

# Lesson 101

## Level Flight

### Overview

You will start your flight training by learning the fundamentals of flight.

In this lesson, you will focus on pitch control and maintaining a constant altitude.

I (your instructor) will be holding your heading constant, allowing you to focus on pitch and altitude.

Ensure that the **"Scenario Captions"** setting is enabled in Prepar3D under **Options> Settings> Simulation> General**.

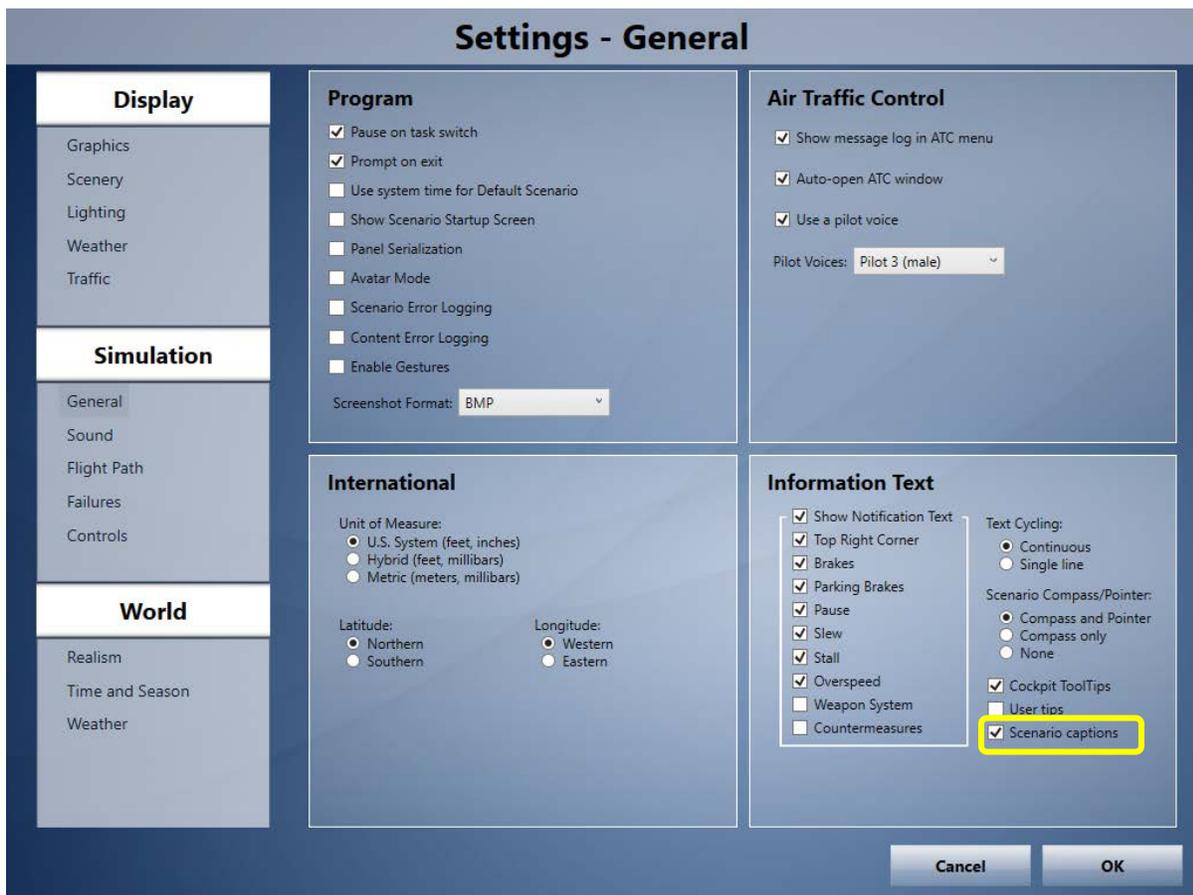


Figure 101-1: Show Captioning

## Briefing

Level flight is the act of holding the aircraft level at a constant altitude. In this lesson, you will practice maintaining level flight while transitioning between airspeeds of 80, 90, and 100 knots. Do not worry about maintaining the heading just yet, I will control the heading and keep the aircraft flying straight.

In order to fly level at a specific airspeed, you first have to set the known pitch and power settings that will get you close to that airspeed. For example, straight and level flight at 90 knots will require approximately 2,300 RPM. Set the pitch so that the imaginary line extending from the top of the magnetic compass should be approximately on the horizon (Figure 101-2).



**Figure 101-2:** Level Flight at 90 Knots

Putting the imaginary reference line on the horizon while flying at 90 knots *should* cause the plane to maintain altitude. However, due to changes in conditions such as updrafts, downdrafts, aircraft speed, temperature and other variables, this may not work perfectly but can still be used as a guide. Because of these factors, you cannot simply rely upon placing the imaginary reference line on the horizon for an extended period of time without cross-checking the instruments (altimeter and airspeed indicator) to see if you are in fact maintaining altitude and airspeed. If you are not, you need to make the necessary, minor corrections.

Figure 101-3 will guide you in setting the pitch and power airspeeds for each airspeed you will practice maintaining on this flight. Each colored line marks where to set the imaginary horizontal reference line to maintain the associated airspeed. Keep in mind that these pitch and power settings are approximations and slight corrections may need to be made based on the day's conditions.



**Figure 101-3:** Pitch and Power Settings for Level Flight

After setting the pitch and power for the airspeed to be maintained, use trim to relieve any pressures you may be exerting on the controls. The aircraft trim is used to eliminate the pilot's pressures on the elevator controls. This relieves the pilot of constantly having to hold pitch attitudes with the controls and allows for "hands-free" flight. An aircraft can be trimmed "up" to hold a nose-high attitude, or trimmed "down" to hold a nose-low attitude.

To determine if the trim is set correctly, ensure that the aircraft is stabilized and let go of the controls. If the aircraft airspeed does not change when you let go, the trim is set correctly. The aircraft will maintain this pitch setting and associated airspeed until the trim is changed, regardless of power setting. Keep in mind that trim should not be used to fly the airplane and instead only used to relieve pressure inputs on the controls to help maintain airspeed.

Although the trim helps relieve pressures you have to put on the controls, it is not a replacement for an autopilot. You will still need to crosscheck the airspeed indicator periodically to ensure that you are maintaining the correct airspeed. Keep in mind that

setting the known pitch and power settings may not get you exactly to the desired airspeed and you may need to make some adjustments.

If corrections need to be made, use pitch to correct for airspeed deviations and power to correct for altitude deviations. If the airspeed is higher than desired, pitch up. Pitch down if the airspeed is lower than desired. Pitch corrections should be small; only adjust pitch by moving the horizon up or down in the windshield by a finger's width or less.

If the aircraft is climbing or descending away from the desired altitude, use power to correct. Increasing power will cause the aircraft to climb, and reducing power will cause the aircraft to descend. Therefore, if the aircraft is descending below the desired altitude, increase the power to stop the descent rate. Decrease the power if the aircraft is climbing above the desired altitude. A rule of thumb we can use is to adjust the power by 100 RPM to induce a 100 FPM change in vertical speed. To stop a descent of 200 FPM, add 200 RPM. Remove 200 RPM if the aircraft is climbing at 200 FPM. In level flight, you want to maintain a vertical speed of 0 FPM.

Make sure not to stare inside at the aircraft instruments during any flight. You should be spending 90% of your time looking outside for other aircraft and referencing the horizon, while the remaining portion of your time will be spent checking the instruments, navigating, doing checklists and other tasks in the cockpit. For this flight, you only need to crosscheck the airspeed indicator, altimeter, and vertical speed indicator as the other instruments will be added in subsequent lessons.

Now you can go practice maintaining level flight at 80, 90, and 100 knots. I will hold the aircraft's heading so you can focus on controlling pitch and power. Have fun!

### **Common Errors**

**Fixating on the instruments:** Remember to use a combination of both inside and outside references during level flight. You should be looking outside 90% of the time and inside the remaining 10%.

**Sudden control movements instead of using smooth control movements:** Always attempt to be very smooth with the flight controls. Remember, you are not flying a fighter jet!