



FIRST FLYING TECHNIQUES COCKPIT PREPARATION – STARTUP – TAXI

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 prepare our cockpit for a flight.

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. Cockpit preparation

We consider our aircraft being in a “cold and dark” state.

This means our aircraft has no supplying source of energy.

Keep in mind that the battery of a light general aviation aircraft is not made for being used for a long time on the ground (except when the aircraft is capable to be powered by an external power system GPU or an alternate electric circuit).
Before the engine is running and the alternator is switched on, limit all use of avionics and lighting equipment.

Cockpit preparation is quite simple for these kinds of aircraft:
We have to check all instruments and switches to be in the normal position at this point.

2.2. Engine Start

Following the latest document, our aircraft was cold and dark, and the cockpit state was checked.

To start the engine of a light general aviation piston aircraft we will specifically use the following sequence of actions:

1. Turn on the battery switch
2. Prime the engine by injecting fuel
3. Use the ignition to set alight the fuel and properly start the engine
4. Check both magnetos
5. Check alternator load

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An aircraft engine works like any engine: it is a mix of air and fuel that explodes to power a rotation axis that, in our case, is linked to a propeller allowing generating power. Power is the force created by the airflow on the blades of our propeller. Each blade is an airfoil which generates lift.

To ignite the detonating mix, we use magnetos which produce high voltage for engine spark plugs.

2.3. Taxiing

Following a successful engine start, we should be ready to taxi.

The first thing to bear in mind when taxiing is to keep the yellow taxiway center line between your legs when you are in a small aircraft.

When you are taxiing on this line, you are sure to avoid any obstacles and the width of your aircraft does not require correcting your position in the cockpit.

Being on the yellow line does not mean not to pay attention to your surroundings.
Remain alert to all other aircraft present on apron or taxiways.

Never taxi through a perpendicular continuous yellow line!

This is a holding point to a runway and must never be crossed without a clearance from the active controller.

On unmanned facilities, monitor UNICOM and make sure there is no traffic operating on this runway.

When operating light aircraft, pilots must pay attention to the wind. It will tend to set the aircraft nose in its direction. Rudder input will be required to remain at the center of the yellow line.

Also your flight control must be set to counter the effect of the wind on your flight surfaces.

If the wind is coming from the right, you will set your ailerons to the right to counter the effect of the wind that will try to raise the right wing. If the wind is coming from the front, deflect the elevator downward as to force the aircraft wheel to remain on the ground.

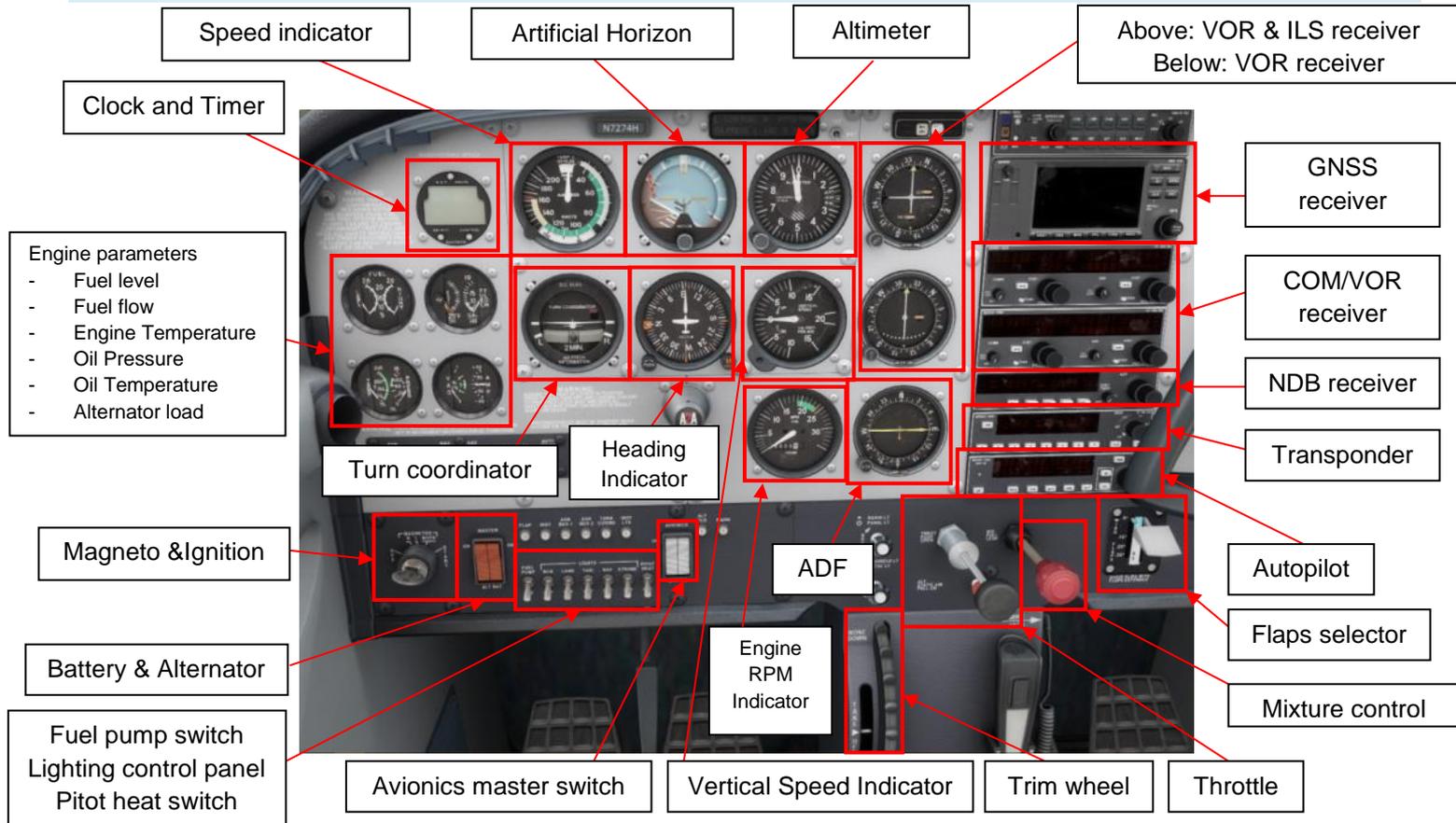
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3. Practical Aspects

3.1. Cockpit presentation

We will introduce our cockpit and locate every instrument. We will not explain how to use these instruments and how they work since dedicated documentation deals with this aspect.

Depending on your platform and aircraft developer, instruments and equipment may vary. Find below the cockpit of the Cessna 172 we will use for our first flight basics. Since there is no power supply active and the engine is not running, equipment is not powered.



The fuel tank selector is below the trim wheel and does not appear on this image. Since fuel tanks on this version of the Cessna 172 are equipped with a fuel crossfeed system, we must just make sure that the selector is set to both.

3.2. Cockpit Preparation

At this point, you should make sure that:

1. All switches are set to the "OFF" position
2. Avionics are not powered and indications are coherent
3. Throttle and mixture levers are completely pulled back
4. Trim is set in the "take-off" position marked by a white bar

The cockpit preparation is quite fast and simple for this typical single propeller general aviation aircraft since there is no data to be inserted into flight computers and no complex system to check.

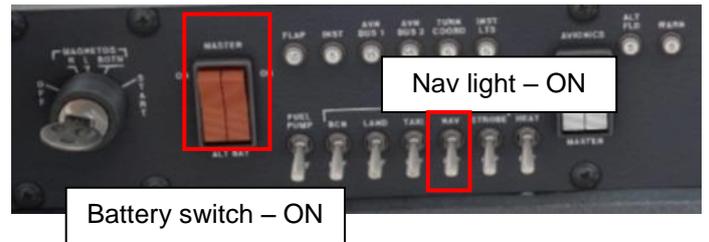
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3.3. Starting the engine

Turn ON the battery switch.

For safety reasons, turn ON the navigation light to notify people around your aircraft that the battery is on.

The battery will provide power to energize the fuel pump in order to prime the engine and trigger the ignition.

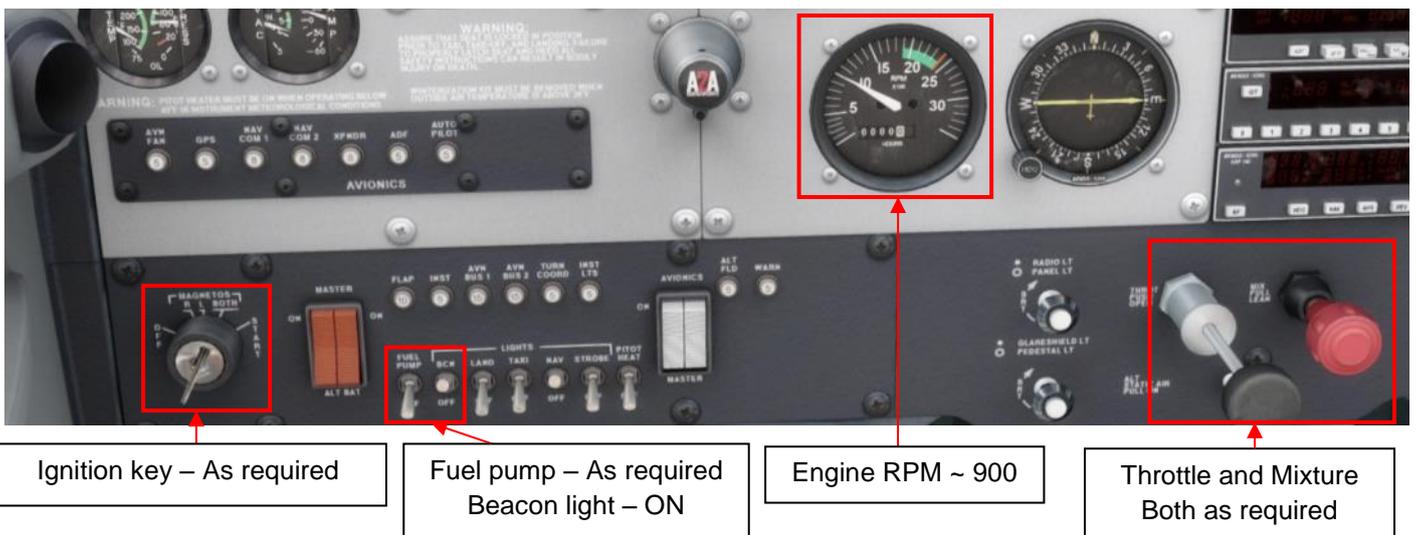


Turn on your beacon light to inform people you will start your engine. Prime the engine:

- Turn on the fuel pump and set throttle lever to half level,
- Fully open mixture for 2-3 seconds and close mixture. Turn off fuel pump,
- Set throttle open at around 10-20%

Then, you shall do the following actions quickly:

- Turn the ignition key to the start position and when it sounds to start, fully open mixture
- When the engine sounds to run on its own, turn the ignition key to the both position
- Reduce throttle to set the engine at about 900rpm.



3.4. After start actions

Once our engine is running, we need to make sure it runs correctly

Since we are at the apron, in case of an incident, we need to make sure we are able to shutdown the engine securely. Also, since this area generally requires a low RPM level to avoid accidents, we will limit our test to the magnetos check. Further engine verifications will be made at the holding point before takeoff, at high RPM.

Perform the check by following this procedure:

- Set RPM to 900
- Turn the magneto key in sequence to the following position: L – BOTH – R – BOTH

Throttle and Mixture Both as required

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When running on a single magneto, do not allow more than 125 RPM drop. Also, the lowest value differential between the two magnetos must not exceed 50 RPM.

- Finally, turn the key to the OFF position, let the engine RPM drop and quickly get back to the BOTH position before your engine dies.

If there is no drop in RPM, engine shutdown must be initiated.



RPM Indicator

Ignition key

When our engine has been checked, it is now time to prepare our aircraft for the rest of the flight.

Protect your battery by turning on your alternator and verify that the ammeter is indicating a load. Finally, light up your cockpit by turning on your avionics.



Avionics switch

Ammeter

Alternator switch

At this point you may set up your instruments according to your needs (altimeter, COM/NAV, GPS...)

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3.5. Taxiing

Before taxiing, turn on the taxi light to inform people around the aircraft and other traffic.

Do not use the landing light unless you are on a runway, there are very powerful.

Contrary to airliners, taxiing with a small aircraft must be done with flaps being retracted so they will not be hit by debris projected by the propeller.



To begin your taxi, release the aircraft parking brake and apply some throttle.

When the aircraft starts moving, apply brakes to check them.

Do not use your engine above 1000 RPM, and keep your speed around 10 knots.

Remain at the center of the yellow line.

Use rudder input to keep the line centered and bear in mind how to use your flight controls.



Pay extra attention to holding points!

Never enter an active runway without clearance and make sure there is no traffic operating on the runway.



4. Conclusion

In this document, we have reviewed our cockpit and prepared it for the rest of the flight.

The engine is therefore started and its condition is tested at low power level.

Taxiing led us to the runway holding point.

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