

The Application of Trim in Flight

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The use of trim

The purpose of trim is to free the pilot from having to exert constant pressure on the flight controls. This is used to maintain straight and level flight or a constant rate of climb or descent at a set speed. Trimming alters the attitude of an aircraft in such a way that when no control inputs are applied, the aircraft maintains its attitude and speed. It allows the pilot to release the control input without the aircraft deviating from the intended path.

There are various ways by which an aircraft can be trimmed. Trimming most commonly refers to **elevator trim** which controls the vertical attitude of the aircraft. This is achieved by changing the angle of incidence of a **trim tab** located on the trailing edge of elevator (Figure 1) in such a way so that when the control column or yoke is released the aircraft does not pitch up or down by itself. In large aircraft, the angle of the whole horizontal stabilizer can be changed to trim the pitch tendency of the aircraft.



Figure 1: Location of elevator trim tab

It is important to note that in most cases (especially on small airplanes) trimming doesn't actually **move** the control surfaces. It changes the force required to deflect the control surfaces. Although there are many types of trimming devices, the common trim tab makes the airflow do all the work. The trim tab causes the airflow to push the control surface to a specific position. On larger aircraft trim tabs are less common and trim is achieved by hydraulically operated control surfaces.

In small aircraft, trim tab control is achieved by the rotation of a **trim wheel** within the cockpit, generally located in the mid lower section of the main instrument panel (Figure 2a). In other aircraft, such as the Piper Cherokee, the trim control looks like a window winder located in the mid ceiling above the pilot. (Figure 2b). Electric trim is also possible in a number of general aviation (GA) aircraft and larger aircraft. This is operated by a toggle switch on the left-hand side of the yoke. (Figure 2c). It should be noted that when an aircraft is flying on autopilot, trim is automatic and no pilot input is required.



Figure 2a: Trim wheel



Figure 2b: Trim lever



Figure 2c: Electric trim switch

Applying trim

As indicated above, elevator trim is applied to relieve the pressure on the yoke during level flight, climbing and descending. So how do you know what trim should be applied.

During a climb, if backwards pressure is required on the yoke to maintain a constant rate of climb and speed, then nose UP trim is required. This is achieved by rotating the trim wheel BACKWARDS. If forward pressure on the yoke is felt, then nose DOWN trim is needed, obtained by rotating the trim wheel FORWARDS. See figure 3.

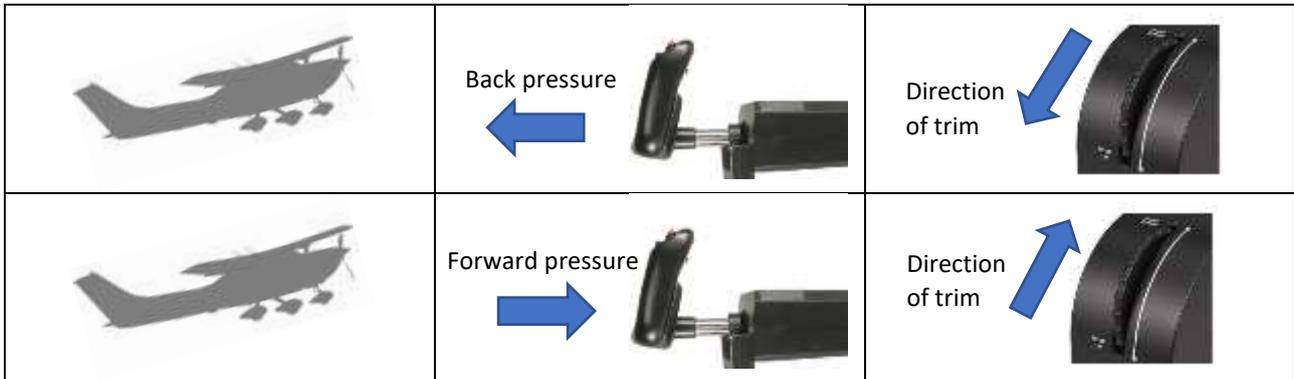


Figure 3: Trim during a climb

Similarly, during descent if backwards pressure is felt to maintain a constant rate of descent and speed, then nose UP trim is required by rotating the trim wheel BACKWARDS. Conversely, if forward pressure is needed, FORWARD trim is required. See Figure 4.

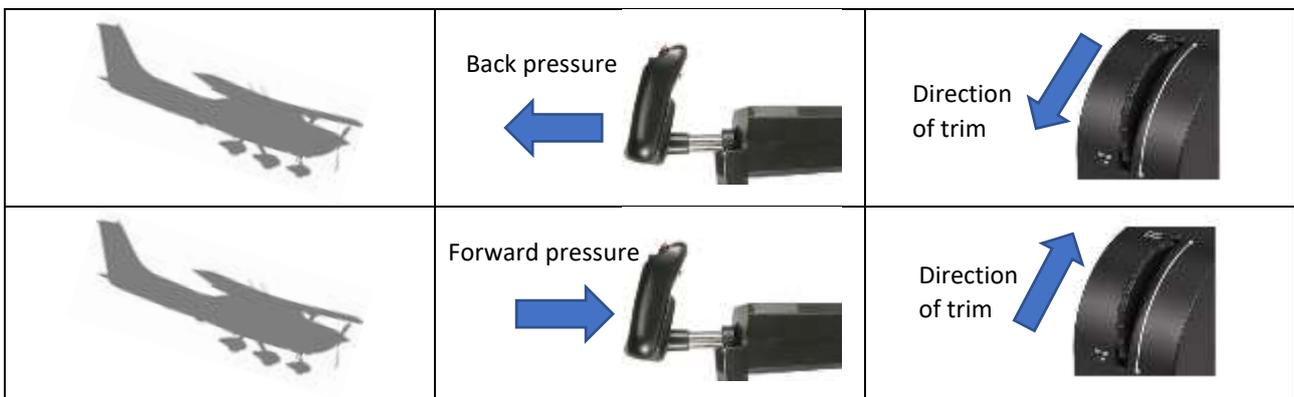


Figure 4: Trim during descent

If electric trim is being used, the trim switch is pulled BACKWARDS for nose UP and pushed FORWARDS for nose DOWN.

Power Attitude Trim (PAT)

Trim should never be used in isolation as a means of achieving aircraft stability. Trim should always be used in conjunction with **power** and **attitude**. During a climb, the required power should be set and the desired rate of climb established and stabilised BEFORE applying trim. During descent power should be reduced and the rate of descent established BEFORE applying trim to relieve yoke pressure. When levelling out at the top of climb, ATTITUDE is established at climb power to enable the build-up of speed. POWER is then reduced to cruise requirements followed by TRIM. When levelling out after descent, ATTITUDE is established, POWER is increased and TRIM is set. As a rule of thumb, trim should be applied following any manoeuvre – climb, descent, change of heading.