301nm (4261km, 2648mi). Service ceiling 28700ft (8700m).

The display aircraft was used by the Royal Aircraft Establishment (RAE) to test numerous sensor systems that were subsequently used in front line aircraft, including thermal imaging and forward-looking infra-red. Built in 1953, it continued in service long after the other aircraft had been retired in 1973. The display aircraft retired in 1991 with its last flight to Cosford in 1992.

de Havilland Comet 1XB G-APAS BOAC



Photograph 2023-11-07.

The DH106 Comet 1 was the world's first jet liner, built with four wing embedded jet engines. The prototype broke many records on long distance flights. Jet engines, pressurised cabin, fast speed and high altitude flight brought a new high level of comfort to passengers.

However, after eighteen months in service there were three mid-flight catastrophic accidents within three months. Two were found to be metal fatigue and previously, one due to overstressing the airframe during thunderstorm weather. The aircraft was

withdrawn from service. Design and construction flaws such as improper riveting and cyclical pressurisation and subsequent depressurisation of the fuselage during flights had accelerated stress fatigue, causing cracks and fissures around square cut-outs around the automatic direction finder (ADF) antennas and some main passenger windows.

After extensive redesign and structural reinforcement, remaining aircraft were modified as 1X and 1XBs and 16 Comet 2s built for commercial service, were transferred to the RAF Transport Command as the Comet C Mk2. Some served in electronic intelligence (2R) and training roles (T2). One was used by the RAE for blind landing, head-up display and autopilot trials.

The Comet 1 on display was originally delivered to Air France in 1953 as an improved 1A with four de Havilland Ghost 50 Mk2 engines, registered F-BGNZ. However, after the fatal crashes the aircraft was returned to de Havilland in 1954. After the problems were identified, it was converted to a Comet 1XB in 1956 with more powerful 2495kW (5500lb) thrust de Havilland Ghost 50 Mk4 engines. Its cruising speed was 426kt (790kph, 490mph), range 3076nm (5710km, 3540mi).

In 1957 the aircraft was registered a G-APAS and handed to the Ministry of Supply and later to other users for trials and as a flying laboratory. For a while the aircraft was also registered as XM823. Its last flight was in 1968. 1978 the aircraft was painted in BOAC livery by Heathrow British Airways (BA) engineering staff for the British Airways Museum. Later in 1978 it was moved to Cosford by Pickford's and BA staff.

Fairey FD2 WG777

The FD2 (Fairey Delta 2) was a single-seat delta-winged supersonic research aircraft designed to study flight and control aspects at transonic and supersonic speeds. It was powered by a Rolls-Royce Avon engine with afterburner. An afterburner (or reheat) is a process whereby thrust is increased by injecting additional fuel into a combustor in the jet pipe. It can be used for take-off, combat and supersonic flight.



Photograph 2023-11-07.

To improve forward vision during taxiing, take-off and landing, the nose section was hinged to lower 10 degrees. A forerunner to the solution applied to the Concorde aircraft.

The display aircraft, WG774, was the second of two built. Its first flight was in October 1954. On the 10th March 1956 the aircraft set a new world record of 984kt (1820kph, 1132 mph), exceeding the previous record by 260kt. It was retired in 1966 and put in storage. In 1973 it was transferred to Cosford and re-fitted with an Avon engine.

Gloster Javelin FAW.1 XA564



Photograph 2023-11-07.

FAW.1 means Fighter All-Weather Mk.1. The Javelin was a two-seat, T tail, fighter in service from 1954 to 1968. It was succeeded by the Lightning. The Javelin was also the first twin-jet delta-wing all-weather fighter in the world. It was designed to intercept bombers approaching at high altitude and sub-sonic speed. It did not entirely live up to expectations, but it did improve with later modifications, such as the change to 44.5kN (10000lb) thrust Armstrong Siddeley Sapphire Mk.10202 or 10302 engines. The initial engine was 35.6kN (8000lb).

Maximum speed was 616kt (1141kph, 708.98mph). Armament was four 30mm cannon plus four Hawker Siddeley Firestreak air-to-air missiles on M.7s and above.

Lockheed C-130K Hercules C.3 XV202



Photograph 2023-11-07.

The Lockheed C-130 first flew in 1954. It is a four-engine turboprop, military transport aircraft, designed to operate from unprepared runways. The now legendary multi-role aircraft has undergone continual development in every aspect one can think of, including engines, propellers, avionics and fuselage extension while still retaining its immediately identifiable shape and civil models have evolved, such as the L100-30.

The C-130 Hercules was a mainstay of the RAF transport fleet since the late 1960s. It was withdrawn from service in 2023, leaving a fixed wing airlift fleet of eight Boeing C-17 Globemaster IIIs, 22 Airbus Defence and Space A400M Atlases and 10 Airbus DS A330 Voyagers (as in 2023).

Cosford has the last RAF C130K Mk.3 to be retired. It was delivered to the RAF in 1966 as a C-130K C.1. 1974 it had its fuselage lengthened by adding Lockheed provided plugs fore and aft of the wing and converted to a C.3 or C Mk.3. After being a truly global flier, its last flight was 12th August 2011. Its final airframe hours 31258 and 40 minutes,

Specifications for the 130K C.3: Four 3131kW (4200hp) Allison T56-A-15 turboprop engines. Maximum speed 310kt (574kph, 357mph). Cruise speed 292kt (541kph, 336mph). Service ceiling 32000ft (9754m). Range 2000nm (3704km, 2301mi), ferry range unrefuelled 3500nm (6482km, 4028mi), over 4000nm (7408km, 4603mi) using air-to-air refuelling.

Hawker Hunter F.6A XG225



Photograph 2008-08-24.

Built in 1956 as a F.6, the gate display XG225 was one of 415 F.6s built, 379 for the RAF. It was delivered to 92 Squadron where, for a while, XG225 flew with the nine-aircraft Blue Diamond aerobatic team while painted in royal blue with a white cheat line and wingtips. 1961 it was converted to F.6A standard by strengthening the wings to carry a greater load in the ground-attack role. Withdrawn from service in 1980, the aircraft was retired and sent to Cosford in 1981 to gate guard duty in 1988. The camouflage paint has faded and the sealed shut canopy to make it watertight has become opaque.



Photograph 2023-11-07.

Hawker Hunter T.7A XL568

The Hunter T.7A was a two-seat advanced training aircraft. Over 1000 single-seat Hunters were built for the RAF, many more for foreign air forces. Forty-five dual control T.7s with side-by-side seating for the instructor and student were built. Powered by a Rolls-Royce Avon 122 34.25kN (7700lb) thrust axial flow jet engine. Armament was a single nose-mounted 30mm Aden cannon. Maximum speed was 600kt (1110kph, 690mph).



Photograph 2023-11-30.

Vickers Valiant BK.1 XD875

The Vickers Valiant long-range, medium bomber was one of three bombers that, during the 1950s and 1960s, collectively comprised the RAF's V class of bombers, or V force of United Kingdom's strategic nuclear strike force. They were the Vickers Valiant, Avro Vulcan and Handley Page Victor. All three first flew in 1951 or 1952

and respectively entered service in 1955, 1956 and 1957. By 1964, in service were 50 Valiants, 70 Vulcans and 39 Victors.

The Valiant was never used in its primary role, but it was used with conventional bombs to attack Egyptian airfields during the 1956 so called Suez crisis. Early in its limited service life from 1955 to 1965, some Valiants were converted to pioneer operational inflight refuelling and in the photo reconnaissance role. The Valiants service life was curtailed due to cracks found in the rear wing spar of one aircraft and a wing spar failure in another. The fleet was checked with many found to have significant cracks. The problem was more severe than originally believed. It was thought that low flying was the cause, but the same was found in the higher flying tanker aircraft. The entire fleet was grounded and withdrawn from service.



Photograph 2023-11-07. Emergency access Visible on the previous photograph) with external lever arrowed and showing the crew area.

The display aircraft was converted to the tanker role. It was powered by four 44.5kN (10000 lb) Rolls-Royce Avon RA28 Mk 204 or 205 turbojets buried in the inner wing, with wing root intakes and trailing edge exhausts. Maximum speed was 493kt (912kph, 567mph) at 30000ft (9144m). Armament was one 4536kg (10000lb) nuclear bomb, 21 454kg (1000lb) bombs, or two 7432 litres (1615 imperial gallons) fuel tanks in the bomb bay. Range with underwing tanks was 7242km or 4500miles. Crew 5, plus 1 or 2 more in tanker mode.

Avro (later Hawker Siddeley) 698 Vulcan B.2 XM598



Photograph 2023-11-30.

The Vulcan was the third of the long-range medium and strategic nuclear bombers, or V bombers. It was the world's first large bomber to use a delta-wing shape. The benefits were high subsonic speed at high altitudes and long range, plus good load carrying. The 5 crew Vulcans first entered service in 1956.

It was already a big aircraft when the B.2 version entered service in 1960. It had a larger wing, more powerful engines, improved electrical system and electronic

countermeasures. 89 Vulcan B.2s were built, which included provision to carry the Avro Blue Steel nuclear missile. The four wing embedded engines were Bristol Siddeley Olympus Mk.201 turbojets upgraded to Mk.301, each 89kN (20000lb) thrust. Maximum speed was 560kt (1037kph, 644mph). Range was 4000nm (7408km, 4603 miles). The Vulcan had no defensive weapons. Its defence being speed and height. Armament was twenty-one 454kg (1000lb) conventional high explosive (HE) bombs, or a Yellow Sun Mk.2 thermonuclear bomb, or a type WE.177 hydrogen nuclear bomb, or a Blue Steel rocket-propelled air to surface nuclear armed standoff missile.

The Museum's aircraft XM598 entered service in 1963. In 1966, Vulcan B.2s became operational as low-level penetration aircraft using new terrain following radar and nuclear weapons.

At the onset of the Falkland War in April 1982, XM598 was one of five Vulcans selected for bombing raids on Port Stanley airfield. They were selected because they were the only aircraft still fitted with forward and aft conventional weapon Skybolt missile attachment points and refrigeration ducts. Extra ECM (Electronic Counter Measure) and navigation equipment (including inertial navigation system) were fitted as well as jamming pods carried on the starboard underwing pylon. XM598 was a reserve bombing raid aircraft. Although it was airborne and heading for the Falklands on six occasions, it was never needed because on each occasion the primary aircraft was able to carry out the raid. 28th/29th May 1982, XM598 was the primary aircraft, but had to abort from the last refuel point before attacking, because the Victor tanker hose failed to deploy.

December 1982 the aircraft was withdrawn and retired from operational service. January 1983 it was flown to Cosford for permanent display.

Handley Page Victor K.2 XH672



Photograph 2023-11-30.

Like the Vickers Valiant mentioned earlier, the Handley Page Victor was a long-range, medium and strategic nuclear bomber that evolved into an air refuelling tanker. Unlike the Valiant it did not suffer from a structural problem. Of the three V bombers it had the longest range, could fly higher, faster and had the highest payload. In service from 1961 to 1993, the Victor was the longest serving of the V bombers/tankers.

The display aircraft first flew in 1960. It did not spend much time in its V bomber role. In

1964, along with eight other Victors, it was modified to a radar equipped B.2 (SR) variant for maritime reconnaissance and day/night photography. The following year to B.2 (SR2) standard. During 1978 it was the last of 24 Victors to be converted to K2 tankers.

During the Falkland War, from the 23rd April to 15th June 1982, as the RAF's only strategic tanker, it was one of a number of Victors deployed to Ascension Island Wideawake Airfield for air-to-air refuelling of Vulcan sorties to bomb Port Stanley Airfield on the Falklands. Tankers had to be positioned at points along the route to refuel the Vulcans there and back. Victors also made photo reconnaissance flights over the islands of South Georgia and the Falklands. In 1991 it participated in Desert Storm operations. 1993 withdrawn from service. 1994 dismantled and taken to RAF Cosford where reassembled for display.



Photograph 2023-11-07.
Display scale model.

Victor K.2 XH672 specifications: Four Rolls-Royce Conway R.Co.17 Mk.201 89kN (20600lb) static thrust. Maximum speed 545kt (1009kph, 627mph) above 36000ft (10973m). Armament

thirty-five 454kg (1000lb) conventional HE bombs, or Blue Streak nuclear stand-off bomb. After K2 conversion it could carry 41000kg (91000 lb) of fuel using a three-point hose and drogue system. One each from wingtip tanks and one central underbelly bomb bay position.

Scottish Aviation Twin Pioneer CC.2 XL993



Photograph 2023-11-07.

The Twin Pioneer was a STOL (Short Take-Off and Landing), high wing, triple tail fin, taildragger fixed undercarriage, light transport aircraft. It was in service with the RAF from 1957 to 1968. It was most effective in a support role moving troops and supplies in Africa, the Middle and Far East where it took part in a number of colonial operations. The Twin Pioneer had two 447kW (640hp) Alvis Leonides 531 air-cooled, nine-cylinder, radial engines. Maximum speed was 162kt (300kph, 186.5mph).

Saunders-Roe SR-53 XD145



Photograph 2023-11-07.

The display aircraft was the first of two prototypes for testing by the Aeroplane and Armament Experimental Establishment (A&AEE) and the Rocket Propulsion Establishment (RPE) at Westcott. 1957 defence cuts resulted in cancellation of the SR.53 and the planned SR.177R production aircraft before the first flight of the prototype aircraft. The third prototype had already been cancelled. Funding of the two prototypes for experimental purposes was honoured. The SR-53 programme was one of several projects designed to meet a Ministry of

Supply Operational Requirement for a rocket interceptor in 1952. The SR53 interceptor used a de Havilland Spectre rocket motor to climb rapidly to high altitudes and an Armstrong Siddeley Viper turbojet to remain at altitude with lower fuel consumption.

Due to development delays the first prototype flight of XD145 was on the 16th May 1957. It reached twice the speed of sound, Mach 2, at high altitude. The second prototype XD151 was lost in 1958 when it crashed at the end of the runway after failing to take-off and exploded killing the pilot.

Even before the SR53's first flight it was obvious that it was too small to carry the required interceptor modern radar and missiles. A more powerful derivative, the SR177, was planned. However, as stated above, this was cancelled.

The last flight of XD145 was in 1959. It was delivered to Cosford in 1982. The engines were one 7.3kN (1640lb) thrust de Havilland Spectre rocket and one 35kN (7868lb) Armstrong Siddeley Viper turbojet. Maximum speed 1144kt (2120kph, 1317mph) at 40000ft (~12200m).

English Electric Lightning F.1.P.1B XG337



Photograph 2023-11-30.

The display Lightning F.1.P.1B XG337 first flew in 1959, its last flight was in 1969, transferred to Cosford in 1983. The Lightning position, pointing nose up, looks impressive and provides a good plan view, but almost impossible to photograph side on.

The English Electric Lightning was the first and last all-British supersonic fighter interceptor aircraft that served the RAF during the 1960s to the late 1980s. Other users were the Kuwait Air Force and the Royal Saudi Air Force. The single-seat fighter was capable of a top speed above Mach 2.

It was designed, developed, and manufactured by English Electric. English Electric later merged with other aircraft manufacturers to form BAC. The Lightning first flew in 1957. The all-weather Lightning had a new concept flight and engine

system integrated with armaments, radar and radio aids. It was also unique in that its two engines were vertically configured and staggered. Range was severely limited, the aim being to climb rapidly to height to defend the airfield from an attacker. The optimum climb profile being to 36000ft (11000m) in less than 3 minutes. The official Lightning ceiling was kept secret. It is believed to be 60000ft to 65000ft (18000m to 20000m), zoom altitude 70000ft (22000m).

A unique feature of the Lightning's design is the vertical, staggered configuration of its two Rolls-Royce Avon R24R turbojet engines within the fuselage with reheat (afterburner). Early Lightning models, which included the display F.1.P.1B XG337, had each engine rated at 50.0kN (11250lb) dry thrust, 64.2kN (14430lb) when using the four-stage afterburner. Later models had two Rolls-Royce Avon 301R afterburning turbojet engines with 56.4kN (12690lb) thrust dry, 72.8kN (16360lb) with reheat. The early models had a maximum speed of Mach 1.7 (1815kph, 1128mph) at 36000 feet (11000 m) in an International Civil Aviation Organization (ICAO) standard atmosphere and 650 knots (1200kph, 750mph) Indicated Airspeed (IAS) at lower altitudes.

Armament was nose-mounted twin 30mm ADEN cannons and two de Havilland Firestreak missiles mounted either side of the fuselage at the wing root leading edge. Alternatively, it could have an interchangeable fuselage weapons pack containing either another two ADEN cannon, or forty-eight 51m unguided air-to-air rockets.

Mikoyan-Gurevich MiG-21PF 503

The MiG-21 is a single-sear, all-weather, supersonic interceptor fighter. Faster than Mach 2. More were built than any other military aircraft since 1960. It is estimated that 13500 were built, used in 56 air forces and been involved in 30 wars. Some war examples are, Vietnam (1955-1975), the Arab-Israeli Wars (intermittently after 1960-1982), Iran-Iraq War (1980-1988), Afghanistan (1978-1989) and the first Gulf War (1991), also known as Desert Storm.



Photograph 2023-11-07.

AA-2 Atoll or AA-2-2 Advanced Atoll air-to-air missiles; or four UV-16-57 rocket launchers; or four S-24 240mm air-to-surface rockets; or four 500 kg/250kg bombs.

It entered service in 1959, evolving from cannon armament to air-to-air missiles or rocket pods. The fuselage has been modified, such as a longer nose with a variable air intake and new search/track radar.

The MiG-21PF 503 of the Hungarian Air Force on display was powered by a Tumansky R-13-300 jet with afterburning. Maximum speed 1203kt (2230kph, 1385mph) at 36000ft (10973m). Armament consisted of a GSh-23L 23mm belly gun pod with 220 rounds and a choice of either; four

Armstrong Whitworth Argosy XP411



Photograph 2008-08-24.

The Armstrong Whitworth Argosy was a British post-war civil (AW.650) and military (AW.660) transport/cargo aircraft. It was the last aircraft produced by Armstrong Whitworth Aircraft. Its first flight was in 1959. The first production military RAF Argosy C.1 flew in 1961.

The RAF viewed the aircraft as a replacement for the Vickers Valetta. The RAF ordered 56 aircraft which they operated with four crew members. The attraction to the RAF was its ability to transport 69 troops, 48 stretcher cases, or 13000kg (29000lb) cargo. It was a high-wing, four-engine aircraft.

An unusual design in that it had a tailplane on twin booms that extended from the wing inner engine nacelles. This left the rear of the aircraft clear for two large clam shell type cargo doors that opened on each side for easy loading. The spacious interior allowed it to carry military items such as the then operational Saracen six-wheeled armoured personnel carrier and 105mm (4.13in) howitzer artillery. The military version had the nose door sealed to accommodate weather radar and its radar dome. The strong tricycle undercarriage permitted take-off and landing on unprepared airstrips.

The military Argosy had four 1820kW (2440hp) Rolls-Royce Dart RDa.8 Mk 101 turboprops driving 4 blade Rotol propellers. It had twice the range of the civil version at 2824nm (5230km, 3,250mi).

Westland Wessex HC.2 XR525

The Westland Wessex was a British licence built development of the American Sikorsky H-34 or S-58. An important change was replacing the Sikorsky's piston engine with a turboshaft Napier Gazelle engine. Later variants, such as the HAS.3 and the displayed HC.2 Wessex, had two 1007kW (1350hp) Rolls-Royce Gnome turboshaft engines connected to a coupling



Photograph 2023-11-07.

range 415nm (770km, 478mi). Armament was a 7.62mm general purpose machine gun that could be mounted at the cabin door.

Bristol 188 XF926



Photograph 2012-10-03.

Three 188s were built. Two flew, one was used for ground tests. The prototype 188, XF923, first flew on the 14th April 1962 making 19 flights. The display aircraft, XF926, is the sole survivor that first flew in the 29th April 1962 and made 51 flights before research ceased in January 1964. It was delivered to Cosford in 1972. XF926s highest speed was Mach 1.88 at



Photograph 2012-10-03.

gearbox. The extra power was needed to carry up to 16 troops, or a 2000kg (4409lb) underslung load. Other versions included the HAR.2 for RAF search and rescue and the improved anti-submarine HAS.3 for the RN that came into service in 1967. It had more engine power, improved radar, avionics, navigational and weapons systems. It was usually deployed on amphibious assault ships, such as the commando carrier HMS Albion that was converted from an aircraft carrier in 1962. The displayed HC.2 had a maximum speed of 115kt (212kph, 132mph)

The 188 was a twin engine, high speed, research aircraft built mainly of stainless steel. Its purpose was to study the effect of heat on aircraft at high speed. A special cockpit refrigeration system was installed to protect the pilot. Data collected could be transmitted to ground for immediate evaluation. The two 188s were powered by 62kN (14000lb) thrust de Havilland Gyron Junior engines, the first British jet built for operation at prolonged supersonic speed. Experience using this engine was utilised when building the Rolls-Royce/Snecma Olympus 593 engine for the Concorde.

36000ft (10973m). This was short of the required Mach 2 for the study. Fuel consumption was very high. Endurance was 25 minutes. This limited sustained supersonic flight thus limiting the study of prolonged kinetic heating. This defeated the aim of the study. The study was cancelled after a total of 70 flights (not all flights were test flights).

Hawker Siddeley HS126 series 2 Dominie T.1 XS709

First flown in 1962 the Hs125 was designed as a business passenger jet by de Havilland with two pilots and up to 8 passengers with

luggage, The RAF used it to replace the Vickers Varsity as a navigation and other rear facing crew training flying platform, particularly for the Hawker Siddeley Vulcan and Handley Page Victor. It was in RAF service for 46 years. The aircraft on display first flew in 1964, delivered to the RAF in 1965. Delivered to Cosford in 2011.

Boeing CH-47 Chinook HC.6A ZA718 BN



Photograph 2023-11-07.

The highly versatile and capable Chinook can be operated from land bases, or ships, from the Arctic to deserts or jungles. The aircraft is fitted with self defence equipment and may be armed.

Primary use is for troop carrying, resupply cargo and battlefield casualty evacuation (CASEVAC). Its triple-hook external load system, internal cargo winch/load system, plus powerful engines enable it to lift a wide variety freight. complex underslung or internal freight, including vehicles. It can

carry up to 55 troops or up to approximately 10 tonnes of mixed cargo. Secondary roles include search and rescue (SAR) and military aid to civil authorities. The Chinook is operated by two pilots and two crew, plus specialists when required.

The Chinook on display was among the first ordered by the RAF in 1978. Known as Bravo November (BN), it is the RAF's most famous helicopter. The aircraft has served in many conflicts, including in the Falklands. 25th May 1982, while airborne ZA718 Bravo November was the sole surviving Chinook when the MS Atlantic Conveyor was sunk with the loss of the other Chinooks. Other places used include the UK, Germany, the Balkans, Iraq, Afghanistan and Lebanon. The helicopter is powered by two Honeywell T55-GA-721 turboshaft engines, each 2796kW (3750hp). Maximum speed is 159kt (295kph, 183mph). Maximum altitude 18500ft (5600m). Armament consists of two M134 Miniguns, one in each side window and one M60 machine gun on the rear ramp.

Hunting H.126 XN714



Photograph 2023-11-07, including insert.

The H.126 was an unusual looking, one off, single-seat, research aircraft capable of flight at very low speed. In the 1960s, there was a lot of interest in vertical and short take-off and landing technology. The H.126 XN714 was built in response to a 1959 Experimental Requirement E.R.189D contract to study the use of jet flaps for Short Take-Off and Landing, commonly called STOL. The contract was for two aircraft, but only one was built.

The jet flap used 60% of the jet engine efflux (or exhaust), via nozzles, through the flap system of a wing, thereby providing high lift at high flap deflections and low air speed control. The H.126 achieved flight at speeds as low as 28kt (51.5kph, 32mph), Another 10% of the engine's exhaust was channelled through small nozzles

in the wing tips and tail to provide control at low air speed. A side effect was that there was a violent wing drop at the stall. Not to be unexpected with loss of high lift at low air speed. Due to impracticability of the complex nozzle and ducting system and adverse effect on engine power, the jet flap was not developed further. The research was done at RAE Bedford. Its engine was one 17.8kN (4000lb) Orpheus BOr.3 Mk805.

XN714s last flight was in November 1967, placed in storage in 1970, struck off charge in 1972, delivered to Cosford in 1974. Believed going to Aerospace Bristol museum early 2024.

Hawker Siddeley Andover E.3A XS639



Photograph 2007-01-21.

The Hawker Siddeley HS780 Andover is a twin-engined turboprop military transport aircraft that was developed from the Avro-designed Hawker Siddeley 748 airliner. The Andover (Avro 748MF) differed from the civil HS748 airliner in that it had an upswept rear fuselage with rear cargo doors and a rear loading ramp, a kneeling landing gear for easier ramp loading and more powerful 2420kW (3245shaft hp) Rolls-Royce Dart Mk 301s engines. It also had larger four-bladed Dowty Rotol constant-speed, fully-feathering, reversible-pitch propellers.

The larger propellers and therefore the engines, had to be placed 47cm (18 inches) further from the fuselage on the wings. However, the wings were reduced by the same amount to keep the same wingspan as the HS748. A dihedral tailplane was also fitted to keep it clear of the propeller slipstream. In simple terms dihedral is the upward angle at which the wings or tailplanes join to the fuselage and relates to the lateral stability of the aircraft. An opposite downward angle is anhedral.

In RAF service it was designated the Andover C.1. Later types were the CC.2 VIP transport and Andover E.3 electronic calibration aircraft. They were in service with the RAF from 1963 to 2015. Maximum speed was 278kt (515kph, 320 mph) at 15000ft (4572m). Service ceiling 24000ft (7300m).

The display aircraft XS639 was built as a C.1 in 1963. It was one of eight redundant Andover C.1 aircraft converted in 1976 to E.3/E.3A standard for landing aid, radar check and calibration at British military airfields and in Germany, Cyprus, Belize and Gibraltar. It was also still used for transport duties. Its last flight was to Cosford in 1994.

Short Belfast C.1 XR371 Enceladus

The Belfast was a four-engine, high wing, long-range transport and heavy lift, turboprop freighter. Designated a Short Belfast C.1, only 10 were built, all for the RAF. Production was from 1964 to 1968. It was the first aircraft to be fitted a Smiths Aerospace fully automated landing system from the start of development.

Five Belfasts were sold in 1977 to Transmeridian Air Cargo (later HeavyLift Air Cargo) for commercial use. Some of these were later chartered during the Falklands War and again to



Photograph 2023-11-07.

The Belfast is powered by four 4273kW 5730hp Rolls-Royce Tyne RTy.1 Mk 515 turboprop engines driving four-bladed Hawker Siddeley Dynamics 4/7000/6, constant-speed, fully feathering propellers. Maximum cruise speed was 292kt (542kph, 336mph). Range was 4609nm (8536km). Service ceiling 30000ft (9144m).



Photograph 2023-11-07. A Rolls-Royce Tyne RTy.1 Mk 506 turboprop.

Hawker Siddeley (Folland) Gnat T1 XR977



Photograph 2012-10-03.

The Folland Gnat F.1 was a retractable tricycle undercarriage, single seat, single engine, swept high wing light fighter. It was powered by a 20.9kN (4705lb) Bristol Siddeley Orpheus 701-01 turbo jet. Maximum speed was 604kt (1120kph, 695mph) at 20000ft (6096m), range 434nm (800km, 500mi). Armament two 30mm Aden guns and two 227kg (550lb) bombs or 18 (75mm (3in) rockets.

The F.1 was not used by the RAF although some were flown by the Finnish Air Force and 213 for the Indian Air Force, 175 were built under licence by Hindustan Aircraft

Limited, India. There was more success with the tandem two seat Folland Gnat trainer after take-over of the company by Hawker Siddeley. Forty-one T.1 trainers were bought by the RAF. The T.1 is famous as the aircraft chosen for world-famous RAF Red Arrows Display Team.

Gnat T1 XR977 was one of a batch of 41 trainers ordered by the RAF, built by Hawker Siddeley. Its first flight and delivery to the RAF was in 1964. Transferred to the Red Arrows aerobatic team in 1976 with the last Gnat Red Arrows display in 1979. Its last flight was as one of a number of ex Red Arrows Gnats transferred to No. 2 School of Technical Training, RAF Cosford. Officially donated to the RAF Museum in 1998. The aircraft was photographed in its Red Arrows colour scheme on the 3rd October 2012. It is no longer on display.

BAC Vickers VC10 XR808

The VC10 was designed as a long range airliner capable of operating from short runways at hot and high airfields as found in Africa and the Far East. The rear engines meant a very quiet

cabin. It had a high cruising Mach number. However, this came at the cost of high fuel burn in the cruise, which may explain why there were few overseas customers.

A later development, first flown in 1964, was the Super VC10. It was fitted with a longer fuselage and an extra fuel-tank in the tail fin. The latter necessitated moving each engine pair 27cm (11in) outboard as well as a 3-degree twist, to stop tailplane buffeting and fatigue issues when using the thrust reversers. There was also 3% wing leading edge extension, which improved low speed lift and reduced high Mach drag. The RAF later added Vickers VC10s and Vickers Super VC10s bought from civil operators that were re-fitted to support air-to-air refuelling operations as the VC10 K.2 and K.3, respectively.



Photograph 2018-07-14.

The VC10 at Cosford was part of an initial order of five aircraft for the RAF to specification C.239/60 for 14 VC10 C.1 hybrid passenger/cargo transport aircraft assembled by BAC. The block serial numbers for the five aircraft were XR806 to XR810. XR808's first flight was in June 1966, delivered to RAF Transport Command a month later. During 1996 it was converted to a C.1K tanker/passenger aircraft with refuelling pods under each wing. Its final flight was in 2013 after 47 years and 3 months service and 43866 hours 50 minutes total airframe flying time. In 2015, it was dismantled and delivered by road to Cosford

where it was reassembled.

VC10 C.1 type 1106 had four 22500lb thrust Rolls-Royce Conway RCo43 engines, a maximum speed 504kt (933kph, 580mph) and range of 6260nm (11631km, 7227mi). It carried 5 crew and 150 troops or 78 stretcher cases.

BAC TSR2 XR220



Photograph 2023-11-07.

The TSR2 (Tactical Strike and Reconnaissance Mach 2) never progressed past the prototype stage. Cancellation of the project caused considerable controversy. It was a revolutionary and technologically advanced aircraft that was cancelled amid rising costs and inter service disagreements with considerable loss to British aviation technology.

The initial motivation was a replacement for the high speed, low-level strike and reconnaissance English Electric Canberra

developed soon after World War II. The TSR2 was intended as a strike and reconnaissance aircraft able to attack a forward battle area at low altitude and high speed, as well as rearward high-value targets with nuclear or conventional weapons, also as a high-altitude, high-speed stand-off aerial reconnaissance aircraft.

The first prototype, XR219, had its maiden flight on the 27th September 1964 and completed 24 flights by the 31st March 1965 before the programme was cancelled on the 6th April 1965. The display aircraft, XR220, was the second prototype which never flew, was delivered to the Cosford museum on the 4th May 1975. It was powered by two 136kN (30610lb) thrust Rolls-Royce Olympus 22R 320 turbojets. The engine was designed for the TSR2. The engine was fitted with an afterburner which gave an approximate 50% thrust increase. It had six low compression stages, seven high compression stages and two single stage turbines. There was also water injection system to restore take-off performance in hot climates.



Photograph 2007-01-21. Rolls-Royce Olympus 22R 320 turbojet.

Hawker Siddeley Kestrel F(GA) 1 XS695



Photographs 2023-11-07. Adjustable nozzles seen on the right and tri-nation roundel.

Hawker began the development of a vertical take-off and landing (V/STOL) aircraft as a private project called the Hawker P.1127. Its success resulted in a tripartite agreement in 1962 between the United Kingdom, the USA and the then West Germany to further investigate in service use with nine Kestrels. XS695 was one of them tested at West Raynham in Norfolk. The unique roundel marking, a combination of the three nations air forces, is partly visible on the wing in the right photograph.

The design was revolutionary. Rotating jet nozzles were used to vector the thrust from the Bristol Siddeley Pegasus turbofan engine so that the aircraft could take-off vertically, hover, move sideways, forward and slowly backward. The success of the project led to the operational Harrier.

The first flight of XS695 was on the 17th February 1965. After test flying it was passed to the RAE at Bedford then to the A&AEE. Its last flight was the 1st March 1967. After being sent to various establishments for study and research it arrived at Cosford November 2001 for restoration that was completed in 2014. Six of the nine went to the USA for further research.

Hawker Harrier GR.3 XZ997

The Harrier served with the RAF from 1969 to 2006. World famous as the first vertical take-off and landing (VTOL) jet fighter. It could also operate from short, rough strips of ground and

hidden in camouflaged hides. Apart from being a single seat fighter, RAF Harrier variants were also used as close air support ground attack and reconnaissance aircraft. The Harrier GR.3 was a development of the Harrier GR.1, being fitted with improved attack sensors, electronic countermeasures and a more powerful engine than the GR.1. GR indicating ground attack and reconnaissance (with its distinctive nose). The GR.3 also served with the RAF in Germany, Norway and Belize. There were numerous other variants, including two-seat trainers, with aircraft serving with the Royal Navy, US Marine Corps, Spanish Navy, Indian Navy and Royal Thai Navy.



Photograph 2023-11-07.

The display Harrier was built in 1982. 4th May 1982 it was one of 5 Harriers flown non-stop from St Mawgan to Ascension Island Wideawake Airfield. A distance of 4000nm (7402km, 4600 miles) in 9¼ hours, carrying two 1500l (330 gallon) ferry tanks and refuelled by Victor tankers. Later in May, along with other Harriers, it was taken on board HMS Hermes. It took part in numerous sorties at the Falklands. Deployed ashore to RAF Stanley July 1982. Returned to the UK October 1982 and time spent in Germany. Its last flight was August 1990, allotted to RAF

Museum September 1991. The aircraft had a 95.6kN (21500lbf) Rolls-Royce Pegasus 103 turbofan engine with four swivelling nozzles. Maximum speed was 634kt (1175kph, 730mph). Maximum altitude 51200ft (15600m). Armament, two 30mm ADEN cannon pods under the fuselage and five pylons for 2268kg (5000lb) consisting of a combination of bombs, rockets and missiles. A reconnaissance pod and two drop tanks could be fitted for extended range sorties.

BAe Harrier II GR9A ZG477



Photograph 2012-10-03.

The Harrier II GR.9A was the last evolved BAe Harrier. A single seat aircraft that could function in extreme environments, day and night, low and high level. Apart from operating from air bases, it could also still operate from aircraft carriers, short, rough strips of ground and hidden in camouflaged hides.

The last flight of all RAF Harriers was in December 2010, due to defence cuts. The cuts included UK fleet flagship HMS Ark Royal that was home to Navy Harrier GR7s and 9s.

Maximum speed was 575kt (1065kph, 662mph). Service ceiling 50000ft (15000m). Combat range 300nm (560km, 350mi). Ferry range 1758nm (3256km, 2023mi) with four drop tanks. Armament was considerably varied. Two 25mm ADEN cannon pods could be fitted under the fuselage, but never fitted in service. It had 8 underwing pylon stations (2 were intended for air-to-air missiles only) with a capacity of 8,000 lb (3,650 kg) of payload. There was provision to

carry combinations of: Air-to-air missiles such as AIM-9 Sidewinders; air-to-ground missiles such as the AGM-65 Maverick; rockets, for example, LAU-5003 rocket pods with CRV7 70mm rockets, or Matra rocket pods with SNEB 68mm rockets; bombs such as Paveway II/III/IV, Enhanced Paveway II/II laser-guided bombs; and unguided 240kg (540lb) and 450kg (1000lb) bombs. As well as an under the fuselage reconnaissance pod, such as the Joint Reconnaissance Pod.



Photographs 2012-10-03. Notice the different nozzle compared with the Kestrel and two outer hard points on the right wing (repeated on the left wing).

The display BAe Harrier GR9A ZG477 started as a new build Harrier GR.7 with enhanced night attack capability. It was one of 34 with a Rolls-Royce Pegasus 105 turbofan engine, composite materials and BAe and McDonnell Douglas made component. Its first flight was in 1990 and delivered to the RAF. In 2004 it underwent conversion to GR.9A standard. This included avionics and weapons update, the installation of the more powerful 106kN (23800lb) thrust Pegasus Mk 107 engine and a terrain referenced navigation system as part of an Integrated Weapons Programme. Its last flight was in 2010 after 4191.25 hours airframe hours and 3969 landings. Transported by road to Cosford in 2011.

General Dynamics F-111F-CF Aardvark 74-0177 LN177



Photograph 2023-11-07.

Force (USAF) at AF Lakenheath.

The F-111 is a two-seat, all weather, fighter bomber and the first variable-geometry (swing wing) aircraft to enter service in 1967. It was used extensively in the Vietnam War (1955-1975). The wing is swept forward for low speed, such as take-off and landing, swept back for supersonic flight. The F (Aardvark, literal translation- earth pig) variant had improved navigational and digital computer systems, an improved wing and landing gear, plus more powerful engines. The display aircraft is in the markings of 492d Fighter Squadron United States Air

Main armament was Paveway laser-guided bombs and defensive Sidewinder air-to-air missiles. It has two Pratt & Whitney TF30-P-100 engines. Maximum speed in excess of Mach 2 at

1425kt (2638kph, 1640mph). It was in operation in the Gulf War in 1991. The last flight of F-111 was with the Royal Australian Air Force on the 3rd December 2010.

Hawker Siddeley Nimrod MR.1 XV249



Photograph 2023-11-07.

The Nimrod was based on the de Havilland Comet. The first two prototypes used two unsold Comet 4C airframes. They could be identified by them still having all the cabin windows of the 4C. The aircraft's primary use was for maritime patrol. The first operational version was the MR.1. Equipment included sonar, radar and magnetic anomaly detection (MAD). Its tactical computer analysed the data for automatic display on visual display screens. Forty-six were ordered during 1967, the first one delivered in 1969, with the first service aircraft (XV230) being delivered in October

1969. These had a reduced number of cabin windows more fitting with internal equipment requirement. It was in service from 1969 to 2011.

Three MR.1 Nimrods, with the designation R.1, were modified for electronic signal intelligence (SIGINT). That is, intercepting electronic communication and radar transmissions. Externally they differed from the MR.1 in that they had numerous additional external aerials and did not have the rear MAD boom. They also had internal rotating dish aerials in the weapons bay, in the rear fuselage and in the front of the wings. One R.1 was forced to ditch in Moray Firth in 1995. The crew of seven survived, but the salvaged aircraft was a write-off. It was replaced by converting a MR.2. R.1 countermeasures were a missile approach warning system (MAWS), Bofors BOZ 107 chaff and flare dispenser pods, separate AN/ALE-40 flare dispenser and towed radar decoy.

From 1975, 35 Nimrod MR,1 aircraft were upgraded to MR,2. The upgraded equipment included: EMI Searchwater radar, GEC-Marconi AQS-901 acoustic processor and associated sonobuoys, Yellowgate Electronic Support Measure system, Electro Optical System (infra-red and visual detection equipment), MAD, MAWS and Link 11 datalink. equipment.

MR.1 and MR.2 armament was Acoustic homing torpedoes (Mks 30, 44, 46 and Stingray), Nuclear bombs, AIM 9 sidewinder air-to-air missiles, wing mounted chaff and flare dispensers, flares and smoke and flame floats.

The R.1 has four wing embedded 54.9kN (12140lb) Rolls-Royce RB168-20 Spey turbofan engines. Maximum speed 360kt (665kph, 415mph). Cruise speed 426kt (787kph, 490mph). Range 4501-5010nm (8340-9265km, 5180-5766mi) The Nimrod R.1 was in RAF service from 1974 to 2011.



Photograph 2012-10-03. A Rolls-Royce Spey RB.163 505-5, similar to the Nimrod engine.

The aircraft on display was one of the three R.1s. First flight was in 1970. Delivered to the RAF in 1971 as a MR.1. Converted to MR.2 1985. 1992 placed in storage. 1995 refurbished and prepared for conversion to R.1 to replace the ditched aircraft. R.1 conversion completed in 1997. Last flight July 2011. Delivered by road to Cosford 2012.

SEPECAT Jaguar GR.1 ACT (Active Control Technology) XX765



Photograph 2023-11-07.

The Jaguar was an Anglo-French project to develop an advanced training and strike aircraft. It entered RAF service in 1973, retired in 2007. The first prototype Jaguar flew in 1968, it was also the first flight of the Ardour engine which was developed along with the aircraft.

The Jaguar is a single seat, high wing, attack, ground support and nuclear strike jet aircraft. It is powered by two Rolls-Royce Turbomeca Adour two-shaft turbofan engines with afterburner. Two engines were preferred for

survivability. Low bypass was needed for high thrust for take-off, supersonic flight and low-level spurts. Low bypass means the engine obtains most of its thrust from the jet engine core discharge. A jet engine that obtains most of its thrust from the surrounding ducted fan is referred to as high bypass. Modern jet airliners derive most of its engine thrust from the mass of air pushed back by the large fan. The ratio of fan thrust to jet core is as high as 12:1.

Ease of maintenance and quick engine change were important requirements for the RAF Jaguars. RAF Jaguars entered service with the 22.75kN (5110lb) thrust Mk.102 and re-engined with the Mk.104 around 1981. Maximum speed was Mach 1.1 at sea level (917kt, 1699kph, 1056mph). Service ceiling 46000ft (14000m). Armament was widely varied rockets (example Matra), missiles (example, AIM-9 Sidewinder) and bombs (example WE177A nuclear), also two 30mm (1,181) DEFA cannon.



The display XX765 first flew in 1975. It was withdrawn from RAF service in 1978 to test the feasibility of Active Control Technology (ACT) by British Aerospace (BAe). The aircraft's normal control rods were replaced with a 'fly-by-wire' (FBW) control system, using four independent computer-controlled electrical channels to relay instructions to the flight surfaces.

Photographed 2012-10-03 at Cosford. Believed to be a 6Sqn SEPECAT Jaguar GR.3 with 6Sqn blue tail badge and ES.

Other test modifications and tests were made, such as adding large leading-edge strakes, or protrusions (also known as a leading-edge root extension (LERX)) to move the centre of lift forward and adding ballast to the rear fuselage to move the centre of gravity aft. This improved the lift to drag ratio, which made the tail plane more efficient, allowing smaller lighter engines,

therefore better fuel efficiency and lower aircraft weight. The overall aerodynamic instability of the aircraft was countered by almost instantaneous computer-controlled flight commands resulting in enhanced manoeuvrability. In essence, without computer control the aircraft would be difficult to fly, if not impossible and downright dangerous.

XX765 was withdrawn from use and stored in 1984. 1986 BAe used it for various ground tests and later Loughborough University. 1996 it was presented to Cosford.

Scottish Bulldog T.1 XX654



Photograph 2023-11-07.

The Bulldog was a two side by side seat, fixed undercarriage, low wing monoplane, primary military trainer developed from the civilian Beagle Pup.

Apart from RAF service from 1975 to 2000, they were also used by foreign air forces. Over 260 were built.

The display Bulldog was built in 1974, flew until 2000, delivered to Cosford in 2004. It served at Central Flying School RAF



Photograph 2007-01-21.

FMA 1A 58 PUCARA A-515/ZD485

The Fábrica Militar de Aviones (FMA) IA 58 Pucará (meaning fortress) is an Argentine reconnaissance, ground-attack and counter-insurgency (COIN) aircraft. It is a two seat, low-wing, T tail, wing mounted twin-turboprop, all-metal monoplane with retractable landing gear and zero/zero Martin Baker Mk 6 ejection seat. It can operate from unprepared strips. First flight was in 1969. It is powered by two 729kW (978hp) Turbomeca Astazou XVIG turboprop engines. Maximum speed 270kt (500kph, 310mph) at 9800ft (300m). Service ceiling 33000ft (10000m). Twenty-four were

deployed to the Falklands in 1982.

The display aircraft A-515, built early in 1982, was one of 12 flown to the Falklands on or after the 15th May. It was one of the last to arrive to reinforce the force, all of which were either destroyed or captured by the British forces. June 10th, A-515 was airlifted by Chinook ZA707 to the SS Atlantic Causeway arriving in the UK on the 27th July for flight trials and handling evaluation. The conclusion was that it is a robust and capable aircraft. 1983 it was flown to Cosford and later repainted in its original light camouflage colour scheme. It was officially donated to the RAF Museum in 1998.

Panavia Tornado PO2 XX946

The Tornado is a two seat, twin engine, variable-sweep wing, multirole combat aircraft. It was jointly developed and manufactured by the BAC in Britain, MBB in West Germany and



Photograph 2012-10-0307.

speed Mach 2.2 above 36000ft (10980m). General Tornado armament was widely variable, including cannon (two 27mm Mauser) and 8165 (18000lb) assortment of missiles (air-to-air, air-to-ground, cruise and anti-radiation) and bombs (laser guided cluster, runway cratering and tactical nuclear).

The RAF versions were: GR.1 early standard air to ground strike aircraft; GR.1A tactical reconnaissance. All electronic (no conventional film cameras). All infra-red images were recorded on videotape. The reconnaissance equipment replaced the guns. Otherwise it kept its ground attack role; GR.1B maritime strike. Armed with Sea Eagle anti-shiping missiles. It replaced the Buccaneer; F.3 air defence fighter. It had a lengthened fuselage to carry Skyflash/AMRAAM air to air missiles in tandem pairs, more internal fuel and additional avionics. The longer nose housed British airborne interception radar. Automatic wing sweep meant the wing is always in the best position for the current manoeuvre. It had a built in retractable air-to-air refuelling probe.

The Cosford Panavia Tornado PO2 XX946 was the first of four British prototypes. Ground testing began in August 1974, first flight was 30th October 1974. In 1976 it was painted in standard RAF camouflage scheme with tri-national roundels. From its first to last flight on the 5th February 1986, it flew just over 660 times, reaching its highest altitude of 63007ft on the 7th December on its 601st flight. 27th January tri-national roundels were replaced by RAF roundels and No. IX Squadron markings. In 1994 it was donated to the RAF Museum, arriving at Cosford in 2003.



Photograph 2018-07-14.

Aeritalia in Italy. It first flew in 1974, serving in the RAF from 1979 to 2019. There were three basic Tornado variants; the IDS (interdictor/strike) fighter-bomber, the ADV (air defence variant) interceptor and the ECR (electronic combat/reconnaissance) aircraft. Its multirole design meant it was able to replace several different fleets of aircraft. Tornados also flew with the Royal Saudi Air Force.

GR.1 specifications are two 75.3kN (16920lb) wet (with afterburner) thrust Turbo-Union RB199 turbofans, maximum

Sikorsky MH-53J Pave Low III 68-8284

Built as a Sikorsky S-65/HH-53C-SI it was a USAF long-range combat search and rescue helicopter. It was also used for covert operations, including Special Forces insertion and extraction. Officially known as the Stallion it was nicknamed the Super Jolly Green Giant.

Donated by the USAF, number 68-8284 was one of nine MH-53Hs converted to MH-53S Pave Low III (Pave = Precision Avionics Vectoring Equipment, an all-weather sensor

system). The conversion consisted of uprated engines, more armour, toward-looking infrared radar, a global positioning system (GPS), Doppler navigation systems, terrain-avoidance radar, on-board computer and integrated avionics. Number 68-8284 was withdrawn from service in Iraq in September 2008. It could carry 27 troops, had a range of 600nm (1104km, 690 miles) and maximum speed 143kt (265.5kph, 165mph). Armament is a combination of three 7.62mm mini guns or 12.7mm (0.50in) calibre machine guns mounted on left and right sides and the ramp.



Photograph 2023-11-07. MH-53J interior and machine gun.

BAe Experimental Aircraft Programme (EAP) ZF534



Photograph 2023-11-074.

ZF534 was the only EAP built. It was an advanced technology demonstrator. Its maiden flight was on the 8th August 1986 to May 1991 when it performed its last of 259 test flights. In 2012 it was brought to the Cosford RAF Museum to be officially donated in February 2014.

Built by BAe (forerunner of BAE Systems) it had a cranked delta wing and canard foreplanes with Panavia Tornado fin, tail and two Turbo Union RB199 turbofan engines. A cranked wing has high sweepback from the wing root with less sweepback further away

from the wing root, similar to a broken arrow in appearance. The high inboard sweep provides low drag at supersonic speeds. Less outboard sweep provides better subsonic speed handling and manoeuvrability. However, it does suffer from higher landing speed.

The aircraft was aerodynamically unstable. Combined with new fly-by-wire (FBW) flight control technology it improved agility, enabling it to fly at a positive angle of attack of up to 35 degrees (still exceptional today). It also had revolutionary new technology carbon-fibre composite wings. It was also a testbed for new electronic cockpit displays, today known as a glass cockpit. It was a forerunner of the Eurofighter Typhoon.

Maximum speed was in excess of Mach 2. Mach 1 is the speed of sound at international standard atmosphere at sea level at air pressure 1013.25hPa and temperature 15°C. This is equivalent to 340ms⁻¹, 661kt, 760mph and 1224kph. Mach 2 is 1322kt, 1520mph and 1448kph.

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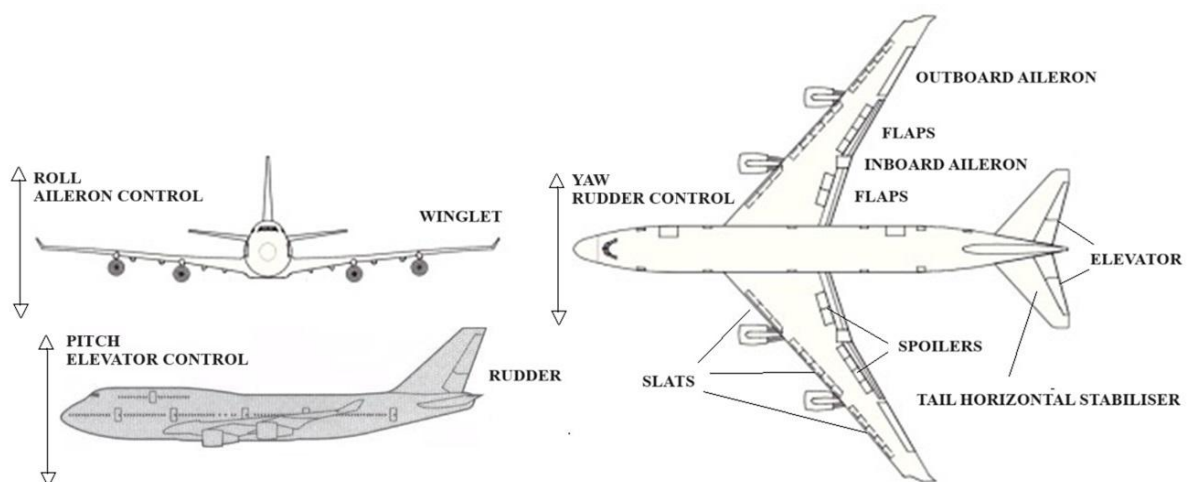
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GLOSSARY

Flight controls



Primary

Aileron: The aileron, located hinged to the rear of each aerofoil (wing) near the wing tips, provide lateral control, or roll. That is, opposite wing up or wing down. Left elevator up and right down, the aircraft rolls to the left. Opposite ailerons and the aircraft rolls to the right. On larger aircraft with longer wings, there is an outboard and an inboard aileron. The larger outboard ailerons are used at slower speeds for maximum effectiveness. Inboard ailerons are used at high speed when less course movement is required. Although in practise inboard ailerons are always in use.

Elevator: The elevator, located hinged to the rear of the tail plane, provide longitudinal control, or pitch. That is, vertical nose up or nose down. Elevator raised causes upward pitch. Elevator lowered caused downward pitch.

Rudder: The rudder, located hinged vertically on the tail fin, provides directional control, or yaw. Rudder turned to the left causes the aircraft to yaw, or turn, to the left. Rudder turned to the right causes the aircraft to yaw, or turn, to the right.

Secondary

Flap: A flap is a device at the rear of each wing that extends outward or tracks. There are numerous different types of flaps. Their aim is to increase lift and lower the stalling speed of the wing at higher angles of attack by improving the laminar (smooth) air flow over the wing, particularly useful at take-off and landing. Facilitating shorter take-off and landing distances. A disadvantage is that they also increase drag. They are retracted in normal flight to minimise drag.

Slat: A slat is a device on the leading edge of a wing that extend forward leaving a gap between the slat and the wing, working in conjunction with flaps. It improves the laminar (smooth) flow of air over the wing and allows a higher angle of attack at slower speed with increased lift. The benefits are the same as flaps. They are also retracted in normal flight to minimise drag.

Spoiler: Spoilers are called many things, such as, air brakes and lift dumpers. Spoilers are panels on the top of wings that can be deployed in flight, or on the ground. An aircraft can have spoilers only used on the ground and inflight spoilers that are used in the air and on the ground. Extended in flight they can act as speed brakes that help to increase the rate of descent and be deflected differentially to roll the aircraft, that is, behave like ailerons. On landing deployment is a quick way to dump lift and increase drag, which increases braking efficiency.

Trim tab: A trim tab is a small flap located on the rear of control surfaces, namely ailerons, elevators and rudder. The purpose is to fine tune the balance of the device to reduce the manual force required to maintain balanced flight. These days computers do all the work.

Angle of attack: In simple terms, it is the angle of the aerofoil, or wing, to the direction of airflow. Normally about 3° nose up in level flight. The critical angle of attack when the airflow over the upper wing surface becomes detached, or turbulent, is about 15° at which point the aircraft stalls.

Stall: When the angle of attack exceeds maximum lift. The airflow over the upper wing surface becomes detached, or turbulent with the sudden loss of lift and increased drag. The speed at which this occurs is known as the stalling speed. Unless corrected, the result is rapid loss of altitude. Near the ground this is dangerous. A stall can also result in a wing drop and spinning of the aircraft.

Engines

Piston engine types

Radial: The engine cylinders are arranged in circle around a spinning crankshaft. The pistons can be in one or two rows.

Rotary: The same as a radial engine except the cylinders and crankcase rotate around a fixed crankshaft.

In-line: The cylinders are in a line or row, or rows or banks along the crankcase.

Turboprop: A turbine drives the propeller.

Jet engines

A compressor feeds compressed air into a combustion chamber where the fuel is ignited to cause a controlled explosion of gas which provides thrust.

Turbojet: The air is forced through the core of the engine.

Turbofan: Most of the air is forced backward by a large ducted fan.