

Piston Engines

Section 1 - Introduction

- 1. History**
- 2. External Combustion**
- 3. Internal Combustion**

Introduction - History

In 1903, the Wright brothers made history with the first powered aeroplane that could carry a man. Their flying machine was powered by a piston engine – and today, a century later, piston engines are still used in hundreds of thousands of aircraft all over the world

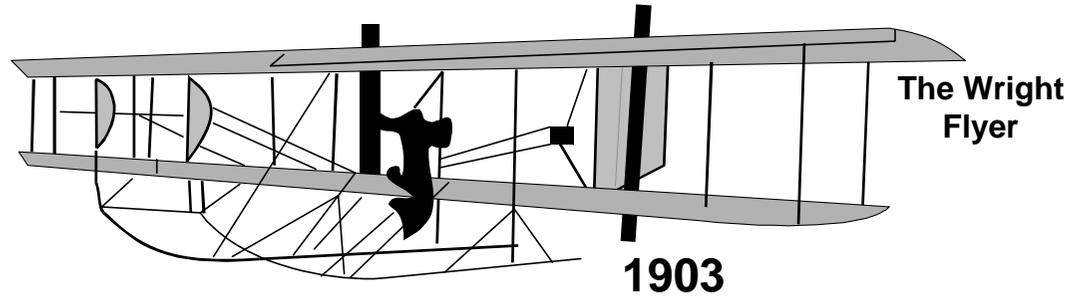
The illustration below shows various propeller driven and jet powered aircraft through the ages.

Jet propulsion will be covered in a separate syllabus.



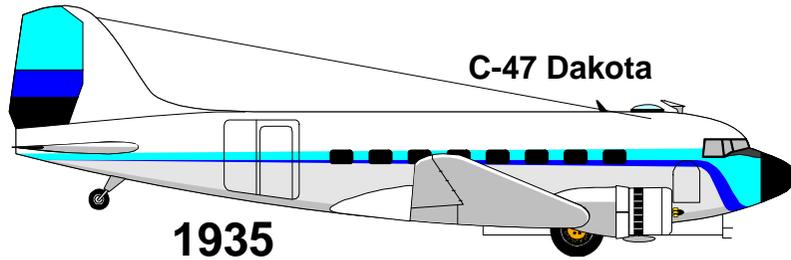
Nieuport Fighter

1916



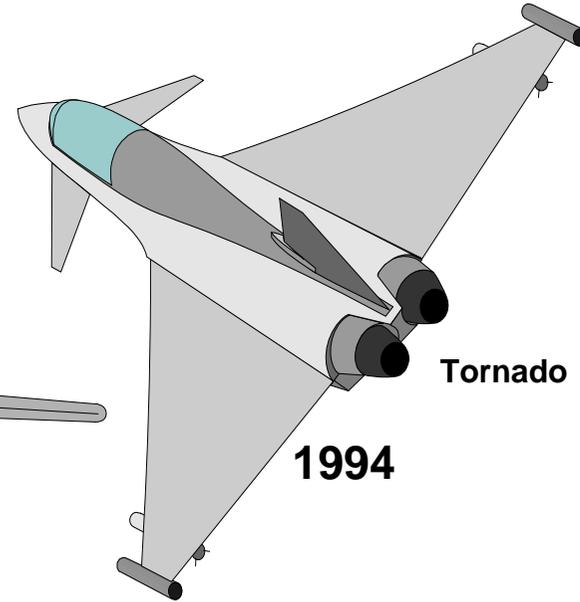
The Wright Flyer

1903



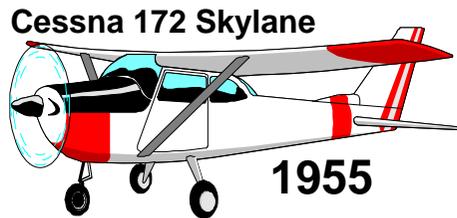
C-47 Dakota

1935



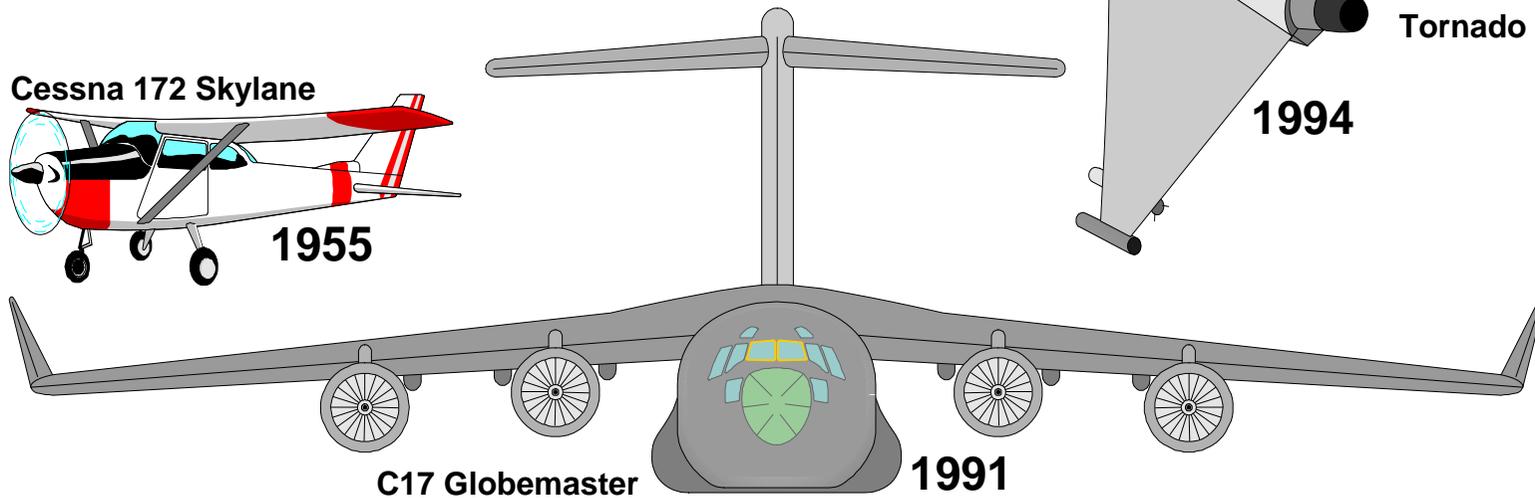
Tornado

1994



Cessna 172 Skylane

1955



C17 Globemaster

1991

Introduction - History

Introduction – External Combustion Engine

There are many types of piston engine – one example is the old type of railway engine (shown below), where solid fuel (coal or wood) is burnt externally in fire box, to turn water into steam which is then piped to the engine to drive the pistons. These external combustion engines are much too heavy for aviation.

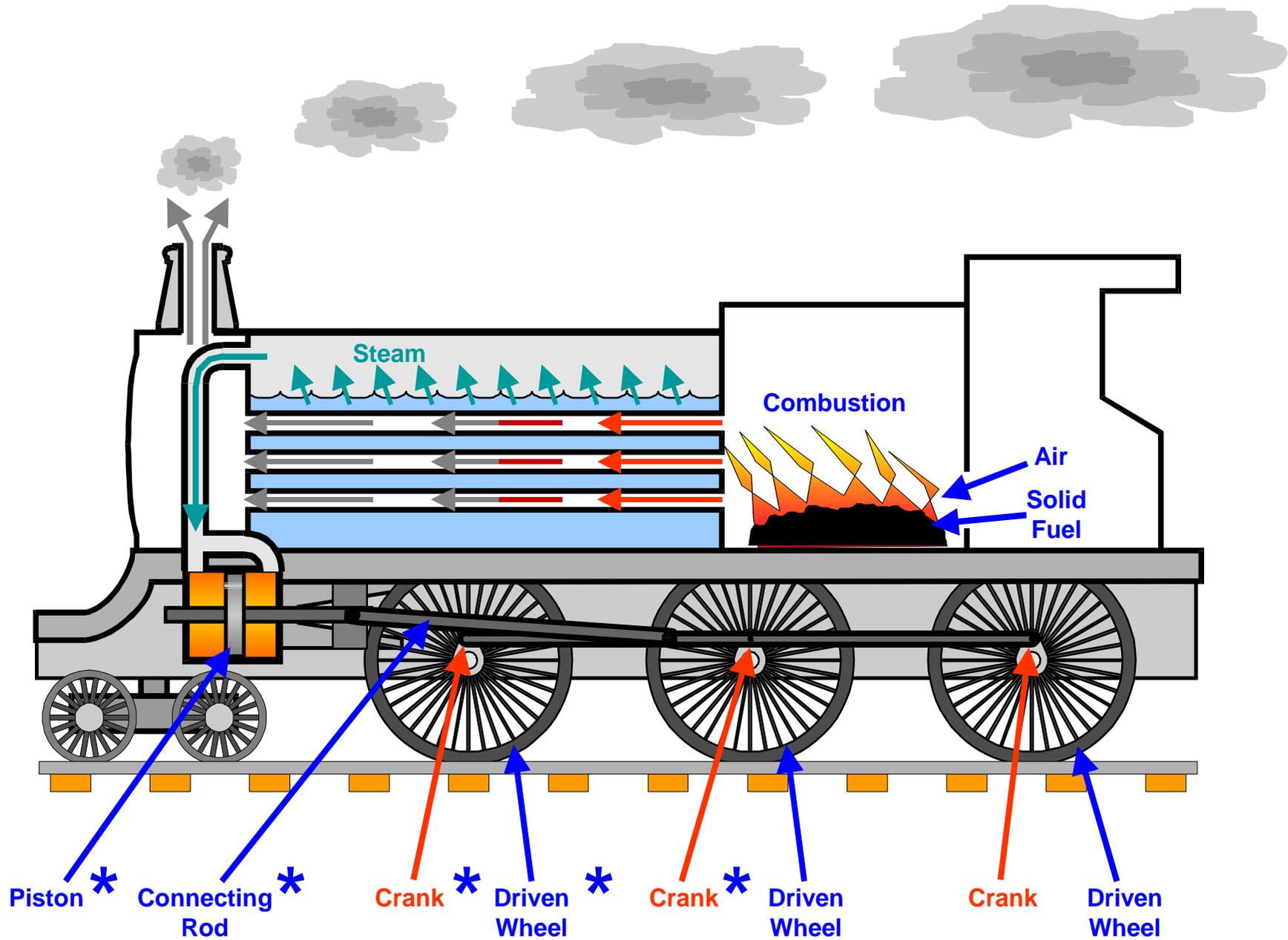
Even though this type of engine is heavy, it is efficient; that is more of the energy developed (power) is available for driving the vehicle and load forward compared to other forms of power generation.

Steam engines weren't just used to pull trains, they were used in many different forms to propel ships, pump water, saw wood, drive machinery in factories, used as road rollers, drive fairground rides and many more uses.

Size also varied greatly, from miniature size for hobbyists, up to ship powerplants, such as the Titanic. And, although relatively simple in operation, the mechanism became quite complex in order to ensure maximum efficiency and power output.

There are numerous examples of stationary steam engines available to view in museums around the country.

Items marked * on the illustration below, will become familiar to the reader (see next illustration)



Introduction – External Combustion

Introduction – Internal Combustion Engine

With the coming of flight power had to be supplied more efficiently from smaller and lighter engines.

This is where the internal combustion engine being developed in the late 1890-1900's came to the fore. This type of engine obtains its power by burning liquid (Petrol or Diesel) fuel inside the engine, where the pistons are located, negating the need for heavy boilers, water tanks and fuel.

When the Wright Brothers started experimenting with flight, internal combustion engines were around, but they were not readily available and those that were available were still too heavy. Consequently, the Wright Brothers decided to make their own engine.

Building a man carrying aeroplane and engine to power it was quite a feat considering their expertise was in bicycles!

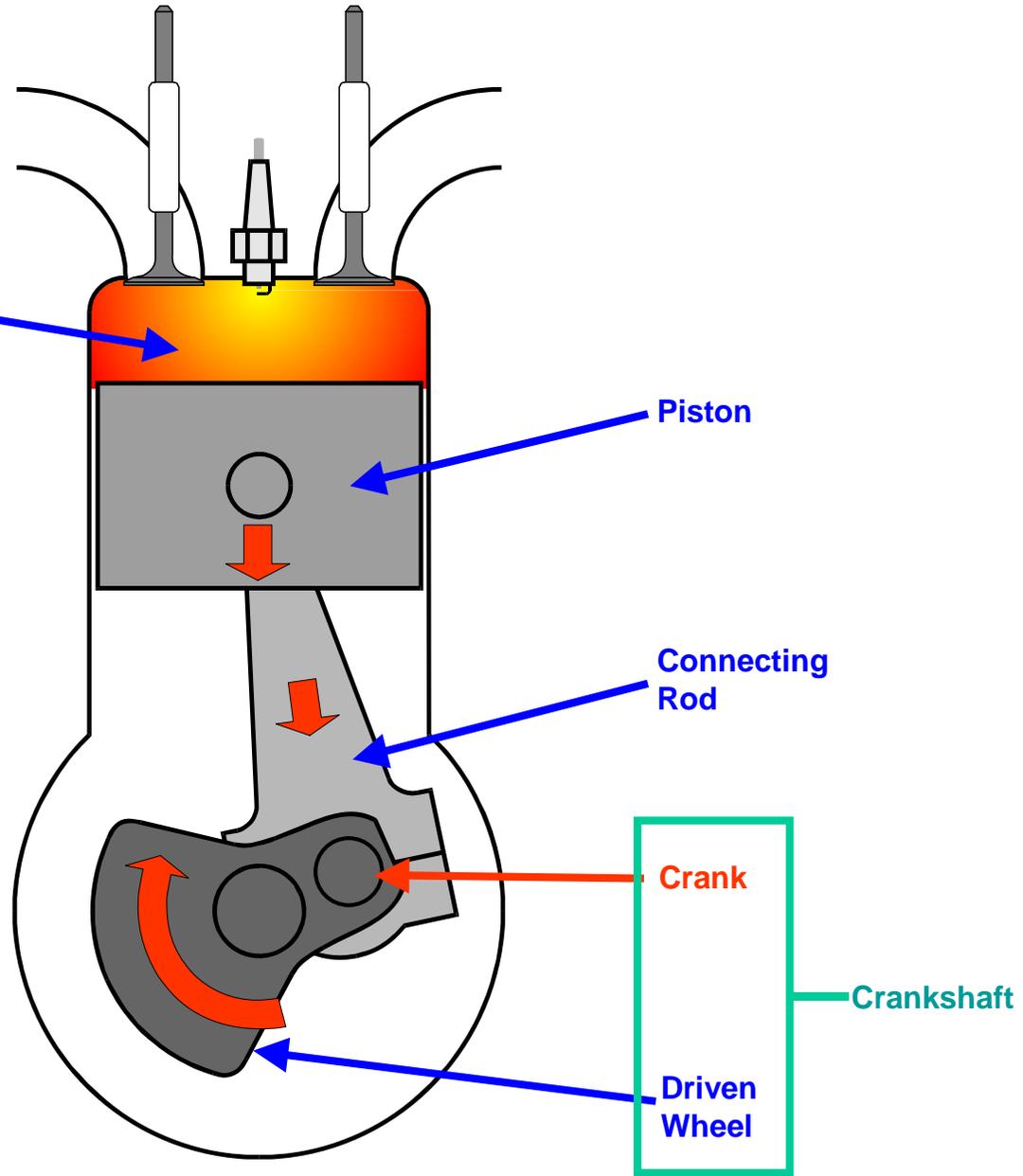
There are similarities between the External and Internal combustion engines in that both feature: -

- a. Pistons
- b. Connecting Rods (Conrods)
- c. Crank
- d. Driven Wheel

Note: the latter two items are features found on the crankshaft, the driven wheel being the actual crankshaft assembly.

The **combustion** process takes place *inside* the engine

BUT, there are some similarities



Introduction – Internal Combustion