Column: Condor Corner
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Correction:
In the February 2011 issue of Condor Corner, I reported that a *Task* needed to comprise at least two *Task Points*, the *Takeoff* (Airport) and the *Start*. No sooner had the February issue gone to print, than I discovered the truth. The only required *Task Point* is the *Takeoff*.
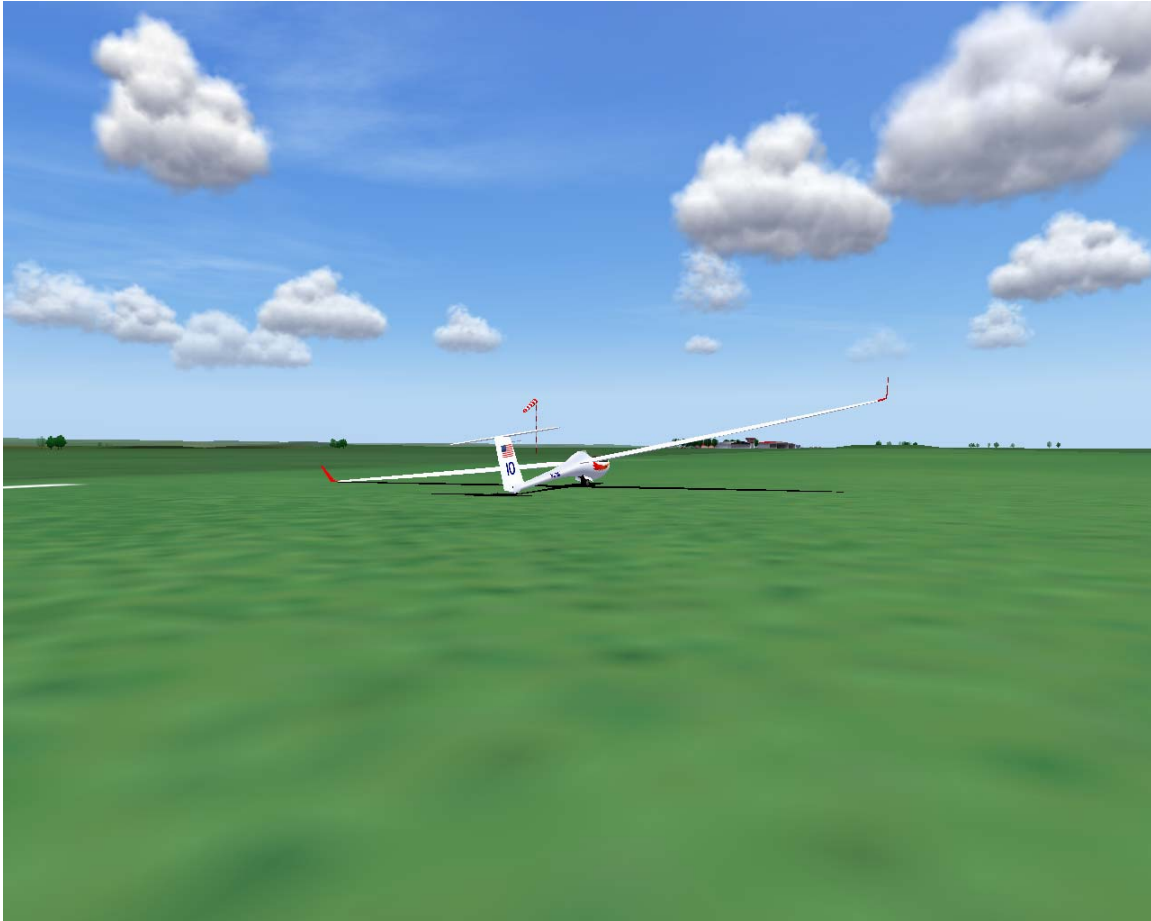
Introduction:
In February, we began the arduous task of covering Condor's *Flight Planner* function. We made it through File Functions (*New, Load, Save*, etc) and described the *Task* component in nauseating detail. This month, we will continue the process by working our way through the *Weather* and *Plane* components.

Note: Condor-specific terms are in *Italics*.

Flight Planner - Component #2 - Weather
Back in April 2010, when we kicked off Condor Corner, I introduced you to my list of Instructional Challenges. #4 on the list was "The Weather Never Cooperates". While that may be somewhat of an exaggeration, it seems to hold true more often than not. Real life weather is rarely ideal for a given day's lesson.

Not so, however, in simulation world. In Condor, you can set the weather up to be whatever you need, so let's take a look at how that's done.

Condor Weather – What you See is What you Set

Wind

When you first enter the *Weather* component of the *Flight Planner*, two things jump out at you. One is a large compass rose that takes up most of the left side of the panel. The compass rose is overlaid with a series of 5 concentric circles, each representing 5.4 knots of wind speed. To set the wind speed and direction, you simply place your cursor on the compass rose and click the left (or right) mouse button. A blue wind vector appears emanating from a red dot and the wind *Direction* and *Speed* are displayed digitally below the compass rose. While Condor lets you highlight the digital *Direction* and *Speed* values, it does not allow you to enter them directly. You need to set these values graphically using the vector on the compass rose. However, holding the CNTL key down, while clicking on the compass rose, lets you set the *Wind Speed* in increments of exactly 2.7 knots and *Wind Direction* in increments of exactly 22.5 degrees.
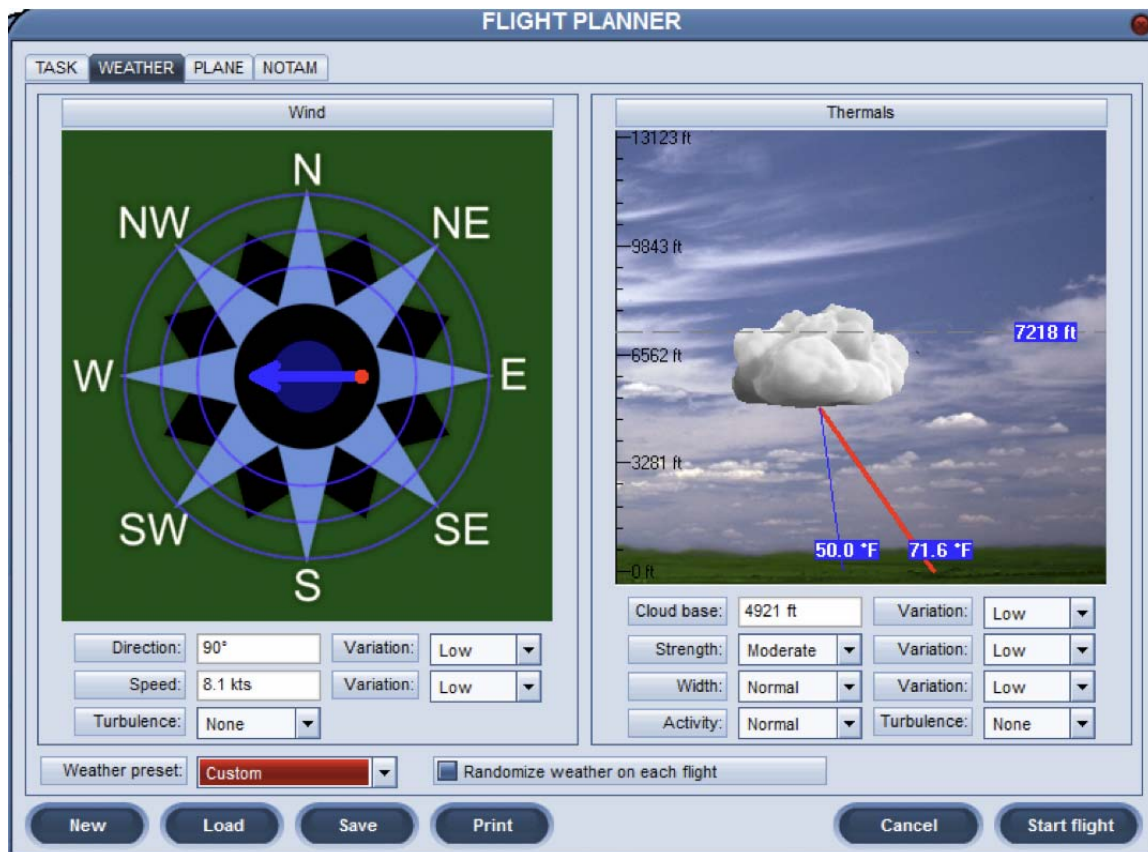
You can change the wind *Direction* and *Speed* by simply repositioning (clicking/dragging) the *Wind* vector's red dot.

To the right of both the *Direction* and *Speed* values is a corresponding "*Variation*" value and drop-down menu. Each menu contains a range of values from "*None*" to "*High*"

with a default of "*Low*".   The *Direction Variation* lets you determine how shifty you
want the wind to be. The *Speed Variation* lets you determine how gusty you want things.

At the bottom of the *Wind* sub-panel is a "*Turbulence*" value and drop-down menu with
options ranging from "*None*" to "*Severe*" and a default of "*Moderate*". The Condor
manual describes this setting as "general mechanical turbulence" caused by wind speed
and terrain. Condor wind speed and direction both vary with altitude and are affected by
local terrain.

For instructional purposes, I am always careful to set the wind in accordance with the
lesson's objectives. For lessons that require a very tranquil atmosphere (e.g. the student's
first aerotow), I set the *Wind Speed* to zero (the default for a *New Flight Plan*), *Direction
Variation* and *Speed Variation* to "*None*", and *Turbulence* to "*None*". In more advanced
lessons, like crosswind traffic patterns, takeoffs, and landings, I start with relatively
benign conditions (e.g. 5 knots at 30 degrees left or right of runway heading) and
progress to more aggressive conditions (e.g. 15 knots at 90 degrees to the runway with a
high level of variability in speed and direction).

Flight Planner - Weather

Thermals
The other major section of the *Weather* panel is dedicated to *Thermals*. What would we
give to be able to control thermals in real life?

Cloud Base is determined the same way Mother Natures does it, using the convergence of the maximum surface and dew point temperature lapse rates. A *New Flight Plan* defaults to a *Cloud Base* of 4921 ft AGL using a surface temperature of 71.6 F and a dew point of 50.0 F. You can set your own *Cloud Base* by repositioning (clicking/dragging) the surface maximum and/or dew point temperature values. Lowest possible cloud base is 3281 ft AGL; highest is 9843 ft. AGL.

Like *Wind Speed* and *Direction*, *Cloud Base* can only be set graphically. It cannot be entered directly.

The *Thermals* graphic also contains an *Inversion Height* value that defaults to 7218 ft. AGL. By repositioning (clicking/dragging) the *Inversion Height* value below the convergence point of the surface maximum and dew point temperature lapse rates, you create a blue day, i.e. you will find lift up to the *Inversion Height*, but no clouds form.

The *Thermals* graphic is a great way to introduce students to the basics of thermal lift, cloud base calculations, and blue day conditions.

Along with *Cloud Base*, the *Thermals* sub-panel has three other thermal-related parameters: *Strength, Width, and Activity. Cloud Base, Strength*, and *Width* have associated *Variation* parameters, with values ranging from "*None*" to "*High*" and defaulting to "*Low*". Finally, there is a *Turbulence* parameter specific to thermals.

With the exception of *Activity*, the meaning of the *Variation* parameters is pretty straightforward. For example, with *Cloud Base Variation* set to "*None*", one would expect all cloud bases to be pretty much at the same altitude. With a high level of variation, cloud base heights would vary considerably from the average value specified graphically when setting the *Cloud Base*.

The *Activity* parameter determines the number of thermals per unit area. *High Activity* means lots of thermals spaced closely together. *Low Activity* means widely spaced thermals. At one point, I thought *Activity* controlled thermal cycle times. Apparently, that is not the case.

To find out more about Condor's thermal cycle times, I checked in with Uros Bergant, one of the Condor developers. Basically, thermal cycle times are a function of the depth of the convective layer and thermal strength. As it turns out, high cloud bases and weak lift produce long-lasting thermals. Thermals associated with low cloud bases and strong lift cycle quickly.

For instructional purposes, it is nice to be able to have thermals available when the syllabus calls for them. It's also nice to be able specify the conditions (i.e. abundant, closely-spaced, strong, wide) that help ensure the student's first experience with thermals is a satisfying one. As the student gains experience, I can set thermal behavior to mimic normal local conditions. For example, a good day in Wisconsin has cloud bases at

around 5000 ft with 300-500 foot per minute lift. I can also simulate weak conditions that require a lot of scratching around and a lot of patience or conditions one might experience in the western United States. And, I can do all that within the span of an hour's lesson. The same level of experience could easily take months or even years in the real world.

The real kicker, however, is that you can "see" thermals in Condor. The first person to duplicate that feat in real life is going to be wealthy beyond their wildest dreams. I have, however, had people ask me "Isn't that cheating?" Maybe so, but from an instructional standpoint, I will do anything I can do to help a student visualize, and therefore better understand, this fundamental aspect of soaring. The objective, of course, is to eventually wean the student off displaying Condor's rising columns of colored bubbles and instead have them use cloud markers, cloud shape and definition, cloud base shape and color, and the visual and auditory outputs of the variometer, all of which are very well simulated in Condor.

By the way, is using a variometer in real life "cheating"?

Weather Presets / Randomization
Besides being able to *Customize* your own weather (the default), Condor has a series of 10 *Weather Preset* options (e.g. *Poor, Average, Bombastic*, etc.) and a *Randomize* feature that sets the weather parameters differently on each flight, within the specified *Weather Preset*.

For instructional purposes, I always customize the weather.

Flight Planner – Plane - 3D Panel

Flight Planner - Component #3 - Plane

The *Plane* panel lets you select from Condor's list of available gliders. Condor comes standard with 13 different gliders. Other gliders are available in optional *Plane Packs* at a small additional cost.
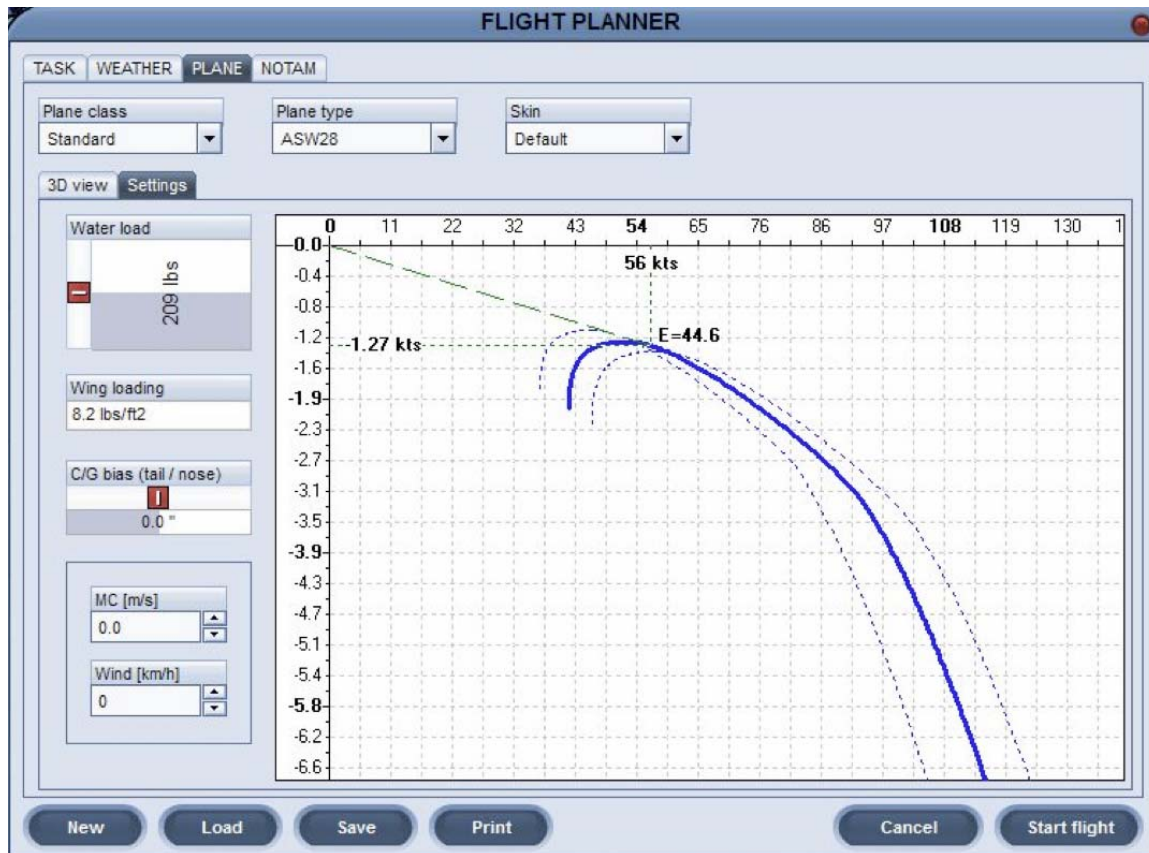
At the top of the *Plane* panel are drop-down menus for *Plane Class, Plane Type*, and *Skin*. *Skins* are optional glider paint schemes.

Plane Classes include *School, World, Club, Standard, 15-meter, 18-meter, Open, Acro* and *All*. *All* is not really a *Plane Class*. It simply lets you select any of Condor's gliders without being limited to a specific *Plane Class*. *World* and *Club* class gliders are only available in *Plane Packs*.

Once you select a *Plane Class*, the *Plane Type* menu will display all the available gliders in that class, regardless of whether the glider is included in one of the *Plane Packs* you may have purchased. 'Clever marketing. For example, I have only purchased the basic Condor offering. If I select the *18-meter Plane Class*, gliders listed include the ASG-29, ASW28-18, Discus2c, LS10, LS8s, and Ventus2cx, but I can only elect to fly the ASW28-18, Discus2c, and LS8s; the ones that come with the base package.

For gliders you have purchased, the *Plane* panel comprises two sub-panels; *3D View* and *Settings*. By default, the *3D View* shows the manufacture's name and glider's designation (e.g. Alexander Schleicher ASK 13), a set of technical data and a small, rotating, 3D image of the glider. Two check boxes at the upper right of the panel allow you to display/hide the *Technical Data* and *Auto Rotate* the 3D glider image. Whether or not you stop the image rotation with the check box, you can control the orientation of glider manually by clicking/dragging on the glider image, allowing you to look at the glider from any perspective. Hiding the *Technical Data* enlarges the glider image.

For instructional purposes, the *3D View* a great way to introduce the student to the external features and technical specifications of the glider.

Flight Planner – Plane - Settings Panel

The *Settings* sub-panel (only available for gliders you have purchased) contains a number of additional sub-panels including the glider polar, *Water Load, Wing Loading, CG Bias*, and *MC/Wind*.

By default, the glider polar is displayed, along with its tangent, as a dark blue curved line and includes the values for best L/D ratio (e.g. E=44.6 for an ASW-28), best L/D speed, and the sink rate at best L/D.

For ships that carry water ballast, the polar curve shifts down and to the right as the *Water Load* is increased using that sub-panel's slide bar. At the same time, the corresponding *Wing Loading* value changes as do the best glide speed and corresponding sink rate. As expected, the glide ratio remains constant. Even as the polar curve shifts with *Water Load*, the dry and fully-ballasted polar curves continue to be displayed as light blue dashed curves.

The *CG Bias* of the glider (tail ballast) can be adjusted using that sub-panel's slide bar. Glider handing is effected, but the effect on performance is negligible.

And finally, the effects of lift, sink, and head/tail winds on glide performance can be graphically displayed by changing the *MC/Wind* values. Changing these values repositions the origin of the tangent to the polar curve, resulting in the corresponding and appropriate changes to the glide ratio, sink rate and speed-to-fly, all within the context of the specified *Wing Loading*. Unfortunately, the *MC/Wind* values display in metric units regardless of how you elect to display speed and variometric readouts; 'not the end of the world for what you get in return.

From an instructional standpoint, the *Plane Settings* sub-panel is absolute dynamite; a great way to have that difficult Speed-to-Fly discussion.

Next Time
In the next instruction-related Condor Corner, Round-4 of the Features, Tips, and Tricks theme, I will finish up my review of the *Flight Planner* by covering the *NOTAM* component, and will begin the discussion of Condor's file types (*Flight Plan, Flight Track, Replay*) and their uses. Until then, keep those cards and letters coming. smanley@wisc.edu

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