



## ClearNav Tips

### **Navigating the Turn Area Task with the ClearNav Flight Computer (Turn Areas, Ellipses, Leader Lines and Set Turn Area Point)**

#### **The Turn Area Task (TAT)**

- Offers extensive flexibility for cross country or racing tasks, but as a result, it can be difficult to optimize your performance.
- This article describes a number of tools included in the ClearNav flight computer to help realize the best performance possible in a TAT. These tools include the ellipse, estimated speed to finish, the leader line and the ability to set a point in a turn area in place of the ellipse.

#### **The ClearNav ELLIPSE (curved blue line)**

- Used in the turn area you are in, or navigating to, is the locus of points that will give an equal distance from your present position to the ellipse and then to the next turn area (usually the center) or the finish.
- The position of the ellipse is calculated to give a total task time equal to the assigned task time based on the time used so far and the calculated remaining speed to the finish.
- Thus, the ellipse allows the pilot the to choose a route that optimizes soaring conditions while remaining confident he will achieve the distance required to arrive close to the minimum task time.
- Early in the first leg of the task, the ellipse will have minimal importance, as the estimated speed to the finish is not based on enough data to be reasonably accurate.
- Also, it is likely the pilot will elect to fly beyond the ellipse in the first turn area if soaring conditions are good to allow more flexibility later in the task.
- The ellipse will be present in the turn area you are in or are navigating to, and target points will show in subsequent turn areas. When a subsequent turn area becomes the destination turn area, (or when a turn area point is designated- see below) the ellipse will move to the new destination turn area and will be drawn through the previously displayed point.
- The ellipse is always moved first if a change is required to keep the Total Task Time equal to the Assigned Task Time. Points in subsequent turn areas are moved in sequence if necessary. For example, if you are going to be under time, the ellipse in the current turn area will first move to the far edge of the turn area before the point in the subsequent turn area is moved. This logic keeps the most flexibility and margin by keeping the target point in the last turn area in the center as long as possible.
- You will find that later in the flight (last turn area), the ellipse will be quite accurate in predicting where to turn to come home within a minute or so of the assigned time.
- In some cases the “calculated remaining speed” may be incorrect due to conditions on the last leg of the task being significantly different from earlier in the task. This includes a really good cloud street or ridge on the last leg, or conditions degrading overall. In this case, the prudent pilot will choose “Manual Speed” on the Task Action page and enter his best estimate of the remaining speed to finish. This will make suitable adjustments to the ellipse in the last turn area and to the time to finish.

### The LEADER LINE (blue line extending in front of the glider symbol)

- The extension of a line drawn through the previous turn (or start) and the glider. This represents the most efficient direction of flight for adding additional distance made good (DMG) on the active leg.
- As you fly a given leg of the task, you will note the course line will adjust its intersection point with the ellipse to match the direction of the leader line, thus showing the most efficient line (DMG) to the ellipse based on your track so far.

**Note:** that flying along the ellipse is quite inefficient in adding DMG, thus when approaching the ellipse, the leader line assumes greater importance in choosing your course line.

- If you elect to go deeper into the turn area than the ellipse, because of good soaring conditions for example, the ellipse will automatically move to the next turn area, thus disappearing from the current turn area. This is logical because at this point, the leader line is the best tool for showing the most efficient route deeper into the turn area, and the ellipse will now be available in the next turn area for route planning of the next leg. If the next turn area is not visible on the map page, it may be viewed on the Task Map page.
- When in a turn area, but still short of the ellipse, a button labeled “Ellipse Next TA” is available. If this button is selected, the ellipse will move to the next turn area and will disappear from the current turn area. Another button, “Ellipse This TA” will now become available. At any time before reaching where the ellipse would be if it were still in the current turn area, you can move the ellipse back to the current turn area by selecting the “Ellipse This TA” button. You can turn at any point, or, continue to fly deeper into the current turn area. In either case, the task statistics will update correctly.
- In the last turn area when short of the ellipse, a button labeled “Turn Here” will be displayed. Selecting that button will shift the destination to the finish. If you fly past the ellipse in the last turn area, the ellipse will disappear, the destination will shift to the finish and the task total time will begin to count up beyond the assigned task time.

If at any time this becomes confusing, you can always go to the **Task Action** page and find the button you are looking for!

### SET TURN AREA POINT

- If you wish to navigate to a specific point in a turn area instead of to an ellipse, you can move the cursor box with the arrow keys placing the cross in the center of the box at the desired point to navigate to, press select to bring up the dialog box and select “Set Turn Area Point”. The ellipse will then move to the next turn area and the course line will move to the desired point. The destination will remain the current Turn Area until you are within a kilometer of the desired turnpoint, or when you select “Turn Here” which will appear when you enter the turn area with the selected point. Your task statistics will update correctly even if you do not select “Turn Here” and the destination will change when you exit the current turn area.
- The set turn area point feature can be quite useful for task planning if you know you want to fly past the ellipse in the current turn area.
- Once set, you can change your turn area point, by moving the cursor box to the new desired point and repeating the process.
- You can always retrieve the ellipse to the current turn area after setting a point (assuming you have not already passed it) by selecting “Turn Here”, and then going to the Task Action page and selecting “Ellipse This TA”.
- While this all sounds complicated, it is really quite simple in flight. Give it a try!

**Note:** Based on glide speed and glide ratio achieved, climb rate achieved, MC setting, and altitude

## Serial Port Communication

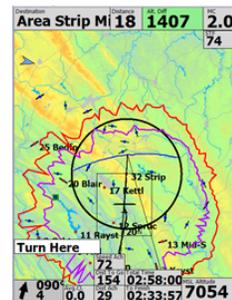
- To ensure serial port communications with attached devices such as the CAI 302 or PowerFlarm, power up the connected devices within 40 seconds of powering up the ClearNav.
- A good practice is to power up these devices before turning on your ClearNav. If successful communication is established, a small "c" and/or a small "f" for the 302 and Flarm respectively will appear in the lower left hand corner of the flying screen.

## Waypoint Editing

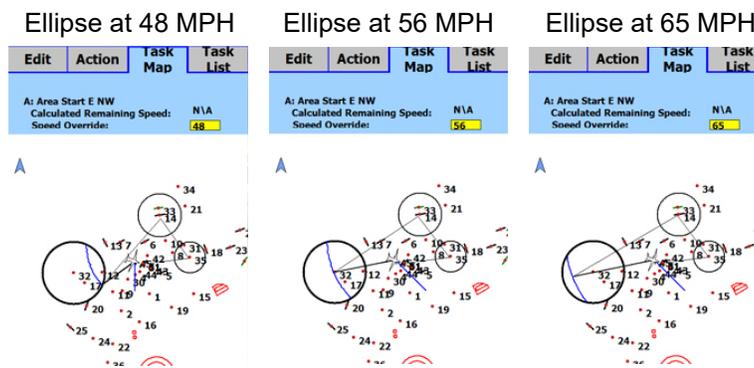
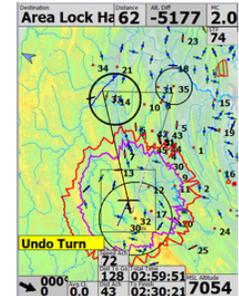
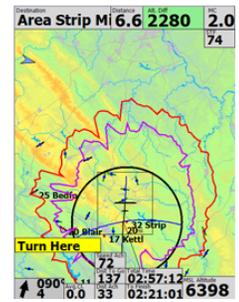
- Waypoint Editing is available under the Waypoints Tab in the Setup menu.
- A new waypoint can be created quickly if you edit an existing WP record and simply update with a new name, lat, long, elevation and attributes
- You can edit an existing WP that is no longer needed, or use the "Mark Point" feature on the Main Map to have ClearNav create a new waypoint record - which you can then edit.

## Flying TATs with ClearNav

- The ClearNav Flight Computer brings a whole new approach to flying the Turn Area Task (TAT).
- The TAT replaces the standard (US) one mile radius turnpoint with one or more cylinders with a radius no greater than thirty miles. A minimum task time is specified and the pilot is free to turn anywhere he pleases within a turn area and begin flying to the next turn area or finish.
- The challenge in flying a TAT is to choose the best turnpoint location within each turn area based on the actual soaring conditions that will maximize the distance achieved with a finish close to but not less than the minimum task time. ClearNav has a number of graphical and calculation tools to make this complex task easier for the pilot.
- The first tool is 'the ellipse' - a blue line in the target turn area plotting turnpoints that give an equal distance from the previous turnpoint (or start) to the calculated turnpoint in the next turn area. (mouseover for closeup.)
- ClearNav calculates the ellipse and subsequent turnpoints using the automatic speed estimate (default) to give a task time equal to that selected in the Task Edit page, which of course should be the minimum task time assigned by the CD.
- The manual speed setting can be useful if you believe your speed for the balance of the task will be significantly different than ClearNav's estimate due, for example, to improving conditions, or running a ridge or a good cloudstreet home.
- The black course line in front of the sailplane on the map page will intersect the ellipse at the point that represents the minimum distance (and thus minimum time) from the previous turnpoint to the ellipse. If, however, you deviate from this heading to fly to a particularly good looking cloud, CN will adjust the intercept point with the ellipse accordingly.
- **Turn Here** Once inside the active turn area, a button labeled "Turn Here" will appear. Activate the Turn Here button with the focus (yellow button) and push select to activate the next Turn Area when you actually make the turn. If you forget to select "Turn Here", CN will pick the optimum turnpoint and activate the next Turn Area when you leave the current Turn Area.



- Soaring conditions may appear better in the current Turn Area than in subsequent ones. This suggests going deeper than the ellipse into the current active Turn Area, in which case CN will adjust by moving the assumed turnpoints in the subsequent Turn Area(s). Also, a leader line will appear in front of the sailplane symbol which indicates the most efficient route to fly to maximize distance from the previous turnpoint.
- If you fly beyond the ellipse in an active Turn Area, the task statistics will assume you are still flying to the currently active ellipse and will no longer be valid. In this case, simply select "Turn Here" which will shift the ellipse to the next turn area, but will continue to correctly update the flight statistics as you fly deeper into the current turn area. ClearNav will automatically pick the optimum turn point in the current turn area with no further action required on the part of the pilot.
- In the case of relatively weak soaring conditions in the Turn Area you are currently in, you may want to consider proceeding to the next Turn Area before reaching the ellipse.
- Selecting "Turn Here" will move the ellipse to the next Turn Area, thus showing how much deeper you will have to go in the next Turn Area to make up for turning before reaching the ellipse in the current Turn Area.
- If you decide to continue deeper in the current Turn Area, simply select "Undo Turn" to return the ellipse to the current Turn Area.
- The Task Map page is useful for viewing the entire task area and the likely turnpoints in the various Turn Areas, especially when you are flying a long task covering a large area. Varying your expected speed will move the ellipse and subsequent turnpoints to give you an idea of how deep you may be flying in each turn area.



- When you enter the last Turn Area, From Here 02:27:57 a green highlighted box (Time From Here) appears, showing **the predicted total task time if you turn now and proceed to the Finish**. This is helpful if you are experiencing weak conditions late in the day and are contemplating returning early (under task time) to insure a finish.
- Another useful tool for the next to last leg on a TAT is the "Glide to Finish" option, especially if soaring conditions are deteriorating. This will show you the altitude required (Alt. Diff.) to glide to the ellipse in the last turnpoint and then to the finish.
- **Turn Here** At any time when in the last Turn Area, you can also select "Turn Here" and see the altitude (Alt. Diff.) required to get home directly from that point.
- It is helpful to display on the flying screen the "Time to Finish" and the "Total Time" for the task.
- I am sure you will find that using the above tools will make flying the TAT an easy and rewarding task.

