

# Flightlevel vs. Altitude

## Pilot tips and tricks

### 1. The challenge

Sometimes pilots get confused about altitude indication. Altitudes in aviation are given either in levels or feet/meters. Why are there two ways of indicating altitude?

In this bulletin we talk about how a pilot should manage this difference. If you are interested in the underlying physical theory have a look at (<https://skybrary.aero/articles/altimeter-pressure-settings>). However, it is essential, that pilots know how to deal with this double concept. There is no room for guesswork – the rules are crystal clear.

Work yourself through this document and you will never get it wrong again.

### 2. The basics

The underlying reason for this double concept is related to separation between aircrafts and separation between aircraft and terrain.

**In lower altitudes** separation from terrain is the main concern. In order to fly accurate altitudes, which assure safe distance from terrain, **it is essential that the aircrafts altimeter is set on the actual barometric pressure (QNH)**. Should the QNH be wrong then the indicated altitude is incorrect and involves the risk of colliding with terrain.

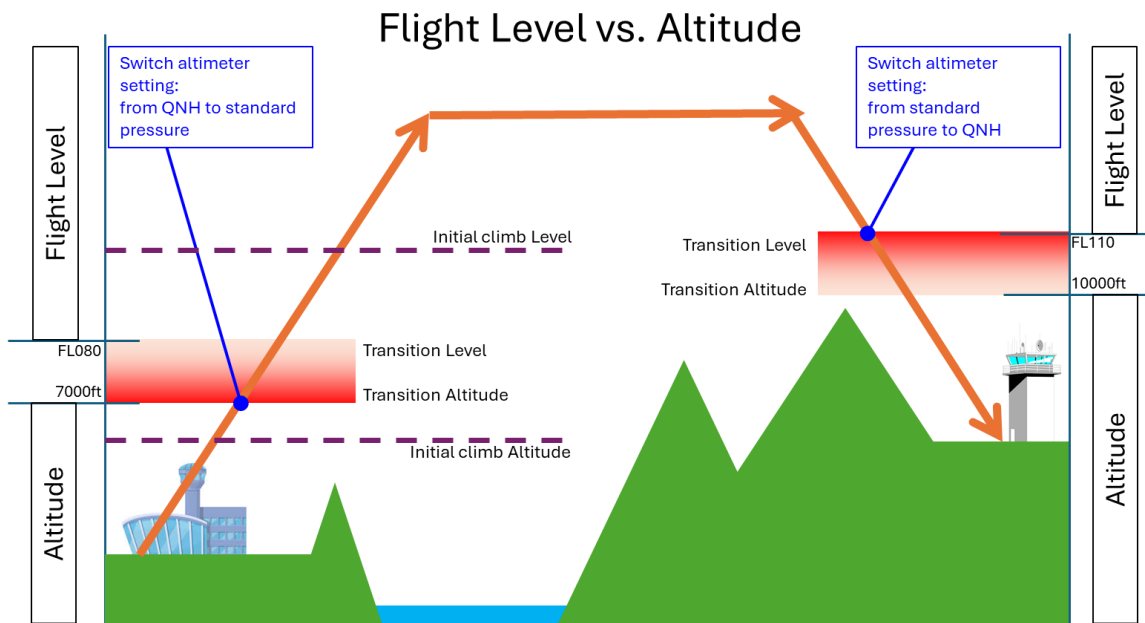
**In higher levels**, where terrain is no longer an issue, the main challenge is to separate aircrafts one from another. For this purpose, it is vital, that the altimeters of all aircrafts are set on the same pressure, in order to make sure that any vertical separation instructed by ATC results in aircrafts being precisely separated from each other. If all aircrafts always had to fly on actual QNH, they would have to be given the updated accurate QNH every few miles, which is not only inconvenient, but moreover impossible in areas, where QNH can not be determined easily (e.g. in oceanic areas). For this reason, **the altimeters of all aircrafts above a certain altitude are set on one and the same defined pressure** (called standard pressure or QNE). When using standard pressure, the absolute altitude of an aircraft will vary depending on the actual barometric pressure, however, as all aircrafts use the same (standard) pressure, their vertical distance will not be affected.

The change from actual QNH to standard pressure (or vice versa) must be coordinated for all aircrafts. Each aerodrome defines the transition level and transition altitude (see below) and communicates these to all aircrafts operating in the area.

### 3. Vocabulary

- QNH:** Actual barometric pressure of a given location adjusted to mean sea level (e.g. QNH Zurich 997 hPa)
- Standard pressure (QNE):** 1013.25 hPa equivalent to 29.92 InHg
- Altitude (ALT):** altitude indication in Feet (ft) or meters above mean sea level (AMSL) using QNH
- Flight level (FL):** altitude indication in Flight level (FL) using standard \*pressure
- Transition altitude (TA):** altitude indication in Feet (ft) – above which for climbing aircrafts altitude will be indicated in FL using standard pressure
- Transition level (TRL):** altitude indication in Flight level (FL) – below which altitudes will be given in feet/meters using QNH

### 4. Need to know



## 4. A. Transition altitude and transition level

- **Below transition altitude (in climb) or below transition level (in descent) all altitudes are indicated in feet/meters and the altimeter must be set to QNH.**
- **Above transition altitude (in climb) or above transition level (in descent) all altitudes are indicated in Flight Level and the altimeter must be set to standard pressure (1013.25 hPa equivalent to 29.92 InHg).**
- Transition altitude is aerodrome specific and can be found on the SID charts.
- Transition level is aerodrome specific and will be broadcasted by the ATIS
- QNH is variable and will be broadcasted via ATIS. ATC may indicate the actual pressure when instructing to descend below TRL

DESCEND ALTITUDE 5000 FEET, QNH 1025

## 4. B. Initial climb altitude

- Initial climb is the maximum altitude authorised by ATC after take-off (as provided as part of the IFR route clearance and/or as stated in the SID charts)
- Initial climb can also be indicated in Flight levels (when its above Transition altitude)
- **Initial climb altitude/level are completely unrelated to Transition Altitude or Transition Level**

## 5. Your personal fitness test:

You are at LSZH preparing for departure, Transition altitude is 7000ft, Transition level is indicated FL 080. Which of the following ATC instructions is incorrect and why?

- SWISS123, YOU ARE CLEARED ... INITIAL CLIMB FL050....
- SWISS123, YOU ARE CLEARED ... INITIAL CLIMB ALTITUDE 5000FT....
- SWISS123, YOU ARE CLEARED ... INITIAL CLIMB FLIGHT LEVEL 5000....

You are on the approach into LSZH at FL100. Which instruction from ATC is correct?

- SWISS123, DESCEND 8000FT, QNH 997
- SWISS123, DESCEND FL080
- SWISS123, DESCEND FL8000

In LSGG you just received your clearance. Which of the following readbacks is correct?

- CLEARED .... INITIAL CLIMB FL090
- CLEARED .... INITIAL CLIMB 9000FT
- CLEARED .... INITIAL CLIMB FL9000

Where do you find the QNH?

- In the ATIS
- From ATC
- From the SID chart

What is the value for standard pressure?

- According to ATC
- 1000 hPa
- 29.92 InHg
- 1013.25 hPa

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