

The CIX VFR Club	Flight Training Notes	Exercise 2
For Simulation Purposes only. Not to be used for real world flight.	PREPARATION FOR FLIGHT	Issue 1.2 08/10/05

1 INTRODUCTION

This series of tutorials for the CIX VFR Club are based on real world flight training. Each document focuses on a small part only of the necessary skills required to fly a light aircraft, and by echoing real world training, you will be a better Flight Simulator pilot and get more enjoyment out of the hobby as a result.

These tutorials are written specifically for the Flight Simulator Default Cessna 172. Some details will be different for other aircraft.

You should read Exercise 1 before continuing with this tutorial.

2 BEFORE THE FLIGHT

A successful flight depends very much on thorough preparation.

Preparation includes: -

- **Personal Preparation** Plan your flight in advance of the trip in a calm, unhurried and thorough manner. Mark the planned route on the chart and calculate bearings and distances for each leg and complete a preliminary pilot's logsheet.
Check that you have all the equipment you need to hand, and settle down for the flight in good time so that all pre-flight checks can be completed without rushing.
Check that you have suitable clothing – a cold pilot will not think clearly, and a busy flight can make you very warm, even sitting at a computer screen!
- **Documentation** Do you need a formal Flight Plan? If so (and it is a good policy to adopt for VATSIM, then rehearse it before going on line and having to think it through "on the fly". You can open Squawkbox and enter a Flight Plan without going on line, and save it to disk, so that it can be reloaded before the flight.
A Pilots Logsheet should be used for every flight, as a means of keeping a check on your current position, distance to run fuel endurance etc.
You cannot fly safely without a map. (In the real flying world, it is illegal to fly without the **current issue** of the chart covering your flight.
- **Preparing the Aircraft** Which aircraft are you going to fly? Are you fully familiar with its handling characteristics, and "vital statistics" – stall speed, cruise speed, engine rpm settings etc. What is you call sign? Rehearse saying it phonetically to reduce the stress of talking to Air Traffic Control.
Set the Direction Indicator to coordinate with the Compass (press "D" on the keyboard. Once connected to Vatsim, set the local QNH by pressing the "B" key on the keyboard.

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- Pre-take off checks See below.

3 SETTING THE ALTIMETER

In the real world, most flying in the vicinity of an airfield is done at heights based on QFE in the UK. QFE is the measured barometric pressure at ground level, and QNH is the calculated average sea level pressure. Exercise 16a in this series of tutorials covers altimetry (height measurement) in detail, and defines “QNH” and “QFE”. With QNH set on the altimeter, the instrument indicates the aircraft’s height above sea level, and with QFE set, the height above the ground at a specified location, normally an airfield, is displayed.

In the UK we use millibars to measure QNH and QFE, and this is the what ATC give you when they say “Cue Enn Aitch wun zero wun two” or “Cue Eff Ee wun zero zero tree” or similar. In the USA they use inches of mercury, with values between 29 and 31 inches. Most of the aircraft used in Flight Simulator show the pressure setting in inches - the small window on the altimeter, the technical name for which is the “Kollsman Scale”.

In Flight Simulator it is normally too difficult to translate a QFE given by ATC into the equivalent in inches by mental arithmetic or memory, and then change it on the altimeter whose Kollsman Scale is almost too small to read anyway, so most people fly using QNH, which the pilot can set automatically by simply pressing the "B" key on the keyboard. With additional hardware such as GoFlight control units it is easy to display and set QFE in millibars, giving zero feet at ground level, but this is not essential.

4 PRE-FLIGHT CHECKS

In Flight Simulator the detailed walk-round pre-flight check carried out in the Real World is superfluous, but there are several sets of checks which remain essential. They mimic the real world checks, though the obviously pointless checks (seat belts tight for instance) have been omitted. However, if you are one of those people (we won’t tell anyone) who enjoys being strapped ~~down~~ in – go ahead anyway and check their tightness!

4.1 Before Start-up.

- Altimeter Set to QNH? (Press ‘B’ on the keyboard).
- Gyroscopic Precession (Drift) ticked ON (for realism).
- Aircraft performance set to maximum realism
- Crash detect ticked ON.
- Auto-coordination ticked ON if you have no rudder pedals, or OFF if you do have rudder pedals.

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- f) Flying controls respond and in the correct sense. *(It has been known for aircraft control surfaces to be re-rigged wrongly during maintenance, but in Flight Simulator, you are checking that your yoke and pedals work and you haven't got "Disable yoke" ticked in the program or the USB plug disconnected).*
- g) Set the elevator trim to the take off position marked "T/O" alongside the trim wheel approximately one notch below the centre.
- h) VATSIM ATIS read and understood – runway in use, QNH and surface wind direction and speed ascertained.
- i) En route weather forecast obtained if possible. (Check what it is doing in the real world, as VATSIM uses real world weather).

4.2 Engine Start.

- a) Fuel ON
- b) Mixture lever set to rich (pushed in towards the instrument panel)
- c) Master switch ON (Red split switch to right of ignition keyswitch.)
- d) Engage starter (either click the ignition switch 4 times until it moves to "Start", or key Ctrl-E.
- e) Immediately after start check oil pressure rising, otherwise shut down immediately.
- f) Check ignition switch has returned to the "Both" position.
- g) Check that the engine responds to your yoke or joystick throttle control input correctly.
- h) Set r.p.m. to 1200 for engine warm up and whenever stationary to prevent the plugs being lead fouled*.

*Lead Fouling

Aviation gasoline (AVGAS) has a high tetraethyl lead content. Consequently, aircraft piston engines are susceptible to the plugs becoming covered in small fibrous particles of lead when the plugs are operating below their designed temperature (typically when the engine is idling) and the fuel mixture is set to rich). This can prevent sparking. This aspect of engine performance is not simulated in Flight Simulator.

To avoid this problem in the real world, the engine is always run at a minimum of 1200 r.p.m. when on the ground. The parking brake may need to be ON therefore, particularly on a hard surface, as with the engine at 1200 r.p.m. most aircraft will otherwise move forward.

4.3 After Start-up.

- a) Allow oil temperature to rise to the beginning of the green arc.
- b) Then set 1800 r.p.m. with parking brake ON.

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- c) Oil Pressure & temperature in the green arc?
- d) Suction gauge in the green arc?
- e) Carburettor heat ON (if fitted) for 30 seconds, then OFF (either drag the knob with the mouse, or press the “H” key to toggle On/off.)
- f) Close throttle – check engine idle r.p.m. is 500 to 600 and smooth running.
- g) Return r.p.m. to 1200.
- h) Set the Direction Indicator to agree with the magnetic compass heading (Press the ‘D’ key)
- i) Set the Altimeter to QNH or QFE as required
- j) Set the necessary radio frequencies on COM 1 – the active frequency being the station you are about to call, the standby frequency being set to the next station you anticipate calling.
- k) You can if you wish, select additional frequencies on COM 2 which you will use, but this isn’t often done.
- l) Set the transponder to 7000, the default code for VFR flight.

If you wish, you can also set the NAV 1 radio to a suitable VOR transmitter and the ADF receiver to the airfield NDB, which can help navigation if you know how to use the information these instruments give you. Technically, we are flying by reference to ground features, so using radio navigation aids is unnecessary, but most pilots do use them as a backup in VFR flight. In Flight Simulator, the VOR instrument is coupled to the DME instrument (in the real world, they are usually separate), so not only will you receive bearing information, but distance also on the DME box. For definitions and explanations of these abbreviations, see “The IMC Rating.pdf” available for download from the Club web site.

5 TAXYING

Taxy slowly. The airspeed indicator should read a small deflection from zero, and certainly not anywhere near the minimum figure on the dial (40 knots). Make small steering adjustments to avoid tail swing which occurs in Flight Simulator, although it is unrealistic. The tail swing can get so bad that you lose directional control and can even tip over. The FS2004 Tiger Cub is particularly prone to high speed taxiing loss of control and “ground looping”. Very embarrassing.

5.1 Vital Actions before Take off.

(Do these at the hold, and then call “Ready for Departure”.)

- a) Trim set in for take off (marked T/O next to the trim wheel). Use dedicated yoke buttons, or the mouse or the (Numeric keypad “1” and “7” to adjust.

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- b) Throttle friction nut tight (not simulated in FS)
- c) Primer in and locked (only simulated on the Club C172N)
- d) Pitot heat on if required (FS correctly simulates pitot icing)
- e) Fuel set to both tanks and sufficient for the flight
- f) Flaps set for take off (Up for the C172)
- g) Mixture lever set to fully rich (Red knob pushed in towards the instrument panel, or mixture lever on yoke, or key Ctrl-F4).
- h) Magnetos (Ignition switch) on “Both”
- i) Fuel ON and sufficient for the flight – check fuel gauges.
- j) Flaps set for take-off (normally flaps UP)
- k) Gauges all operating and displaying sensible values. QNH set and temperature and pressure gauges “in the green”. (Press ‘B’ key to set QNH, beacon and strobe lights switched on).
- l) Gyros (all functioning – and the Direction Indicator synchronised with the compass heading (Press ‘D’ key).
- m) Parking brake OFF.
- n) Carburetor heat to cold (if fitted – the Club Cessna 172N has one)
- o) Controls full and free movement. If you use a joystick, yoke or pedals, waggle them in all axes a couple of times to make sure that the calibration hasn’t been altered or the USB plug pulled out of the PC.
- p) Hatches (You can open and close the doors of the aircraft in FS)
- q) Harnesses (Are you strapped to your desk?)
- r) Good lookout for other aircraft on final approach before moving onto the runway. (Do not rely on ATC telling you there is someone on final). Press ‘W’ key for a better view without the instrument panel. Press ‘W’ again to restore panel.

Real world pilots often learn these off by heart helped by the mnemonic TTMMPPFFGGHHCLL, (just about pronounceable as “Tumpfughuckle”).

5.2 After Flight

- a) Parking Brake ON (Shift –“.”)
- b) Mixture fully lean to stop engine. Pull red knob out with mouse, or mixture lever on yoke, or key Ctrl-F1.
- c) Ignition switch to OFF (3 mouse clicks)
- d) Master switch to OFF (both halves)
- e) Fuel OFF (if possible – some aircraft don’t have a fuel valve in FS).
- f) If desired, save your position as a “Flight” (the older versions of FS used the word “Situation” which is more accurate). Press the semicolon (;) key and enter the details of your location, e.g. “Biggin Hill Apron”, and tick the “Save as Default Flight” tick box if you want to start from this position for your next flight. (This is of course normally the most

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realistic option, but you can always get the train to somewhere else – virtually of course.)

6 REFUELLING

You may not always have the time to refuel “properly” so you use the menus to enter the amount of fuel you wish to carry. This is usually 100% - full tanks - of course. In the real world, aircraft tend to be parked with full tanks to avoid water condensation forming in the otherwise empty space above the fuel. Water in an aircraft’s fuel tanks is always a VERY BAD thing! The water tends to reach the carburettor shortly after the throttle is opened fully, which is generally when you are 20 feet off the ground, nose high and slow. The engine stops and *Houston, we have a problem.*

So, where you can, refuel at the end of a flight. Park near the fuel pumps thoughtfully provided by Mr Gates at most aerodromes. If you park within a wingspan or so, then once you have stopped, about 2 seconds later, your fuel gauges magically move to “Full”. This feature has been with us since FS4, but many virtual pilots are unaware of it (and many, but not you naturally, fly with the “unlimited fuel” tick box ticked). Take care to park in a position such that when you move off again, you don’t hit the pumps with a wingtip – no reverse gear on an aeroplane – well, not the Cessna 172 anyway. This mimics a real world situation, where it is possible to taxi into a position you can only get out of by getting out (having first stopped the engine of course) and pushing the aircraft back manually. Another embarrassing scenario.