



The Pilot's Manual

PM **1**

Flight School

How to fly your airplane through
all the FAR/JAR maneuvers

Fourth Edition

**Full-Color
Edition!**



Foreword by Barry Schiff

The Pilot's Manual 1: Flight School

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The Training Airplane 1

Objectives

To name and describe:

- the main components of a basic training airplane; and
- the systems, controls and instruments used by the pilot.

Considerations

The Airframe

The structure of the airplane is called the *airframe*. It consists of a *fuselage* to which the *wings*, the *empennage*, the *landing gear* and the engine are attached. A propeller converts engine *torque* to generate *thrust* to propel the airplane through the air. Forward speed causes the airflow over the wings to generate an aerodynamic force, known as *lift*, that is capable of overcoming the force of gravity (*weight*) and that supports the airplane in flight. The airplane can even fly temporarily without thrust if it is placed in a *glide*—its forward momentum assisted by gravity keeps it moving through the air, and this allows the wings to produce lift. However, the path is inevitably downward. In the absence of vertical air currents, thrust is essential to allow level, turning and climbing flight.

Lift is the means by which flight is attained.

Thrust is the means by which flight is sustained.

The tail assembly of the aircraft is situated some distance to the rear of the main load-carrying sections of the fuselage and provides a balancing, or *stabilizing*, force much like the tail feathers on an arrow or a dart. The tail section consists of a *vertical stabilizer* (or *fin*) and a *horizontal stabilizer* (or *tailplane*), both of which are shaped to produce stabilizing forces. The pilot and passengers are housed in the cockpit, usually in side-by-side seating—the pilot (or *pilot in command* in a two-pilot aircraft) sits on the left side.



Figure 1-1 A Cessna trainer.



Figure 1-2 Tobago aircraft.

Controls and instruments are placed in the cockpit to enable the safe and efficient operation of the airplane and its systems, and for navigation and communication.

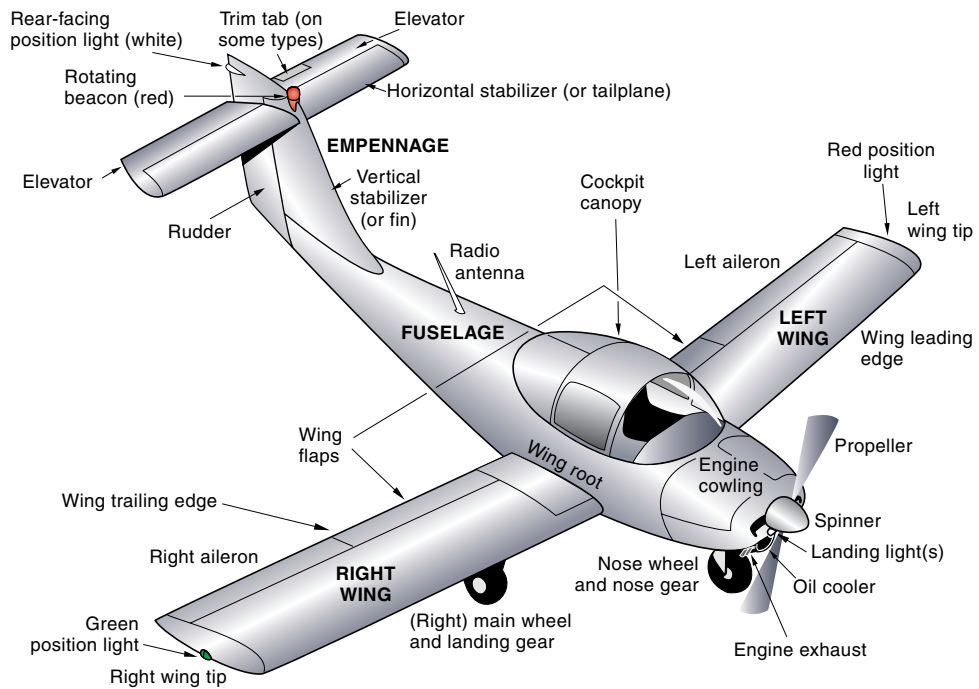


Figure 1-3 Parts of an airplane.

Aircraft Types

Light aircraft were traditionally classified under Federal Aviation Regulation (FAR) 23 which described structural and performance standards. These represented the fleet of General Aviation aircraft up to a certain weight limit.

More recently, the FAA has introduced a new category - the *Light Sport Aircraft* (LSA) category which offers relaxed construction, performance and licensing standards for pleasure flying and for training.



Figure 1-4 Cessna 162 SkyCatcher LSA on its maiden flight.

The LSA category allows a wide range of designs that are placed between the ultralights and the GA categories. It allows adventurous designs and fun flying at lower cost, using less energy and with less of the burden of regulations and testing.

Many pilots are now introduced to aviation via the LSA category and traditional, well respected manufacturers such as Cessna are now testing new designs that will be placed within this category.

This manual describes flight techniques which are equally applicable to all GA and LSA airplanes although there will be unique characteristics shown by some more radical designs and configurations. The techniques remain a vital foundation for a trainee pilot.

Primary Controls

Flight Controls

The most common primary flight control has been the wheel or *yoke*. This is still prevalent although there are more diverse options available now. The yoke came about because of high control forces and the need to be able to use both hands for control inputs. It also allowed relief so that the pilot could change hands. Also, the yoke provided a convenient place for transmit buttons, trim switches and some autopilot functions. It is retained in many larger aircraft even though the control forces have now been overcome by hydraulic actuators.

With the widespread use of ultralights and homebuilt aircraft there was a reappearance of the central control column or *joystick*. Many feature the transmit button on the top and some even have electric trim switches. The stick is better for highly maneuverable aircraft – for aerobatics, display flying and crop dusting – as it provides greater leverage and instantaneous control deflection. (It can also be held between the knees when cruising).

As more advanced types have been introduced into the General Aviation (GA) fleet the *side-stick* as used in modern complex transport airplanes, has appeared. The control forces and response have been refined to the point where only a small mechanical advantage is needed. The magnificent Cirrus and Sky Arrow aircraft both used side sticks – as does the Australian Lightwing Speed.



Figure 1-5 Traditional control wheel or yoke



Figure 1-6 Traditional joystick – Lancair.



Figure 1-7 Side stick control – Cirrus

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