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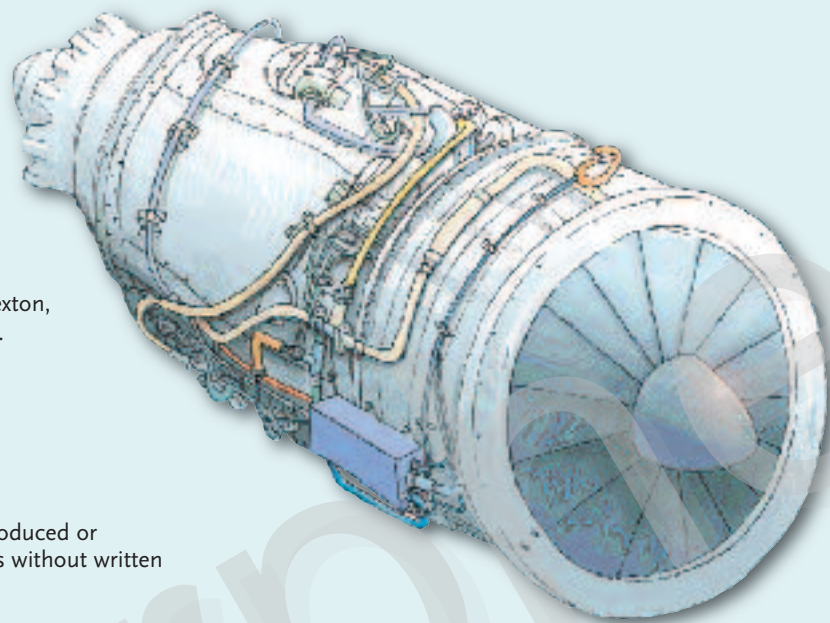
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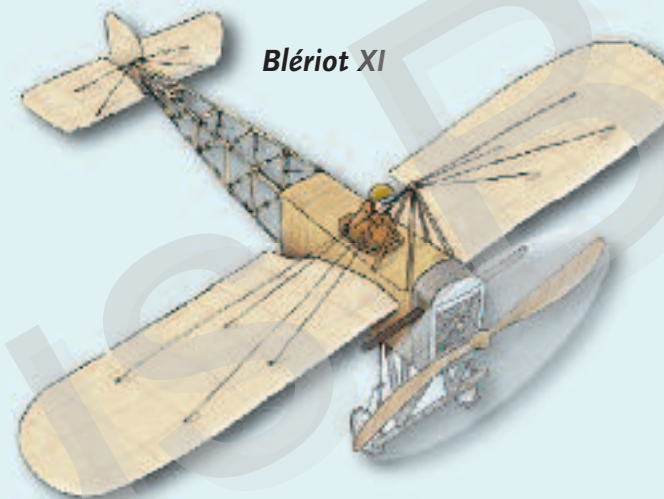
# THE FIRST PLANES

**O**n November 17th, 1903, the American inventors Orville and Wilbur Wright made the first controlled, powered flight in an airplane. *Flyer 1* could be steered by twisting its wings slightly.



*Wright Flyer 1*

*Flyer 1*'s first flight covered only 120 feet and lasted 12 seconds. Just six years later in 1909 French aviator Louis Blériot flew across the 21-mile-wide English Channel in his monoplane. He had no means of navigation, but simply set off into the mist and crash-landed above the cliffs.



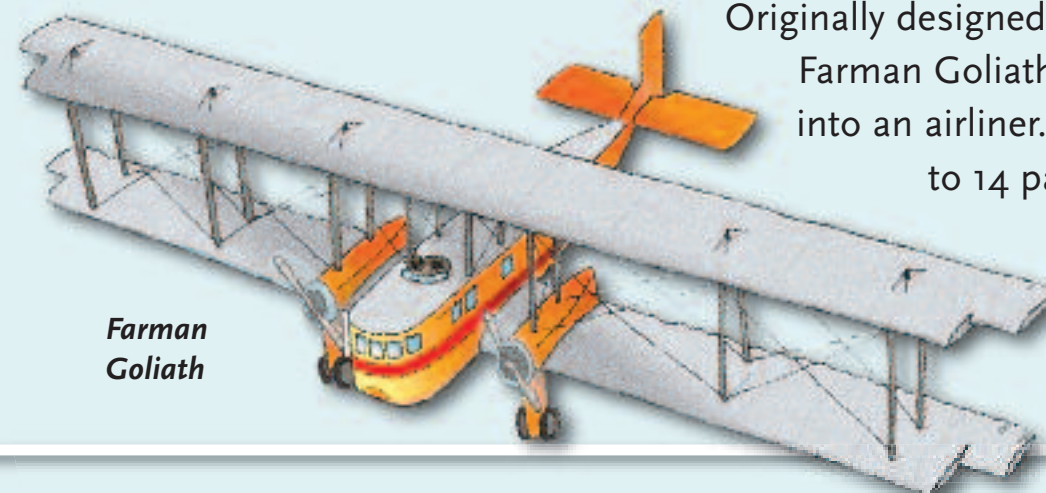
*Blériot XI*

Very soon, planes became weapons of war. During World War I (1914-1918), biplanes and triplanes—planes with two or three sets of wings respectively—took to the skies. German aviator Manfred von Richthofen, the “Red Baron,” flew a Fokker triplane painted bright scarlet. The plane was fitted with a machine gun and an interrupter gear, a device that allowed the gun to fire forward without hitting the plane’s propeller.



*Fokker Dr.1*

Originally designed as a heavy bomber, the Farman Goliath was later converted into an airliner. It was able to carry up to 14 passengers. It opened the first scheduled international passenger service in 1920.



*Farman Goliath*

# TYPES OF PLANE

**A** plane, or airplane, is a fixed-winged aircraft that is heavier than air. Wings support the plane in the air by creating an upward force called lift (see page 10). Engines provide a forward force called thrust. Planes are able to carry passengers or cargo quickly over long distances. Some planes are built for military purposes.

*This is a type of plane called a Very Light Jet. Powered by two small jet engines, it is a six-seater that can be flown by a single pilot.*

**Nose**

*The plane is equipped with the latest technology. It is designed for use as an air taxi service, normally making journeys of up to 500 miles.*

Planes vary in size from small single-seaters to huge machines able to transport hundreds of passengers (see page 14) or heavy cargo. They all have the same basic layout: a long tube, called a fuselage, with a set of wings attached. A plane also has a tailfin and tailplane, to keep it flying straight and level, hinged sections, known as control surfaces, to steer it, and a set of wheels.

**Tailfin**

**Tailplane**

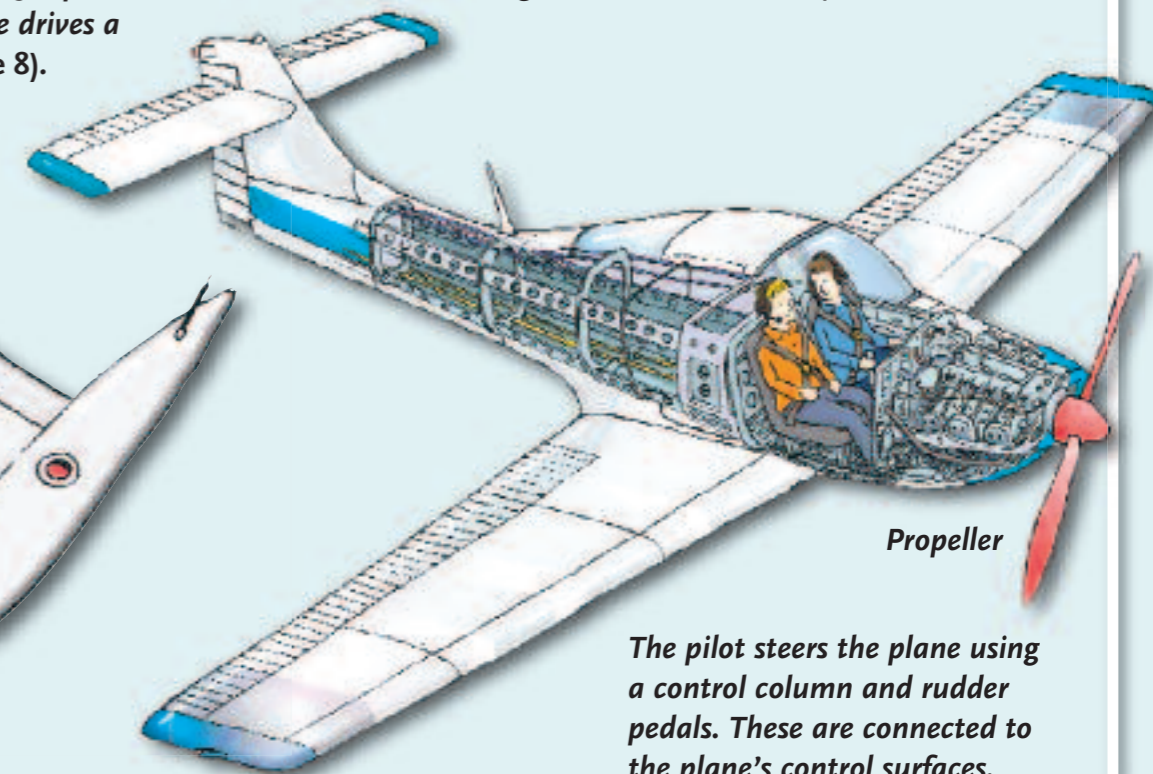
**Engine nacelle**

**Wing**

*The fighter's nose contains both the cockpit, where the two pilots sit, and the plane's electronics. These include radar, used to detect enemy targets, and devices designed to shield the plane from enemy radar.*

**Cockpit**

*A light aircraft like this one (below right) is often used for recreation or learning to fly. Together with fuel and passengers, it weighs around 1,300 lbs. It cruises at around 125 mph. The small piston engine drives a propeller (see page 8).*



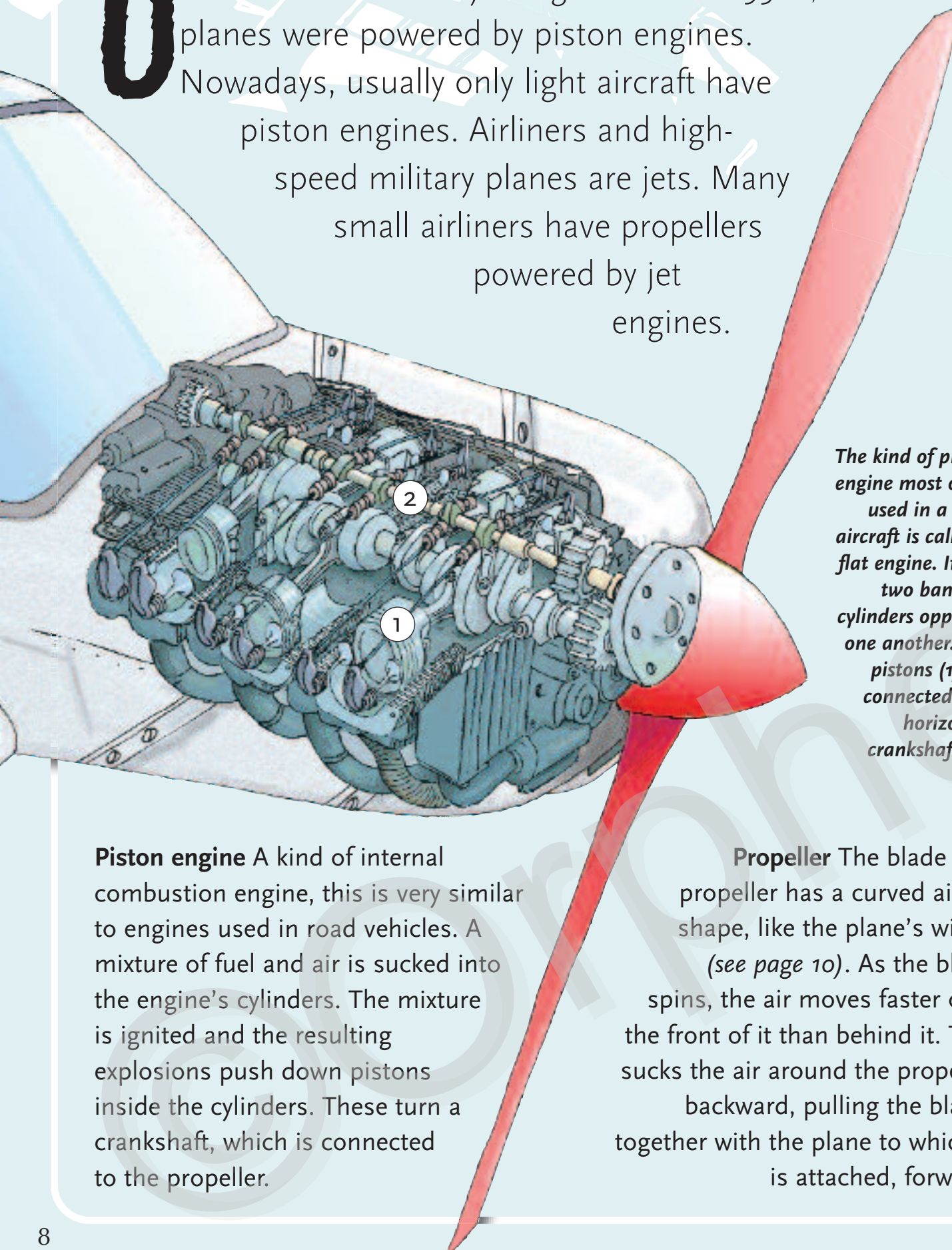
**Propeller**

*The pilot steers the plane using a control column and rudder pedals. These are connected to the plane's control surfaces.*

A military fighter jet (above) is designed for high speed and maneuverability in the air. It may be used to combat other fighter jets or to intercept enemy bombers and attack them with guns or missiles. It can also be used to attack targets on the ground. It can fly at supersonic speeds: faster than the speed of sound. On some fighter jets the angle of their wings can be altered ("swept back") mid-flight so the plane can go at even faster speeds.

# ENGINES

Until the invention of jet engines in the 1930s, planes were powered by piston engines. Nowadays, usually only light aircraft have piston engines. Airliners and high-speed military planes are jets. Many small airliners have propellers powered by jet engines.



The kind of piston engine most often used in a light aircraft is called a flat engine. It has two banks of cylinders opposite one another. The pistons (1) are connected to a horizontal crankshaft (2).

**Piston engine** A kind of internal combustion engine, this is very similar to engines used in road vehicles. A mixture of fuel and air is sucked into the engine's cylinders. The mixture is ignited and the resulting explosions push down pistons inside the cylinders. These turn a crankshaft, which is connected to the propeller.

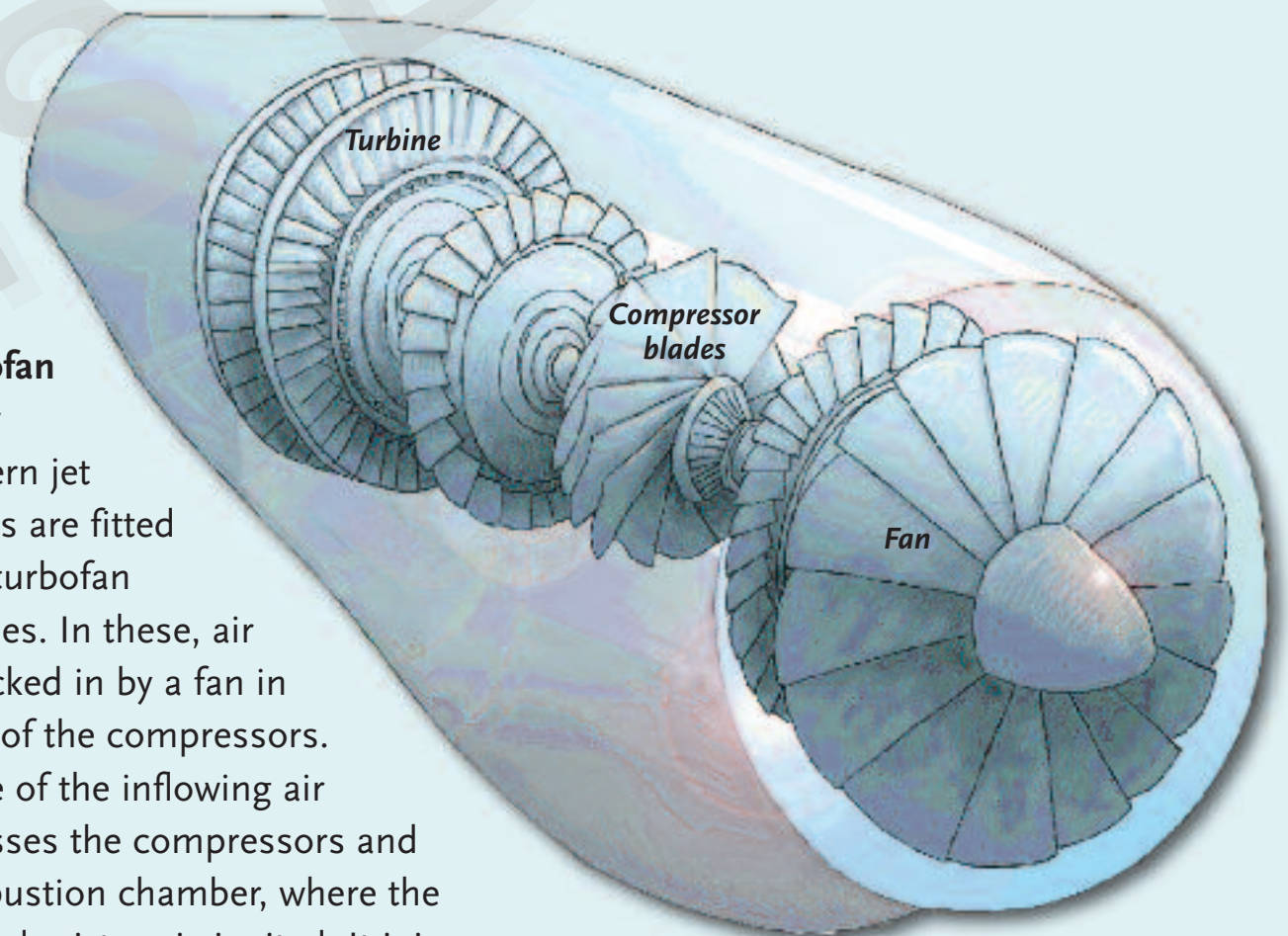
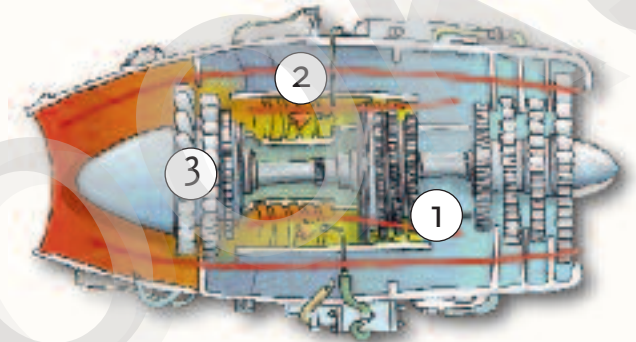
**Propeller** The blade of a propeller has a curved airfoil shape, like the plane's wings (see page 10). As the blade spins, the air moves faster over the front of it than behind it. This sucks the air around the propeller backward, pulling the blade, together with the plane to which it is attached, forward.

## HOW JET ENGINES WORK



The force of air escaping from a balloon sends it in the opposite direction. A jet engine works in exactly the same way: a jet of gases blasted out of the back of the engine drives it forward. The explosive force is produced by igniting a mixture of air and fuel. Air is drawn in at the front

and compressed by spinning blades (1) before being mixed with fuel and ignited (2). The hot exhaust gas escapes through the rear, powering a turbine (3), which drives the compressors as it shoots past.



### Turbofan

Many modern jet planes are fitted with turbofan engines. In these, air is sucked in by a fan in front of the compressors. Some of the inflowing air bypasses the compressors and combustion chamber, where the air/fuel mixture is ignited. It joins up with the exhaust gases blasted out at the back. This makes the engine quieter and more economical.