TOP HAT TRAINING GUIDE

General Discussion

The Top Hat glide computer app is an alternate user interface (UI) for the XC Soar app. This document is designed to teach you how to use the Top Hat UI for cross-country soaring by flying with Top Hat connected to the Condor2 soaring simulator.

To become truly proficient with Top Hat, you will need to read the XC Soar user manual (www.xcsoar.org) for details on the computer functionality upon which the Top Hat UI is built.

> **VERSION:** This guide is based on **Top Hat 2.2.2b_beta**, August 6, 2017.

> www.tophatsoaring.com

What If You Are an iPhone User?

Top Hat runs only on Android devices and I had been strictly a Mac and iOS user who had never used an Android device. I was disappointed when I learned that Top Hat and XC Soar work only on Android devices, until I discovered the pricing for a new Samsung Galaxy Tab A: $150. That is minor in relation to other soaring costs.

I was still concerned about learning Android. That turned out to be easy because I found it to function remarkably like my iPads.

> **NEW vs. USED:** When I bought my first Samsung tablet, I did not bother to check the cost of new ones and went straight for a used one on eBay. It worked fine but had a weak battery. Since battery life is essential in a glider, I bought a new one, which means I figured out how to pay $240 for a $150 Samsung tablet! I trust you will not make that mistake.

The Curriculum

This guide will **(1)** break down the Top Hat UI to help you understand it, then **(2)** walk you through setting it up for cross-country and contest soaring, then **(3)** show you how to connect your Top Hat Android device to Condor2 and **(4)** give you a sample task for both Condor2 and Top Hat so you can thoroughly learn to fly with Top Hat by training from the safety of your home.

<div style="text-align:center; color:red; font-weight:bold;">Please do not try to become proficient with Top Hat while flying a real sailplane!</div>

Four Major Sections

It is time to get started going through the four major sections in this document:

- **TOP HAT SETUP GUIDE:** Which you are now reading, which shows you how to set up and use Top Hat and concludes with notes about training outside of your sailplane cockpit.
- **TOP HAT FLIGHT TRAINING:** After Top Hat is set up, this section gives you a sample task to fly when you connect Top Hat to Condor2.
- **CONFIGURE CONDOR2 FOR TOP HAT:** This section supports your training by showing you how to set up Windows 10 and Condor2 so that Top Hat appears to fly along with Condor2.
- **ADDENDUM:** Lots of bonus material, including five sets of sample Infoboxes, which will get you started with your training, after which you will most likely begin to customize them for your personal preferences.

Best Way to Use This Manual

This manual is written to walk you straight through from beginning to end. The sequence has been carefully planned to introduce you to the many powerful Top Hat features at the same time it sets up Top Hat on your device and links it to the Condor2 soaring simulator, then shows you how to fly with it.

> **GOOD NEWS/BAD NEWS:** Here is some good news and bad news about Top Hat along with a solution to the bad news.
>
> Top Hat has a dazzling array of custom choices—many thousands of different options—which allows you to set up the app to give you exactly the information you want to see. So, the good news is that you can remake the app to be your personal, custom soaring computer. The bad news is that the massive customization options are bewildering to a new user.
>
> The solution in this manual is to give you a solid example as a starting point: one set of **Pages**, one set of **Infoboxes**, a few other "nice-to-know" options, plus one **map**, one set of **waypoints**, and **one task** for Top Hat, plus the **matching task** for Condor2.
>
> If you follow this manual and set up your Top Hat exactly as shown here—including the Infoboxes in the ADDENDUM—you will be able to fly the sample task in Condor2 while you navigate and manage the task with Top Hat.
>
> As you gain experience with these sample sets and this sample task, you will learn how to begin customizing Top Hat for the way you fly and process information. In other words, the customization options will become welcome rather than bewildering as you naturally and easily begin to make the UI into your own custom version.

What is Coming Next

The training concept outlined above is presented in this document with these sub-headed sections:

- **TOP HAT TRAINING GUIDE**
  - The Basic Concept
  - Notes About Zoom
  - The Nav Bar
  - Set the Screen Layout
  - Create Infoboxes Sets
  - Create Pages
  - Prelude to Training
- **TOP HAT FLIGHT TRAINING**
  - Download the Top Hat data
  - Building and Using Tasks
- **CONFIGURE CONDOR2 FOR TOP HAT**
  - Configure Windows 10 and Condor2 for Top Hat
  - Configure Top Hat for Condor2
  - Download Matching Landscape into Condor2
- **ADDENDUM**
  - When to use XC Soar instead
  - How to create Top Hat terrain maps for any area you want to fly
  - Tips on setting up, flying, and tracking training flights in Condor2
  - Bluetooth variometers that connect to Top Hat
  - Sample Infoboxes

The Basic Concept

For the Top Hat UI to make sense to you, you need to understand the basic concept of **Pages**, each of which show the **Map** and the **Infoboxes** in **different ways**—depending on the current flight mode and your personal needs and preferences.

The **Nav Bar** appears on each Page and is basically fixed—with just a few options, each of which will be covered. The Nav Bar does not change from Page to Page.

The Infoboxes could be arranged in thousands of looks, which is the primary source of the bewildering array of options. This guide is intended to reduce the thousands of options down to a few from which you can learn, and from there begin to create your own look and feel. You will create multiple sets of Infoboxes and then display them by assigning each one to its own Page.

> **NOTE:** Seriously, it is daunting to dive right in and try to figure out all the options. Do yourself a time-saving favor and set up Top Hat as shown here, using the Infoboxes in the ADDENDUM. Then fly a few tasks in Condor2 and make notes on what boxes you might want to change.
>
> Change only a few at a time and then test-fly again. Trust that you will more quickly get Top Hat set up the way you like it if you begin from a proven working set up and then make edits.

Pages and Infoboxes: Default and Custom

Top Hat comes with **three Default Pages**, each of which has a corresponding set of Infoboxes (**Circling, Cruise** and **FinalGlide**). These three are displayed automatically depending on your flight mode**.**

You can create up to **five sets of custom Infoboxes**, but these will not display automatically for you. You will need to assign each one to a custom page and then manually select the desired page.

Notes about Infoboxes Layout

The Screen Layout is defined as the **number** of Infoboxes and **where** they appear on the screen. Top Hat allows **only one** Screen Layout. You cannot assign different Screen Layouts to different pages. You have control only over which Infoboxes appear on the single active Screen Layout.

So, the first thing to do is to decide how many Infoboxes you want and where you want them displayed.

> **CAUTION:** The Screen Layout is an important decision in terms of your precious time because if you change layouts after you have created your Infoboxes, they will not match up anymore. You will have to edit all your boxes again. But, more importantly, if you decide to go back to your previous Infoboxes layout, Top Hat may wipe out your work on your custom Infoboxes. This will be quite annoying if you have spent hours figuring out what you want!
>
> **Record your work by taking a screenshot before any major editing attempt.**
>
> There are screenshots in the ADDENDUM for the sample Infoboxes used in this guide.

Navigating to and from Settings

This guide will list the Top Hat menu path to get to the screen you need for each process being taught. To access the **Settings** selections, touch the large **M** on the map **three times**, then touch the **gear**.

> **NOTE:** All future references to the word **Settings** in this context will assume you will remember how to perform these steps.

To get out of any Settings screen, touch the **Back Arrow** button until you get where you want to be.

Notes About Zoom

Before moving on there are some screen zoom behaviors that you need to know right away, as well as some touch screen behaviors.

Top Hat does not support the "pinch zoom" feature used in most other apps. You zoom in and out either by touching the large **PLUS** or **MINUS** sign boxes on the main screen, or using the volume buttons.

> **NOTE:** You can move the map by dragging it with a finger.

> **NOTE:** Tapping the map produces different results depending on what you touch:

> - **Airport or Waypoint:** Top Hat opens a "Details" screen for that element.
> - **Open area on map:** Distance and magnetic direction to that point, elevation of the point, and your AGL and MSL altitude upon reaching the point if you fly directly to it.

Auto Zoom

Top Hat has an **Auto** zoom feature that will zoom in closer as you approach a turn point and then move back for a wider view the instant you exit that turn point.

You can set the maximum distance shown in the wider view:

Settings, Advanced, Map Display, Orientation

Touch **Max. auto zoom distance** and set your desired value.

> **NOTE:** While on this page, make your other basic display selections. Read the next two sections for a discussion of these options.

Zoom Level Stays with Auto Pages

Top Hat uses a feature called **Distinct page zoom** to remember the zoom setting you have for the Circling and Cruise Pages. So, when you use the zoom buttons to set these zooms the way you want, Top Hat will remember and reset the different zooms when it changes Pages.

> **NOTE:** Top Hat will not automatically switch between Circling and Cruise unless you select the **Circling zoom** to **ON** here on this screen.

Further, Auto Zoom will not work unless you turn it on by touching the **M** button twice and then touching **Set zoom Auto** if it is in the Manual mode.

Zoom Takes Over Android Volume Controls

Top Hat zoom takes over the side volume controls on Android devices, which is good news and bad news. The good news is you can use the side buttons for zoom, which is more stable than using pinch zoom while bouncing around in turbulence.

On the other hand, if you want to change volume, you are out of luck because the side buttons do not change volume! Further, if you touch the side buttons out of habit to change volume, Top Hat will change back to Manual zoom.

> **NOTE:** EVERY TIME you manually zoom using either the screen buttons or the side buttons, the zoom option is set to **Manual!** You will have to reset it to Auto.

Next, we will cover the **Nav Bar**, which has little in the way of customization.

The Nav Bar

The primary difference between the Top Hat and XC Soar UIs is that Top Hat adds a valuable **Nav Bar** on the top of each page. If you fly only to one point, the Nav Bar will display only that point. But if you are flying a cross-country or a contest, the Nav Bar will display all of your turn points **and** it gives you some instant access to abandoning your task and heading to a safe landing somewhere other than the task-completion waypoint.

The Nav Bar contains three basic blocks of information:

- Turn Point Icon and Name
- Distance and [Glide Ratio needed]
- Altitude upon arrival above your preset safety margin

Change the Font Size

Before continuing you may want to increase the Distance and Altitude font to **150%**:

Settings, Advanced, Look, Fonts

The turn point name is already large, so start out using the default for that.

Bonus: Change the Circling Display

Here is an out-of-context bonus that you might as well set while you are at the **Map Display** screen.

Settings, Advanced, Map Display, Elements

Top Hat will color your flight trail so that it represents the lift and sink you are experiencing and have achieved. By default, it displays climb in green and sink in brown—**yes, that is green and brown color-coding on a green and brown map!**

Fortunately, there is an option to change the colors to ones you can see, which are **yellow/orange/red** for lift and shades of **blue** for sink. Set these options:

- Set **Trail length** to **Long**
- Set **Trail drift** to **On**
- Change **Trail type** to **Vario #2**
- Set **Trail scaled** to **On**

Okay, back to the context of the Nav Bar.

Turn Point Icon and Name

The largest text, centered on the bottom half of the Nav Bar, shows the icon and the name of the waypoint. You will not directly enter the name because you will pick it off a Waypoint list.

The icon matches the icon on the moving map, but by default both are quite small. Considering that these icons depict runway direction and relative length, I suggest increasing them to the max size:

Settings, Advanced, Map Display, Waypoints

Change the **Landable size** setting to 200%, which will make the icons large enough to readily distinguish the direction and length of runways. Be sure to set **Scale runway length** to **On**.

Distance and Glide Ratio

Above the waypoint name is the distance to the waypoint, followed by the numerical glide ratio **[XX]** that you need to arrive at the point at or above your set safety height.

> **NOTE:** The required glide ratio number is obviously more valuable when you also have one or more of the glide ratio options showing in an Infobox.

The far right of the top of the bar shows the altitude at which you will arrive at the waypoint, in relation to the safety height you have set.

Swipe Nav Bar to View Other Waypoints

You can swipe the Nav Bar left or right to see your other waypoints.

> **CAUTION:** The altitude you see is NOT the altitude that Top Hat expects you to have when you get there **if you complete all intermediate turn points**. That number is the altitude you would have if you turned directly for that point from where you are. This makes for good abort decision making but DOES NOT indicate how your altitude is in relation to completing the task. There is a separate indicator for that function, which is covered in this section.

Nav Bar Context Menu

Touch the Nav Bar to display a context-sensitive menu, which has *eight possible options*, six of which are in the bullet list below. The seventh one **(TP details)** is special and gets a full discussion after this list. The eighth one is context-sensitive and will appear ONLY if you have suspended your current task.

- **Nav to center:** The title in this button changes depending on the setting:
  - **Nav to center**: The default, which means navigation guidance is given to the center of the turn point. Because that turn point is generally a landable area, the icon will usually be an airport symbol that shows the runway direction and relative length.
  - **Nav to target**: When this option is selected, the name is preceded by a target symbol and the info accounts for your time on a task and may guide you to somewhere in the circle other than the center. For details, watch the YouTube video: **NSX8o9ng5s**
- **Stats:** Touch to see task statistics.
- **Edit task:** Touch for an editable list of the waypoints used in your current task.
- **Edit start:** Touch to edit the contest start time.
- **Goto**: Displays a list of waypoints that you can sort by **Name**, by arrival altitude (**Arriv.**) or distance from your current location (**Dist.**). Touch any waypoint and then touch **Goto**. Your task will be suspended, and the Nav Bar will display the information for the new waypoint.
- **Waypoint list:** You will use this option to add or remove a new waypoint in your task:
  - Touch the **Nav Bar**
  - Touch **Waypoint list**
  - Touch either **Name** or **Arriv** or **Dist** to change the sort order
  - Touch the waypoint, then touch **Select**
  - Touch the **Right Arrow** for more options
  - Touch the option you want

> **NOTE:** Beware that if you want the quickest way to abort a task and go directly to a waypoint on your current task, **the Goto button is not the way!** See the **TP details** discussion, next up.

TP details

Primarily, this button presents quick reference for the waypoint that is shown in the Nav Bar. It is valuable in case you need to land at a waypoint. It will show field elevation, runway heading, runway length, and in many cases some descriptive text such as runway width and frequencies.

If all you want to do is read the TP details, then hit the **Back Arrow** to return to the map.

If you need to take an immediate **Goto** action to a waypoint on your current task, **this is the path** to get there. Each of the remaining two options are discussed here:

> **The correct way to perform a Goto:** To do a real Goto operation, swipe the Nav Bar to the desired waypoint, touch the **Nav Bar**, touch **TP details**, then touch **Goto**. You will be all set.

> **Right Arrow:** There is also an arrow on this screen that brings up many more TP options.

Resume Task

If you abandon your task for an unexpected **Goto** diversion and stick with it, there is nothing else to do but to fly there. But if you find some lift and decide to resume your task, you can get right back to it:

> Touch the **Nav Bar**, then touch **Resume task** (appears only when a task is suspended)

> **NOTE:** It is highly recommended that while flying Condor2, you abandon some tasks with a **Goto** diversion and then resume the task. Also, practice adding and removing waypoints while flying.

Task Arrow

The vertical arrow on the left edge of the page shows your overall altitude relative to the entire remaining task. In other words, it will generally show you how much total altitude you need to gain to complete the task through all waypoints.

> **ALERT:** This is an essential tool for cross-country and task flying! The XC Soar manual has a detailed discussion about the task arrow with many color images and a great amount of detail. **Carefully study pages 86 and 87 in the XC Soar user manual.**

Tips for Screen Orientation

Here are some important factors to consider in your decision about landscape versus portrait:

- Portrait seems tempting because it provides a larger map, but you usually will focus on the Infoboxes with more intensity than the map.
- Portrait mode makes for smaller Infoboxes.
- In Portrait mode, with Infoboxes at the bottom, they will be low in your cockpit, and you will likely want them more in your line of sight. Consider the location option: **top or left**.
- In Portrait mode, the Nav Bar will touch the Infoboxes at the top, leading to errors when you swipe the Nav Bar in turbulence and miss a little.
- It is better to have the Infoboxes toward the center of your cockpit, rather than the map, which will make it easier to keep your eyes closer to the panel while picking up Top Hat data.
- Consider **Landscape** mode with Infoboxes **top or left**. This gives you larger boxes, isolates the Nav Bar so you don't brush Infoboxes when you swipe the bar, and it also isolates the **M** and the **S** buttons away from your Infoboxes, so you don't accidentally touch Infoboxes when you are trying to switch pages or open a menu.

You are now ready to move on to **Screen Layout**, **Infoboxes** and **Pages**.

Set the Screen Layout

To set the screen layout:

Settings, Advanced, Look, Screen Layout

The Infoboxes shown at the end of this document were made with **Infobox layout**: **12 top or left.**

> **CAUTION:** Top Hat may wipe out all your work on your custom Infoboxes. This will be quite annoying if you have spent hours figuring out what you want! **Record your work by taking a screenshot before any major editing attempt.** Don't learn this tip the way I did!

> **NOTE:** See the screenshots in the ADDENDUM for the sample Infoboxes used in this guide.

The look you choose will be personal, of course. But there are some logical constraints and realities of screen size that may help you narrow your choice from these many options.

Top Hat Vario

The Top Hat Vario Infobox takes up the space of two or three other Infoboxes. And, you likely have a good vario in your panel already. Here are some thoughts on the Top Hat vario:

1. It can contain a lot of information that would normally display in other Infoboxes, which means that losing one or two other Infoboxes to this vario is not, technically a loss. In fact, it can display more information than you would get in one or two other boxes.
2. However, depending on your device (I use an 8" Samsung Tab A), all that cool information may be small, jammed up and overlaid and pretty much useless.
3. Do you need another repeat of rate of climb/sink that is on your panel vario?
4. After testing the vario through flights on Condor2, I elected to not use the Top Hat vario.

> **NOTE:** There is more on the Top Hat vario function in the ADDENDUM.

How Many Infoboxes Do You Need?

Top Hat has a bewildering array of layout choices, ranging from four to 24 Infoboxes on the screen.

I think you will agree that four or five is not enough. I think you will agree that 16 or 24 takes up too much screen real estate and leaves you with a confusing jumble of changing information.

Rather than jam 16 or 24 Infoboxes onto one screen, use the Pages concept to select smaller sets of Infoboxes, with each set tailored for some specific phase of flight.

Next, as to the choices that use eight or nine boxes plus the Top Hat vario, I have discussed the Top Hat vario and do not recommend using it—which eliminates the options for eight or nine Infoboxes.

That leaves only the options that have 12 boxes, which works best for me. Examples of how I managed those 12 boxes are included in the screenshots in the ADDENDUM to this document.

> **NOTE:** When you look over my sets of Infoboxes, you will notice that many boxes are "paired up" with another that has similar information. For example, I am a big fan of the pair of boxes that show Altitude AGL and Terrain Elevation. I keep these boxes adjacent.

In summary, I recommend:

Settings, Advanced, Look, Screen Layout, Infobox layout: **12 top or left**

Once you have chosen the layout you want, you are ready to set up the Infoboxes.

Create Infoboxes Sets

Next, to create or edit Infoboxes sets:

Settings, Advanced, Look, Infoboxes

First, select the **Use final glide mode** that you want. When set to **On**, Top Hat will automatically switch to the FinalGlide page when you attain final glide. If you happen to attain final glide altitude early in your task, you may not want the FinalGlide page to come up early. Therefore, if you set this option to **Off**, Top Hat will keep your Cruise page active until you switch manually to it by touching the **S** button. I prefer this option and simply touch the **S** when I am ready to focus only on the final glide phase.

Circling, Cruise, and FinalGlide Sets

These are the **three Default Top Hat sets**. Top Hat will, if you choose to allow it to do so, automatically switch between these three sets. I cannot imagine why you would not want that feature, so I will not show how to turn it off.

Touch and edit each box in each one of the first three, default Infobox sets.

> **WHERE TO FIND THE SAMPLES:** See the screenshots in the ADDENDUM to this document for an example of each of these Infobox sets.

Double-touch each box to change the option, then choose from the list.

> **NOTE ABOUT BOX NAMES:** Not all names on the list match their heading that will appear on the main map. If you see a second entry in a cell on my samples, that is the Top Hat name you will need to find alphabetically on the list.

Once you have completed those changes, consider creating two custom Inboxes sets.

ABORT and LOCAL Sets

These are suggested custom Infoboxes sets that illustrate how to create and use custom sets. I provide them because they are valuable, and because this guide uses them to illustrate how to access the Infoboxes sets that are **not the default sets**. See the ADDENDUM to this document.

Touch **AUX-1** and change the name to **LOCAL**, then edit to match the sample screenshot.

> This is a good set of Infoboxes for flying around the local airpatch.

Touch **AUX-2** and change the name to **ABORT**, then edit to match the sample screenshot.

> This is a good set of Infoboxes for getting home when you really need to.

> **NOTE:** These are merely suggest starting points for your own sets of custom Infoboxes. You will no doubt make changes, but changes from these starting points will be easier than starting from scratch.

> **REMINDER:** The only way to see your custom Infoboxes sets on the map screen is to include them on a dedicated Page, which is the next topic.

Create Pages

Now that you have your Screen Layout and your Infoboxes, it is time to learn how they will be accessed.

The three default Pages (Circling, Cruise, and FinalGlide) will automatically switch based on the flight mode that Top Hat is using.

> **NOTE:** Using a featured called **Distinct page zoom,** Top Hat remembers your zoom setting for each of these three Pages when it automatically switches between them.

You can access your custom Infoboxes sets ONLY by creating a Page that uses them. In other words, you will need to create Pages to access the custom Infoboxes sets you create from the AUX sets.

To Create Pages

To create a new page:

> **Settings, Advanced, Look, Pages**

Use the **Add** button to add a new page to this list.

> **Main area:** Select **Map** for all pages.

> **Infoboxes:** Select Auto to have Top Hat select the pages for you. This works **only for the three automatic modes** (Circling, Cruise, and FinalGlide), unless you turn off the FinalGlide option! (Then it switches only between the other two modes.) Or, choose any other set of Infoboxes to display on this page.

> **Bottom area:** Select Nothing for the map to take up all available space. Select Cross Section to display a side view of your glide with a line drawn to where you will touch the terrain.

> > **NOTE:** You may want to turn on Cross Section for FinalGlide and ABORT.

Use the **UP** or **DOWN** arrows to change the order of your pages. This is the order in which they will appear when you press the large **S** button on the main map. You are unlikely to want to change the #1 option (the Auto page) in the list you see below. After that, however, the order is up to you.

> **NOTE:** More Pages is not necessarily better! You will need to cycle through your list.

Here are the Pages that go with the Infoboxes shown in the samples in ADDENDUM to this document, along with the purpose of the optional ones (2-6). Obviously, there are countless options!

1. Map, Infoboxes (Auto)
2. Map, Infoboxes (Circling)
   a. Top Hat can take up to two full circles to detect you are circling. Having this screen second on your list lets you tap **S** and get the Circling screen instantly.
3. Map, Infoboxes (Cruise), Cross section
   a. As with #2, this give you instant access to the Cruise data. But it includes the cross-section view, for your peace of mind if you cruise across some elevated terrain.
4. Map, Infoboxes (FinalGlide), Cross section
   a. Similar idea to #2 and #3—a way for you to force these three default pages.
5. Map, Infoboxes (ABORT), Cross section
   a. For when you need to abandon the task and get to safety.
6. Map, Infoboxes (LOCAL)
   a. A handy page when you plan to remain within range of home base all day.

To Change Pages

The large **S** button on the main map will cycle through the pages you have created on this list, **in the order you have them on this Pages screen.**

The **S** will show the Infoboxes set that is in use for that page.

> **NOTE:** Small text in the **S** box will show either **Auto**, or the name of the Infoboxes set you have assigned to that page in the previous step.

Prelude to Training

Once you create the Pages and Infoboxes shown in this document, you will need to do some serious flight training with your device connected to Condor2.

> **NOTE:** Detailed steps for connecting Condor2 to Top Hat on your Android device begin in the next section of this guide. Beware that there are more complicated ways to accomplish the connection, and those methods are not reliable. Therefore, this guide will show you an easy process that so far has been 100% reliable.

Practice, Practice, Practice

They say that the secret to getting to Carnegie Hall is: **practice, practice, practice**. But I have not heard of anyone dying due to a mistake they made while playing a violin, so in the case of Top Hat and your sailplane, practice is even more important than trying to become a concert virtuoso.

Practice using the Pages and Infoboxes for full tasks, of course, but also abort some tasks and go directly to different waypoints on your task list. Practice land-outs, too. Thoroughly test all the menus and Pages and Infoboxes by flying many different scenarios so that you will know how to quickly get to the information you need, when you most need it. And you will learn what Infoboxes that you prefer.

> **NOTE:** Decide if you like the automatic Top Hat options by flying a few tasks with **Final Glide** set to **Off** to experiment with the glide computer behavior in that mode.
>
> **Settings, Advanced, Glide Computer, Glide Computer**
>
> Most likely, however, you will want the additional computing power when this option is On.

Careful, scientific testing will not only give you practice for making those choices quickly when it really matters, but it will be essential to you making wise choices for your own Top Hat settings.

XC Soar Manual

The XC Soar manual is 187 pages long, which gives you an idea of how complex some of the functions are to understand. While you are unlikely to read and absorb the entire 187 pages, logic dictates that not even giving it a quick read-through would be poor Aeronautical Decision Making.

> **After completing this training guide, you will still need to study the XC Soar manual to learn to use Top Hat's soaring computing power to safely fly cross country in your sailplane.**

To ease your concern over tackling a 187-page document, this list shows with **RED** headings the pages that pertain to Top Hat. While the UI is different, the underlying technology uses the same computing technology as XC Soar.

- **PAGES 1-23:** The introduction, table of contents, and legal disclaimers.
- **PAGES 24-33:** Covers the XC Soar UI, which is totally different from Top Hat.

- **PAGES 34-37:** You can scan these because they cover details on some elements that are the same in Top Hat.
- **PAGES 40-51:** Section 4 - Navigation
- **PAGES 52-75:** Section 5 - Cross Country Tasks
- **PAGES 76-93:** Section 6 – Glide Computer
- **PAGES 94-106:** Section 7 – Atmosphere and Instruments
- **PAGES 107-116:** Section 8 – Airspace, Traffic and Team Flying
- **PAGES 117-128:** Covers technical details that you can scan
- **PAGES 129-134:** Is a "Quick Start" guide that is based on the XC Soar UI, which means much of the information is of value, but you cannot follow the steps exactly.
- **PAGES 135-144:** Section 12 – Infobox Reference, which is excellent information for Top Hat users because the Infoboxes function the same in both apps.
- **PAGES 145-165:** Section 13 – Configuration, which contains a lot of good information, but you will have to translate the XC Soar UI access methods to the Top Hat IU.
- **PAGES 166-187:** Source-code notes for programmers, plus credits to those people who created XC Soar.

Top Hat Soaring Videos

The functionality of the Nav Bar options as well as the Task Arrow are complex. To help you learn about those two functions, the Top Hat Web site has videos that explain more about task calculations. (www.tophatsoaring.org)

Top Hat on YouTube

Be sure to search for "Top Hat soaring" on YouTube and watch any of the videos that interest you.

> **NOTE:** This document focuses only on the Top Hat UI differences from XC Soar. Bear in mind that the underlying computer functionality of Top Hat is identical to XC Soar. It is best to thoroughly study the XC Soar manual for details on the workings of the glide computer, which is very sophisticated and complicated.

What is Coming Next

The next section is TOP HAT FLIGHT TRAINING, which will show you how to create and manage tasks to use while flying Condor2 to accomplish your training.

To that end, the training section will illustrate the following:

- How to download a Top Hat map
- How to download published soaring waypoints
- How to build a task
- How to use that task to fly with Condor2

Please do not try to become proficient with Top Hat while flying a real sailplane!

TOP HAT FLIGHT TRAINING

This section will show you how to create and manage tasks to use while flying Condor2 to accomplish your training. Before you can fly a task with Top Hat, you need to know the basic concept of how Top Hat gets the data it needs, which consists of the following:

1. **MAPS:** Terrain maps of various areas around the world
2. **WAYPOINTS:** Lists of waypoints that exist on each of those maps
3. **TASKS:** Saved tasks that use the maps and waypoints

To keep this simple, the steps will be illustrated with **one specific example**, based in the Shenandoah Mountains just west of Washington, D.C. and Dulles International Airport. This data will make for some excellent training flights and once you have gone through these steps you will be ready to do it again for any area in which you will fly, using the waypoints and tasks that apply to your own soaring area. Or, if you plan to fly only on Condor2, you can download maps and waypoints from anywhere in the world.

> **DETAILS IN XC SOAR MANUAL:** This section is not a detailed guide on how to fly tasks. The purpose is to get your Top Hat set up—with one map, one set of corresponding waypoints, and one task to fly—as a foundation for building your own tasks.
>
> You can learn deep-dive scientific facts about the Top Hat glide and soaring computer from the XC Soar manual. The underlying engine is the same for both apps, but the Top Hat UI is more intuitive and user-friendly than the bare-bones XC Soar UI.

Download a Top Hat Map

While your tablet has a WiFi connection to the Internet, open Top Hat and:

Settings, Advanced, Site Files, Site Files

Then follow these steps:

1. Touch **Map database**, then touch **Click to scan Internet** and then **Select**
2. Touch **Continent or country**, scroll to and touch **United States**
3. Touch **Select** and then touch **Continue**
4. Scroll to **US_NORTHEAST_HighRes.xcm** and touch **Select**

> **NOTE:** For each map you load into Top Hat over which you want to fly with Condor2, you will need to download the corresponding landscape into Condor2. The "How To" on that is in the CONFIGURE CONDOR2 FOR TOP HAT section, which comes after this section.

Download Published Soaring Waypoints

Soaring clubs publish lists of turn points for use in contests that they sponsor. You should still be on the **Site Files** screen as before:

1. Touch **Waypoints**, then touch **Click to scan Internet** and then **Select**
2. Touch **Continent or country**, scroll to and touch **North America**
3. Touch **Select**, then touch **State**, then **Virginia**, and then touch **Select** and **Continue**
4. Touch **Front Royal** and then **Select** (wait for the download)
5. Touch the **Back Arrow** to return to the map view

Build a Task

The exact steps to start this process will depend on some variables, so this will assume that your Top Hat has at least one task saved, which will be named **default.tsk**. Open this task, and then we will edit that task and save it with a new name.

> **TASK MANAGEMENT TIP:** All data for XC Soar and Top Hat are saved in the same folders on your device. XC Soar has much better task management, which means you should consider having both apps installed and use XC Soar for task management. There is more on this topic in the ADDENDUM.

Depending on your default task you may have to remove or add points to the task, but this is a start:

1. Touch the **Nav Bar** then touch **Edit Task**
2. Touch the first waypoint on the list and touch **Replace**
3. Scroll to and touch **109Start Signal Knob** then touch **Select**
    a. Set the **Radius** to 0.5NM
4. Replace other waypoints or use **Insert before** if you need to add points and continue until you have created the following list:
    a. 109Start Signal Knob
    b. 115Mulberry Run
    c. 045Winchester
    d. 112White Post
    e. 099Finish
5. Touch the **Back Arrow** once
6. Touch **Save as** and enter a name (see naming convention note)
7. Return to the map display

> **TASK NAMING CONVENTION:** If you expect to create a lot of tasks, now is a good time to begin using a consistent naming convention for all your tasks. For example, I use the airport ID, the word task, and then the numbers of the turn points used. Using that convention, this task would be named:
>
> **FRR TASK 115-045-112**
>
> This convention will keep all your tasks for each airport sorted together and you can easily pick them out by matching the turn point numbers. In this example, all tasks made at Front Royal will use the 109 point to start and the 099 to finish so there is no point using those numbers on every task name. If your club has multiple start/finish points, then you will want to include those numbers as well.
>
> Finally, you will use the exact same naming convention in Condor2 so you will never get confused about which task to load.

Use the Task to Fly with Condor2

At this point the only process left for setting up Top Hat is to connect it to Condor2, which will feed its GPS information into your device in place of the device's built-in GPS function, which you will turn off.

The next section, CONFIGURE TOP HAT FOR CONDOR2, will do that by linking Condor2 with your Top Hat device and showing you how to download into Condor2 a landscape that matches the map used in this sample Top Hat task, and, finally, by creating a matching task in Condor2.

CONFIGURE CONDOR2 FOR TOP HAT

Configure Windows 10 for Top Hat

Now that you have set up Top Hat on your device and you have a good sample map, waypoint list, and task to fly, it is time to connect Top Hat to Condor2 and take to the skies—virtually speaking. Here is the process that will unfold in this section of the guide:

- Create A Bluetooth Com Port in Windows that Condor2 can use to communicate with Top Hat
- Connect Condor2 to the Bluetooth Com Port
- Configure Top Hat for Condor2
- Download Matching Landscape into Condor2

Create A Bluetooth Com Port in Windows

Open your **Windows** settings, and then:

1. Click **Devices**
2. Click **Bluetooth & other devices**
3. Click **More Bluetooth options**
4. Click the **COM ports** tab
5. Click **Add…** choose **Incoming**
6. Click **OK**

Remember the COM port number because you will use it in Condor.

> **NOTE:** This port will always be there. You will not have to do this every time you start up again—just this once!! And you are almost done.

Connect Condor2 to the Bluetooth Com Port

Open Condor2, and then:

1. Click **SETUP**
2. Click **OPTIONS**
3. Under **NEMA output**, click **Enable**
4. Select the COM port number you noted in the Windows setup.
5. Click **OK**

You are permanently done on the Windows side. Close your Windows setting dialog box.

> **IMPORTANT NOTE!!**
> Mostly likely you have never turned off the built-in Condor2 PDA on any of your flights. But **Allow PDA** is an option on the Condor2 **NOTAMS** tab, which lets you remove the PDA from your Condor2 cockpit.
>
> **Keep that option checked!!**
>
> Turning off the Condor PDA makes the PDA disappear from your cockpit, **but it also** stops the flow of information out of Condor. I do not know why that is true, and it is annoying, because with Top Hat running on my tablet, I no longer use the PDA. But you have no choice.

Configure Top Hat for Condor2

With Condor2 configured to send GPS data to Top Hat, you will now move to your tablet to configure Top Hat to receive that data.

Shut Down the GPS

You must shut down the GPS in your device because it will block Condor's information flow. On your Android device:

1. Open **Settings**
2. Scroll to **Privacy**
3. Then set **Location** to **Off**

   NOTE: Of course, you must turn on the GPS when you fly for real. But do not worry because each time you start Top Hat you will be taken to the tablet **Settings** page. If you are flying Condor, simply switch back to Top Hat, which will be running in the background. If you are flying for real, then use the screen you see to turn on Location, then go to Top Hat.

Link Your Device to Top Hat

You will now need to tell Top Hat to take its GPS data from the Condor2 output:

Settings, Device

1. Touch any device (**B thru F**) that is not in use, then touch **Edit**
2. Under **Port** touch your Windows machine.
   a. The name of your PC should be on the list. If not, then Windows 10 was not successfully configured. You may need to reboot Windows 10.
3. Touch **Select**
4. Touch **Driver**
5. Touch **Condor Soaring Simulator**, then touch **Select**
   a. On this screen, the device you just configured will say "Not connected" **every time** that you do not have an active flight.
   b. In other words, do not worry about connecting it now. It cannot be done from here, and it will happen automatically when the time is right, without returning to this screen.
6. Touch the return **Arrow** at the bottom until you are back at the map.

You will never have to do these steps again.

The map screen will always show **GPS not connected**, unless you are actively flying, because you turned it off in **Privacy**. That is okay at this point in the process.

   NOTE: Your tablet will ask you to **DENY** or **ALLOW** your PC to connect. Unless you are surrounded by a lot of other computer users, like in a crowded Starbucks—in which case you should get out of the crowded Starbucks unless everyone is at least six feet away and wearing a face mask—otherwise, touch **ALLOW**.

Download Matching Landscape into Condor2

Now that you have the map, waypoints, and task in Top Hat, you will need to give Condor2 the landscape that covers the same area as the Top Hat map. The quality of landscapes varies greatly from one to the other. All are created by volunteers who tediously build them as a labor of love.

The sample I have chosen is one that is very well done because it was created by members of a soaring club who are glider instructors and experienced cross-country and contest soaring pilots. They were diligent about including on their map the real published waypoints from clubs in the area.

So, when you have this sample landscape in Condor2, it will match the sample map and waypoints that you loaded into Top Hat.

> **SYNTAX NOTE:** Top Hat calls its maps "maps." Condor2 calls its maps "landscapes," because they are more detailed than a map. But they match up just the same.

Condor Club EU

You have two choices on how to download and install landscapes into Condor. One is tedious and requires some serious knowledge of computers. It is free. The other one is about as easy to use as buying a song from iTunes. It costs 12 Euros per year. Your choice.

If you choose not to spend 12 Euros for the first year, then you are on your own. But if you join Condor Club EU, then you can follow this guidance on how to get the map that matches the sample task in this guide. When you get to their Web site, it will seem daunting at first, but all you need to do is go through this one sample download and you will know how to easily get others—trust that it is very easy to use.

If you think this is bad, you DO NOT want to save 12 Euros by figuring out the difficult method.

Begin by closing your **Condor2** app:

1. Go to the Condor Club EU Web site: www.condor-club.eu
2. Register to join and pay €12 for the Premium membership
3. Mouse over the black **Landscapes** tab, then click **How to install landscapes?**
4. Read about the **Condor Updater**, then click on **download it from here**
5. Complete the download and install process on your Windows PC

You will not need to perform those steps again. But you will perform the following process each time you want to download and install a new Condor2 landscape:

1. Start **Condor Updater**
2. Scroll under the list entitled **Landscapes available** and click **Allegheny Ridges**
3. Click **Start install** and let the process finish. When it is complete, close **Condor Updater**
4. Start **Condor2** (These four steps are all you need to download all future landscapes.)

Build the Sample Condor2 Task

Start your Condor2 app and then lay out the turn points:

1. Click **FREE FLIGHT**
2. Click **New** and then click **OK** to confirm
3. Click the **Landscapes** drop list in the upper-right corner, and choose **Allegheny Ridges**
4. Move the map until you find **Front Royal**
   a. It is near the middle of this landscape on the north-south axis and about 1/3 of the way toward the eastern side of this landscape.

5. Double-click **Front Royal** to start a task, then move three miles NW of Front Royal and set the **START** (there is a small "scale" ruler on the bottom of the map window for judging distance)
6. Continue moving NW and click on **Mulberry Run**
7. Move NE and click on **Winchester**
8. Move SE and click on **White Post**
9. Move SW to a point about a half-mile NW of Front Royal, then right-click and select **Finish task**
10. Click **Save** then enter a name (see naming convention note below) then click **OK**

> **TASK NAMING CONVENTION:** If you expect to create a lot of tasks, now is a good time to begin using a consistent naming convention for all your tasks. For example, I use the airport ID, the word task, and then the numbers of the turn points used. Using that convention, this task would be named:
>
> **FRR TASK 115-045-112**
>
> This convention will keep all your tasks for each airport sorted together and you can easily pick them out by matching the turn point numbers that you see in Top Hat.

At this point, your task is good enough to start flying in Condor2. However, you may want to edit the task to better match the Top Hat sample task. For example, you may want to edit the turn points to be circles of the same diameter as you used in Top Hat and you can rename them as well with the exact waypoint names used by the club that created the turn points.

> **NOTE:** However, you will likely find that you never again look at your task on the Condor2 PDA because Top Hat will provide you with better information.

Matching Condor2 Tasks

Here is a little more on the topic of making your Condor2 task exactly match your Top Hat task.

You do not need to have a full task in Condor2 that matches the task that is the one you want to fly with your Top Hat. However, you will need **at the minimum** a basic task that takes off from the same airport. Further, if you build the matching start point into the Condor2 task, the tow plane will take you in that direction as you climb.

The least you can get away with is to build a task in Condor2 that begins at the airport in the Top Hat task, set to start out airborne or with a winch launch. From there you will need only to fly to the start point in the Top Hat task, with no need of any Condor2 task information.

> **NOTE:** If you do not build an exactly matching task in Condor2, the Condor2 logbook will not give you credit for the miles you fly on each task. So, if you care about the logbook, then take the time to create a full, matching task for each Top Hat task.

If the logbook matters to you, there are two ways to get that full, matching task:

- **MANUALLY CREATE IT:** The sample task used in this guide is simple. It has only three turn points, each of which is on the matching Condor2 map. You can begin with an aerotow or winch launch for more realism. Or, you can get right to the flying by starting out airborne.

- **CONVERT YOUR TOP HAT TASK:** Via an Internet search you can find methods for converting a Top Hat task (file names are *.tsk) into Condor2 task format (file names are *.fpl) and vice versa. If you are comfortable with the computer apps that this entails, then go right ahead.

Creating Matching Waypoints

You will often find Condor2 tasks that use waypoints not found in any published turn point file. To create a matching waypoint in Top Hat, you first begin in Condor2:

- Open Condor2 and go to the **FREE FLIGHT** page and the **TASK** tab.
- Right click any waypoint on the Condor2 task map and select **Properties**.
- Write down the waypoint name and coordinates.

Now go to Top Hat:

- Touch the main map **"M"** three times then touch **Add waypoint**
- Touch the **Name** field and enter the matching name
- Enter any comment if you choose
- Enter the latitude/longitude you copied from Condor2
- Under **Type** select either **Airport** or **Turnpoint**, then click the **Back arrow**
- You will now be able to select this turnpoint from your active waypoint list.

  NOTE: Currently there is no way to reverse this process cleanly and easily. In other words, if you have a waypoint in Top Hat that you want to place on a Condor 2 map, Condor2 will not allow you to edit the latitude/longitude. Through patient trial and error, however, you can move a "New TP" in Condor2 and repeatedly use the **Properties** list to compare the coordinates with the ones you have. Within a few minutes you will be able to get close enough for simulator work.

Accessing Tablet Files with Windows

You are likely to want to copy task and turn point files on your Android device to have a backup of your work as well as to share with other pilots, and vice versa. Your Android device will easily connect to your PC so that it appears as a separate drive with Windows:

- Connect your Android device to your Windows computer with a standard USB cable
- Open **File Explorer** in Windows
- Scroll down to the **This PC** icon
- If it is not already expanded, click the **>** symbol
- Click the **>** next to the name of your device
    - Depending on your security settings within Windows and your Android device you will most likely need to touch or click some verification challenges.
- Click the **>** next to that name and you will see the folder hierarchy on your device as if it were a drive on your PC
- Scroll down more and click on the **>** next to the **XCSoarData** folder, then click on the **XCSoarData** folder, where you will see the followings:
    - ***.cup** files, which are turn point data files
    - ***.xcm** files, which are terrain maps for Top Hat
    - ***.sua** files, which are Special Use Airspace (SUA) overlays for the Top Hat maps
    - ***.txt** files, which provide other data used by Top Hat
    - ***.xcp** files, which are the profiles for the gliders you have downloaded
    - **cache** folder, which you will ignore
    - **logs** folder, which you will ignore
    - **tasks** folder, which contains the ***.tsk** files

If you have obtained any of these files that you want to use with Top Hat, simply drag and drop them from Windows into the appropriate folder as shown above. Of course, you can just as easily drag and drop **from** these folders if you want to share those files with other pilots.

Ready to Soar

You are now ready to fly Condor2 while using Top Hat for your navigation and glide computing.

To give a clear summary, here is how to load the samples referenced in this document:

- Open **Top Hat** on your device
- Touch the **Nav Bar** then touch **Edit task** then touch **Browse**
- Touch **FRR TASK 115-045-112** and touch **Load**
- Touch **Yes** then touch the **Back Arrow** twice to return to the map
- Start **Condor2** on your PC and click **FREE FLIGHT**
- Click **Load** then **User flightplans**, then click **FRR TASK 115-045-112** and click **OK**
- Click **Start Flight** and the Top Hat GPS will come alive when the Condor2 flight screen appears and Top Hat will behave as if you were flying this task for real.

Please do not try to become proficient with Top Hat while flying a real sailplane!

ADDENDUM

The reference sections in this ADDENDUM address the following information:

- **WHEN TO USE XC SOAR:** The Top Hat UI is generally more intuitive and more informative than XC Soar for most flying. There are two exceptions that we will review:
    - Task management
    - Final glide
- **CREATE A SIMPLE START TASK:** If you created the sample task in this guide for both Condor2 and Top Hat, you saw it is a simple task. But you are not likely to keep using simple tasks. Rather than go through the trouble of creating matching tasks or using conversion software, you can make a simple "Start Task" and save yourself a lot of time.
- **CONDOR2 LOGBOOK:** Depending on how you choose to use Condor2 and Top Hat together, you may find that Condor2 records 0.0 miles for all your tasks. This section shows how to keep your Condor2 logbook accurate. This section will also show you how to stop using aerotows to start your tasks without creating an unrealistic start that will reduce the training value.
- **REAL VARIOS:** When you fly with Condor2 you use its simulated data. This section discusses sources of real flying data.
- **SAMPLE INFOBOXES:** The last five pages contain the Top Hat Infoboxes that are referenced in the Top Hat set up instructions.

When to Use XC Soar

You can easily alternate between using Top Hat and XC Soar because they use the same folders for data storage, and they share most user settings. They do not, however, share the primary **Look** settings, such as Screen Layout, Pages, and Infoboxes. But those differences can be used in your favor as you will see in the second subheading (Final Glide in XC Soar) below.

Task Management in XC Soar

The task management page in Top Hat is rudimentary, not intuitive, and is missing some key features.

The same process in XC Soar has more functionality, a better display, better information, and more options. It is easy and intuitive to use so there is no reason to get into it in depth in this guide. Just remember to do your task management in XC Soar, using these steps:

> Close Top Hat. Open XC Soar and then **double-tap the map**, touch **Nav**, then touch **Task**

You will see the last task you had open in Top Hat, displayed with a nice task management screen, with more detail on each leg, as well as a mini map of your task. Here is a summary:

- **Turn Points:** the opening screen from which you can see the task and edit points
- **Manage:** You will see two options here that are not available in Top Hat:
    - **New Task** – Which allows you to start from scratch rather than editing a task
    - **Declare** – If you have a logger attached you can make task declarations here
- **Rules** – Same functionality as in Top Hat, just with its own button

All the work you do here will show up exactly the same in Top Hat. When done with XC Soar, close it and then reopen Top Hat and it will load whatever task you had open in XC Soar.

Final Glide in XC Soar

The **Task Arrow** in Top Hat omits some key features in relation to XC Soar—enough so that you may prefer switching to XC Soar after you leave your last turn point **and** have achieved your Final Glide altitude. Since you will be flying with Condor2, practice this switch to give you a chance to see the differences and decide if you want to switch to XC Soar for Final Glide.

As a reminder, the XC Soar manual (which is a PDF on www.xcsoar.org) has important **safety of flight information** on the use of the XC Soar flight computer in these sections:

- **PAGES 40-51:** Section 4 - Navigation
- **PAGES 52-75:** Section 5 - Cross Country Tasks
- **PAGES 76-93:** Section 6 – Glide Computer
- **PAGES 94-106:** Section 7 – Atmosphere and Instruments

Once you switch to XC Soar, you will lose the Top Hat **Nav Bar** and all your Screen Layout, Pages and Infoboxes you have set up in Top Hat.

But the only Infobox set you need to make in XC Soar is the **FinalGlide** set and this set might be a good time to consider using one of the **9 + Vario** options. And here is why to consider switching apps as you turn for Final Glide:

- You will no longer need most of the information on your carefully crafted Top Hat Infobox sets. You lose the Nav Bar, but you no longer need it, either. You only need the **FinalGlide** set.
- You can choose a **Screen Layout** that uses the **9 + Vario** option because that vario will give you instant guidance on pushing over or easing up to maintain optimum Final Glide speed.
- The **Task Arrow** is far more robust, with much more information. For example, compared to Top Hat, the XC Soar Task Arrow:
  - Splits to show your altitude in relation to the current MacCready setting as well as if zero MacCready was set.
  - It continues to grow as you climb. Once Top Hat attains Final Glide, its Task Arrow will not grow **UP**. In other words, the green up arrow will not become longer, no matter how much higher you climb after attaining Final Glide altitude. You will be commanded to fly a higher speed when you stop adding altitude, but there is no way to gauge what you are getting by additional climbing. In contrast, the XC Soar Task Arrow continues to grow—both sides of the split, too. Having that extra altitude visible allows you to try different Final Glide speeds because you can see how your speed affects the height of the green arrow.

Make It Easy on Yourself

The simplest solution is to create just one Condor2 task for all your Top Hat tasks at each airport. It will start out airborne and place you several miles away from the Start Point in Top Hat. This spares you the aerotow and—instead of **climbing up** to the start circle—you will **glide down** to the start circle. See **Tips on Starting Airborne**, below.

> **NOTE:** This method will record in the Condor2 logbook either 0.0 miles or—if you have set a Finish point that matches the one in Top Hat—the miles of your short task. The logbook will correctly record the flight number, date, time, ship type and flight time. You can then edit the distance. You may find it valuable over the long run to record a comment in the Condor2 logbook that shows the name of the task you flew and if you completed it or landed short.

Tips on Starting Airborne

When you are new to Condor2—and soaring in general—it is a good idea to fly your early tasks with an aerotow start. But soon you will tire of spending your time getting towed out for your task.

An airborne start to maximum altitude can deprive you of training on the start—which is not a good habit. An airborne start can also deny you the practice at taking off, not finding lift, and then returning to base for a "relight." You can, however, set up an airborne start to emulate an aerotow. The good news is that you will only need to do this once for each Start Point that your club uses. Try this:

1. Create a task with nothing more than the **START** and **FINISH** points—no turn points
2. Fly it once with an aerotow to the **START** and up to the normal tow altitude AGL
3. Notice the altitude at which you typically reach **START** from this aerotow
4. Change the Condor2 **Start option** on the **NOTAM** page to airborne and set it to maximum
5. Fly it once with an airborne launch to see the altitude at which you reach **START**
6. Reduce your **Airborne height** setting by the amount of the excess altitude you had and **Save**

From then on, you can use this one, simple, start task to get started. One downside it that Condor2 will no longer record the correct task miles, but you can edit that number with the correct distance from Top Hat much faster than you can make a matching task and fly a full aerotow to start the task.

Convert Top Hat Tasks to Condor2 Format

When flying virtual soaring contests, the group will use a Condor2 task, from which it may be very time-consuming to create a matching task for Top Hat. And you could always make a mistake!

There are conversion apps on the Internet that will take a task created in either format (*.fpl for Condor2 flightplans and *.tsk for Top Hat tasks) and convert it to the other format.

Having matching tasks should keep your Condor2 logbook accurate. But if not, then you can still use the method below to correct your Condor2 logbook distance.

Keeping an Accurate Condor2 Logbook

The information flow between Condor2 and Top Hat is one-way, which means Condor2 sends data to Top Hat, but does not receive from Top Hat. Because of this one-way flow there are two ways to keep your Condor2 pilot logbook accurate when you fly with Top Hat.

Two Solutions

If you create an **exactly matching** task in both Condor2 and Top Hat, then the Condor2 logbook will record the correct miles flown. But if you create a task that is **almost** the same and you end up missing even one TP in Condor2, the logbook will record zero miles.

The simple **Make It Easy on Yourself** method—detailed on the previous page—is the most efficient use of your training time, but it will record only the miles from your short task. Editing your Condor2 logbook is much quicker than creating a perfectly matching task and flying an aerotow before every practice task you fly.

Edit the Condor2 Logbook

Follow these steps to place the correct task distance from Top Hat into your Condor2 logbook:

1. In Top Hat, touch **Nav Bar**, and then **Stats** and note the **Distance done**
2. Open Windows **File Explorer** and navigate to the following folder:
    a. **Documents > Condor > Pilots > Your Name**

3. Double-click the file **logbook.txt**, which should open it in Windows **Notepad**
4. Scroll to the last line and look at the number between the comma after the flight time (**hh:mm:ss**) and before the comma ahead of either **Yes** or **No** (multiplayer status). On that line you will see either:
    a. **0.0** if you had a task in Condor2 and missed a turn point
    b. the distance in your short Condor2 task
5. Carefully edit the number between those commas to match the true Top Hat distance
6. Press **CTRL+S** to save, and then **ALT+F4** to exit

MAKE A SHORTCUT: You could place a Windows Shortcut on your Desktop for quick access to the Condor2 **logbook.txt** file. Or, if you fly Condor2 regularly, you will find **logbook.txt** on the Windows Explorer **Recent files** list.

Tips on External Varios and GPS

So far, this guide has discussed only the setup for flying with Top Hat while connected to Condor2, using the Condor2 NEMA output instead of the GPS built into the device you use to run Top Hat.

When you fly for real, you have several choices for GPS and vario input to your device. This discussion is not exhaustive, but it will get you started. Further, if you use the ones detailed here, you will find they work well.

> **NOTE ON EXTERNAL GPS DEVICE:** The GPS built into the Android device you will use when you fly for real is a hybrid system that uses a GPS receiver as well as positioning information from the cell-tower network. Those two technologies working together are more accurate that unassisted GPS, typically about plus or minus one meter. When your device is unassisted by the network—which will happen often when soaring cross country—the accuracy can be plus or minus three to five meters.

> You can connect an external GPS device to your Android device that will give you WAAS GPS accuracy, which is approximately plus or minus one meter through the USA. I'll share with you what I've learned through experience.

> **NOTE ON TOTAL ENERGY:** A portable vario will not have total energy (TE) compensation. This is not all bad, however, because most of the portable models have digital accelerometers that will react with less lag than the TE vario built into your panel. And you will still have the panel mounted TE vario for reference.

> **NOTE ON TOP HAT VARIO INFOBOX:** In the setup section, I suggested that you not use the vario Infobox that comes with Top Hat. The lack of TE compensated vario to feed that Top Hat feature is another reason to not take up screen space with it.

The external vario devices detailed here connect with Top Hat on your Android device with BLE (Bluetooth Low Energy), which gives you wireless connectivity and minimal battery drain from your vario as well as your Android device.

All units also connect to your PC for easy and detailed, desktop configuration.

BlueFly Vario

The BlueFly vario (www.blueflyvario.com) does not have built-in GPS, but its vario signal is enhanced by a digital accelerometer. I used a BlueFly on several flights and it does a good job of feeding the Top Hat software on your device. Here are some pros and cons:

- The cost is at the low end of the range: $100 Australian (about $90 US)
- It has a fast-responding vario that is supplemented with an accelerometer that gives you lag-free audio vario—of course it is not TE compensated.
- You will need to use the GPS that is built into your device or buy an external GPS device if you desire more accuracy and features.

I have tried several devices that seemed to be better, but have not completed the connection for them, even though I watched every YouTube video the company made and had numerous email exchanges with the company's technicians. BlueFly required zero research and no emails—it connected quickly and has always worked perfectly.

Since the BlueFly lacks GPS, you have three choices. First, you can use the GPS built into your tablet, which might be fine for you. But if you want WAAS GPS or more features, you can buy an external unit. Finally, you can try one of the combo devices (GPS and vario), which are mentioned below.

External GPS Device

The Internet is awash in external GPS devices that can send their data via Bluetooth. Every external GPS unit I researched will easily replace—and is better than—the GPS on your Android or iOS tablet.

> **CONNECTIVITY NOTE:** There are two ways to connect an external device to your tablet. One is the direct method, in which the external unit enhances the built-in GPS unit. This is a seamless process by which your device—both Android and iOS—automatically pull GPS information from the external unit when one is connected. If connection to the external unit is lost, your device will automatically switch to the internal GPS. This is the method for the two **GPS-only** solutions that are discussed below.
>
> The other method is to turn off the internal device GPS—which means you will disable location services in the tablet settings and then connect Top Hat directly to the unit. This is used by the units that combine vario with GPS because neither Android nor iOS offer native support for vario information. I have never gotten one of the hybrid devices to connect. Therefore, my solution has been to use the BlueFly vario—which connects directly to Top Hat—along with a single-purpose external GPS unit—which connects to the tablet's operating system and thus will feed enhanced GPS to all apps that use GPS information.

I will discuss two external GPS devices I have used.

Bad Elf Pro or Pro Plus

I bought a **Bad Elf Pro** in 2012 when I took up sailing because—just as you will be while soaring—I would be out of range of cell towers when I most needed accurate positioning. The cost is about $150.

The **Bad Elf Pro Plus** is a better choice for flying because it has a barometric altimeter that augments the GPS height information. You can even set the altimeter to the field elevation at the airport, or to the actual altimeter setting. The cost for the Pro is $230. I did not spend the extra money when I was sailing because I would always be a sea level. Today I would choose the Pro Plus.

Both models feature WAAS service and are easy to connect and will work with up to **five Android and Apple** devices simultaneously—which is a good practice as a backup in case the battery runs out in your Android tablet. So, you can connect to your Bad Elf to your Android tablet that runs Top Hat as well as to a smart phone, or even an iOS tablet that runs ForeFlight or FlyQ—or both.

Stratux ADS-B Receiver

Another "no vario GPS" solution is the **Stratux ADS-B Receiver Aviation Weather and Traffic** unit. It will give you WAAS GPS, plus it will feed AHRS information into ForeFlight or FlyQ to give you a back up instrument panel if you use one of those two apps. Further, it will give you ADS-B weather and traffic information in those two iOS apps.

A downside is that the Stratux will connect to only one device. You'll have to evaluate that trade-off because even out in the wilderness, the built-in GPS in your phone will be good enough for a back-up if the Stratux or your Top Hat tablet stop working.

The Stratux is priced similar to the Bad Elf Pro Plus at $250 for a complete system, which includes an external battery, suction cup mounting bracket and other small accessories.

Combined GPS and Vario

The remaining devices combine vario and GPS into a single unit. I have yet to find one that will connect to either one my two Samsung tablets. Further, these will not power ForeFlight or FlyQ, which is why I think that the BlueFly vario with an external GPS to be a good and versatile solution because that set up works for me when I soar, and the GPS will also drive my iOS tablet when I fly powered aircraft. Further, in the case of the Bad Elf Pro, you will have augmented GPS for all your devices. These devices will be reviewed:

- **Skybean Skydrop**
- **XC Tracer Mini III GPS**
- **LX Nav Nanos**

Skybean Skydrop

The Skybean SkyDrop (skybean.eu - **not .com**) is one of those solutions that seems ideal for soaring, but that I never got to connect to Top Hat. The maker, SkyBean, assures me that their SkyDrop works with lots of devices that are running Top Hat and XC Soar, but they have found that certain tablets do not connect correctly. Apparently, my 2019 Samsung Galaxy Tab A (Mode T290) is one of those. (Actually, I own two Tab As, one an older T377 model, and it never connected to that one, either.) I returned mine.

The retailers who sell them are good about returns so if you have another tablet model and want to try a SkyDrop, then I suggest you try it because it has these advantages:

- The cost is right in the middle of the range of other solutions: $280.
- The built-in battery has a long life.
- It has a fast-responding barometric vario that is supplemented with an accelerometer that gives you lag-free audio vario—of course it is not TE compensated.
- It will record your flights in IGC format. Those files are not certified by F.A.I. for badges and world records.

XC Tracer Mini III GPS

This unit is a solar variometer with GPS and BLE connectivity. The description on the Web site—as for the SkyDrop—makes it sound ideal for Top Hat. The Web site claims it works with XC Soar and Top Hat on all Android devices and has details on how to connect it to those apps. But I never got it to connect to either one of my tablets even after much time on the phone and about a dozen emails with tech support. Tech support was patient and helpful, but I finally had to return it for a refund.

As with the SkyDrop, if you try an XC Tracer, check with the retailer before you buy to confirm your return rights. Here is a summary of factors to consider:

- The cost is in the middle range of these solutions: $360
- The built-in battery has a long life, but it has a solar panel—if you fly with the unit exposed to sunlight, they claim many pilots fly a whole season without using an external charger.
- It has a fast-responding barometric vario that is supplemented with an accelerometer that gives you lag-free audio vario—of course it is not TE compensated.
- It will record your flights in IGC format. Those files are not certified by F.A.I. for badges and world records.

LX Nano Portable Series

I have not tried to use any of the LX Nano (www.lxnav.com) series devices with Top Hat—so all I can do is outline the facts I discovered. They are reported to me to connect with Top Hat on an Android tablet and feed both vario and GPS data. Verify the return policy of the retailer that sells it to you!

- These are the highest-cost solutions:
  - The cheapest Nano model does not include vario
  - The other two models (Nano3 and Nano4) cost more but do have vario. Further both the 3 and 4 models receive FLARM and ADS-B traffic.
- I wrote to LXNAV for verification that a Nano3 or Nano4 will feed vario and FLARM and ADS-B traffic information into Top Hat on an Android device. Due to the language difference, I did not receive clear confirmation other than it will feed the GPS information.
  - I have found several posts on the Internet that indicate that neither the Nano3 nor Nano4 will feed data to Top Hat or XC Soar.
  - I also found posts on the Internet that indicate that both the Nano3 and Nano4 feed data to Top Hat or XC Soar. Good luck!
- Their published battery life is longer than any flight you can take in a sailplane, but if you are flying back-to-back days in a contest you will need to charge the Nano unit at night.
- Their IGC files are accepted by the F.A.I. for badge flights as well as world records.

  FEEDBACK PLEASE: If you know for sure if the Nano3 and Nano4 models will feed vario information and/or FLARM data and/or ADS-B data to Top Hat over the NEMA stream, please let me know and I will edit this section.

Create Custom Terrain Maps – EASY!

If you ever want to create a terrain map for Top Hat, there is an easy system for doing that through XC Soar.

http://xcsoar-mapgen.sigkill.ch/

The directions on this page are mostly self-explanatory, but if you are new to contest soaring you will likely need help with the fourth step on this list:

1. Choose a name for the map.
2. Enter your E–Mail address if you want to be informed when the map is ready.
3. Select the map options.
4. Select the **Map Bounds** and/or upload a **Waypoint File** (discussed next)

Map Bounds and Waypoint File

A previous section in this guide showed you how to download Top Hat waypoint files and terrain map files. Those will be saved in the **XCSoarData** folder on your tablet, which you can access via Windows Explorer when your tablet is connected to Windows with a USB cable.

Sometimes you will obtain a set of waypoints (in the standard format ***.cup**), but not have a good terrain map that encompasses all the waypoints in that file. XC Soar has made it super easy to obtain a matching terrain map for any set of waypoints.

Go to the XC Soar URL above and when you get to Step 4 on that page, do the following:

- **Options:** In the third set of options, check **Add waypoint file and compute map bounds automatically**
- **Waypoint file:**
    - Connect your tablet to your Windows PC with a USB cable.
    - Open Windows Explorer and navigate to your tablet to make sure it is connected.
    - Return to the XC Soar map page and click the **Choose File** button.
    - Navigate to the **XCSoarData** folder on your tablet, then select the file (***.cup**) for which you need a terrain map.
- **Bounds:** Leave blank and click **GENERATE**.

Where to Save Your Terrain Map

XC Soar will generate the map for you and email you a notice when it is complete.

Download the map (which will have the file extension ***.xcm**) into the **XCSoarData** folder on your tablet.

From then on, the new terrain map will appear on your list of maps here:

> **Settings, Site files, Map database**

Go there and select that terrain map and then:

> **Settings, Site files, Waypoints**

And select the matching waypoints file.

Sample Infoboxes

The last five pages in this document show the following five sets of Infoboxes:

- **Circling** (Top Hat default)
- **Cruise** (Top Hat default)
- **FinalGlide** (Top Hat default)
- **ABORT** (custom, good for abandoning all else and focusing on getting down safely)
- **LOCAL** (custom, good for days when you remain at home, like training or giving rides)

These are a good starting point and I highly recommend that you use these samples and then fly a lot of tasks with your Top Hat connected to Condor2.

> **NOTE:** Top Hat is not consistent with the name of the Infoboxes that you will see on the screen versus the name of that Infobox on the list of options.

> Most names are consistent enough that you will find them by using the name only. But for those that are somewhere else on the list due to a secret naming convention, that secret name is shown **in red text** on the screenshots.

Landscape versus Portrait

The sample Infoboxes are set up in the Landscape mode. Until you get good at picking out your Infoboxes you may find that a set looks good in Portrait but not in Landscape, or vice versa.

These samples are designed to look good in **either mode**, which means that you can set them up in the Landscape mode even if you plan to use them in Portrait mode.

To set Top Hat to use Landscape or Portrait based on the orientation of your device:

> **Settings, Advanced, Look, Screen Layout**

Then set **Display orientation** to **Default**.

Matching Pairs of Boxes

Note that many of the boxes are paired next to a related box. For example, I like to have the **Altitude AGL** next to the **Terrain Elevation** box.

The matching pairs used in these samples are designed so that the boxes will be side-by-side in Landscape mode and are stacked in Portrait mode.

> **FINAL REMINDER:** There might be millions of options for how to select and arrange the Top Hat Infoboxes. You will save time in the long run if you begin by duplicating the suggested content and arrangements on the last five pages of this guide. You will soon want changes and you may well make regular tweaks as your knowledge and experience increase, but at least you will have started out with a good set of boxes that simplify the bewildering array of choices you have.

Circling Infoboxes

Suggested content for the Top Hat default **Circling** set.

Settings, Advanced, Look, Infoboxes, Circling

Then **Double-Touch** each box to change its content

In case you wonder why the Horizon is on this set, consider how visibility can get low as you near the bottom of a cloud. The Horizon is handy to have on this screen if you get disoriented near the top of a thermal.

Cruise Infoboxes

Suggested content for the Top Hat default **Cruise** set.

Settings, Advanced, Look, Infoboxes, Cruise

Then **Double-Touch** each box to change its content

MC MacCready setting	Netto Trace Netto vario trace
Vopt Speed dolphin	Climb Band
V GND Speed ground	GR Avg
Altn 1	Bearing
Alt AGL	Terr Elev
Task D rem	Flt Duration

Name **Cruise**

Infobox **1**

Content **MacCready setting**

FinalGlide Infoboxes

Suggested content for the Top Hat default **FinalGlide** set.

Settings, Advanced, Look, Infoboxes, FinalGlide

Then **Double-Touch** each box to change its content

Vopt *Speed dolphin*	V GND *Speed ground*
Task D rem	Task dT *Task delta time*
GR Inst	GR Avg
Home Dist	Altn 1
Flt Duration	Time loc
Alt AGL	Terr Elev

Name **FinalGlide**

Infobox **1**

Content **Speed dolphin**

ABORT Infoboxes

Suggested content for a custom Top Hat set for abandoning all other objectives and focusing on landing safely.

In case you wonder why the Horizon is on this set, consider that you might be aborting due to weather that has moved in. Even if you are not aborting a task, you will have the comfort in knowing you can select this Page any time you quickly need a horizon!

Settings, Advanced, Look, Infoboxes, AUX-1

Then touch **Name**, backspace over the **AUX-1**, then type **ABORT**

Then **Double-Touch** each box to change its content

LOCAL Infoboxes

Suggested content for a custom Top Hat set for flying training flights or joy rides at your local field.

Settings, Advanced, Look, Infoboxes, AUX-2

Then touch **Name**, backspace over the **AUX-2**, then type **LOCAL**

Then **Double-Touch** each box to change its content

Takeoff Dist *Distance takeoff*	**Home AltA**	Name	**LOCAL**
Alt AGL	**Terr Elev**	Infobox	**1**
Altn 1	**Bearing** *Next bearing*	Content	**Distance takeoff**
V GND *Speed ground*	**Vopt** *Speed dolphin*		
Climb Band	**MC** *MacCready setting*		
Flt Duration	**Time loc**		

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