



FIRST FLYING TECHNIQUES PERFORM A TURN

1. Introduction

We aim to teach and demonstrate how to operate a general aviation aircraft and show some basic techniques and manoeuvres that every real pilot must have learnt to be licensed.
In this document, we will learn how to perform a turn while maintaining the same altitude.

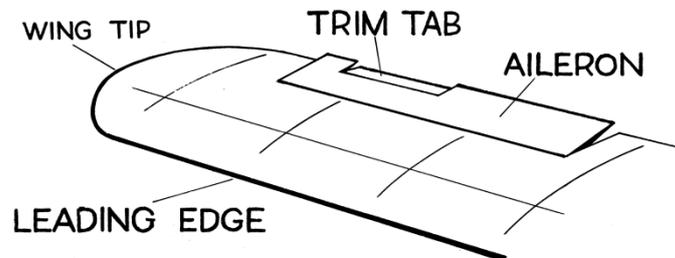
We use the Cessna 172 as training aircraft which is also a default aircraft in most flight simulators.

Understand we are not learning to fly the Cessna 172 specifically.
We will not review specific practical aspects about this aircraft.

2. Theoretical Knowledge

2.1. Standard turn

In order to alter our course, we need to perform a turn.
Roll axis is induced by ailerons.



The goal of the ailerons is to temporarily increase the lift on one wing while it will decrease on the other wing. The plane will then start rolling.

A standard turn is performed at 25°, and for correction can be increased up to 30°.
A rate-1 turn is performed at 0.15 times the true airspeed and corresponds to a turn of 180° in 1 minute.

At 100 knots, you should turn at a bank angle of 15° to do a 180 in 1 minute.

You may turn at higher bank angle such as 45° and 60°.
However, please keep in mind that in level flight, the load factor will increase, and so will the stall speed.

First Flying Techniques : Turns	Version 1.1	22 June 2017	Page 1
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2.2. Spiral dive effect

Over bank angle of 30°, you aircraft will have a natural tendency to continue banking while adopting a nose-down attitude.

As this situation gets worse, your airspeed will increase rapidly.
At this moment if you try to raise the nose of your aircraft, the airspeed will dramatically increase and you may enter into an over-speed situation. This will create a spiral dive.

Spiral dive sounds as desperate as a stall but a simple recovery procedure exists.

First, given the high speed, reduce throttle to idle and immediately reset the bank angle to neutral.
Then initiate a very smooth recovery to initiate a climb and only apply climb power when required.

3. Practical Aspects

3.1. Standard turn

In this part, we will perform a standard rate-1 turn.
Our aircraft is established in stabilized straight level flight at 100 knots.



First Flying Techniques : Turns	Version 1.1	22 June 2017	Page 2
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Since we are flying near the ground, our true airspeed is approximately equal to our indicated airspeed.

15% of 100 knots = bank angle of 15°

Simply initiate a turn and stop the roll at a bank angle of 15°. You aircraft will have a tendency to slowly descend. Simply pull the flight control barely to compensate for the descent.

Your pitch angle should be raised by 1° per 15° of bank.

To end the turn, simply roll the aircraft back to the neutral bank angle.

Remember to remove the pitch you added.



3.2. Spiral dive

We will now illustrate the principle of a spiral dive and the recovery procedure that follows. Our aircraft is established in stabilized straight level flight at 100 knots.

Initiate a turn with a 20-degree bank angle without correcting the pitch.



First Flying Techniques : Turns	Version 1.1	22 June 2017	Page 3
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From now on, do not manipulate flight controls and let your aircraft fly on its own.

You will notice that your aircraft will begin to increase its bank angle, increase its nose-down attitude and speed will increase dangerously



If you try to simply pull the flight control in order to correct the nose-down attitude, it is now too late. You will put your aircraft at risk by increasing the airspeed at a high load factor.



First Flying Techniques : Turns	Version 1.1	22 June 2017	Page 4
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To solve the situation, set throttle to idle immediately, then cancel the bank angle and return to leveled wing attitude.

To help the speed reduction, pull gently on the flight controls, adopt a nose-up attitude and set climb power when speed is safe.



4. Conclusion

To know how to perform a turn with the aircraft is an obvious necessity for a pilot. But he must also know the limitations and possible danger that may appear with such a manoeuvre.

First Flying Techniques : Turns	Version 1.1	22 June 2017	Page 5
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