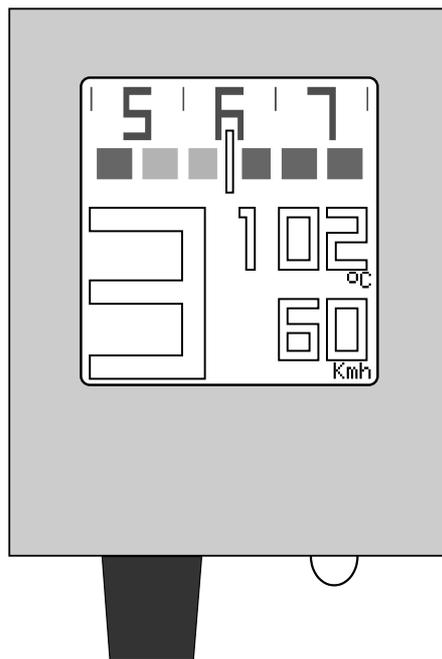


# User Manual

Periscope - Software Version 1.1

Gimpo Garage UG, all rights reserved



*Thank you for purchasing your Periscope.*

*The design, development and test of this product was primarily supported by the genuine passion for motorcycles.*

*I hope that you will use it with satisfaction to enhance your driving experience as well as your safety.*

*I also want to thank all people that supported this idea by sharing their experiences and knowledge.*

Gimpo Garage UG

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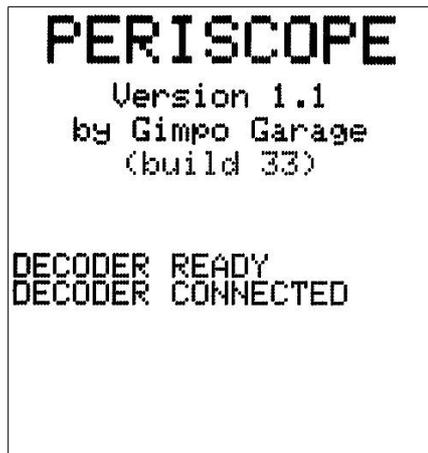
# Introduction

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## Starting

When correctly mounted, you can start Periscope by simply turning the ignition-key in the ON position.

At every start Periscope will check the status of the cable connections. If connections are working properly then a screen like the following one should be displayed:



```
PERISCOPE
Version 1.1
by Gimpo Garage
(build 33)

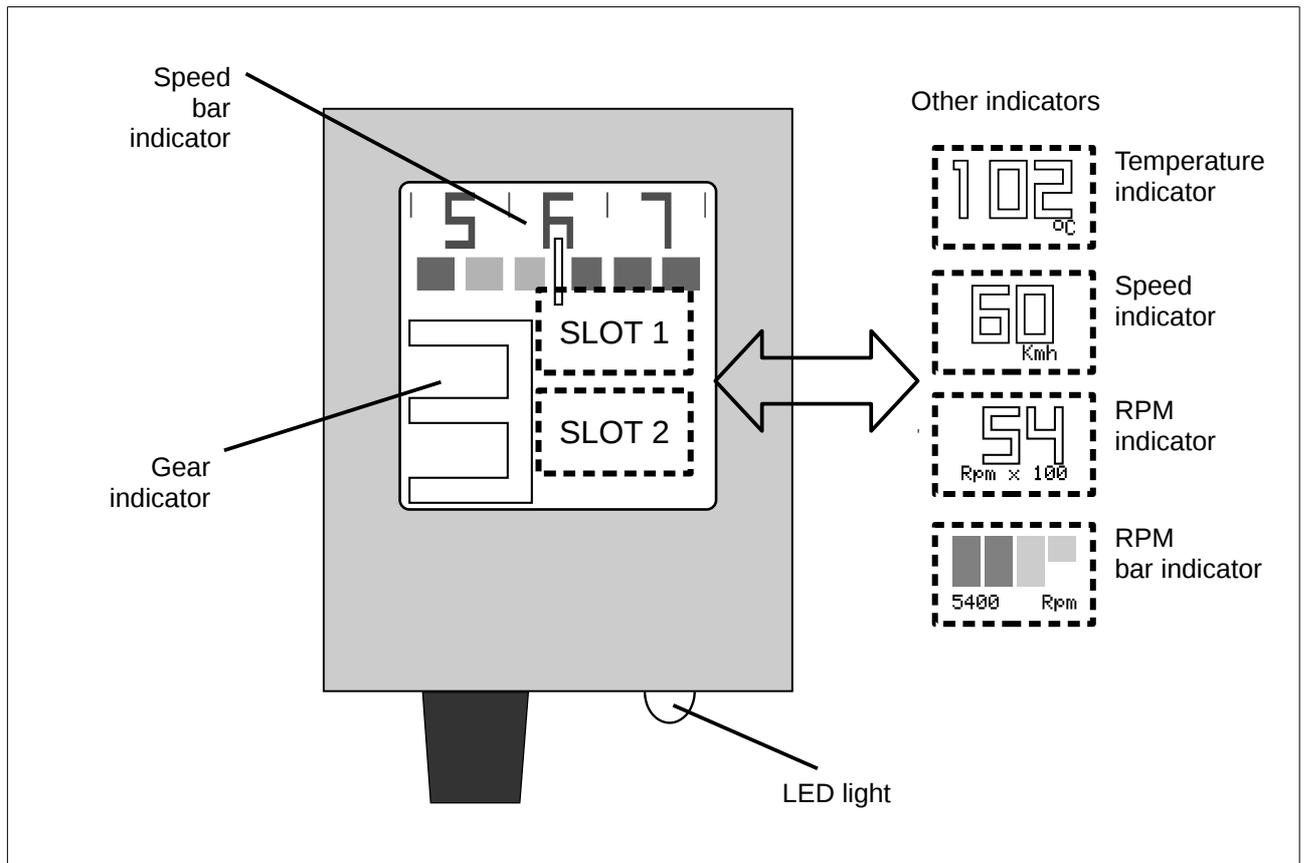
DECODER READY
DECODER CONNECTED
```

Otherwise, Periscope will show

- 'DECODER NOT READY' if there is a communication problem between the computer unit and the decoder;
- 'DECODER NOT CONNECTED' if there is a communication problem between the decoder and the ECU.

In both cases you have to check the cables between the computer unit and the decoder as well as between the decoder and the OBD plug.

## Overview



The Periscope's screen displays some permanent information as well as other configurable ones. Basic information are:

- the gear currently engaged,
- the current speed by using a colored band indicator.

Other user-configurable information can be displayed in the predefined Slot 1 and Slot 2 areas:

- current speed in numeric format,
- current engine temperature,
- current engine RPMs in numeric format,
- current engine RPMs in colored bands format.

The built-in LED light can be activated either in automatic or manual mode both.



Please note that in this manual the ignition-key is assumed to be in the ON position. Periscope is not directly connected to the battery; this means that it completely turns off when the ignition-key is in the OFF position. Also, Periscope has no internal battery.

## Indicators list

In the following all different type of indicators are listed.

### ***Gear indicator***



It shows the current engaged gear by calculating the ratio between the RPM of the engine and the current speed. Some instants (typically less than one second) can be necessary before the indicator show the correct value.

Possible values are listed in the table below.

Displayed value	Meaning	Note
'0'	No gear engaged.	
'1'..'6' (white color)	Gear currently in use.	
'1'..'6' (yellow color)	Clutch engaged.	The clutch needs to allow Periscope to calculate the new gear number or to turn it in white color again.
'-' (horizontal line)	Gear unknown.	The gear cannot be calculated due to abnormal RPM and/or speed value.

### ***Temperature indicator***



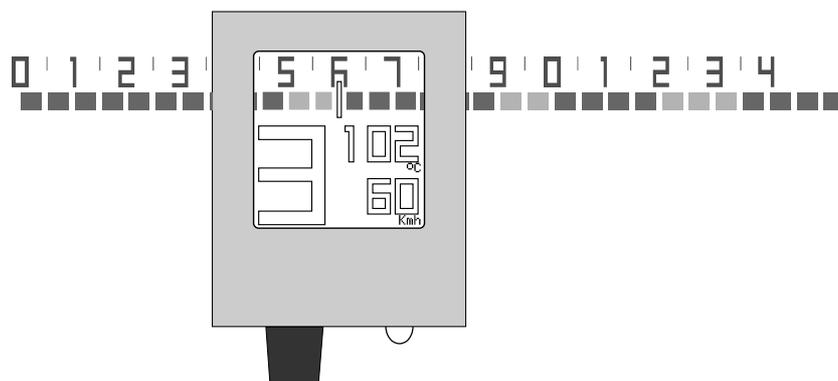
It shows the temperature of the engine as calculated by the ECU unit of the motorcycle. The digits will start blinking when

- the temperature is below 70° Celsius (cold motor),
- the temperature is above 120° Celsius (hot motor).

### ***Speed bar indicator***



It shows the current speed (as calculated by the ECU unit) in a graphical way. It can be thought as a visor moving across an horizontal graduated scale.



Every tick/bar of the scale indicates a displacement of 5 Km/h (or Mph). The central white tick shows the current speed value.

Note: the central tick snaps/moves just every 5 Km/h (or Mph) over the horizontal scale. This is not an error but a design feature: in this way the driver is not bothered by the reading of too precise values.

### Speed indicator

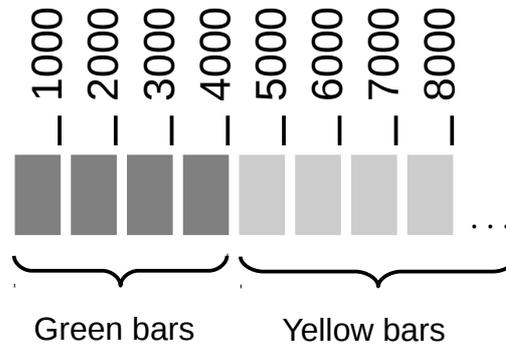


It shows the current speed as calculated by the ECU unit as a numerical value. Note: the value can be tuned to be as closest as possible to the real speed value by using a reliable speedometer (e.g. a GPS device). See the 'Configuration' part of this manual in the following.

### RPM bars indicator



It shows the current RPM value by using green/yellow bars over an imaginary colored band. The bars shift from left to right as the RPMs of the engines increase.



Every bar-tick holds for 1000 RPM while every half-bar holds for 500. Maximum four bars are displayed by the indicator.

Examples:

Bars	RPM
■	1000
■ ■	2000
■ ■ ■	2500
■ ■ ■ ■	4000
■ ■ ■ ■ ■	5000
■ ■ ■ ■ ■ ■	6000
■ ■ ■ ■ ■ ■ ■	7000
■ ■ ■ ■ ■ ■ ■ ■	7500

### RPM indicator



The indicator shows the current RPMs of the engine as a numerical value.

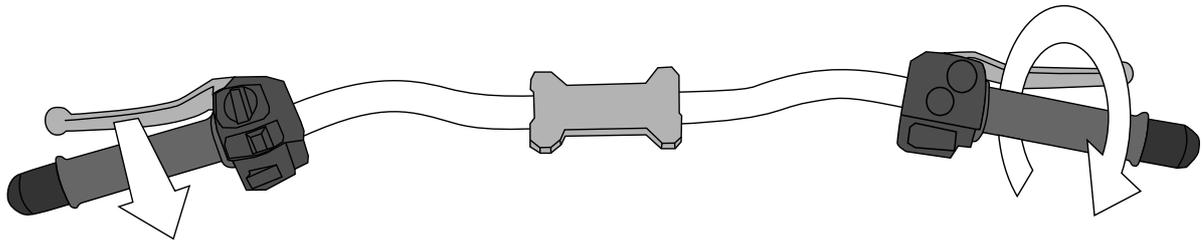
# Configuration

## Access to settings

In order to view/modify the settings of Periscope you have to execute the following procedure:

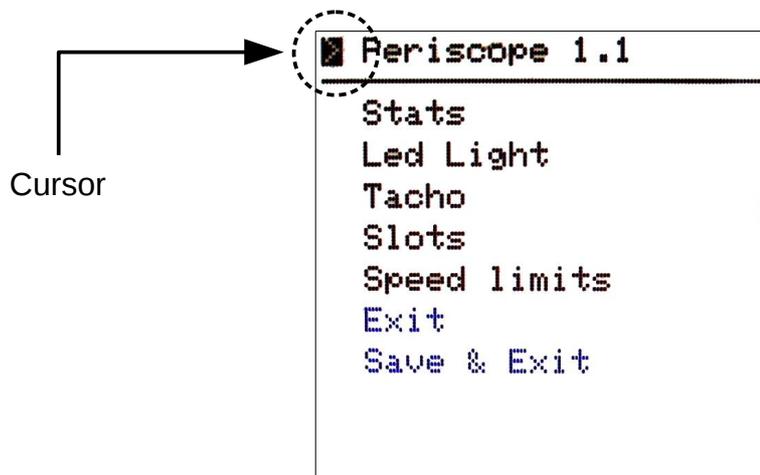
1. stop the engine if running,
2. put the ignition key in the ON position if not yet,
3. pull the clutch and rotate the gas-handle, both at the same time,
4. hold for around 3 seconds,

After that, the main settings menu should be shown on the scree.



## The main menu

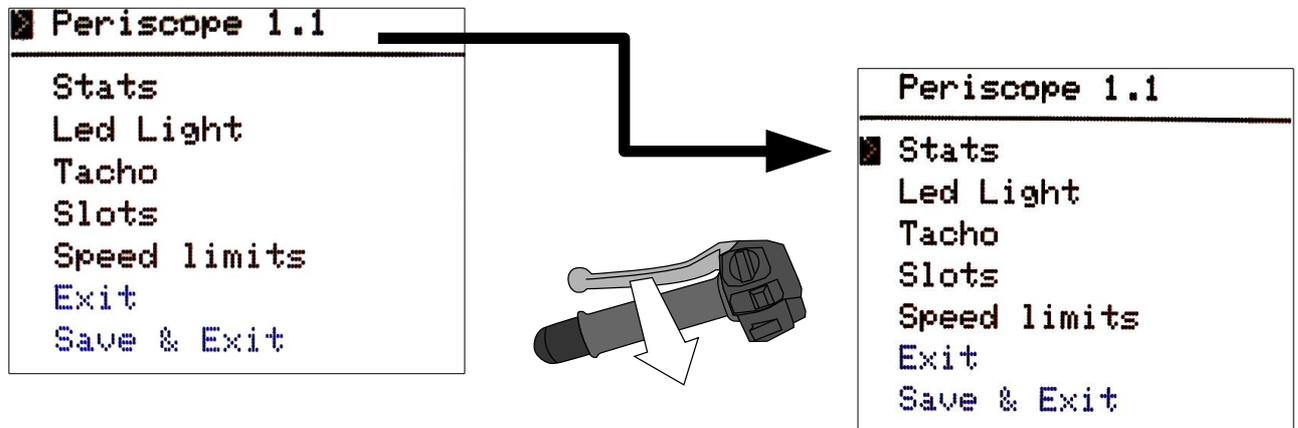
All of the Periscope settings are listed in menu and sub-menu as depicted in the image below.



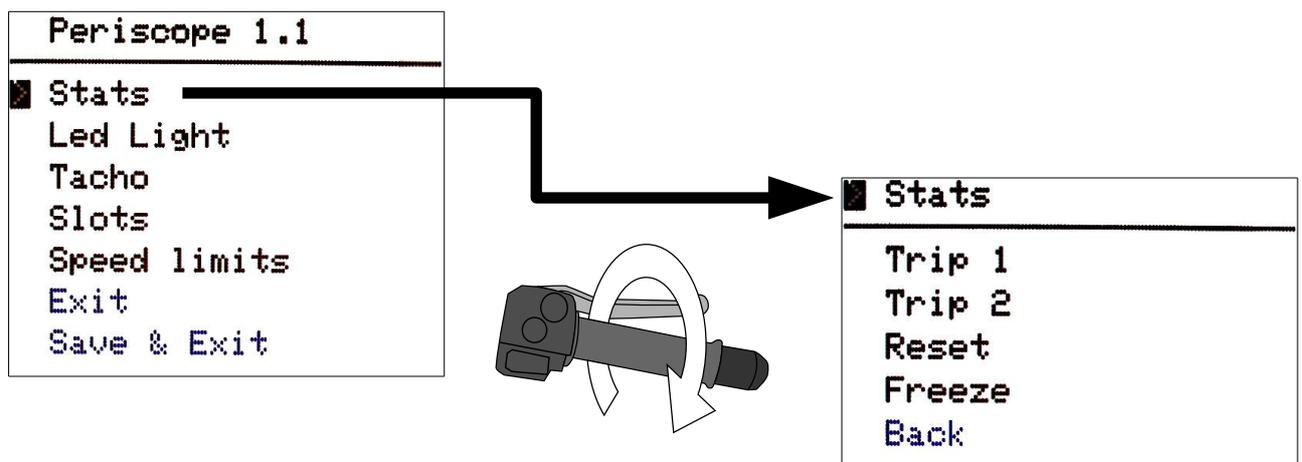
The square block on the left (cursor) indicates your current position in the menu.

## How to navigate across menus

To move down the cursor of one position simply pull the clutch lever and then release it after a fraction of second. The corresponding menu (or an action listed in a menu) is now ready for selection.



Instead, to enter into the menu (or to execute a command), simply rotate the throttle and then release it after a fraction of second.



That is all you need to change the Periscope settings. Just move the cursor and select, have fun!



It's useless to fast pull-and-release the clutch lever. Periscope reads the status of the lever approximately every 0.7 seconds so you have to perform that action with calm.

The same holds about the throttle rotation: you have to rotate smoothly.

Note also that if you simply pull the lever (or rotate the throttle) without releasing it then nothing will happen on the screen!



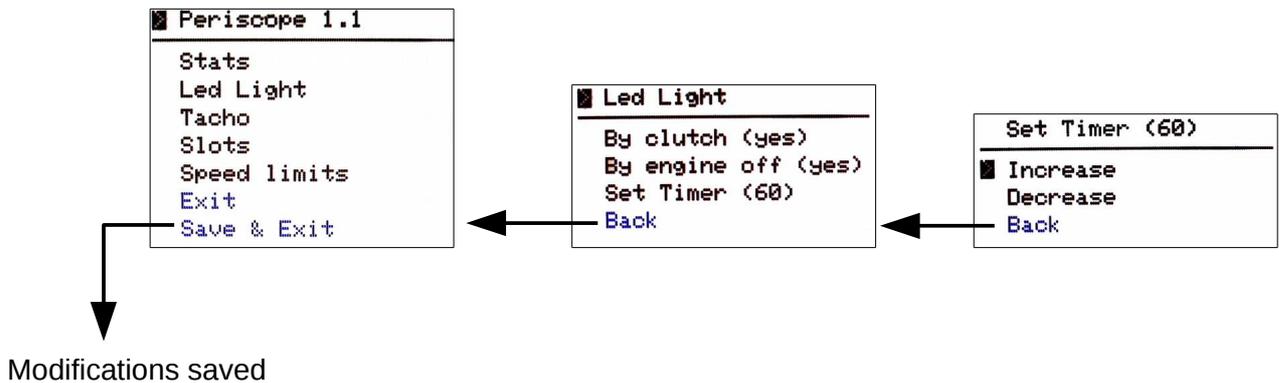
As you probably noticed, using the clutch lever you can move the cursor only downward. Don't get worry about that, after reaching the lowest position the cursor will appear again at the top of the screen!

## Save your changes!

Always remember to save your modification! You will loose your new settings otherwise.

To save your changes you have to select the 'back' command listed in any menu until you return to the the main one. There you can select the 'Save & Exit' command to store your changes permanently in the Periscope.

For example:



If you don't need to save your modifications then simply select 'Exit' command.



The fastest way for exiting from the configuration session is to simply turn off the ignition key and then turn it on again. Periscope will restart with the usual initial screen (Obviously, this works if you don't need to save any modification!)

## Statistics

Periscope collects statistics about the gear usage when the motorcycle is moving and a gear is engaged.

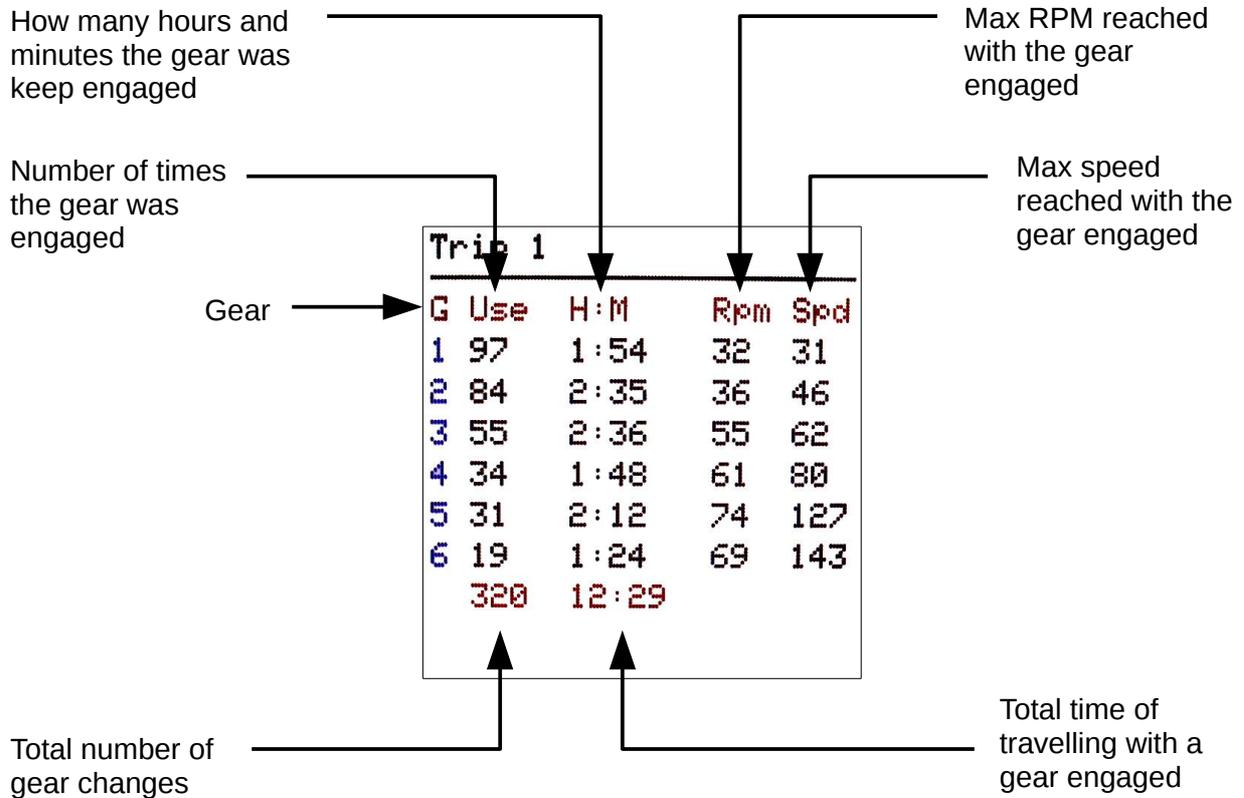
Separated data for two trips (1 and 2) are available. After selecting the "Stats" menu from the main list you will be able to view, reset or freeze the stored values for both trips.

```

■ Stats
-----
Trip 1
Trip 2
Reset
Freeze
Back
  
```

## View statistics

By selecting “Trip 1” (or Trip 2) in the ‘Stats’ menu you will see the stored data. Here below an example:



Due to the characteristics of the ATMEL processor there are some limitations about the maximum amount of time for gear-usage that Periscope can store and display on the screen:

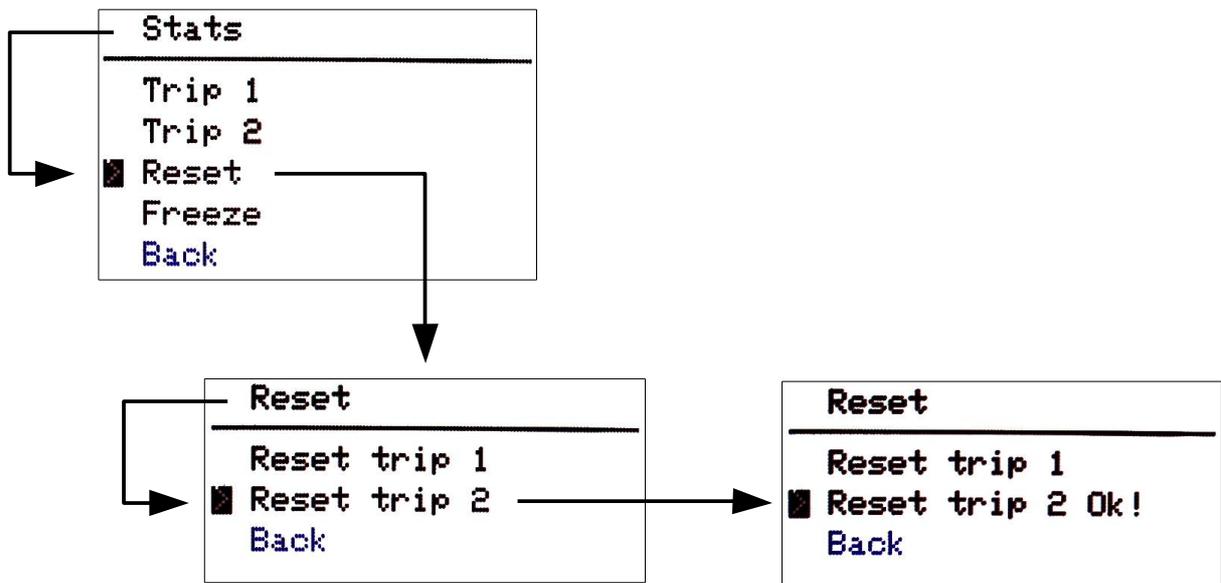
- the maximum number of hours displayed in the “H:M” column is around 18.2 hours
- the maximum total time of traveling reported at the bottom of the ‘H:M’ column is just around 9.1 hours

If you see strange negative numbers in the ‘H:M’ column it simply means that the maximum value has been reached. In this case you can set to zero all value by resetting the trip (see this manual for instructions about that).

## Reset statistics

To set to zero all the statistical value you have to move the cursor on the ‘Reset’, select it and choose what trip (1 or 2) you want to reset.

In the example below trip 2 is reset:

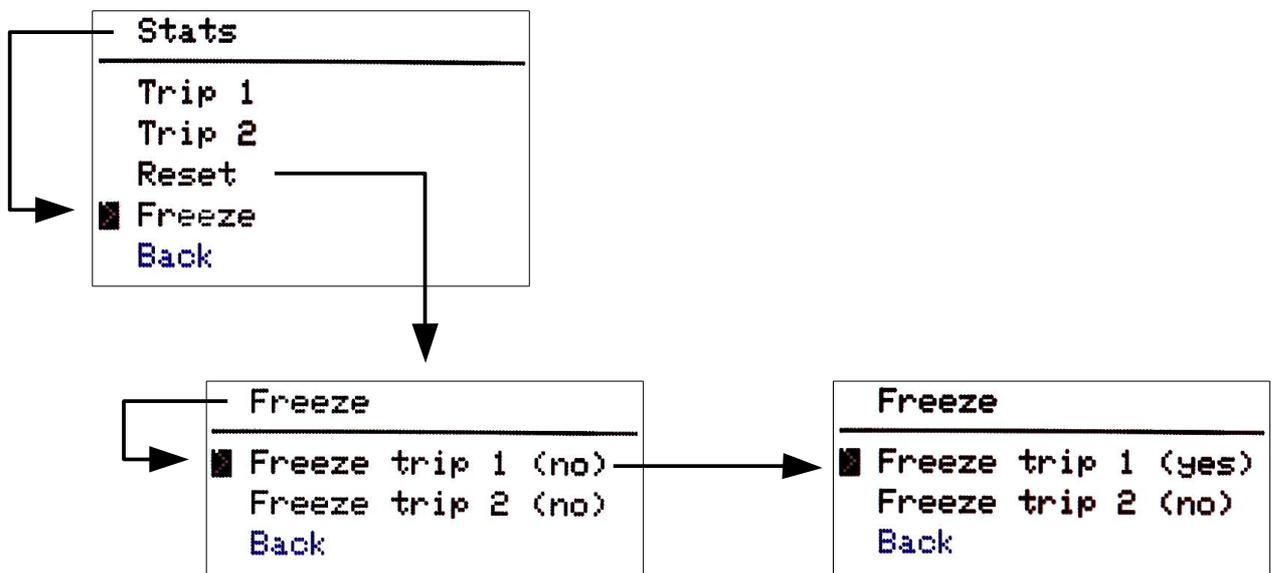


Note that the reset of statistics is executed immediately.  
You don't need to go back to the main menu and select 'Save & Exit'

### Freeze statistics

You can temporary stop recording statistics for trip 1 or 2 in any moment. This is useful if you want to analyze values about a particular road, or a particular day, and review data at home without having to take a notice on paper.

A “frozen” trip is depicted by ‘Yes’ beside the name in the ‘Freeze’ menu as shown in the example below (showing how to freeze Trip 1):

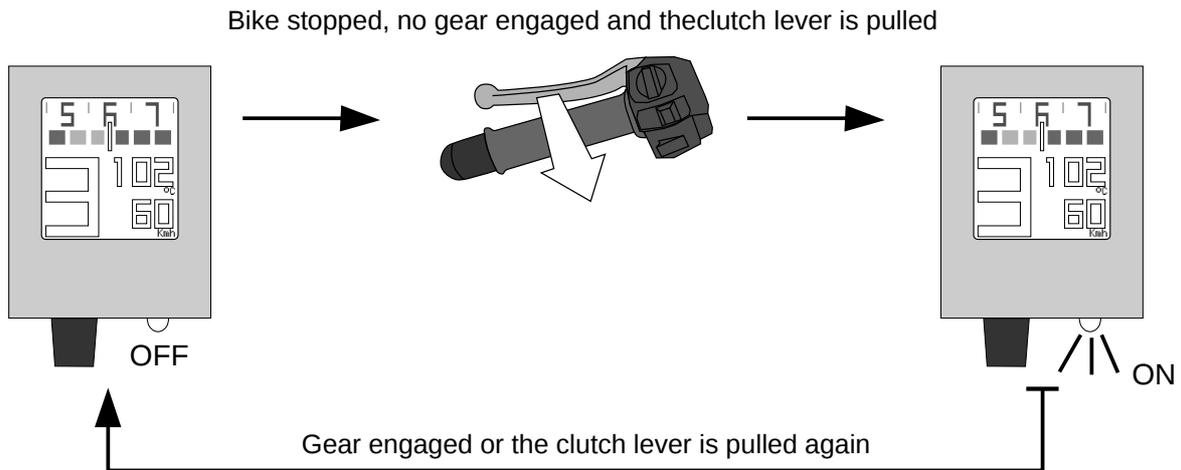


## Led light

Periscope is equipped with a spot LED lamp. The light is useful at nighttime when you need to look at a map or check your home keys.

### ***Turn it on/off manually***

You can turn on the light below the Periscope by pulling and release the clutch lever (when the motorcycle is not moving and the ignition key is on).

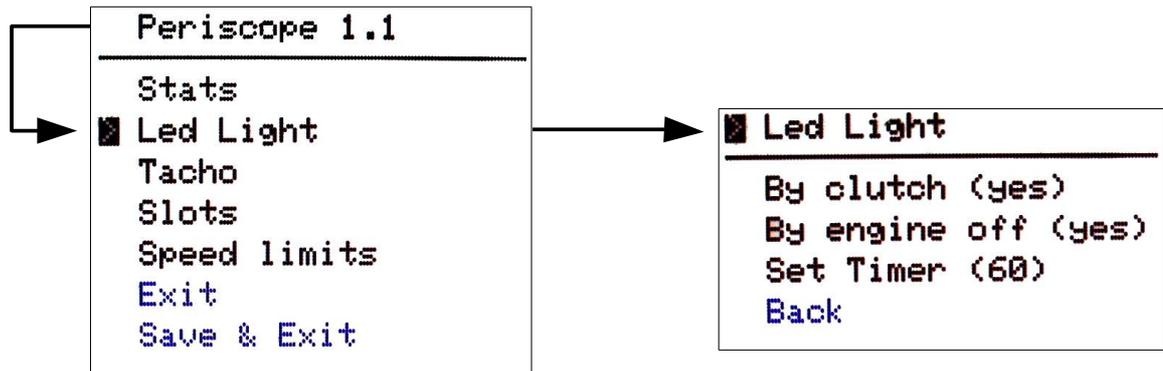


If you engage a gear, or the bike starts moving, the light will automatically turned off.

## LED light Settings

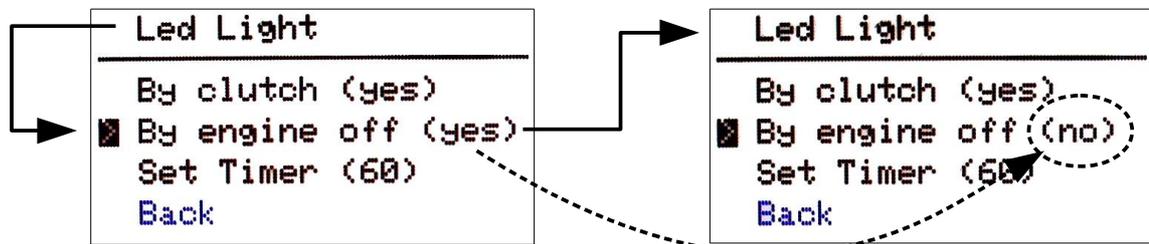
By using this menu you can decide to enable/disable the following options:

- to turn on/off manually the light by using the clutch lever,
- turn on automatically the light every time after the engine is turned off (useful when parking at nighttime),
- in any case, does not allow the light to stay ON more than a predefined number of seconds.



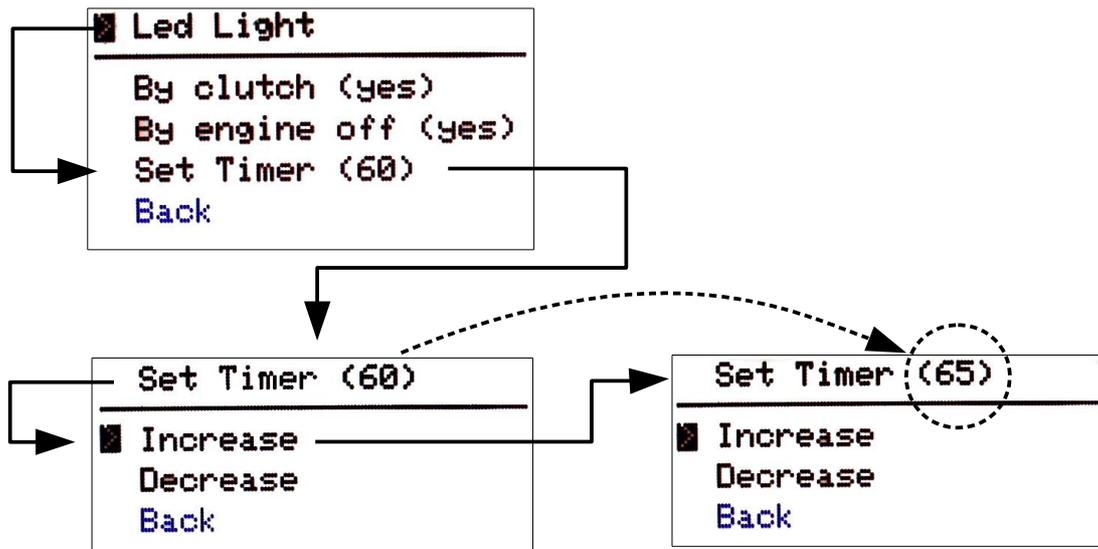
For enabling/disabling first two options you have simply move the cursor over the right command and toggle the value from 'yes' to 'no' (or vice versa).

For example:



To set the maximum amount of time the light could stay on you can use the timer option.

For example, the picture below show how to increase the timer (it can be increased/decreased with steps of 5 seconds):



The timer can be useful to save the motorcycle battery if you forget your ignition key on the ON position (with the light ON too).



If you want to keep the light ON with no time-limitation then decrease the value to 0 (zero).

## Speedometer

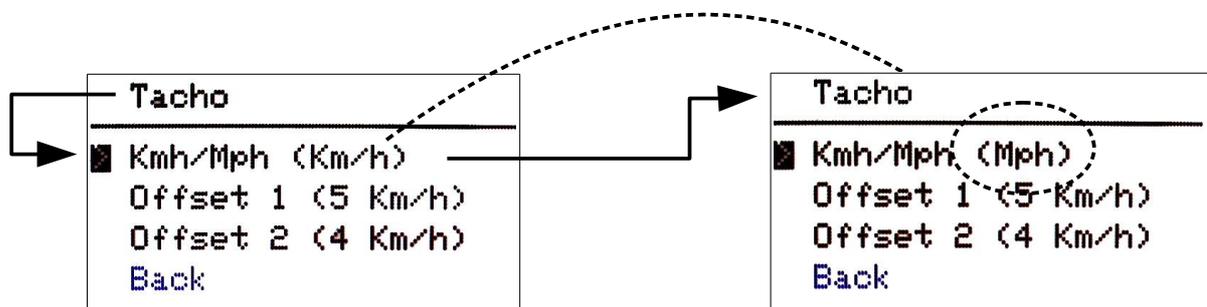


Note for native English speaker: in this document the terms 'speedometer' and 'tachometer' are used interchangeably as homage to German/Italian tradition.

### *Change the speed measure unit*

To change the speed measure unit of the Periscope speed indicators you have to toggle the value beside the 'Kph/Mph' option in the 'Tacho' menu.

You can switch from Kilometers per hour (Kph) to Miles per hour (Mph), or viceversa.



Please note that if you commute from Kph to Mph every single band on the band speed indicator (see above in the manual) will now have a value of 5 Mph, not 5 Km/h! Obviously, the same symmetric case holds if you commute from Mph to Km/h.

Also, if you have set, for example, a speed of limit 50 Km/h now the colored band will switch color at 50 Mph! Obviously, the symmetric case holds if you commute from Mph to Km/h.

If you plan to stay long time in a foreign country maybe it could be a good idea to update your preferred speed limits too (see further in this manual).

### *Speedometer tuning*



Please note that the speed reported by Periscope has only help/suggestion purposes. The speed shown by the standard speedometer mounted by the motorcycle manufacturer is the only one that the driver should observe.

Gimpo Garage UG is not liable for any improper use of the device about problems that can occur on public roads and/or with current regulations/laws in your country.

Since all speedometers are quite optimistic, you can refine the speed showed by Periscope so it will be more close to the real value. (Or far away how much you want!)

In modern motorcycle the speed value is picked from the ECU and modified (in a mysterious way) by the circuits in the dashboard. Following the same principle you can do it by yourself by using Periscope instead.

To recalibrate Periscope you need to know the difference between your real speed while driving and the one showed on the display (by the numeric indicator). The most common way to do this is by using your GPS navigator.



Even if a GPS is not a very precise instrument, it can be used with satisfactory results if you maintain your speed as much as possible constant for at least 2 minutes.

Periscope needs to know the difference between the ECU-speed and the “real speed” at two precise speeds:

- at 60 Km/h (or 35 Mph),
- at 120 Km/h (or at 75 Mph)

The numerical difference that you see on the road (called *offset* in this manual) can then entered into the Periscope through the ‘Tacho’ menu.

For example:

Speed showed on your GPS	Speed displayed by the numerical indicator of the Periscope	Offsets 1 and 2 to be entered
60 Km/h	56 Km/h	4 (= 60 - 56)
120 Km/h	113 Km/h	7 (= 120 - 113)

The same happens if you have set Mph as measure unit on your GPS and Periscope both. For example:

Speed shown on your GPS	Speed displayed by the numerical indicator of the Periscope	Offsets 1 and 2 to be entered
35 Mph	32 Mph	2 (= 35 - 32)
75 Mph	71 Mph	4 (= 75 - 71)

Once that you know the value for the two offsets you can enter them into Periscope.



Default offset values are

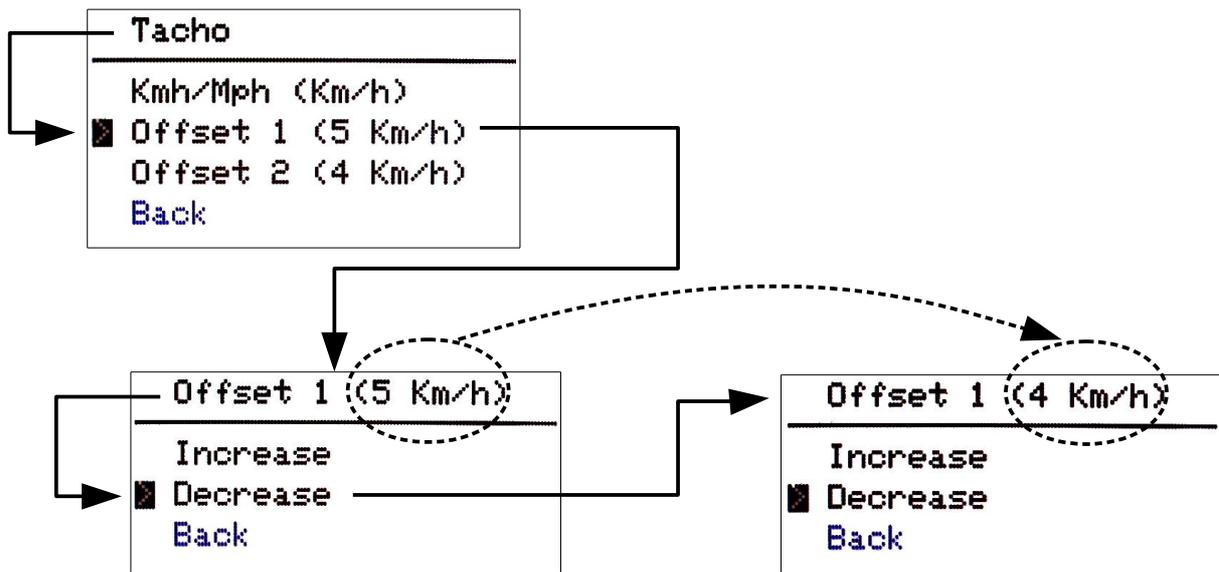
- Offset 1 = 5
- Offset 2 = 4

They was taken on a Moto Guzzi Stelvio 1200 4V equipped with Michelin Pilot Road 2 tires but you can increment/decrement that value as you want.

The speed can slightly change when adopting other tires with an even small difference in length of the circumference.

To enter an offset just move the cursor to it and select it. A sub-menu will allows you to increase/decrease the current value.

In the following example the Offset 1 is decremented by one unit:



BE SURE THAT THE RIGHT MEASURE UNIT IS SET BEFORE ENTERING TUNING VALUES.

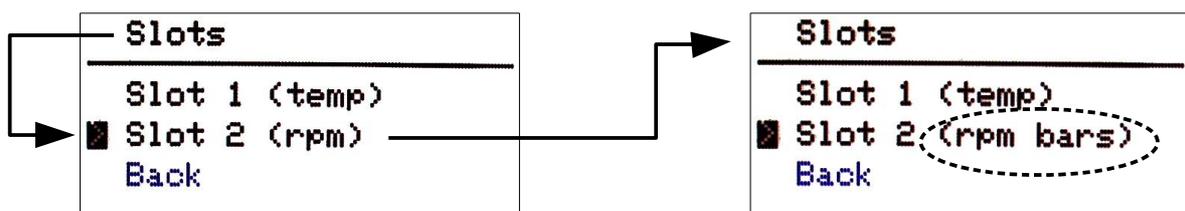
If the "tacho" is set to 'Kmh' then the values will be interpreted as an offset in kilometers per hour, or miles per hour otherwise.

## Configuring slots

To choose what indicator to display in the area of the slots 1 and 2 you can use the 'Slots' menu and choose one indicator.

Available choices	Indicator displayed in the slot
speed	Numerical speed
temp	Numerical temperature
rpm	Numerical RPM
rpm bars	Band

In the example below the numerical RPM indicator in the slot 2 is replaced by the RPM bar indicator:

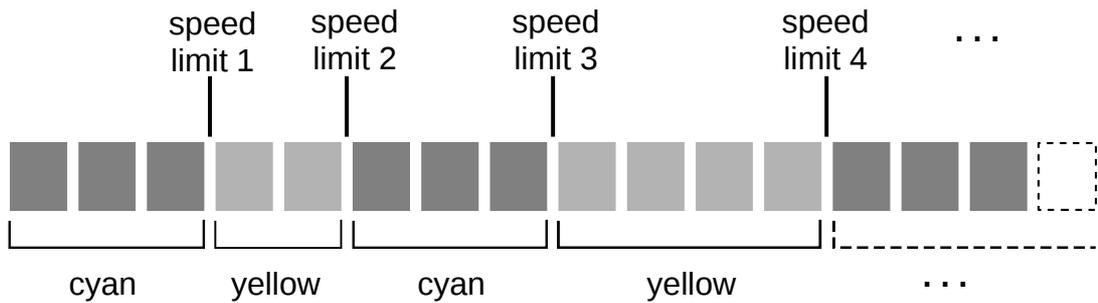


## Speed limits

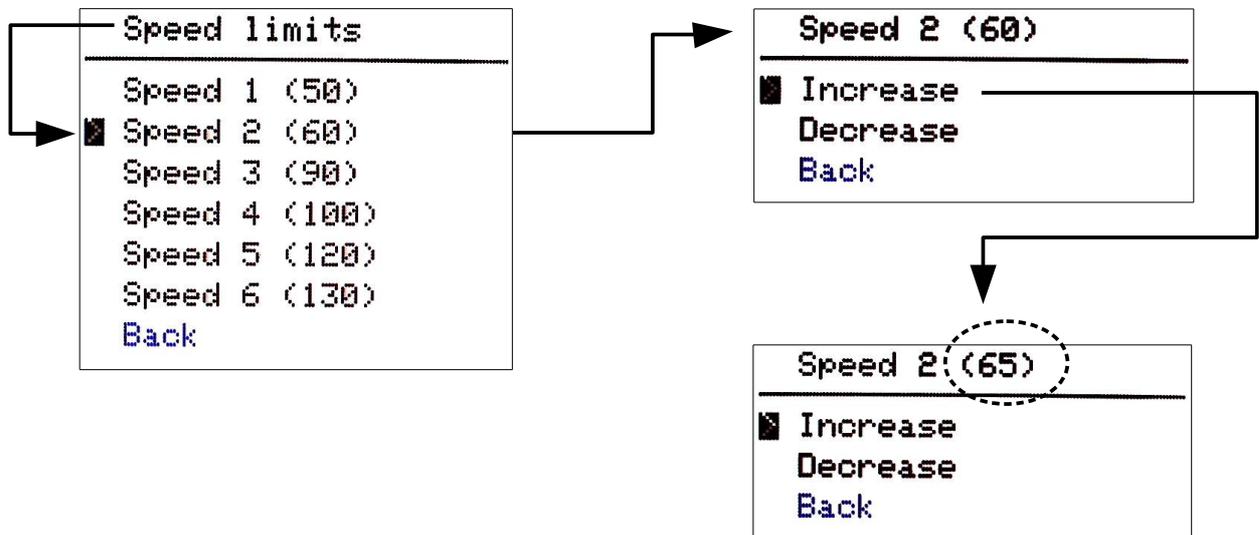
In origin the colored band on the top of the screen was designed to mark the most common speed limits existing on the roads. In this way you can take a quick look to know if you are above or below the current limit.

Anyway, you can use this menu to outline any of your preferred speed ranges.

You can set 6 values for 6 speed limits. Periscope will switch the color at any speed limit from cyan to yellow or vice versa, to outline the different ranges:



You can set the default values to the values that you like more by using the 'Speed limits' menu. In the example below the speed limit 2 is increased to 65.



Be aware that every bar of the indicator holds for 5 km/h when the speedometer is set to the 'Kmh' mode, or 5 Mph if you set it to the 'Mph' mode.



You should enter values in the right order (i.e. limit 1 lower than limit 2, limit 2 lower than limit 3 and so on). If not, results are unpredictable.

## Maintenance

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### Cleaning

Use only water and mild soap to remove dirt from the display screen. All other parts can be washed normally like any other part of the motorcycle.

### Fuse substitution

To extract the fuse use the tip of a screwdriver. After a little rotation, the cap will pop up. Use only fuses with following characteristics:

Type	Glass fuse – “fast blow” (or AGC)
Max current	1A
Max voltage	250V
Dimensions	5 x 20 mm (diameter x length)

## Appendix

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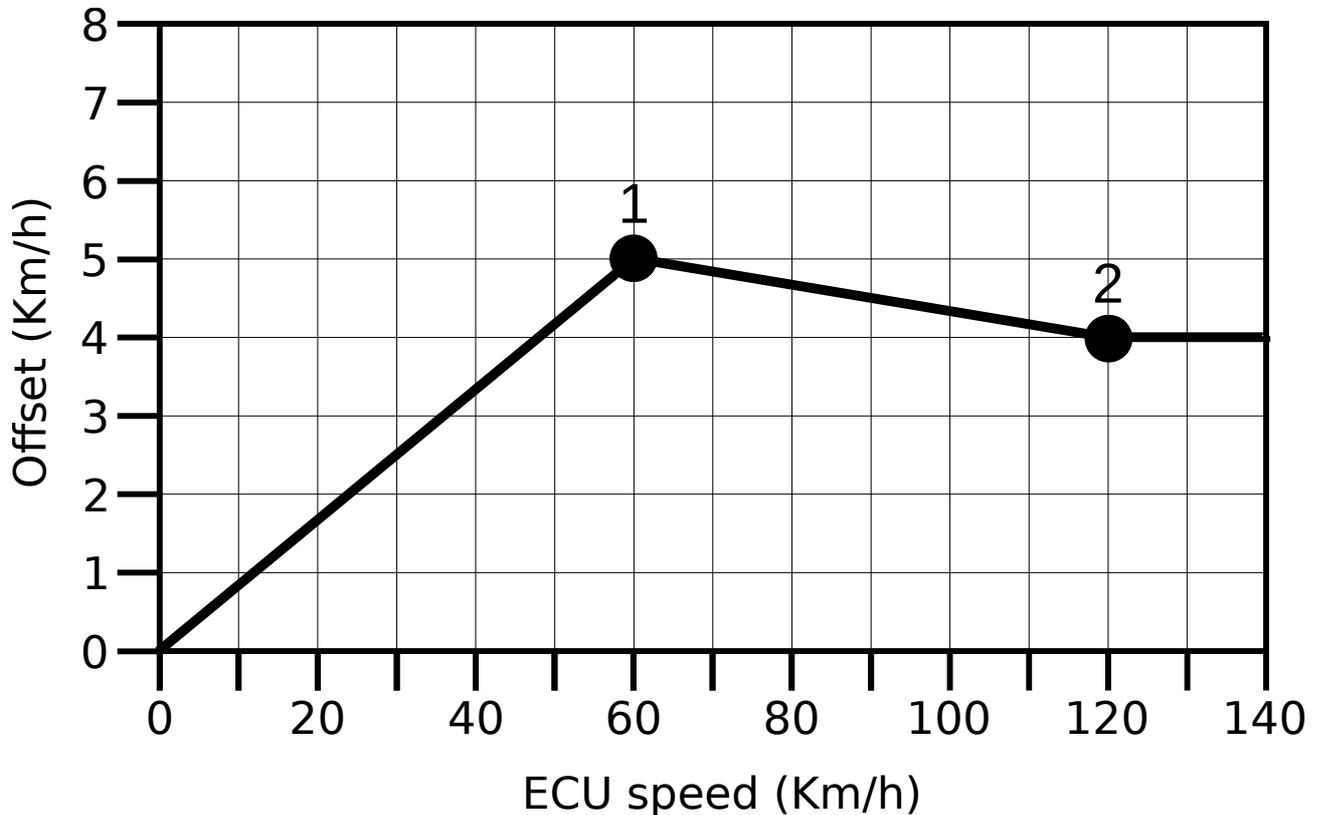
### List of default settings

Setting	Default value
Turn off light when the engine stops	YES
Turn on the light when clutch lever is pull-and-released.	YES
Maximum time the light can stay ON (seconds).	60
Indicator on Slot 1	Temperature
Indicator on Slot 2	RPM (numerical)
Speedometer mode	Km/h
Offset 1	5 (Km/h)
Offset 2	4 (Km/h)
Speed limit 1	50
Speed limit 2	60
Speed limit 3	90
Speed limit 4	100
Speed limit 5	120
Speed limit 6	130

## Tuning details

To calibrate the speed showed by the display Periscope uses the entered offset values to create a “calibration curve”. The curve represent the correction that must be summed to the value provided by the ECU to obtain the correct speed value.

The curve is calculated by interpolating the offsets 1 and 2 in a linear way, as depicted by the example diagram below (default settings are shown).



In other words, the offset

- grows linearly from 0 to the value of *Offset 1* (for speeds between 0 and 60 Km/h),
- decreases (or increases!) linearly until it reaches the value of *Offset 2* (for speeds between 60 and 120 km/h),
- stay constant at the value of *Offset 2* for all speeds greater than 120 Km/h

The resulting offset value is then added to the ECU speed to obtain the correct speed.

$$\text{Correct speed} = \text{ECU speed} + \text{Offset}$$

Please note that the same behaviour holds when the offsets are entered in Mph in place of Km/h. In this case the predefined offset speeds are 35 and 75 Mph for offsets 1 and 2 respectively.

Please note also that the values for offset 1 and 2 are independent. They can have any value, even zero.