

The CIX VFR Club	Flight Training Notes	Exercise 2
For Simulation Purposes only. Not to be used for real world flight.	FLIGHT PREPARATION and CLOSE DOWN	Issue 1.5 14/02/12

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 OBJECT

The aim of this exercise is to prepare an aircraft for flight from a “cold and dark” condition, and to close down the aircraft to a “cold and dark” condition at the end of the flight.

3 DEFINITION

Cold and Dark is the aviation term for an aircraft in the same condition as your car parked in your driveway. The engine is not running, the ignition key is out and the lights and radio turned off. In a piston engined aircraft, that means engines shut down, magnetos off, fuel valve(s) shut, radios off, all electrical power switched off, master switch off and keys out. It is just a little more complex than a car.

4 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!

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- 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.
- Pre-take off checks See below.

5 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

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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.

6 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!

6.1 Before Start-up.

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

6.2 Engine Start.

- a) Parking brake ON.
- b) Fuel ON
- c) Mixture lever set to rich (pushed in towards the instrument panel)
- d) Master switch ON (Red split switch to right of ignition keyswitch.)
- e) Engage starter (either click the ignition switch 4 times until it moves to "Start", or key Ctrl-E.
- f) Immediately after start check oil pressure rising, otherwise shut down immediately.
- g) Check ignition switch has returned to the "Both" position.
- h) Check that the engine responds to your yoke or joystick throttle control input correctly.

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- i) 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 will need to be ON therefore, particularly on a hard surface, as with the engine at 1200 r.p.m. most light aircraft will otherwise move forward.

6.3 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.
- 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.
- 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, you 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

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the real world, they are usually separate), so in FS, not only will you receive bearing information, but also a distance readout on the DME box. For definitions and explanations of these abbreviations, see “The IMC Rating.pdf” available for download from the Club web site.

7 CONNECTING TO VATSIM

- Logging on to the VATSIM server via a pilot client
- Opening Servinfo or Vatspy and using the data
- Checking for any ATCUs in the area to be flown
- Checking VATSIM weather (may be different from real world weather at the chosen location)
- Disabling VATSIM weather if necessary for VFR flight
- Creating a VATSIM Flight Plan (within the Pilot Client)
- Entering VFR Route details (optional – just “VFR” may be entered)
- Essential entry in comment box “Cix VFR Club”
- Optional entries in comment box /V/ (voice) /D/ (Daylight) “Trainee/Newbie”
- Saving a plan for future use
- Sending a Flight Plan to the VATSIM servers
- Setting the Transponder. VFR Code 7000; CAS Conspicuity codes; Mode C.

8 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 and FSX Piper Cub is particularly prone to high speed taxiing loss of control and “ground looping”. Very embarrassing.

8.1 Vital Actions before Take off.

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

- T**rim 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.
- T**hrottle friction nut tight (not simulated in FS)
- M**ixture lever set to fully rich (Red knob pushed in towards the instrument panel, or mixture lever on yoke, or key Ctrl-F4.
- M**agnetos (Ignition switch) on “Both”.
- P**rimers in and locked (only simulated on the Club C172N)

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- f) **P**itot heat on if required (FS correctly simulates pitot icing)
- g) **F**uel set to both tanks and sufficient for the flight – check fuel gauges.
- h) **F**laps set for take off (Up for the C172)
- i) **G**auges 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).
- j) **G**yros (all functioning – and the Direction Indicator synchronised with the compass heading (Press ‘D’ key).
- k) **H**atches (You can open and close the doors of some aircraft in FS)
- l) **H**arnesses (Are you strapped to your desk?)
- m) **C**arburetor heat to cold (if fitted – the Club Cessna 172N has one)
- n) **C**ontrols 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. It is useful to do this while in outside view so you can see the control surfaces moving.
- o) **L**oose objects – if your computer desk is going to fly inverted, all the pencils could fall out. Seriously, this isn’t a Sim issue, although very import in real world flying, hence its inclusion in the Vital Actions.
- p) **L**ookout for other aircraft on final approach before moving onto the runway. This is an issue in the world of online flying. Do not rely on ATC telling you there is someone on final – make sure you can see them. Possibly Press the ‘W’ key for a better view without the instrument panel. Press ‘W’ again to restore the panel. Better still, pan around in outside view, a privilege not available to real world flying.

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

9 AFTER FLIGHT

Just as it is more realistic to start up from Cold and Dark before flight, so it is equally satisfying to shut down properly 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 or magneto switches to OFF (3 mouse clicks on the left of the switch in the Cessna 172.)

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- d) Master switch to OFF (both halves) – or separate battery and alternator/generator switches in other aircraft.
- e) Fuel OFF (if possible – some aircraft don't have a fuel valve in FS).
- f) If you wish, 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 realistic option, but you can always get the train to somewhere else – virtually of course.)

10 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.