

Optimized Route and Finish Line IQ-COMPEO+

New features covered in this supplement to version 3.33

1. Optimized route
2. Entry and Exit flag for all waypoints
3. Auto Zoom
4. Goal-line finish
5. Nascent/near thermal tone

1. Optimized Route

With this new function the COMPEO+ will calculate the shortest path around the *Competition Route*. If you get off course line as you fly the task, the instrument will recalculate the new optimal cylinder intercepts. With this new functionality the following features are added:

- Optimized route will be shown on the map page
- Compass bearing pointers (next WP and 2nd WP) will point to optimized intercepts
- Distance to optimized intercept will be shown in new user-field *Dist Opt WP*
- *Dist Goal* will reflect the distance around the remaining optimized route

Relevant user-field distances:

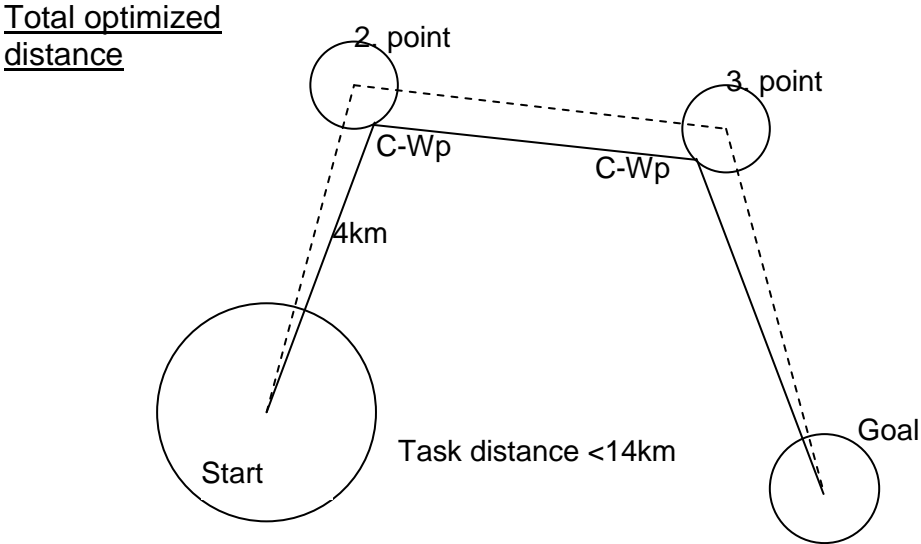
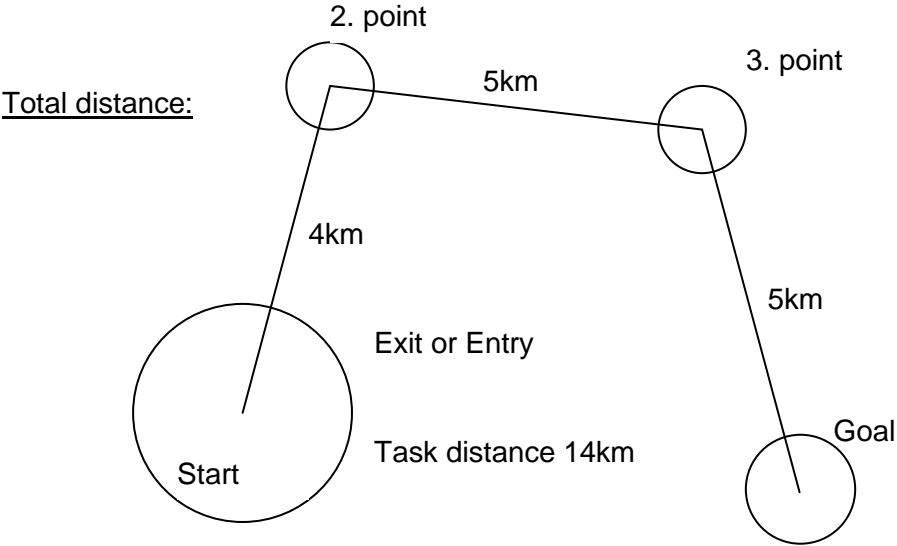
- Dist to WP: The distance to the center of the waypoint
- Dist opt WP (new): The distance to the optimized intersection of the turnpoint cylinder
- Dist. to Cyl: Shortest distance to the WP cylinder – not to be confused with *Dist opt WP*
- Dist goal: The distance from current position to goal. If the route is optimized this total is optimized. This is the distance used in L/D calculations and arrival altitude user-fields
- Spd StCyl: The necessary speed to reach the circumference of the startcylinder exactly at start time

To turn on the optimized route function, long-press the *Route* key in the run mode and the function for *F1* will show “Optim C-RTE”. Press *F1* and note that “COMPETITION-ROUTE” is now “Opt. COMPETITION-ROUTE”. Press *Esc* to exit the route list or press *OK* to activate the current optimized competition route (if one was built in the Route Menu) and exit the route list.

If you turn on the optimized route function and go to the Route Menu (Menu>Routes) you will see that the “COMPETITION-ROUTE” is now shown as “Opt. COMPETITION-ROUTE”. If you highlight Opt. COMPETITION-ROUTE, you will see the total distance and the optimized total distance of the route in the lower portion of the display (assuming you have previously built a competition route). The un-optimized total distance is calculated as shown below. The optimized total distance is calculated as shown on the following page.

Note: In order to display or edit route details in Menu Mode, you must deactivate the route before, by long-press the *Route* key in the run mode and the function key *F2* .

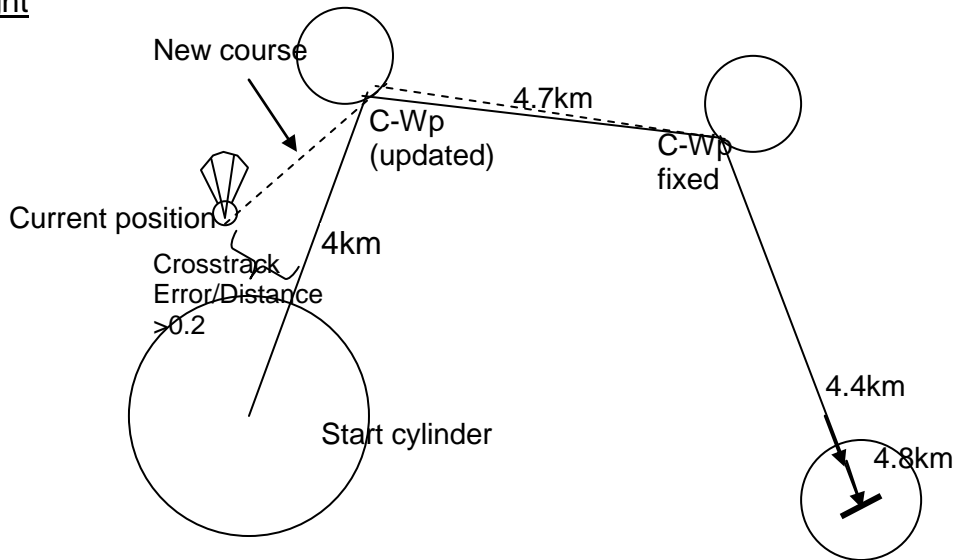
Optimized Route and Finish Line



If you look at the map page when an optimized competition route is active you will be able to see the route line connecting all of the optimized points (shown as “C-Wp”). In flight, if your cross track error divided by the distance to the cylinder is greater than 0.2 (~11°) the new optimum intercept is calculated and you will see the map update the current C-Wp and bearing line (see diagram below). Of course, all of the related user-fields and compass pointers are updated as well. Note: the C-Wp for subsequent turnpoints remains unchanged.

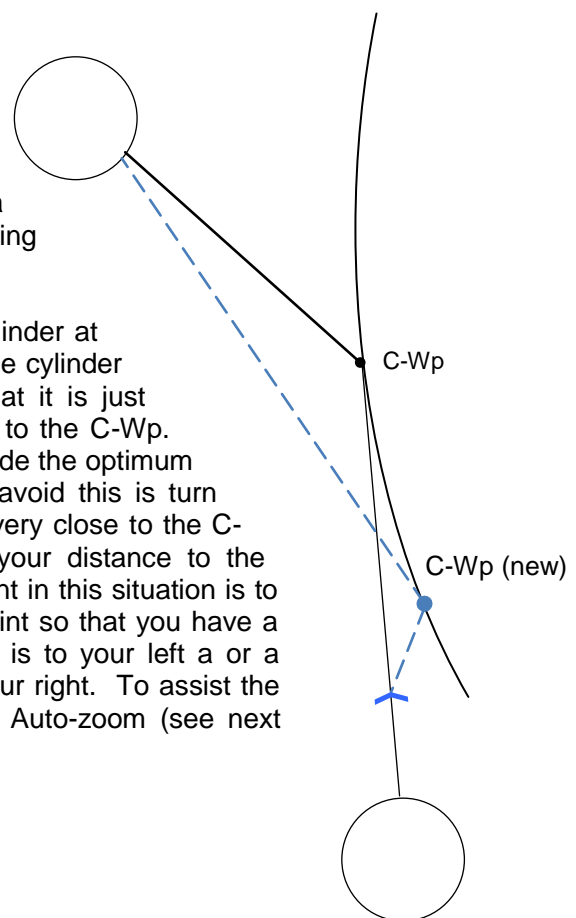
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Re-optimization in flight



When approaching a C-Wp on a large turnpoint cylinder at near tangent, the COMPEO+ will automatically recalculate to a closer intercept as you get close to the cylinder. This will cause the bearing pointer to angle more towards the turnpoint center as you get close to the cylinder. There is a 15-second delay in the recalculation of a new intercept to prevent the C-Wp from becoming jumpy when thermaling just outside a cylinder.

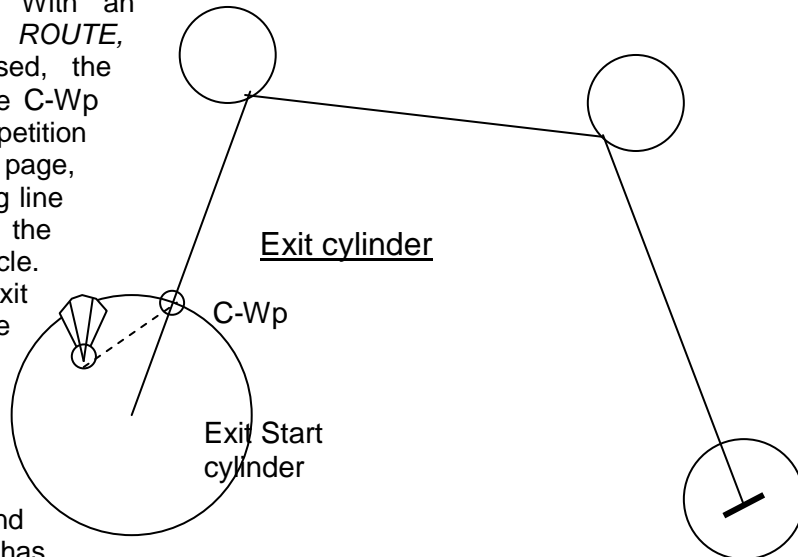
When approaching a C-Wp on a small turnpoint cylinder at near tangent, to be sure that you do not just-miss the cylinder intercept, you should adjust your flight path so that it is just slightly on the turnpoint side of the bearing pointer to the C-Wp. Failure to observe this could result in flying just outside the optimum intercept and missing the turnpoint. One way to avoid this is turn slightly towards the turnpoint center when you are very close to the C-Wp. Use the user-field *Dist Opt WP* to monitor your distance to the intercept. Another way to avoid missing the turnpoint in this situation is to adjust you flight path when you get near the turnpoint so that you have a slight negative (-) *cross track* error if the turnpoint is to your left a or a positive (+) *cross track* error if the turnpoint is to your right. To assist the pilot in this situation the COMPEO+ now features Auto-zoom (see next section).



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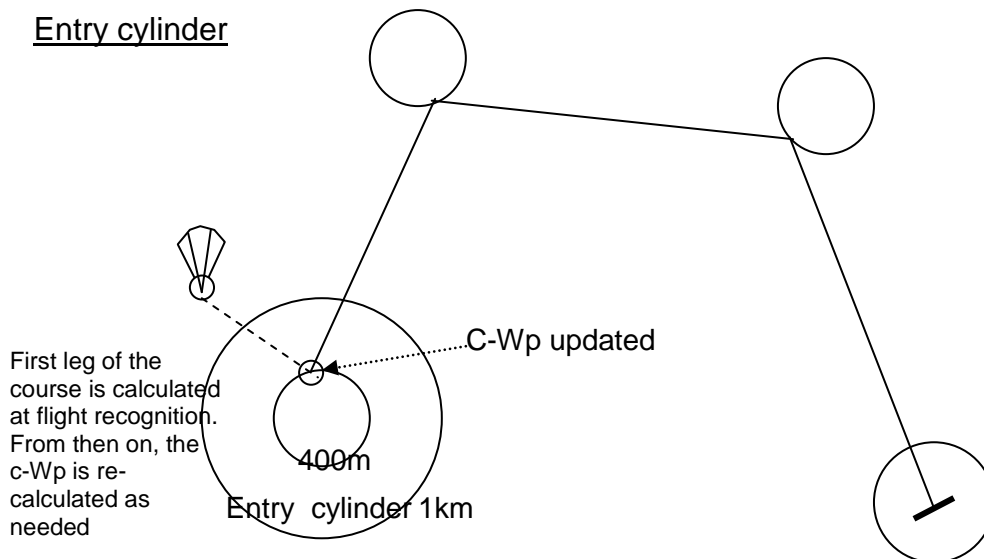
Exit Start

The exit start cylinder is treated like a normal optimized waypoint. With an active *Opt. COMPETITION ROUTE*, before start time has passed, the bearing arrow will point to the C-Wp calculated at the time the competition route was built. On the map page, the route will show the bearing line from your current position to the C-Wp on the start circle. Assuming you are inside the exit cylinder when start time passes, the waypoint reached signal sounds, the next waypoint becomes active and the directional arrow in the compass points to the next waypoint. Keep in mind that before the start time has passed, the directional arrow in the compass points to the optimal point (C-Wp) and not to the start circle center. If you are trying to position yourself for an optimal start you should monitor *Dist to Cyl.* to see if you are inside or outside the cylinder (positive distance is outside and negative distance is inside).



Entry Start

The entry start cylinder has no optimized entry point, however, the turnpoint inside the entry cylinder has an optimized intercept (C-Wp) that is calculated when the COMPEO+ recognizes that the flight has begun (flight acceptance). The first leg of the route is drawn from your position at flight acceptance to the C-Wp and is updated when your cross track error divided by the distance to the cylinder is greater than 0.2 (~11°).



If you are trying to position yourself for an optimal start you should monitor *Dist to Cyl.* to see if you are inside or outside the cylinder (positive distance is outside and negative distance is inside).

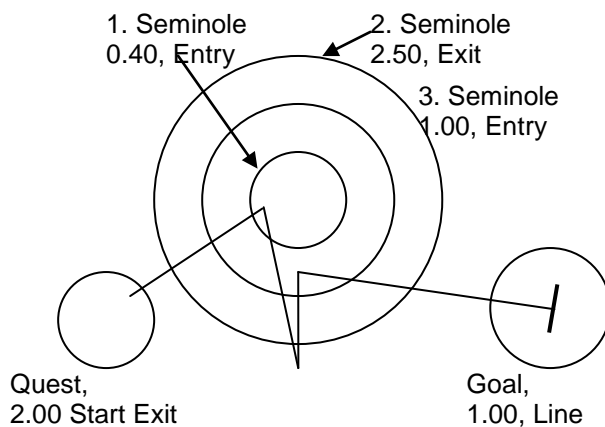
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inside). Before a valid start has been achieved the direction arrow points to the C-Wp of the first turnpoint and will continue to point to the first turnpoint's C-Wp until the first TP is achieved.

As an additional hint, there is a special beep, when the start time is reached. You may use the remaining time to start by watching the userfield *Start Race*.

2. Entry and Exit flag for all waypoints

To fly a task like the example below, it is possible to set for every waypoint if it is an ENTRY or EXIT waypoint. Until now, all waypoints between start and goal have been assumed to be ENTRY waypoints.



COMPETITION-ROUTE	
Quest	2.00 S 7.38
Seminole	0.40 E 0.00
Seminole	2.50 X 0.00
Seminole	1.00 E 8.78
Goal	1.00 L 0.00

Wp 2/5 in Route	
Seminole	
Total Dist:	53
Radius [m]:	400
Mode:	EXIT

Ins.	Del.
Wayp	Wayp.

The instrument can't decide which optimized waypoint after the EXIT Waypoint 2. Seminole is correct. Therefore it assumes the optimized waypoint in the south. As soon as the pilot flies in one direction, this optimized waypoint will be updated.

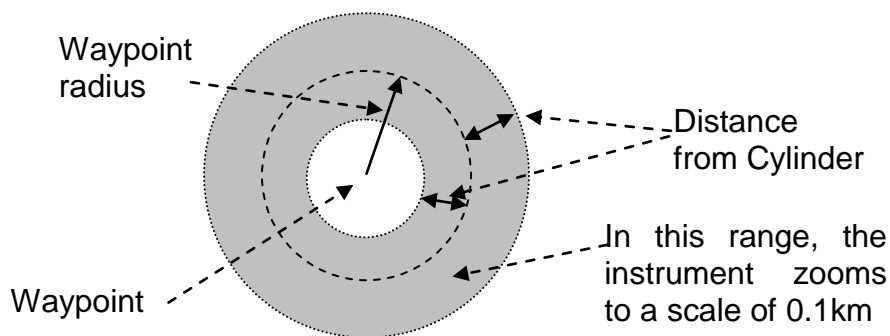
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3. Auto Zoom

As you approach a turnpoint and fly within a preset user-defined distance (e.g. 100m), the COMPEO+ will automatically switch from the main page to the map page at maximum zoom (0.1km scale). This way it will be immediately obvious that you are close to the cylinder and you will be able to see clearly your position relative to the cylinder and avoid just-missing the optimized intercept. Once you fly into the cylinder and the turnpoint reached sound is given the display will go back to the main page. There are three modes of Auto-zoom: *off*, *map only*, and *full*. Full auto-zoom will work as described above. If *Map only* is selected the COMPEO+ will only zoom to maximum within the map page, that is, it will not automatically switch from the main page to the map page. The Auto-zoom mode and the threshold can be set in *Menu->Settings->Auto Zoom C-Route*. The threshold can be set between 30 and 180 meters. In case of a goal line, the autozoom activates from the distance to the radius defined and remains active until the goalline is crossed.

```
>Settings
-----
Auto Zoom C-Route
Pilot Name
Glider Type
Glider Id
-----
Auto Zoom C-Route
0: No 1: Map only 2: Full
2
Dist. from Cyli. 180
Userfields in autozoom
left: GND speed
middle: Dist opt WP
right: Dist cyl
```

Important: Restricted airspace is not shown when the map is showing the maximum zoom level!



User Fields in Map Mode

In the Map mode the 3 fields below can now be used as user settable userfields. Setting: select with the left arrow button the user field and select with the arrow up arrow down key the function which this userfield should display. This adjustment applies to the normal mode map. In the zoom mode other user fields are required. You can setup menu *Main Setup Menu -> Settings -> Auto Zoom C-route* will be selected. (See illustration above)

4. Goal line function

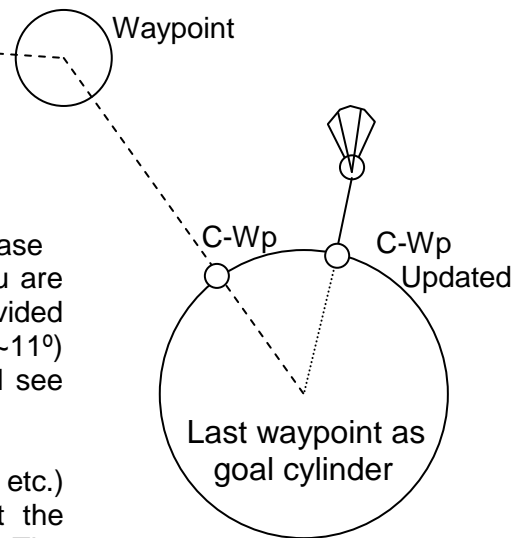
A goal line is defined as a line of predetermined length, centered on a defined point and that is perpendicular to the course line from the last turnpoints center to goal. To complete a competition task that has a goal line finish, it is necessary for the pilot to cross over the goal line. The pilot must cross over the line, starting from the side closest to the last turnpoint. This is in contrast to a goal cylinder where it is only necessary for the pilot to fly into the cylinder. In some cases, a task will be called with a goal line centered inside an end-of-speed cylinder. In this case, the pilot's course time ends when he flies into the end-of-speed-

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cylinder around the goal line, however, it is still necessary for the pilot to fly across the goal line. In the event the task calls for a goal line finish, the comp organizers may put out a physical line that does not coincide with the virtual line. To prevent any disappointment you should familiarize yourself with the competition rules as they pertain to crossing a goal line and/or ask for clarification at the pilot briefing.

Goal cylinder finish (optimized)

In the case of a goal cylinder finish, if the competition route is optimized, the instrument will pre-calculate the optimum goal cylinder entry point. However, wind and/or sources of lift will often cause you to approach goal from a direction other than straight from the last turnpoint. As is the case with the optimized route up until this point, when you are on the last leg of the route, if your cross track error divided by the distance to the cylinder is greater than 0.2 (~11°) the new optimum intercept is calculated and you will see the map update the current C-Wp and bearing line.



Waypoint arrival numbers (e.g., *Alt a BG*, *Alt a WP*, etc.) are relative to the optimized intercept (C-Wp) not the cylinder center (as was the case in earlier firmware). The turnpoint reached alert is given the moment you enter the goal cylinder and the task is complete. When building a competition route in *Menu>Routes* the instrument treats the last waypoint in the list as goal. In this case you must set the cylinder radius as defined by the competition task and set with the up arrow key the *Mode* to ENTER (Default), LINE or EXIT

COMPETITION-ROUTE		
Quest	5.00S	7.38
Seminole	0.40E	12.34
Fantasy	0.40E	24.22
Clermont	0.40E	8.78
Goal	1.00L	0.00

Wp 6/6 in Route		
Goal		
Total Dist: 53		
Radius [m]:	1000	
Mode:	LINE	

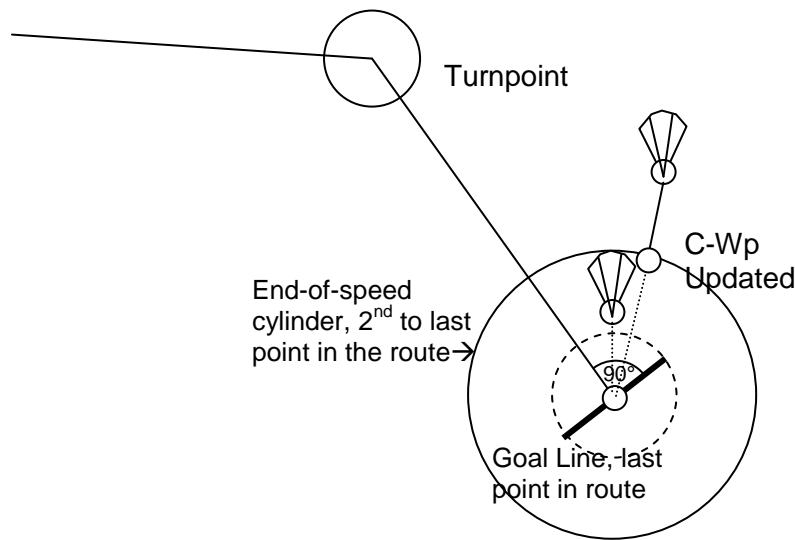
Ins.		Del.
Wayp		Wayp.

Goal line finish (optimized)

In the case of a finish line with an end of speed section, the instrument behaves similar to above. The end-of-speed cylinder intercept is optimized when the route is activated and if you get off of this course line, the instrument will recalculate a new intercept as discussed above. The turnpoint reached sound will be given as you enter the end-of-speed cylinder and again when you cross the goal line. The task is complete only when you cross the goal line.

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On the last leg of the route the directional pointer points to the center of the goal line. There is also an imaginary circle around the finish line with a diameter equal to the length of the goal line (visible on the map page). If you approach the goal line at a significant angle it will be a shorter distance to cross the finish line near the endpoint closest to you. This may make the difference between making goal and not making goal when you have no reserve altitude. In this situation, if there is no physical goal line for you to judge, you can use *Dist to Cyl* to know the soonest moment you can cross the virtual line. When the distance to cylinder is negative you are within the imaginary circle around goal and should turn towards the goal



line.

If you have enabled full Auto-zoom, when you fly within the preset margin from goal, the display will switch to the map page at maximum zoom enabling you to see the finish line and the closest place to cross. The autozoom remains active until you cross the goal line.

To set up a route with this type of finish, enter the goal turnpoint twice when building the competition route, the first one with a cylinder radius corresponding to the size of the end-of-speed section and the second one with a line length equal to the length of finish line each side of center (as defined by the task-setter). In the example, the end-of-speed section is 1000m radius and the finish line is 200m either side of center (400 meters total). If there is no end-of-speed section, goal need only be entered in the route list once, of course with the proper goal line length.

COMPETITION-ROUTE		
Quest	5.00S	7.38
Seminole	0.40E	12.34
Fantasy	0.40E	24.22
Cleremont	0.40E	8.78
Goal	1.00E	0.00
Goal	0.20L	0.00

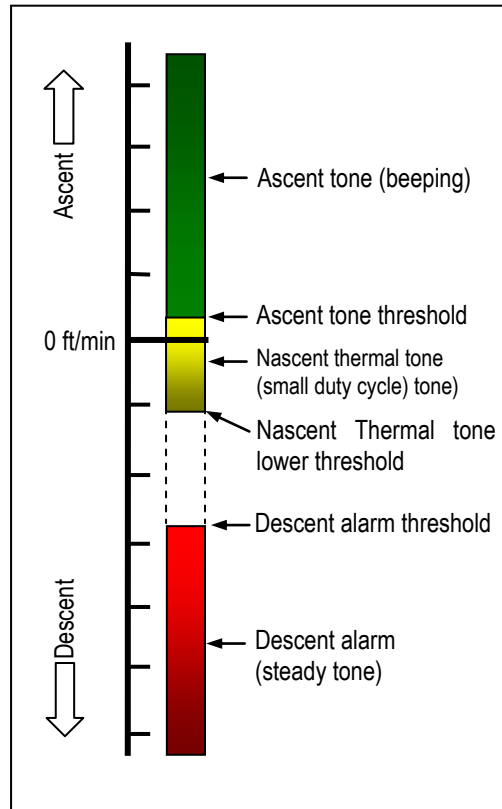
Wp 6/6 in Route		
Goal		
Total Dist:	53	
Radius [m]:	200	
Line:	Yes	

Ins.		Del.
Wayp		Wayp.

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5. Nascent/Near thermal Tone

This is an intermittent tone similar to the ascent tone but with adjustable pulse duty cycle. It indicates lift that is not quite strong enough to trigger the ascent tone but may deserve investigation when finding a source of lift is critical. The nascent thermal tone is only active in flight (groundspeed bigger than 10km/h) to prevent unnecessary and distracting beeping while standing at launch while waiting to take-off or after landing. The frequency of this tone starts at the same frequency as the ascent tone and gets lower as the weak lift gets weaker (down to the user-set lower threshold). The upper threshold of this tone is the same as ascent tone threshold and the lower threshold can be set between 0 and -200ft/min (0-1 m/s) in *Menu* ⇒ *Settings* ⇒ *Acoustic Vario* ⇒ *Near thermal tone*. The tone can be enabled/disabled in the above menu as well. The Nascent thermal Tone does not sound, if McCready acoustic is active.



The duty cycle of the near thermal tone can be adjusted in *Main Setup Menu* -> *Settings* -> *Acoustic vario* -> *Near thermal tone*. Set to 10%, only a very short beep will sound, with 10% of the beep frequency. Set to 50% it sounds similar to the ascent tone, set it to 100% for a continuous tone.

```

>Acoustic vario
-----
Customize sound
Lift audio threshold
Near thermal tone
Sink tone threshold

-----
Near thermal tone
Range: -1.0-0.0   Activate
-0.5             Yes
Cycle10-100%: 15
    
```