



# RR400/420 Regularity timer Annexe

The screenshot shows a software interface for a regularity timer. At the top, it displays 'RT:1' and 'Nbr : 181'. Below this is a table with columns for 'Ind', 'Km', 'Latitude', 'Longitude', and 'Comment'. The table contains three rows of data, with the first two rows highlighted in yellow. Below the table, there are several buttons: 'Remove' (red), 'Add inter' (green), 'Add absolute' (yellow), and 'Auto Km' (white). At the bottom, a large display shows '40.012 Km' and '0.200'. On the right side, there is a vertical column of buttons: 'Help', 'Start', '^', 'v', 'End', and a circular arrow button.

Ind	Km	Latitude	Longitude	Comment
178	39.134	44.865795	5.582873	
179	39.488	44.866943	5.586785	
180	39.785	44.866596	5.590035	
	0.227	44.163284	1.552415	comment

## Distances auto-correction by GPS

Version 190126

26/01/2019

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Important: videos explaining the operation of the device can be viewed and downloaded on the page:

<http://www.crisartech.com/fr/rr400.html>

or *Youtube channel* **CRISARTECH**

## 1 Principle of distance corrections

During the race, Trip1 distance counter serves as a reference for calculating and displaying the advance or the delay. It is therefore essential that this distance is as accurate as possible with respect to the distance used by the timekeepers.

But this distance always shifts slightly for two main reasons:

- calibration is never quite precise. It is calculated over a few km whereas the RT can reach several tens of km. **An inaccuracy of about 2 m on the calibration zone (1 m at the start + 1m at the finish) will result in a 20 m inaccuracy in a RT with 10 times the length of the calibration zone,**
- difference of trajectories between the organizer who "traced" the RT and the pilot. Between two different paths to approach a pin curve, we can have several meters difference, for example.

The only way to be precise is to regularly correct the Trip1 (1 to 5 times per km). This requires to make the scouting or reconnaissance run when possible and to take couples "landmark / distance", that is to say that at each landmark, we will associate a distance during the reconnaissance. Then, during the race, arriving at the landmark we will correct the Trip1 with the distance that was noted during reconnaissance. There are two ways to do this:

- use visual cues (signs, km markers, posts, recognizable buildings ...), described in a notebook or photographed,
- use GPS waypoints (exclusive CRISARTECH), recorded during reconnaissance (§ following) and that the device "unrolls" automatically during the race. It is simple and more precise, especially in case of snow, fog, night...

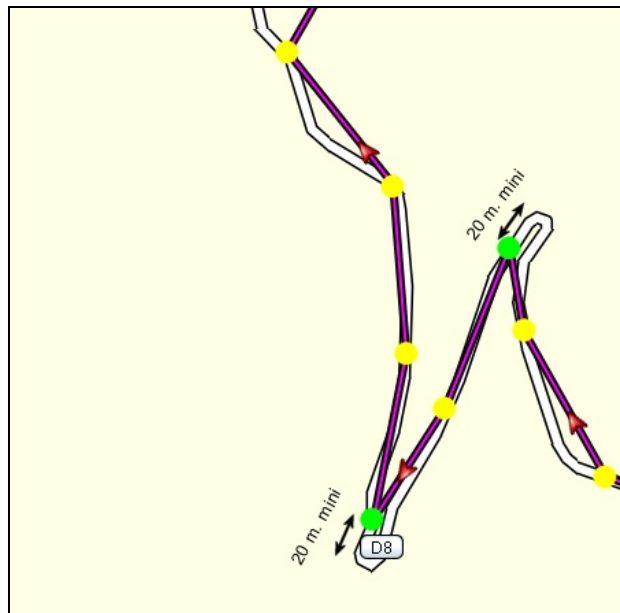
## 2 Principle of CRISARTECH GPS distance corrections

### 2.1 Where to record correction waypoints?

CRISARTECH system uses two kinds of correction waypoints:

- absolute correction: the correction is applied even if it is important. This can correct small shifting or large error due to tunnel, path error, manipulation error... Those waypoint must not be placed just after air pin curve. They have yellow button (on touch screen or infrared remote control). They must be placed regularly to avoid distance discrepancies due to trajectories, or small measurement inaccuracies (calibration not perfect, GPS measurement). They can be taken automatically by ticking the box Auto Km. The recommended interval between two points is 0.2 to 0.25 km, but it is possible to take one after each left turn (no hairpin turn).
- intermediate corrections: correction to be placed after the hairpin turns, respecting a minimum of 20m. after the hairpin. Their correction is limited to a distance of 30 m. (Configurable). They are associated with the green button (touch or infrared remote control).

See on the following map, the typical placement:



### 2.2 Recording screen



In the 'RT management' screen, push the satellite button

Push the green or yellow button to add a waypoint (green or yellow key on the remote control).

Push the red button to remove the last waypoint (red key on the remote control).

Check/uncheck the 'Auto km' checkbox to start/stop auto selection points (blue key on the remote control).

### 2.3 Files

Each time a key is pressed, the timer adds a line to a file named `gps_zrxx.csv`, for each ZR (xx represents the ZR number). **There is no need to save the file at the end**, this is done at each point. Files are transferred along with distance / speed files using the 'import / export' buttons on the ZR management screen.

The format is:

```
point_type;distance;latitude;longitude;comment
```

with :

- point\_type: I for Intermediate waypoint and A for Absolute waypoint,
- distance in meter,
- latitude in degrees,
- longitude in degrees,
- comment: 25 char maximum text.


## 2.4 Tips and tricks

### 2.4.1 Comments

You can enter a comment that will be added to the file.

**Important:** comment must be entered **before** pressing the button.

Two possibilities:

- with an external keyboard:
  - o connect an American USB keyboard (*qwerty*) before turning on the device,
  - o check the **Uses USB keyboard** box in the configuration of the GPS corrections screen, accessed by the  button
  - o then press the **tab** key once before the first use: the input field of the comment takes a gray box,
  - o before each entry, press **enter**
  - o type the comment
  - o validate with the **enter** key
- with the virtual keyboard:
  - o press the comment input field
  - o type the text on the virtual keyboard
  - o press the **OK** key



If the comment begins with an exclamation point: the comment will be displayed during the race on the timer, accompanied by a long beep and a light sequence on the Led6 module:

Comment	Light sequence on the Led6
!	Double yellow flash
!>	Mauve mover from left to right
!<	Mauve mover from right to left

Example : avec comment !> To the Right!!, the following popup window will be displayed:



### 2.4.2 Automatic entry

In automatic entry, if we see that the device will take a waypoint at a left turn entry, we can disable the automation (blue key), take the turn, then revalidate the automation (blue key again), the waypoint will be taken immediately.

### 2.4.3 Distances on 2 or 4 wheels

The system creates automatically a second file named `gps_det_zrxx.csv`, for each RT.

This file contains each wheel distance (the 4 wheels if Peugeot / Citroën with **auxiliary wheels** checked). It is useful if one prefers to make calculations quietly on his computer while returning at office, rather than a simple normalization during the Scouting.

It can not be used directly to make corrections because there are several distances and the system does not know which one to use. That's why it is registered in addition.


The format is:

```
point_type;RL_dist;RR_dist;FL_dist;FR_dist;latitude;longitude;comment
```

with :

- point\_type: I for Intermediate waypoint and A for Absolute waypoint,
- RL\_dist: rear left wheel distance in meter,
- RR\_dist: rear right wheel distance in meter,
- FL\_dist: front left wheel distance in meter,
- FR\_dist: front right wheel distance in meter,
- latitude in degrees,
- longitude in degrees,
- comment: 25 char maximum text.

### 3 Distance adjustment

Distance adjustment screen is accessed with  button (calculator pictogram):

RT:1	Length: 10.275 km	Nbr : 71	Help
Add ->	0.000	Km	
Multiply by ->	1.000000		
Normalize to ->	10.275	End km	
From the point:	1	0.000	Km
GPX export	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>

#### 3.1 Addition

To add a distance to the entire table, enter this distance (with minus sign if subtract) in the first field then press button: **Add ->**.

#### 3.2 Multiplication

To multiply the entire table by the same coefficient, enter this coefficient (or its inverse to divide) in the second field and then press button: **Multiply by ->**.

#### 3.3 Normalization

When the organizer gives cue points, it is possible to use them to fine adjust the distances taken during scuiting by performing a "rule of three" calculation on the table:

- the first is considered right,
- the last point entered will be adjusted to match the "right" distance by multiplying by a coefficient,
- this same coefficient (displayed in the second field) will be applied to all intermediate points.

Enter the distance given by the organizer corresponding to the last waypoint entered in the third field then press button: **Normalize to ->**.


Note: it is possible to repeat this operation for each box of the road-book, as and when. Check that the **From the point** point corresponds to the previous box that has been normalized.

#### Example:


- at the start, we take the waypoint 1,
- following the road we take 8 waypoints, from 2 to 9,
- we arrive at a box of the road-book bearing a precise landmark and the distance 2.482 km, while Trip1 indicates 2.490 km. We then normalize, between the waypoint 1 (0.000 km) and the waypoint 10 brought back to 2.482 km. The distance corresponding to waypoints 2 to 9 is modified accordingly,
- following the road we take 9 waypoints, from 11 to 19,
- we arrive at a box of the road-book bearing a precise mark and the distance 9.658 km, while Trip1 indicates 9.649 km. We then normalize between waypoint 10 (2.482 km, the last waypoint considered "right") and waypoint 20 increased to 9.658 km. In the field **From the point** there must be 10 and the distance associated, on its right must be 2.482. The distance corresponding to waypoints 11 to 19 is modified accordingly ...

## 4 GPX format export

In this same screen, the button **GPX export** allows you to create a universal *GPX Exchange* format file from the waypoints of the current RT.

If the checkbox with green / yellow tabs  is checked, the file will also contain the color pads corresponding to the types of points entered. This makes it possible to check that the "green" points have been entered in the necessary positions.

**Note:** This feature is compatible with the *Garmin Basecamp* program but may not be compatible with all mapping programs.

This file is transferred along with the distance / speed files using the **export to USB** button on the RT management screen: 

## 5 Data duplication

In the case where a RT is performed several times, the **GPS auto correction** data can be duplicated using the button:



This makes it possible to prepare different distances / speeds for the same RT.

## 6 In case of problems

If the timer has a power supply problem, when it re-starts, it will not know which GPS auto correction point to seek. It can also happen in very rare configurations of very tortuous roads, if the number of points entered is insufficient.

In all these cases where the system seems "lost", in the main menu, press the "GPS Panic" button:



The system will compare all its points in memory and stall on the nearest. But there is a chance in two for the next point to be behind us. In this case the point will be "passed" after a few seconds to lock on the following: in front of us.