

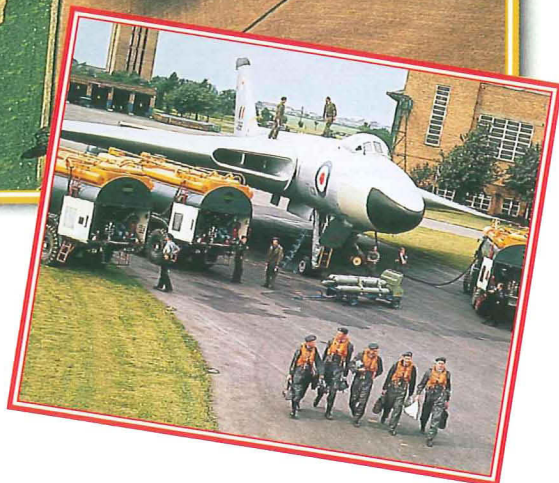
AVRO

VULCAN

● Strategic missile carrier ● Delta-wing bomber



WARPLANES
OF THE 1950s,
1960s AND 1970s



A major component of the Free World's Cold War nuclear forces, the majestic Vulcan ruled the skies for more than two decades. This enormous delta-winged jet was one of the most graceful and beautiful flying machines ever committed to the grim reality of nuclear deterrence. But the Vulcan also excelled as a conventional bomber, tanker and reconnaissance platform.

SAMPLE!

▲ First flown in 1955, the Avro Vulcan was to spearhead British nuclear and conventional bombing capability for more than a quarter of a century.

Vulcan to the fore

New frontiers in aerodynamic design were opened up by the Avro 698 Vulcan, the world's first large aircraft with a delta, or triangle-shaped, wing. When the Vulcan joined Britain's bomber force, it marked a quantum leap forward in technology. But in addition to its impressive performance the Vulcan gave the world a new look: it was one of the most exquisite and best-loved aircraft ever to take to the skies.

The prospect of atomic war was far from pleasing, however, and the Vulcan's

grisly assignment was to prepare for the worst and to retaliate if a nuclear attack came. This serious business was at first carried out with heavy and awkward atomic and hydrogen bombs, and later with a far-reaching, nuclear-tipped missile called the Blue Steel.

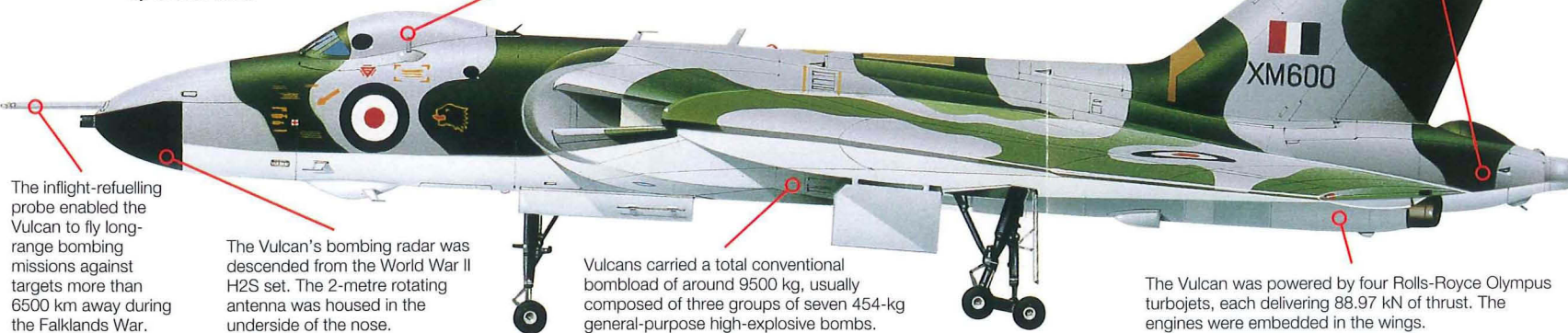
As a conventional bomber, the five-man Vulcan achieved dramatic success in the 1982 Falklands War. Vulcans also served as strategic radar reconnaissance aircraft before their retirement in the late 1980s.

VULCAN B.Mk 2

Vulcans were in the process of being retired when they were called into action during the Falklands War. They were used to bomb Port Stanley airfield in the longest raids that had ever been flown up to that time.

The Vulcan flew with a crew of five. The pilot and co-pilot sat on ejection seats beneath the canopy, with navigator, air electronics officer and radar operator facing to the rear behind and below the flight deck.

Upward and downward control of pitch was provided by four large elevators mounted inboard, between the ailerons and the exhausts of the Olympus turbojets.



The inflight-refuelling probe enabled the Vulcan to fly long-range bombing missions against targets more than 6500 km away during the Falklands War.

The Vulcan's bombing radar was descended from the World War II H2S set. The 2-metre rotating antenna was housed in the underside of the nose.

Vulcans carried a total conventional bombload of around 9500 kg, usually composed of three groups of seven 454-kg general-purpose high-explosive bombs.

The Vulcan was powered by four Rolls-Royce Olympus turbojets, each delivering 88.97 kN of thrust. The engines were embedded in the wings.



The Vulcan's unique delta wing made it highly manoeuvrable for such a large machine.

Prototype Vulcans had straight-wing leading edges. Production wings were kinked, a feature which helped eliminate buffeting in high-g manoeuvring at altitude.

The huge delta wing was the Vulcan's most outstanding feature, which made the aircraft highly agile at height.

The fairing on the tip of the fin housed a passive countermeasures antenna, but most of the defensive electronics were in the tailcone. This also housed a rear-warning radar and twin braking parachutes.

SPECIFICATION Vulcan B.Mk 2

- Type:** five-seat long-range bomber
- Powerplant:** four 88.97-kN Bristol (Rolls-Royce) Olympus turbojet engines
- Maximum speed:** 1038 km/h at 6096 m
- Range:** 5550 km on low-level mission with full bombload
- Weight:** maximum take-off 90720 kg
- Armament:** Blue Danube hydrogen bomb, Blue Steel nuclear cruise missile or 21454 kg of conventional bombs
- Dimensions:**

span	33.83 m
length	30.50 m
height	8.29 m
wing area	368.30 m ²

COMBAT DATA

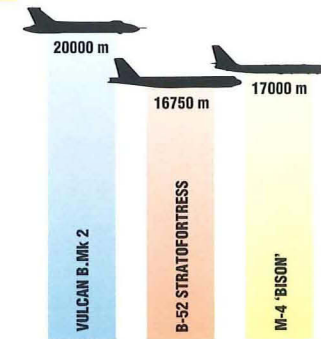
MAXIMUM SPEED

The first generation of strategic jet bombers were as fast as the fighters of the period, and were very hard to catch, particularly when flying high-level missions.



SERVICE CEILING

Bombers tend to have big wings, which enables them to operate at high altitude more effectively than fighters. The Vulcan's huge wing gave it a particular advantage. Even at the end of its career, a well-flown Vulcan at 12000 metres could prove a handful even for an F-15 Eagle during mock dogfights.



Vulcan nuclear strike profile

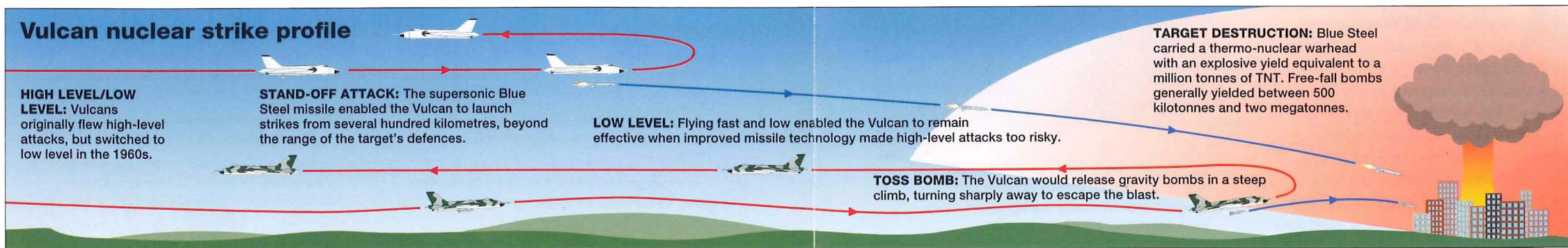
HIGH LEVEL/LOW LEVEL: Vulcans originally flew high-level attacks, but switched to low level in the 1960s.

STAND-OFF ATTACK: The supersonic Blue Steel missile enabled the Vulcan to launch strikes from several hundred kilometres, beyond the range of the target's defences.

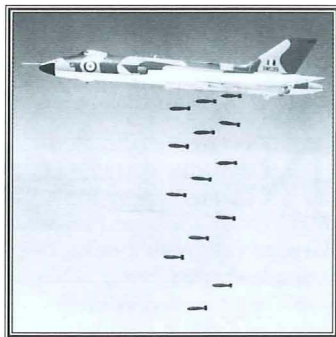
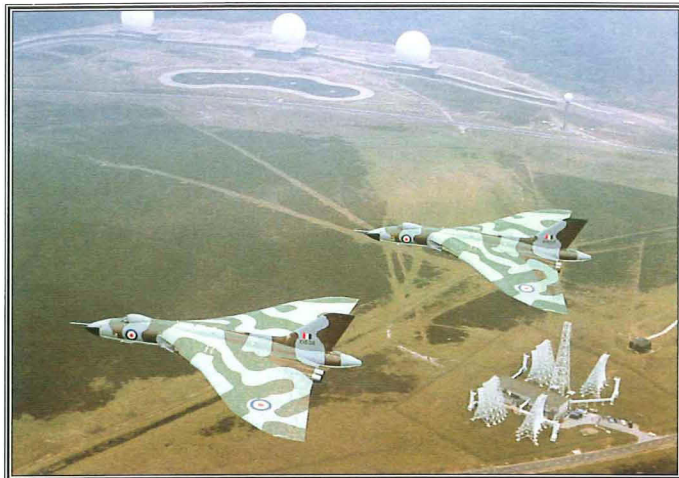
LOW LEVEL: Flying fast and low enabled the Vulcan to remain effective when improved missile technology made high-level attacks too risky.

TOSS BOMB: The Vulcan would release gravity bombs in a steep climb, turning sharply away to escape the blast.

TARGET DESTRUCTION: Blue Steel carried a thermo-nuclear warhead with an explosive yield equivalent to a million tonnes of TNT. Free-fall bombs generally yielded between 500 kilotonnes and two megatonnes.



AVRO VULCAN



▲ 'Iron' bomber

Although designed for high-level nuclear strike, the Vulcan was a capable conventional bomber. The maximum bombload of '500-pounders' was over nine tonnes.

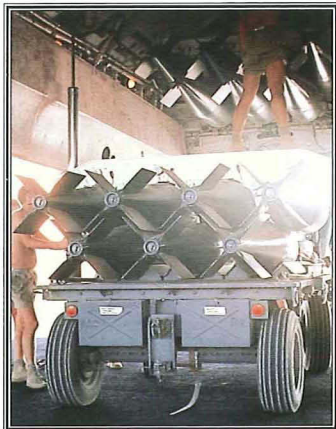
▲ Switch to low level

Development of Soviet air defences meant that in the 1960s the Vulcan's attack profile was changed to low-level penetration, and the men crewing the big bomber had to learn new skills.



▲ Stand-off strike

The Blue Steel nuclear missile meant that the Vulcan could attack key strategic targets up to 350 km away.



◀ Target Falklands

Armourers load 454-kg bombs into the belly of a 'Black Buck' Vulcan from the British base on Ascension Island.



◀ Conventional bomber

With weapons bay doors open, an Avro Vulcan banks away at the end of a bomb run.

FACTS AND FIGURES

- Early Vulcans were painted a stunning pure white to reflect nuclear 'flash'.
- The four Olympus engines produced as much power as 18 railway engines.
- Vulcan pilots had ejection seats, but in an emergency the other three crewmen had to bail out through hatches.
- The Vulcan's pilot sat 5 metres up and used a periscope to steer on the ground.
- The Vulcan could outmanoeuvre F-15s in high-altitude mock dogfights.
- Vulcans flew 12650 km to bomb the Falklands, at the time the longest straight-line combat missions in history.