User Manual

Periscope - Software Version 2.0
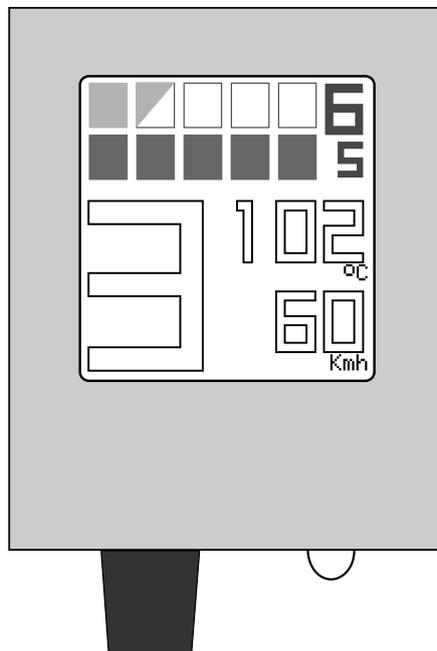
Thank you for purchasing your Periscope.

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

Table of Contents

Introduction

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 2.0
By Gimpo Garage
(build 38)

DECODER READY
DECODER CONNECTED
```
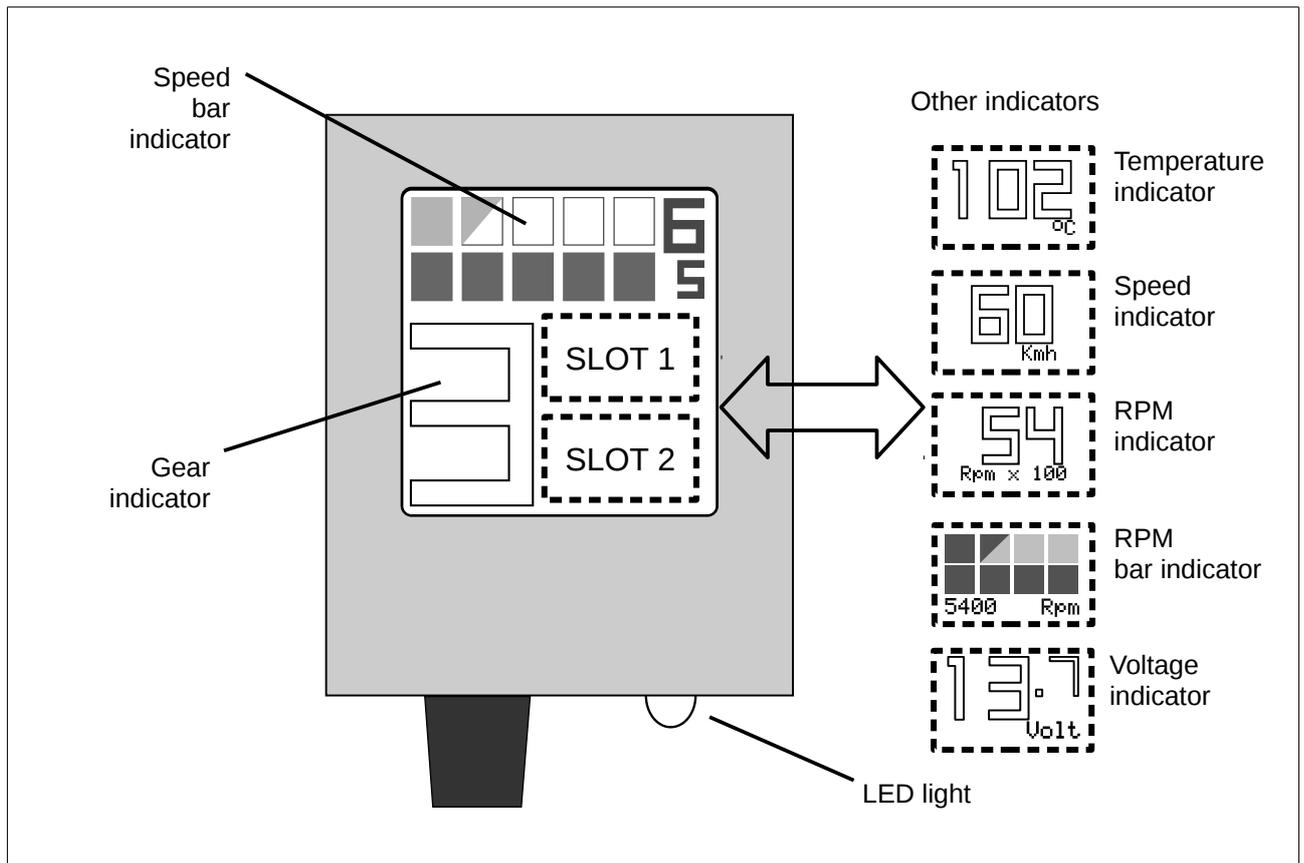
Otherwise, Periscope will show

- '`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,
- current battery voltage status.

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

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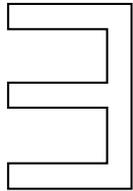
It shows the current engaged gear by calculating the ratio between the RPM of the engine and the current speed. Some instants (typically less than one second) can be necessary before the indicator show the correct value.
Possible values are listed in the table below.

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.

Speed bar indicator
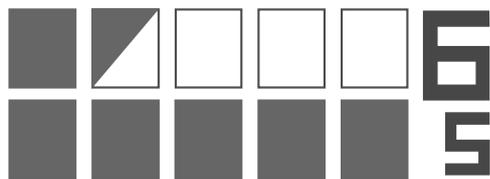
It shows the current speed in a graphical way.
It can be thought as a set of rows, vertically stacked one over the other.

Each row is composed of five bars. The bars gets colored as the speed of the motorcycle increases, the lower bar before the upper one.
When all bars are fully colored, the indicator switches up to the next couple of rows.

Every fully colored bar of the row indicates a speed of 10 Kmh/Mph, while an half-colored bar indicates a speed of 5 Kmh/Mph*.
On the right-side is reported the numerical value of the speed, rounded by 5 Kmh/Mph. It can be used as fast reference if your eyes get lost.

(*) Note: you can configure the Periscope to use a speed of 5 and 2.5 Kmh/Mph for every fully-colored and half-colored bar, respectively.

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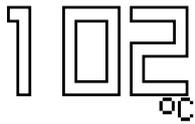
It shows the temperature of the engine as calculated by the ECU unit of the motorcycle. The digits will start blinking when

- the temperature is below the lower temperature threshold,
- the temperature is above the upper threshold.

Note: threshold values can be configured. See further in this manual.

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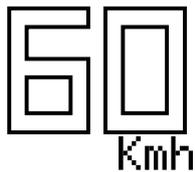
It shows the current speed as calculated by the ECU unit as a numerical value.
Note: the value can be tuned to be as closest as possible to the real speed value by using a reliable speedometer (e.g. a GPS device). See the 'Configuration' part of this manual in the following.

RPM indicator

Shows the current RPMs of the engine as a number. RPMs are divided by 100.

Battery voltage indicators
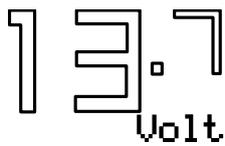
It shows the current voltage between the battery poles.

The indicator will starts blinking when the voltage goes below the threshold-value set.

Note: the threshold value can be configured, see further in this manual.

RPM bars indicator

It shows the current RPM value by using two little rows composed of four green bars.
As the engine RPMS increases the bars get colored. A full-colored bar stays for 1,000 RPM, an half-colored bar holds for 500 RPM.

The maximum value displayable is 8,000 RPM.

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, <u>both at the same time</u>,
4. hold for <u>around 3 seconds</u>,

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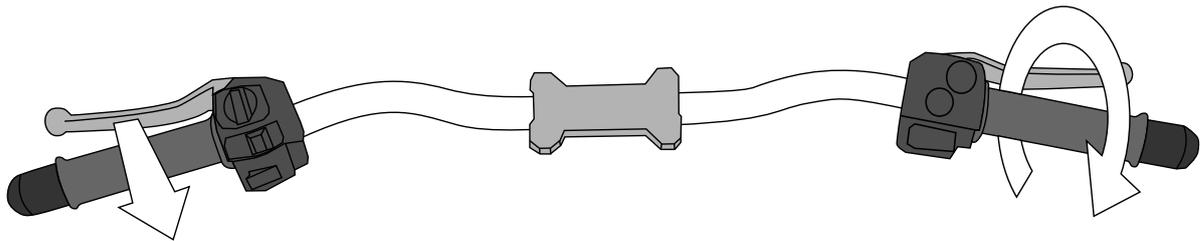
The main menu

All of the available actions to change the Periscope settings are arranged in menu and sub-menu, as depicted in the image below.

Cursor

> Periscope 2.0
>
> Stats
> Led light
> Speedo
> Slots
> Temperature
> Battery
> Exit
> Save & Exit
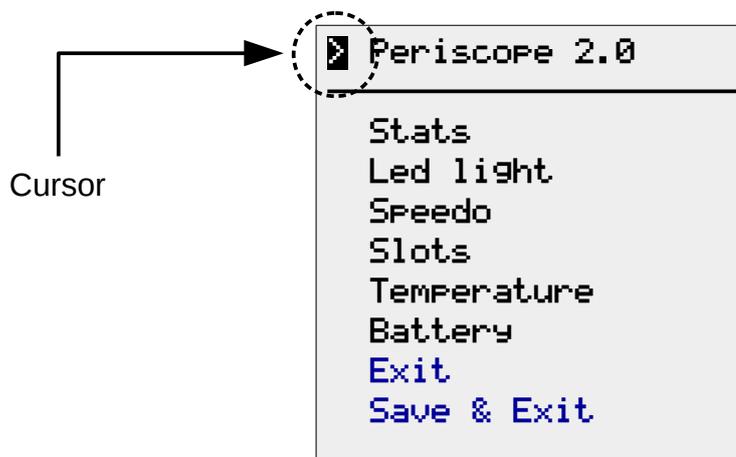
The square block on the left (cursor) indicates your current position in the menu.

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.
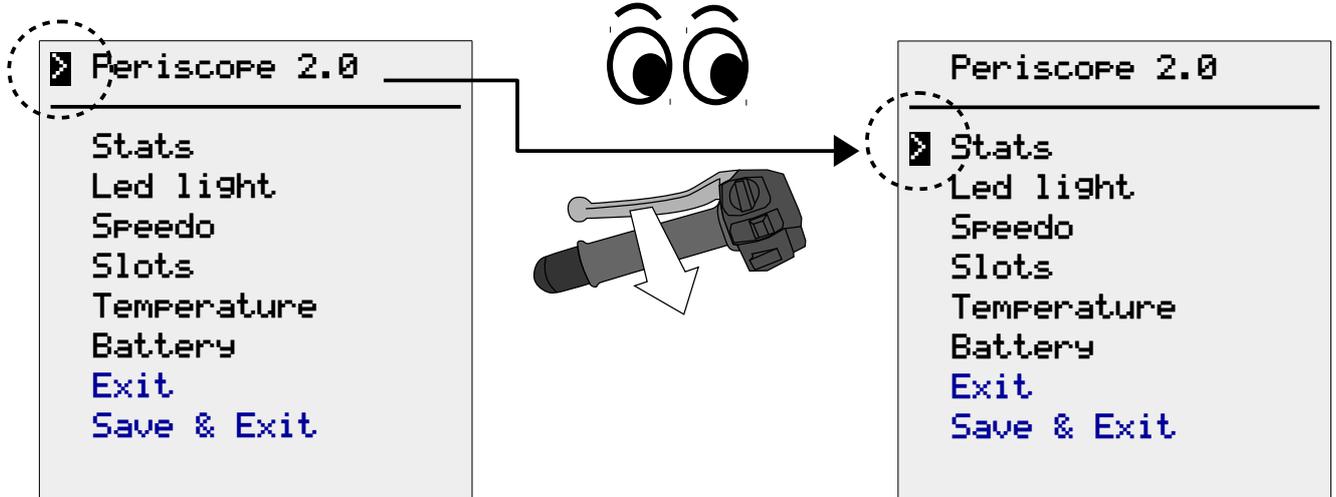
Instead, **to enter into the menu** (or to change a setting) simply rotate the throttle and then release it after a fraction of second.
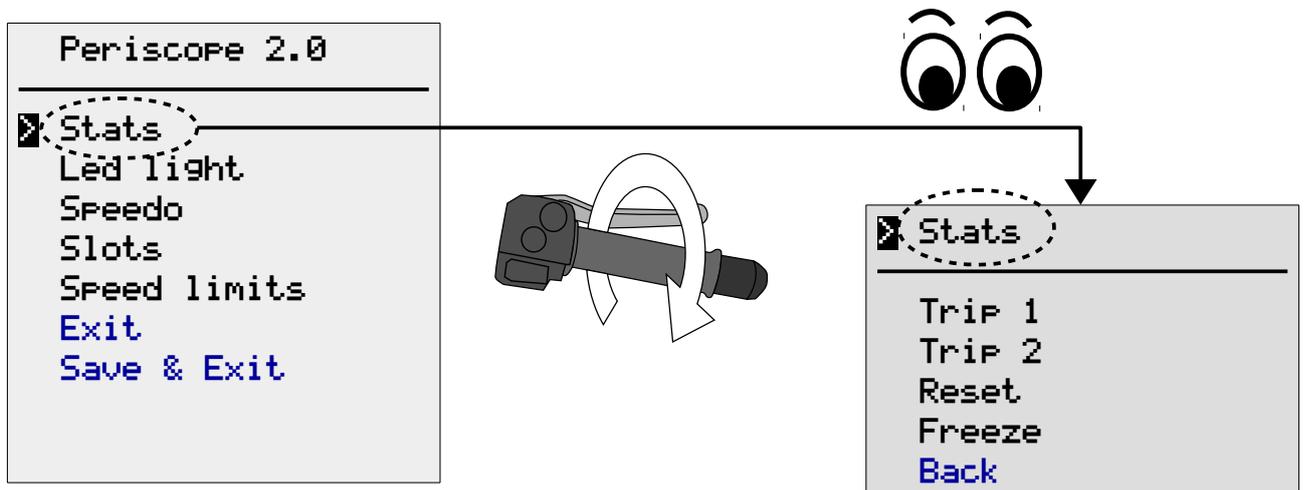
That is all you need to change the Periscope settings. Just move the cursor and select. Have fun!

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 perform that action with calm.
The same holds about the throttle rotation: you have to rotate it smoothly.
Note also that if you keep the lever pulled (or the throttle rotated), without releasing it, then nothing will happens 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 it 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:
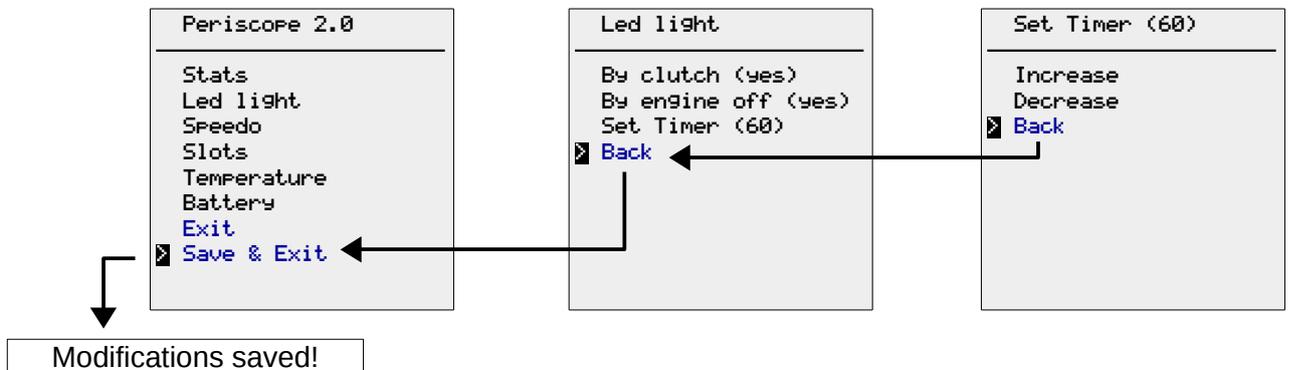
If you don't need to save your modifications then simply select 'Exit' command.

If you don't need to save any modification then simply switch the ignition key off!

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.

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
```
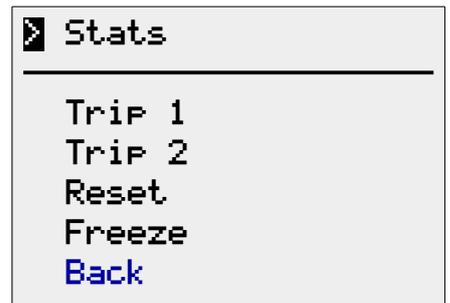
View statistics

By selecting "Trip 1" (or Trip 2) in the 'Stats' menu you will see the stored data during your trips with the motorcycle. Pull the clutch to return to the previous menu.

Here below an example:

How many hours and minutes the gear was keep engaged

Max RPM reached with the gear engaged

Number of times the gear was engaged

Max speed reached with the gear engaged

```
Trip 1

G Use   H:M    Rpm  Spd
1 97    1:54   32   31
2 84    2:35   36   46
3 55    2:36   55   62
4 34    1:48   61   80
5 31    2:12   74   127
6 19    1:24   69   143
  320   12:29
```

Gears

Total number of gear changes

Total time of travelling with a gear engaged
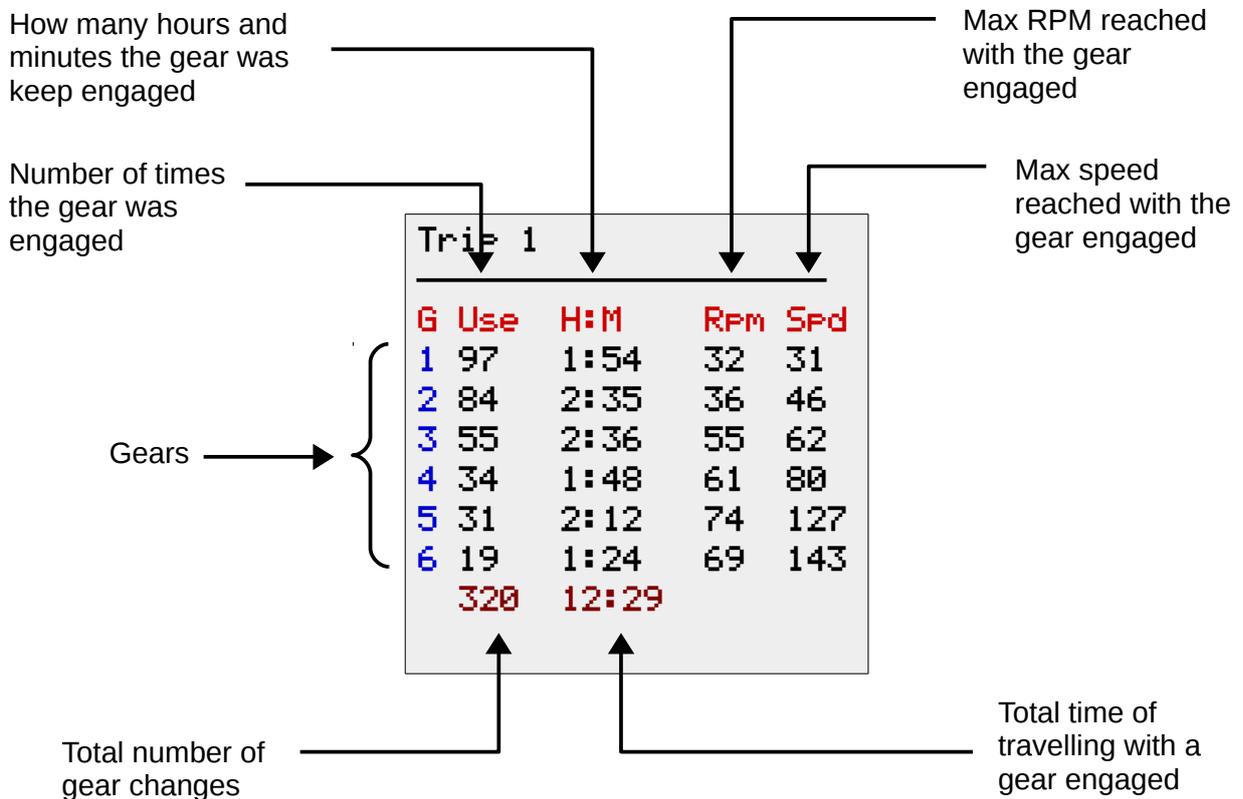
Reset statistics

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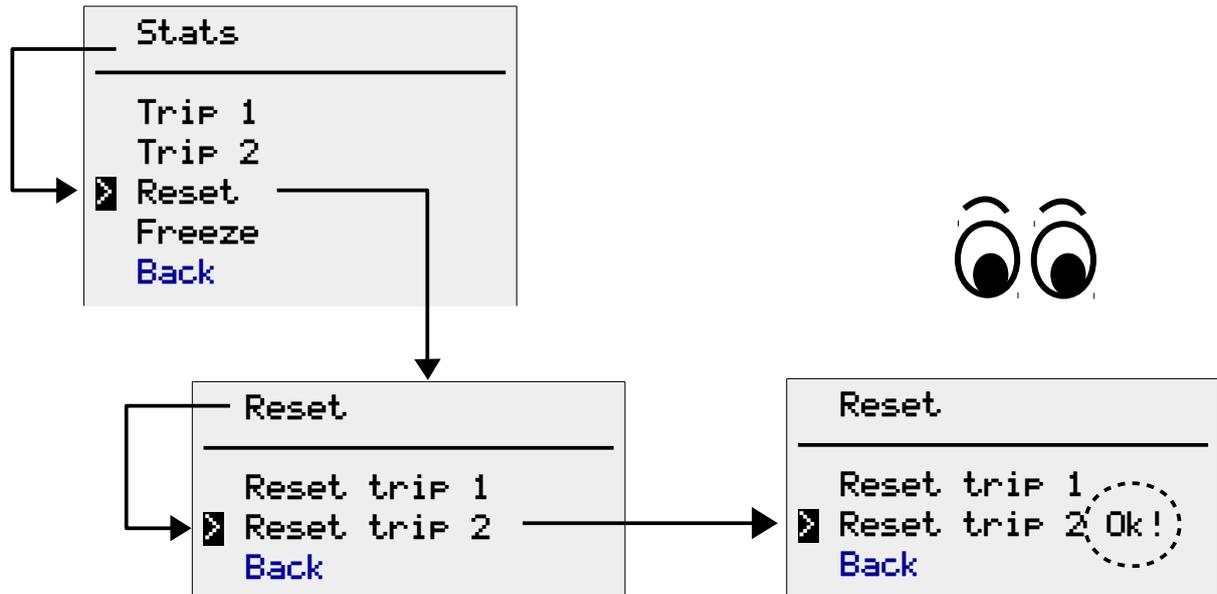
| | Note that the reset of statistics is executed <u>immediately</u>.
You don't need to go back to the main menu and select 'Save & Exit' |

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):
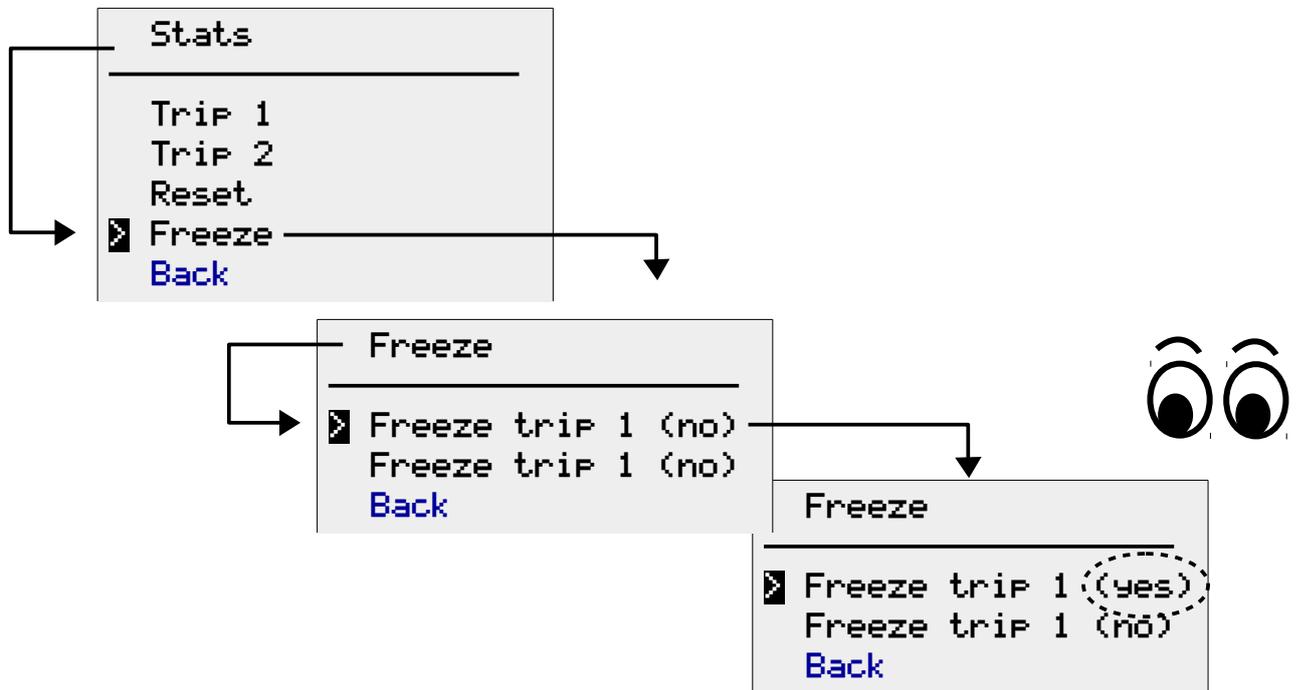
Led light

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).

Bike stopped, no gear engaged. Then the clutch lever is pulled

OFF

ON

Gear engaged or the clutch lever is pulled again
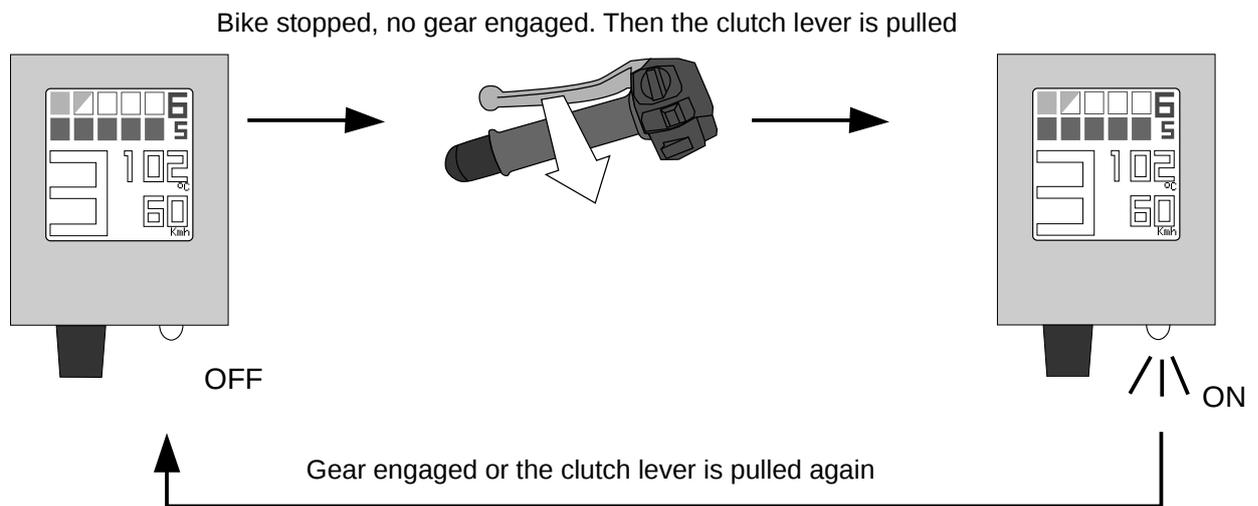
If you engage a gear, or the bike starts moving, the light will be automatically turned off.

LED light Settings

```
┌─── Periscope 2.0
│
│    Stats
├──▶ Led light ──────────────▶   ▶ Led Light
│    Speedo
│    Slots                          By clutch (yes)
│    Temperature                    By engine off (yes)
│    Battery                        Set Timer (60)
                                    Back
```
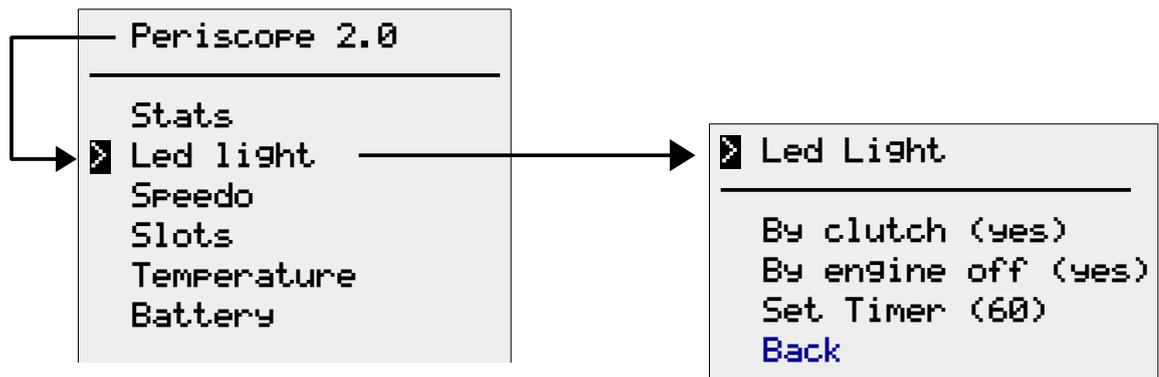
By using this menu you can decide to enable/disable the following options:

- to turn on/off manually the light by using the clutch lever,
- to turn on automatically the light every time after the engine is turned off (useful when parking at nighttime),
- to set the maximum amount of seconds the light will stay ON (useful to save the battery).

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:

```
┌─── Led Light                      Led Light
│
│    By clutch (yes)                By clutch (yes)
├──▶ By engine off (yes) ──────▶  ▶ By engine off (no)
│    Set Timer (60)                 Set Timer (60)
│    Back                           Back
```
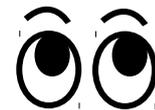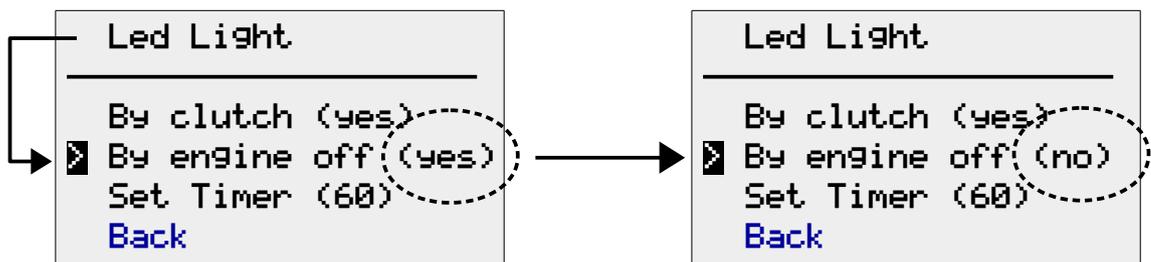
To set the maximum amount of time the light could stay on you can use the timer option.

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

```
 Led Light
 _____

 By clutch (yes)
 By engine off (yes)
▶ Set Timer (60)
 Back
```

```
 Set Timer (60)
 _____
▶ Increase
 Decrease
 Back
```

```
 Set Timer (65)
 _____
▶ Increase
 Decrease
 Back
```
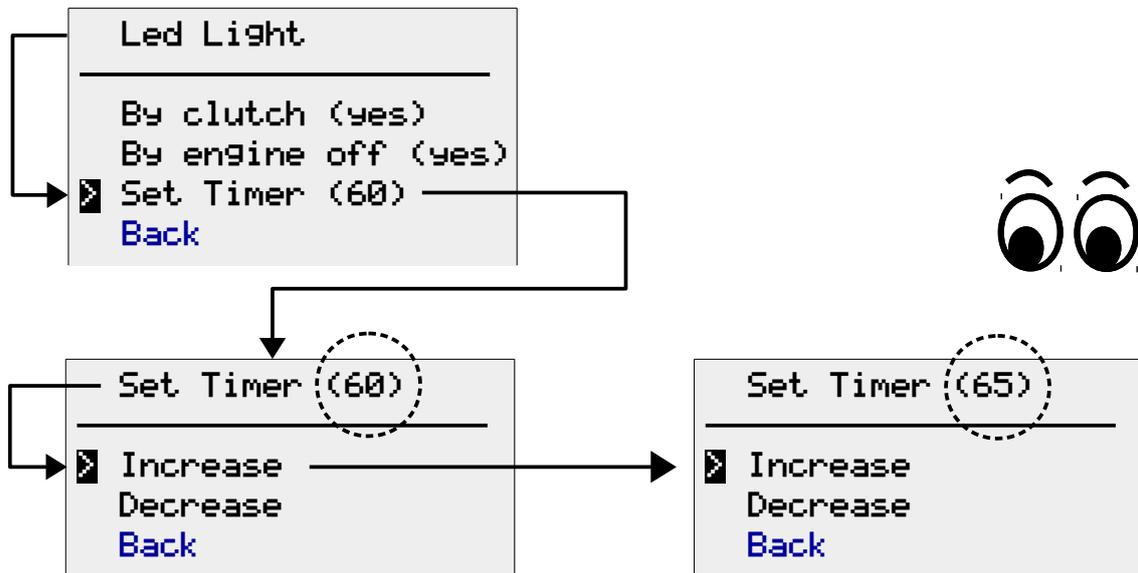
The timer can be useful to save the motorcycle battery if you forget your ignition key on the ON position (with the light ON too).

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

Speedometer

By accessing to this menu you can personalize the way the speed is managed, to meet your personal needs/preferences:

```
Periscope 2.0
─────────────
  Stats
  Led light
▶ Speedo
  Slots
  Temperature
  Battery
  Exit
  Save & Exit
```

```
▶ Speedo
─────────────
  Mode (Kmh)
  Bar range (10)
  Tuning
  Speed limits
  Show speed (yes)
  Back
```

> (i) A note for non-native English speakers: the term 'speedometer' is equivalent to 'tachometer', used in middle-European countries.
> On the other side, in Anglo-Saxon countries, 'tachometer' refers to the instrument measuring the revolutions per minute of an engine.

Change the speed measure unit

Changing the measure unit is a useful option when you're going across foreign countries. To do so, you have to toggle the value beside the 'Mode' option in the 'Speedo' menu.

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

```
Speedo
────────────
▶ Mode (Km/h)
  Bar range
  Tuning
```

```
Speedo
────────────
▶ Mode (Mph)
  Bar range
  Tuning
```

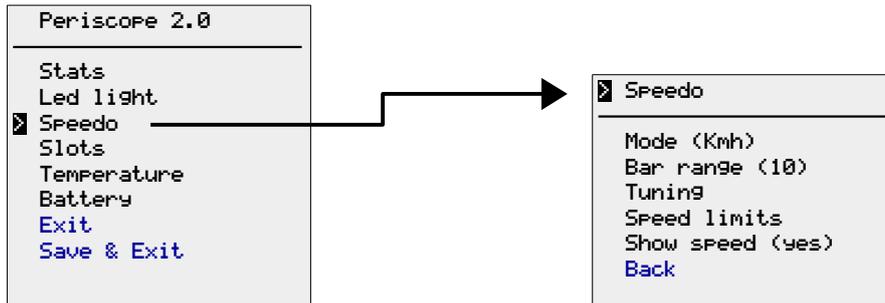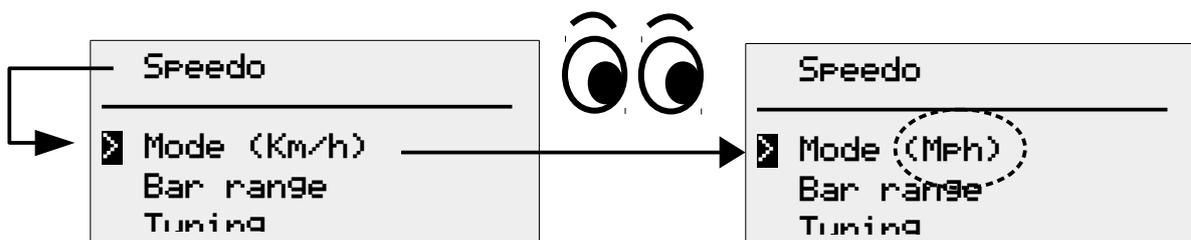> ⚠ Please note that if you commute from Kph to Mph every single band on the band speed indicator (see above in the manual) will now have a value of 10 or 5 Mph, not 10/5 Kmh!
> Obviously, the same symmetric case holds if you commute from Mph to Kmh.
>
> Note also that, if you have set, for example, a speed of limit 50 Kmh then the colored band will switch color at 50 Mph. Obviously, the symmetric case holds if you commute from Mph to Kmh.
>
> 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).

Change the bar-range of the visual speedometer.

By default, every colored bar indicates a speed of 10 Kmh (or Mph). If you prefer a more fine-grained indication of the speed, you can switch it to 5 Kmh (or Mph).

All you have to do is to commute the value in the "Bar range" menu item:

Speedometer tuning

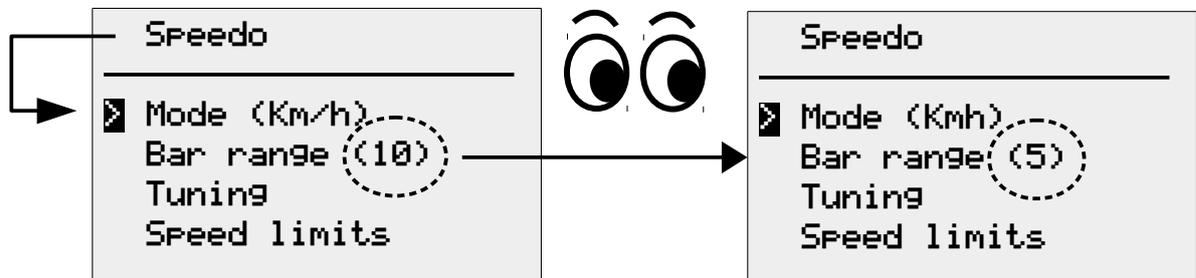⚠ Please note that the speed reported by Periscope has only help/suggestion purposes. The speed shown by the standard speedometer mounted by the motorcycle manufacturer is the only one that the driver should observe.
Gimpo Garage UG is not liable for any improper use of the device as well as about problems that can occur on public roads 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 30 seconds.

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 enter
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)

> **(i)** Default offset values (in km/h) 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; even a small difference in the length of the circumference can affect the speed calculation in a motorcycle.

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

To change an offset you have navigate to the 'Tuning' menu and move the cursor to the the offset that you want modify. A sub-menu will allows you to increase/decrease the current value.

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

```
 Speedo

 Mode (Km/h)
 Bar range (10)
▶ Tuning
```

```
 Tuning

 Mode (Km/h)
▶ Offset 1 (5 Km/h)
 Offset 2 (4 Km/h)
 Back
```

```
 Offset 1 (4 Km/h)

 Increase
▶ Decrease
 Back
```

```
 Offset 1 (5 Km/h)

 Increase
▶ Decrease
 Back
```
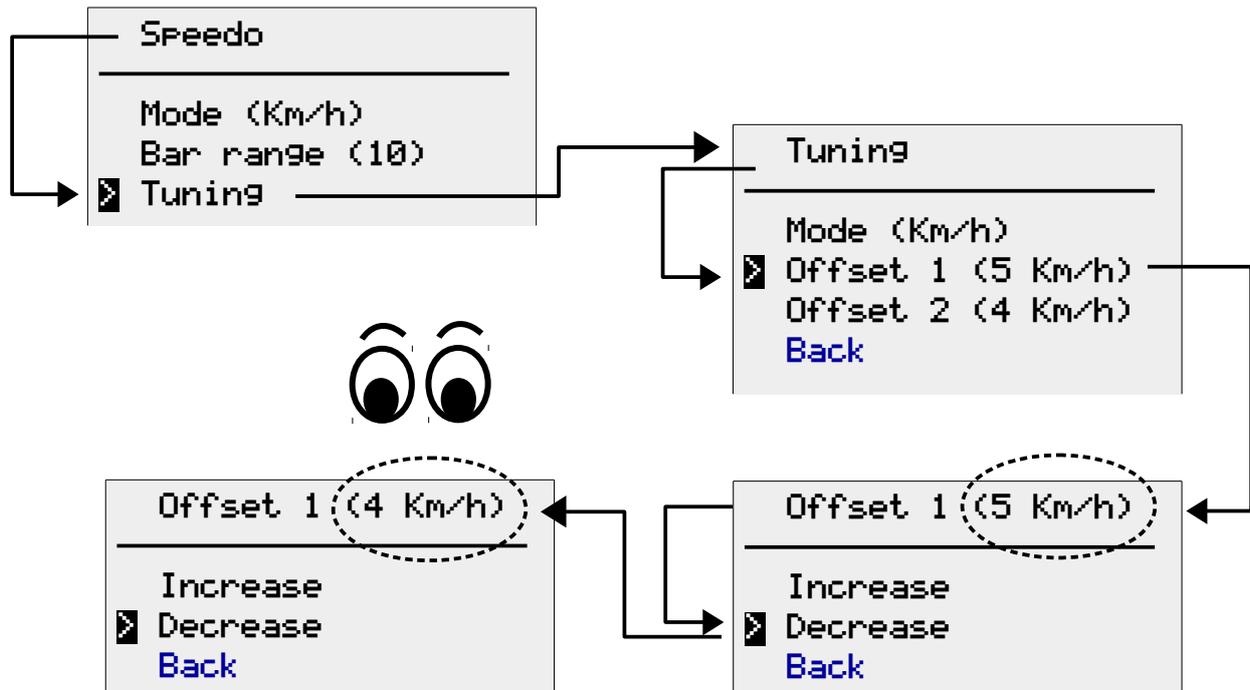
To set the right measure unit for your tuning values, you have to set properly the "mode" option.
To switch from Km/h to Mph (or vice versa) simply move the cursor over the 'Mode' option and select it.

This option has not to be confused with the one in the "Speedo" menu that have just visualization purposes.

> ⚠ BE SURE THAT THE RIGHT MEASURE UNIT IS SET BEFORE ENTERING TUNING VALUES!

Speed limits

Since the first version of the Periscope the speed limits 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.
Nevertheless, you can use the limits just to set the color distribution that you like more.

You can set 6 values for 6 speed limits. Periscope will switch/swap the color, from cyan to yellow (or vice-versa), when the speed reaches a limit:
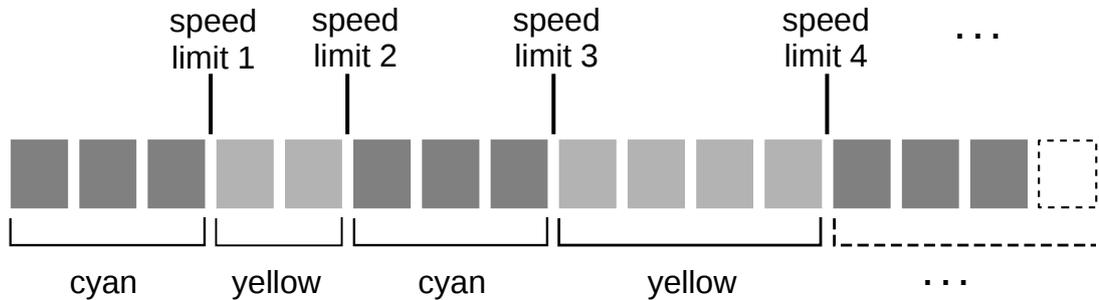
To change a limit, move the cursor on it and the select it. A sub-menu will allows you to increase or decrease the value.

In the example below, the speed limit 2 is increased to 65:
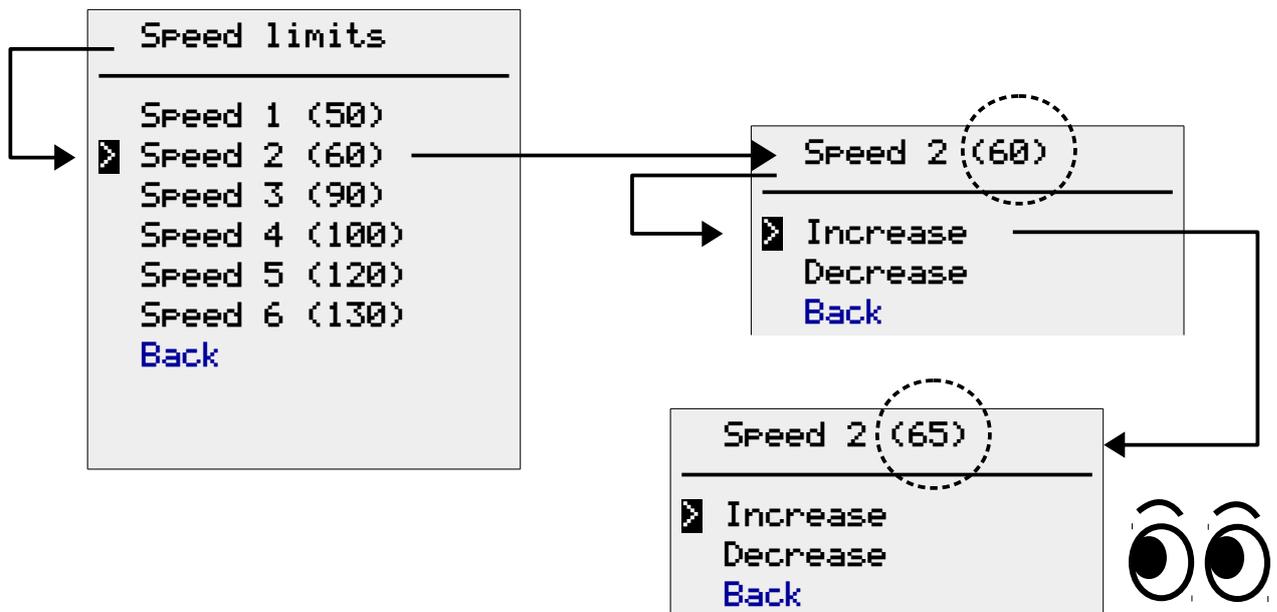
> ⚠ You should keep limits ordered! (I.e. limit 1 lower than limit 2; limit 2 lower than limit 3; and so on). If not, results are unpredictable.

⚠ You can configure the limits by increasing/decreasing them with steps pf 5 units. Nevertheless, you should note that if the "Bar range" option is set to 10 (as by default), the limit will be rounded to the next number multiple of 10.

In other words, if a limit of 45 is set then the color will be switched when the speed of 50 kmh/Mph is reached.

ⓘ ***I want all bars colored with cyan color at any speed, how I can achieve that?***

Easy, just set <u>all</u> of the limits to 200.
In this way the speedometer will never switch to yellow color. (Note: 200 is the maximum value displayed on the visual speedometer.)

What if I want all bars colored in yellow instead?

Easy, set the limit 1 to zero, and all the other ones to 200.
In this way the speedometer will switch from cyan to yellow immediately.

Show/hide the rounded speed beside the coloured bars

If you want, you can hide the rounded speed shown besides them, on the right-top corner of the screen. In this way the bars will be slightly larger and more visible.

To do so, just navigate to the "Show speed" menu and commute the value from *yes* to *no*:
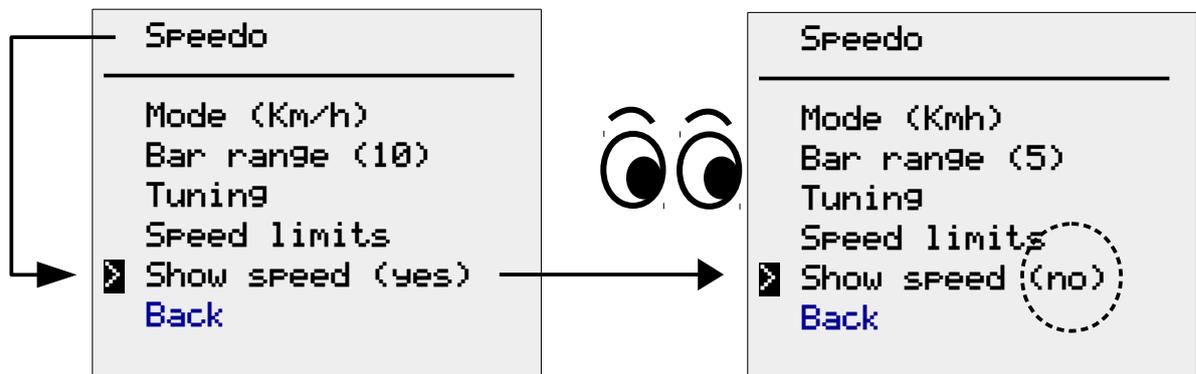
Configuring slot 1 and 2

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	RPM band indicator
battery	Numerical battery voltage

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

Settings for the temperature indicator

When displayed, the numerical indicator of the engine temperature will start flashing if the temperature is below a lower limit (cold motor) or if it raises above an upper limit (hot motor).

You can increase/decrease both thresholds (measured in Celsius degrees) by using the "Temperature" menu:

```
┌──────────────────────┐              ┌──────────────────────┐
│ Periscope 2.0        │              │ ▶ Temperature        │
│ ──────────────────── │              │ ──────────────────── │
│   Stats              │              │                      │
│   Led light          │              │   Cold (70)          │
│   Speedo             │              │   Hot (130)          │
│   Slots              │              │   Back               │
│ ▶ Temperature ───────┼──────────────▶                      │
│   Battery            │              └──────────────────────┘
│   Exit               │
│   Save & Exit        │
└──────────────────────┘
```
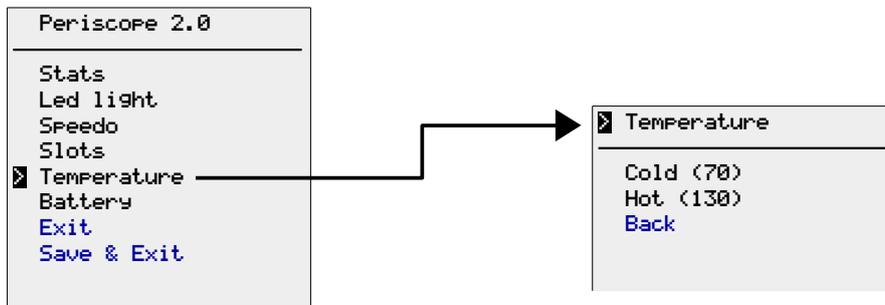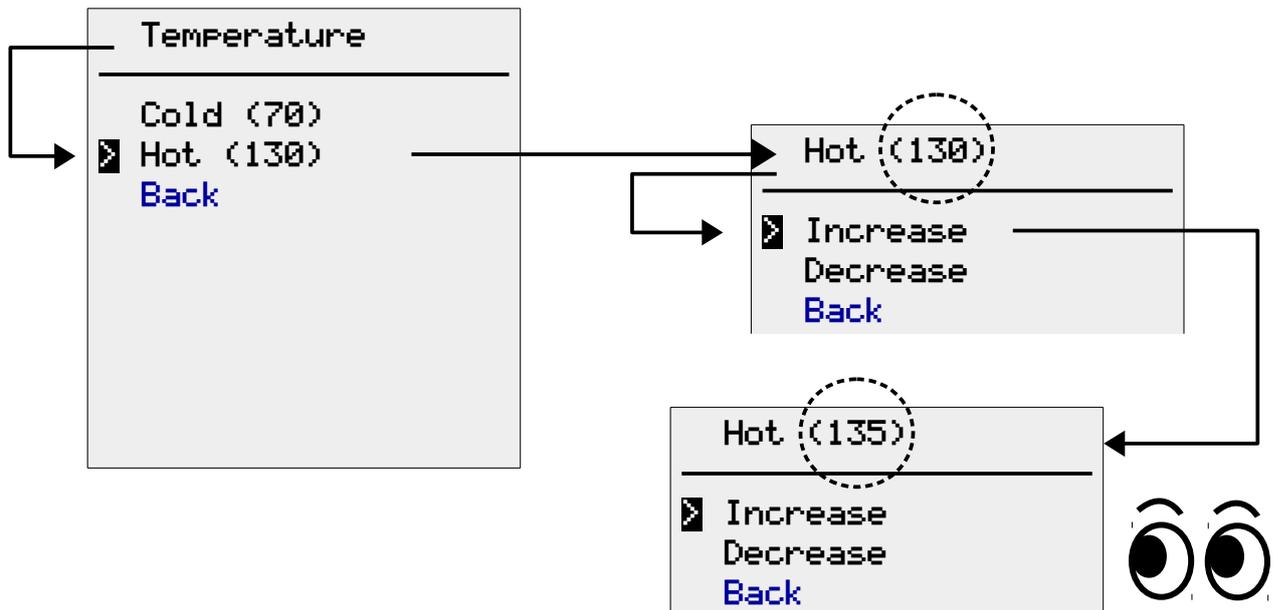
In the example below the upper threshold is increased by 5 Celsius degrees:

```
┌──────────────────────┐        ┌──────────────────────┐
│ Temperature          │        │ ▶ Hot (130)          │
│ ──────────────────── │        │ ──────────────────── │
│   Cold (70)          │        │ ▶ Increase ──────────┐
│ ▶ Hot (130) ─────────┼────────▶   Decrease          │
│   Back               │        │   Back               │
│                      │        └──────────────────────┘
│                      │        ┌──────────────────────┐
│                      │        │ Hot (135)            │
│                      │        │ ──────────────────── │
│                      │        │ ▶ Increase           │
│                      │        │   Decrease           │
│                      │        │   Back               │
└──────────────────────┘        └──────────────────────┘
```

Configuring the battery voltage indicator

The `Battery` menu offer options to configure the settings for the numerical voltage indicator:

```
Periscope 2.0
─────────────────
  Stats
  Led light
  Speedo
  Slots
  Temperature
▶ Battery
  Exit
  Save & Exit
```

```
▶ Battery
─────────────────
  Minimum (11.8)
  Offset (0.3)
  Check (yes)
  Alarm (yes)
  Back
```
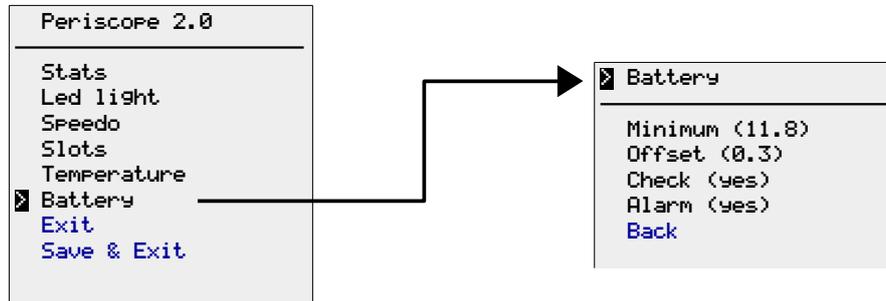
When displayed, the indicator will start flashing when the voltage level goes down the `Minimum` level. You can increase/decrease the level by moving the cursor over the item and selecting it.

The `Offset` setting is a parameter that you rarely will need to configure.
It's an amount of Volt indicating the difference between the voltage at the battery poles and the one reaching the ECU/Periscope.

> (i) The Periscope is not directly connected to the battery, so the picked voltage is always a little smaller than the real one. This well-know voltage-drop is due to the components adopted by the manufacturer to protect electric and electronics components (like fuses and diodes).
> It can happen that the manufacturers apply some modifications to the electric circuits for production reasons without documenting such changes.
>
> If you will see a difference between the voltage displayed by the Periscope and the one on the motorcycle dashboard, then all you have to do is to increase/decrease the offset value to compensate the difference

The `Check` and `Alarm` option are enabled when the voltage indicator is <u>not</u> visualized on slot 1 or 2. (I.e. the slots are configured to show some other information.)

If the `Check` is set to `yes` then the voltage indicator will pops out <u>on slot 2</u> when the dashboard turns on.
The indicator will remain visible until the engine is started.

The `Alarm` option is used to enable/disable the checking of the voltage during driving.
If the voltage goes below the `Minimum` threshold then the voltage indicator will pops out <u>on slot 2</u> and it will start flashing.

The `minimum` value of the voltage is used to warn you about a battery malfunction. Possible reasons for that could be:

- the battery is damaged or too old to retain the charge,
- the generator of the motorcycle is damaged and it is no more recharging the battery.

If you will see a battery voltage below 12 Volt, after turning the ignition-key on, then you can be sure that there is some problem with your battery (regardless of the type: lithium, AGM, lead-acid, etc.)

Also note that, after starting the engine, the voltage should raise to around 13.7-14 Volt to allow the recharge of the battery. If this does not happens then the generator of the motorcycle is probably damaged. In this case, there is a big risk that you will not be able to start again the engine after one stop.

Maintenance

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 pops 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

List of default settings

Setting	Default value
Turn on 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
Speedometer tuning mode	Km/h
Offset 1	5 (Km/h)
Offset 2	4 (Km/h)
Speed limit 1	70
Speed limit 2	100
Speed limit 3	130
Speed limit 4	150
Speed limit 5	200
Speed limit 6	200
Temperature – minimum (°C)	70
Temperature – maximum (°C)	130
Battery – minimum (Volt)	11.8
Battery – offset (Volt)	0.3
Battery check	YES
Battery alarm	YES
Bar range (Kmh / Mph)	10
Show rounded speed	YES

Tuning details

To calibrate the speed showed by the display Periscope uses the entered offset values to create a "correction curve". It represents the value to be summed to the one 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).
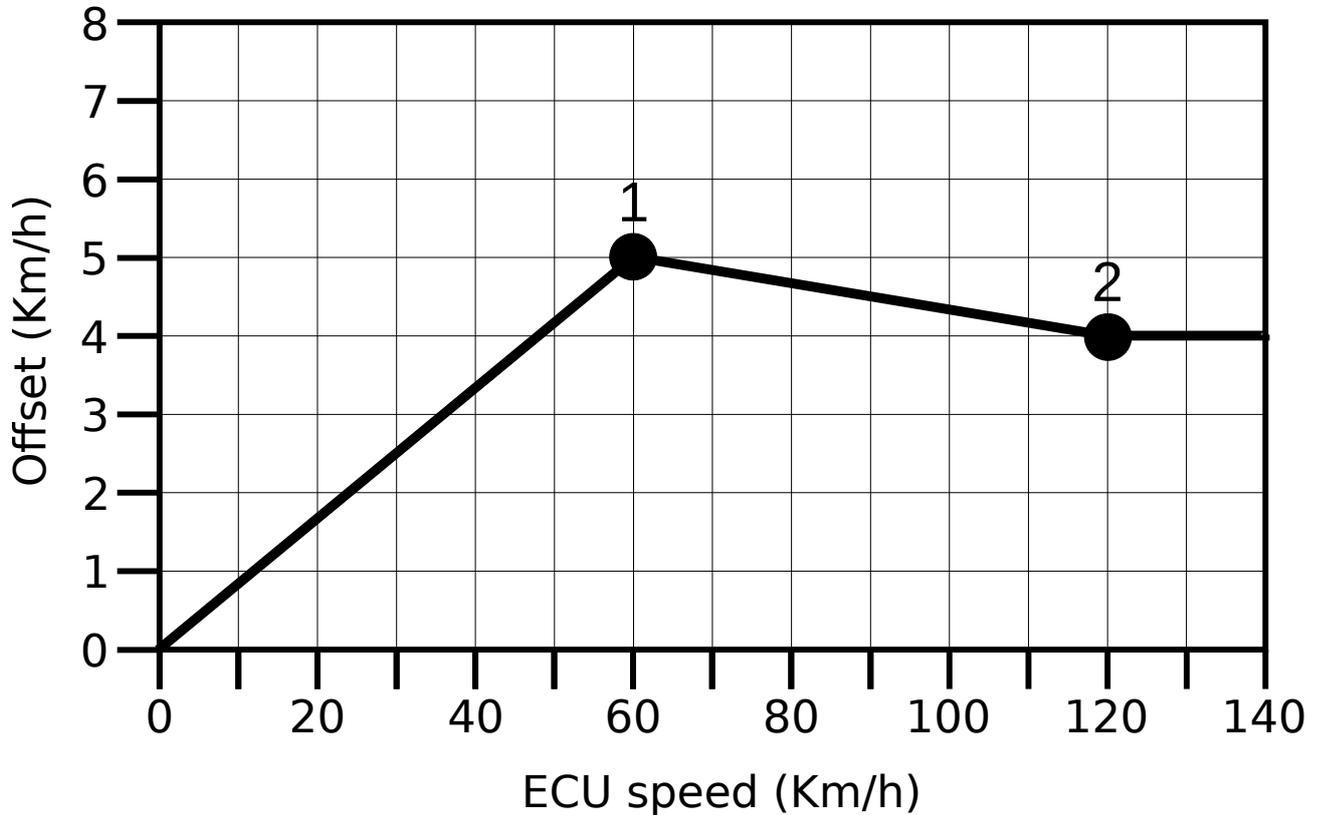
In the example, the offset

- grows linearly from 0 to the value of *Offset 1* (for speeds between 0 and 60 Km/h),
- decreases 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.

Correct speed = ECU speed + 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.