BHPFC Ab-initio training advice

1. Introduction

These notes have been put together as an aid to those who are about to attempt their first human powered flight.

2. Aircraft

Do one final walk-round. Remember it's your safety at stake so do a pre-flight inspection just before attempting to fly. If the aircraft has already flown, (or attempted to fly) then you need to check that nothing has broken or rattled loose.

Has the aircraft flown before? If it has then talk to the previous pilot(s) they're best placed to provide you with practical advice.

3. Weather

In general, pick a day with as low a wind speed as possible. If there is some wind, then try to choose a time when gusting is at a minimum. A light steady breeze shouldn't be problem, but gusts may be.

Remember, a gentle headwind isn't necessarily a problem and can in fact be an advantage, a headwind will reduce the groundspeed you and your crew need to achieve to get the required airspeed for flight.

If there is a breeze, then always take-off directly into wind.

4. Location

Pick a site free of obstructions, especially in the direction of flight. If there is any wind, then make sure you don't pick a site immediately down wind of an obstruction – that obstruction will likely generate eddies and turbulence in the air.

Ideally, pick a launch area that's either tarmac or concrete. Soft ground or grass will slow you down noticeably.

A gentle downhill slope will help the launch, but remember that if your aircraft doesn't have brakes then too much slope may be a problem.

Plan for success – assume you will fly, and make sure that you have enough space in front of you to fly as far as possible. Few things are more frustrating than having to cut a flight short because you've run out of space.

Give yourself a good arc of space on either side of your intended direction of travel. You might intend to fly down the centerline of an airstrip, but make sure the area 45 to 60 degrees on either side is clear of obstruction.

5. Launch Crew.

If this is just a test flight and you're not limited by competition rules, then use as a many launch assistants as appropriate – get as much of a push as possible!

Competition rules normally state a maximum of two assistants, one 'javelin man' on the boom, and one wing man to keep the wings level. If there's only one wingman, then he can't provide thrust without turning the aircraft, but if two are allowed then, depending on aircraft design, it may be possible for both to provide a bit of help by pushing against the flying wires.

When you're on the ground, the ground crew has much more influence on which direction you move than you do – make sure they know that! If you're drifting off to the left or the right before you've even taken off, then it's probably their fault, not yours.

HPA often have poor roll control, so it's critical that your wing men know to keep the wings level on take-off. It often helps to have an additional helper standing 20 meters behind the aircraft to judge the wing angle and provide some advice on wing-leveling.

6. Pilot skill.

At the risk of stating the bleedin' obvious, it helps if you know how to fly!

If you get the chance, then even a few trial lessons in a glider will help (why a glider? – because a glider is the aircraft that mostly closely resembles an HPA in flying characteristics)

If you don't have any real flying experience, then even experience with RC models or flight simulators will help.

Before you attempt to fly, test yourself on a gym ergometer to confirm you have the physical power required. Remember, all flights (even those that don't get off the ground) involve a degree of risk, both to you and your aircraft. If you don't have the power for a realistic chance of flying, then don't risk damaging yourself or the aircraft!

7. Control Checks.

Before you get into the aircraft, move the controls and make a visual confirmation that they move in the correct sense (stick back, elevator up etc.)

After you're in, and immediately before flight check the controls again and get someone else to verify the position. Do this because it's possible that the controls have been broken or damaged as you've squeezed yourself in! Make sure you check that the controls move in the correct sense, not just that they move! Don't just shout "rudder" and wait for a "yeah" from someone behind you, make sure he's briefed to tell you which way the control is actually moving. Move the rudder, ask "rudder?" and wait for the response "rudder left" (or whatever). By not actually telling the person on the rudder which way you've moved it you're doing on double check that the controls have been connected the right way around.

8. Launch

You, the pilot, must be in charge of the launch, start by checking that everyone's ready (especially the people you can't see!) warm up for a minute or two and then shout "walk" at which point you start to pedal, and your launch assistants all walk forwards (taking care to keep you pointed in the correct direction). A few seconds later focus your eyes on the end of the runway, increase your pedaling, shout "run" and everyone should give maximum effort. When everyone's running flat-out, the javelin man shouts "release" at which point the two wing men release the wing tips or flying wires and the javelin man lives up to his name and gives one final

push to help the aircraft into the air. It's important that javelin man gets the timing right, if one of the wing men tires and lets go before the other than the aircraft risks veering off track.

For those with no flying experience, you're going to be on a quick learning curve! In general, a pilot (of any aircraft) will attempt to keep the aircraft on the ground whilst the airspeed increases and then will rotate into the climb when flying speed is reached. As a HPA pilot you may not have an airspeed indicator, so you're going to have guestimate a bit. If you don't know how fast the aircraft is going and you've got no idea of fast you need to be turning the pedals, then the best option is to apply maximum power for 10-15 seconds, and then gently ease back on the stick, avoid the temptation to yank the stick back, one of two things is likely to happen, either you'll leap sharply into the air, stall*, and drop right down again, or you'll increase the angle of attack so much, that the wings stalls , the drag increase and you'll never get off the ground. The aircraft is unlikely to respond immediately, so try to inch the stick back a little, wait a couple of seconds for a response, and if nothing happens inch the stick back a bit more – repeat until you take off or collapse from exhaustion!

As a final tip – remember to keep pedaling when you take-off, it's not uncommon for the euphoria of flight to cause the pilot to simply forget to pedal!

*A stall occurs when the angle-of-attack is too great – i.e. the wing is pointing too sharply upward. When a wing stall is will generate no lift but lots of drag.

9. Flight

Your first flight in a HPA is likely to be relatively short, and the incredible adrenaline buzz you'll be feeling will make it even shorter! It's going to be almost impossible to master the controls in the few seconds of flight you'll have, so best to understand what's likely to happen before it happens.

Remember, you're flying a powered aircraft (even if you're providing the power), and despite what you might think, the stick controls the airspeed, and the power controls the rate of ascent/descent. Stick forward, airspeed increases, stick back airspeed decreases. Increase power aircraft climbs, decrease power aircraft descends. Simple.

Many early HPA flights start with a sudden climb followed by an abrupt descent back to ground. When an aircraft climbs, you are in effect, converting kinetic energy into potential energy i.e. you're converting speed into height – but by doing this you may be reducing the speed to below that required for flight (hence the sudden descent). So once you're airborne, try to keep the aircraft reasonably low, and if you do climb, don't climb too fast. A flight that

maintains a steady few inches above the ground is likely to last a lot longer than a flight that starts with a lurch 6 foot into the air.

10. Landing

Most HPA flights come to end, not because the pilot has made a conscious decision to land, but simply because he's run out of energy! This isn't a bad thing, simply maintain the stick in the normal flying position, and rely on the decrease in power causing the aircraft to gently descend to the ground. Attempting to 'fly' the aircraft down (by pushing the stick forward) is more likely to result in a heavy landing followed by a bounce back into the air.

The landing and subsequent ground roll can be one of the riskiest phases of the whole flight, more so for the ground crew than the pilot. If one wing touches the ground before the aircraft has slowed down, then the entire aircraft may pivot (and accelerate) around the grounded tip causing a ground-loop. This can catch the flight followers out, so make sure they're all briefed about the dangers beforehand. Someone cycling 10m behind your aircraft may think they're out of harms way, but if a wing drops and the aircraft spins around rapidly then that cyclist may find himself pedaling towards a wing or flying wire moving rapidly towards him! For a pilot, the safest place to be in a ground-loop is in the cockpit hanging on!

Mike Truelove

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