

## Condor as a Competition Trainer

Flight simulators have been with us almost as long as flight. The first controlled powered flight occurred in 1903, and the first production flight simulator (the famous 'link trainer') was in widespread use in the late 1930's. Now most airline pilots are trained almost exclusively on flight simulators and the first time they sit in a real airline cockpit is on a revenue-producing trip with passengers in the back. The USAF has long recognized the value of simulator training. It turns out that humans aren't real well adapted to the mental and psychological stresses common in high-dynamics flight environments and it is fairly easy for a pilot to get overwhelmed by a rapidly changing flight environment, usually resulting in a fatal crash. It is *much* less expensive to crash a simulator than the real thing, and the pilot gets to think about that 'fatal' mistake over a beer rather than attending their own funeral.

So what does this all have to do with Cross-Country (XC) competition and the Condor flight simulator? Well, it happens that while the basic skills needed for successful XC competition flying aren't that complex, they are very difficult to learn and practice due to the very nature of cross-country soaring. Up to now, the only practical way to learn XC was to go fly XC, meaning you have to have a capable aircraft, instruments, a supportive club environment, etc. You almost have to be a XC fanatic before ever getting away from the home airport. Maybe you can cadge a flight with an XC pilot in a two-place XC capable ship. Maybe your club hosts a regional competition, or maybe you crew for a racing pilot at a competition, and thereby get some feel for the thrill and sense of accomplishment when pilots return from a racing day.

I believe my own experience with learning to fly XC is pretty typical. I got my glider rating, and flew club aircraft for a while, rapidly tiring of just tooling around the local area. There were a number of XC pilots at our club, and they seemed to be able to do magic things with their gliders. Not only did they make one tow do for the entire day, but they came back at dusk with stories about flying for hundreds of miles without an engine. I got into a partnership in an LS-3 and was able to do some (very) mild cross-country flights, quickly snaring the club record for the most landouts (3) in a single day. Eventually some of the other XC pilots took pity on me and dragged me around on some leader-follower flights, dramatically lowering (but not entirely eliminating) my penchant for poor thermal selection, poor thermalling skills, and subsequent outlandings. Then I got my own ship (an LS-4) and decided I'd show everyone up at our local regional meet – boy was *that* a learning experience! Not only did I suck at all the basic racing skills, but I also had to divide my limited mental horsepower between sucking at the basics and sucking at navigation and turnpoint management! Needless to say, the only reason I didn't finish that meet at the very bottom of the score sheet was because someone withdrew halfway through the contest. However, I was well and truly bitten by the competition bug, and have now improved to the point where I'm in the top half of the score sheet more often than in the bottom half. Still, the way that I improved was by continuing to make mistakes (sometimes the same mistake over and over again) and

paying the price in real-time and in real contest points, and in at least one case, in real aircraft damage.

What if there was a way to practice all this stuff at home so that you didn't have to learn it all literally 'on the fly'? What if you could make a serious mistake and, instead of waiting for the next season while my glider was repaired, go right back out and make the right decision or avoid the wrong one? What if you could measure oneself against more experienced pilots from all over the world, in realistic soaring conditions with realistic glider performance? What if you could try a number of different combinations of cruise speeds, MC settings, CG conditions and ballast loadings under the same or very similar conditions, just to see what happened? What if you could practice with your new navigation software over the winter so that you didn't have to fumble around in the cockpit, trying to decipher strange dialog boxes and/or displays?

Well, now there is a way - the Condor simulator. Almost every aspect of modern XC racing is available in Condor with an amazing degree of fidelity, from basic thermal centering practice to extreme mountain grand-prix racing. The rest of this article will discuss racing basics in general and thermal centering in particular and subsequent ones (alternating with Scott Manley's articles on using Condor for glider instruction) will examine the use of Condor for more advanced training. From now on, it will be assumed that the reader has acquired a copy of Condor and at least a decent joystick, has read the 'Condor How To' available from the SSA website's Soaring Magazine page (April Issue), and can take off, land, and fly around with a reasonable amount of skill.

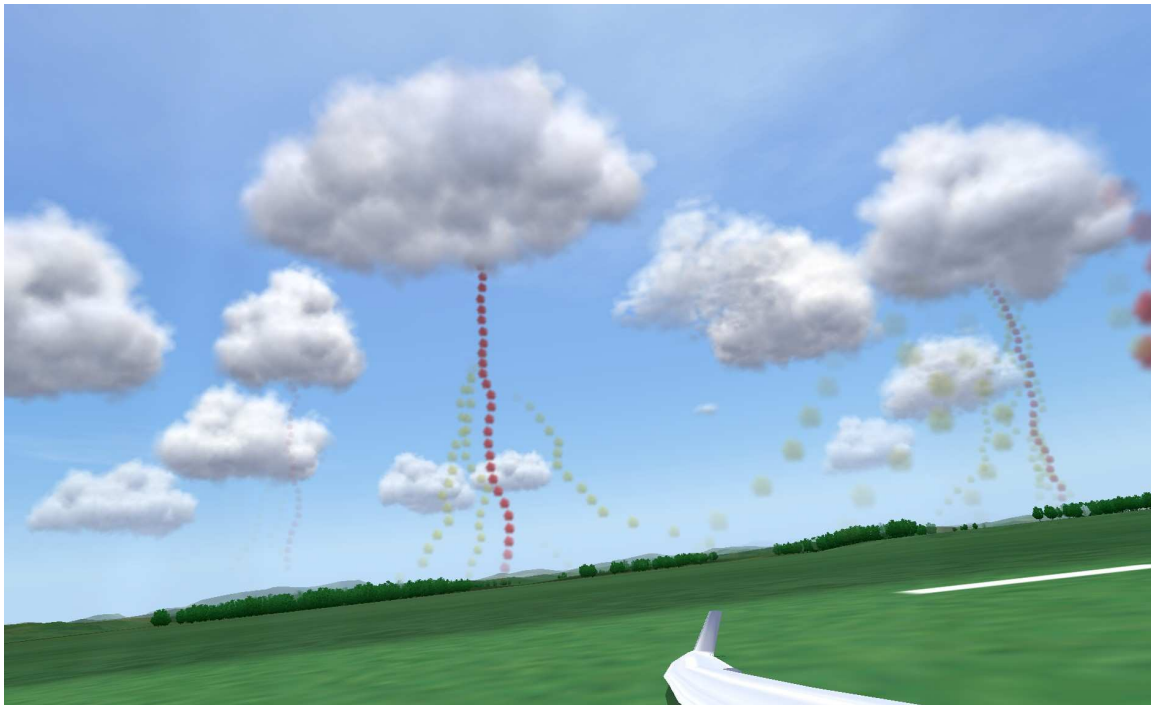
### **Racing Basics:**

Any book on XC racing (and there are many good ones) will tell you that the basics for successful XC racing are pretty simple. Thermal effortlessly, cruise efficiently, only stop for the best thermals, and fly straight lines. If you can master these things, you will do well in typical flatland contests. Of course, mastering these things is like the joke about the tourist asking directions to Carnegie Hall. The answer was "practice, practice, practice". There is no magic for mastering soaring skills – it takes lots of practice and the dedication to stick with it longer than the next guy.

### **Thermal Centering in Condor:**

In order to do well in XC racing, you must be able to thermal well and effortlessly. By this I mean that you should be able to center the thermal within one or two turns, stay in the core until the climb rate drops off significantly, and then exit cleanly and on course. As in most things soaring, this is a lot easier said than done. A typical local-area glider pilot usually takes several turns to (loosely) center a thermal, and usually doesn't stop climbing until cloudbase or zero lift, whichever comes first. Condor offers the opportunity to practice your thermal-centering skills as often as you like, and under as many different conditions as you like. In addition, Condor has the ability to make thermals visible via the 'Thermal Helper' feature (the 'H' keyboard key by default). Thermals in Condor are very realistic, being composed of many 'threads' of rising air (denoted by different colored rising balls) that start out separately from the ground and coalesce and intertwine to form the main thermal column. Dark red indicates a strong hot

'thread' and shades of blue indicate sink. When cumulous clouds are present, they form, mature, and dissipate in a very realistic fashion. The following image shows a representative view of Condor clouds from the ground on a good day, with thermal helpers turned on. Note that thermals in Condor are actually fairly complex and are made up of multiple 'threads' as shown. To see the entire sequence of formation, maturity, and dissipation, click on 'Soaring Magazine' then 'Current Issue' on the SSA home page and look for 'CondorClouds.zip'.



When I first started flying Condor, I would set the Thermal Helper distance on the NOTAM page to 3 or 4 miles (any more than that isn't useful), and then turn them on and off periodically with the 'H' key. I would make thermals visible so I could compare thermal strengths as shown by the dot colors to the shape, edge quality, and color of the cumulous clouds above them as I approached a thermal. I would turn the thermal helper OFF before entering, and attempt to pull up and center the thermal as rapidly as possible. When I thought I had it centered, I would turn the helper ON and look out at my inside wingtip. If the main thermal 'thread' was right on the wingtip, I would consider myself centered. Anything else and I would try to figure out what caused me to be off center. I would also time this procedure from first pull-up to centered, and I wouldn't be satisfied until I could pull up into any thermal and have it centered in one or two turns. Initially I did this with nice strong thermals so there would be no doubt as to the core position. After doing this a few hundred times I became pretty confident that if there was a core, I could center it quickly. Then I started changing the weather (weather page in the flight planner) to weaker and weaker conditions, and also to conditions where the thermal strength varied quite a bit from cloud to cloud. This allowed me to practice thermal assessment and stay/go decision making.

According to Doug Jacobs, you should be able to thermal tightly enough to make a complete circle in 15 seconds or less, while maintaining excellent speed/attitude control, without breaking a sweat. If you can do this, then you are capable of efficiently coring even very narrow thermals, (like that narrow gnarly thermal at 1000' AGL) and capable of using the stronger center section of wider thermals. This is easy to practice in Condor; just put a stop watch out where you can see it (or use the clock on the Condor instrument panel) and see how you do. If you can do it in Condor, then you can do it in the real aircraft. Conversely, if you *can't* do it in Condor, you have no hope of being able to accomplish it in the air. Practice, practice, practice!!

To try this exercise, launch Condor and select 'Free Flight'. Select the Slovenia (default) scenery. On the Task page, Left-click on the PTUJ airport three times to set the takeoff, start, and finish points all to the same place (you must define a complete task, but it doesn't have to go anywhere). On the Weather page, set thermals to strong, wide, and normal activity. Set all the variations to low and the turbulence to none. On the Plane page, select your favorite glider (I like the V2bx, but your mileage may vary). On the NOTAM page, change the thermal helpers distance to about 3 miles. Set the start type to 'Airborne' if you want to avoid the time for towing.

I have placed a short Condor Replay (.RPY) file illustrating the above practice techniques, along with the Condor FlightPlan (.FPL) file for this exercise on the Soaring Magazine page of the SSA website (Look for 'ThermalEx.FPL' and 'ThermalEx.RPY' on the page for the June issue). To 'replay' this flight, simply launch Condor and select 'View Replay', then navigate to where you put the replay file, select it, and then click on 'View' (note – you may have to have PlanePack1 installed to view this). I also created a short narrated YouTube video that can be viewed without Condor – see <http://www.youtube.com/watch?v=gs61CxgryU8> or search for 'ThermalEx3'

OK, that's all I have space for this month. If you have any questions or comments about this article or the exercise, I'd love to hear about it – email me at 'paynterf@gmail.com'. In the next installment, we will talk about some other basic XC racing skills like thermal selection and efficient cruising.

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