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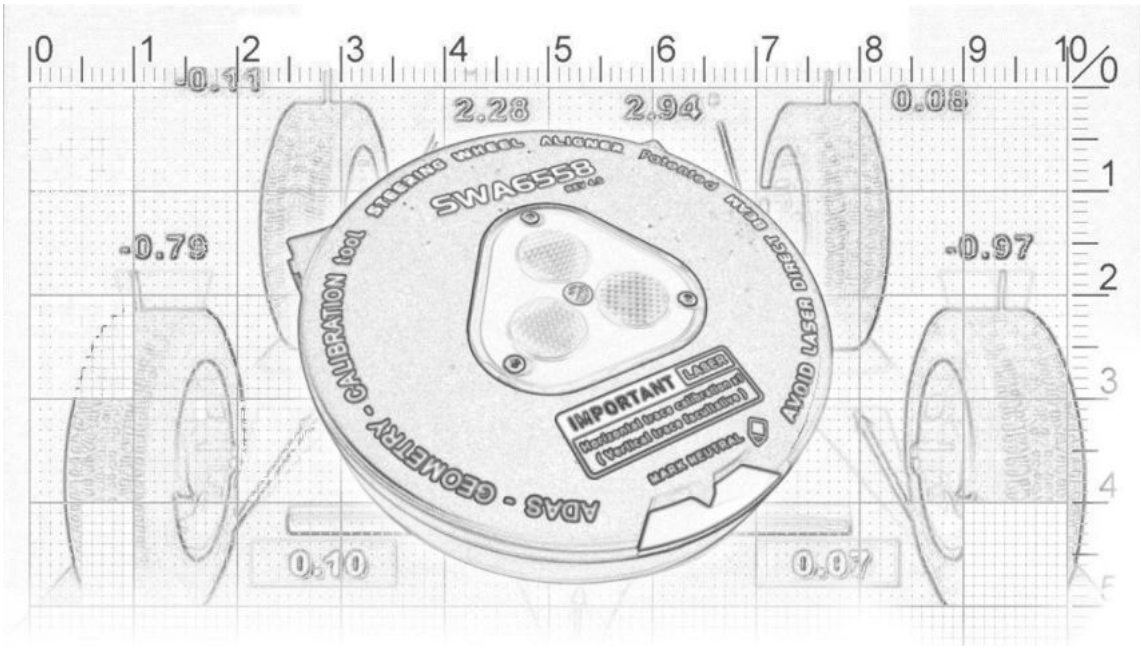
Steering wheel aligner SWA 6558

GEOMETRY / ADAS & SAS *(standalone model)*



1) Environment : geometry operation description (reminder)

2) Product stage / step in the geometry operation

3) Human intervention in the aftermath of operations

4) Technical product solution

5) Product details

6) Tool assembly after receipt – related manipulations

7) Summary technical data

PYPE™ Industry

1) Environment : geometry operation description (reminder)

The geometry adjustment operation consists in adjusting / controlling the components of the undercarriage of a vehicle following a path defect and / or observed dynamic behavior

This operation is either mandated by expertise, within the framework of an damaged and repaired vehicle, or by customer complaint, or by simple mechanical "logic" during the repair of a vehicle (for example following a mechanical operation which requires the removal / refitting of the engine cradle) or else related to the replacement of certain worn parts such as the ball joints, axial ball joints (defect noted by a technical control typically)

A poorly adjusted or out of alignment undercarriage means random vehicle trajectory, degraded road holding, deviating braking, premature wear of the tires, excessive slip sometimes leading to a counter visit to technical control. Some isolated cases have also shown that deactivation of the ESP system may be due to a heading drift.

This undercarriage adjustment is performed in the workshop and requires specific equipment with a human operator trained in the operation but also in the equipment used

2) Product stage in the geometry operation

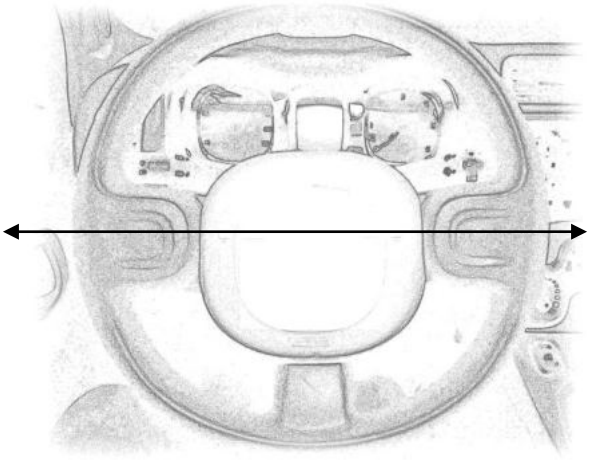
The vehicle is placed on a lift, typically a scissor bridge where the vehicle rests on its wheels. This bridge is fitted with free plates for the wheel support points so as not to apply any stress to the rolling elements , neither axial nor lateral

There are some preliminary steps specific to the vehicle which will not be described here such as checking the pressure and condition of the tires, checking the loads transported unevenly distributed in the vehicle

The operator then installs the specific geo equipment on the vehicle and / or on the scissor bridge in order to start the work.

We do not describe the detailed points of the operation because each piece of geometry equipment has its implementation methods, but among all these methods, **one is common to all cases.**

Indeed, after the pivot angle readings, flushing, deviations ..., before making the necessary adjustments resulting from these preliminary measurements, the operator must keep the steering wheel of the vehicle in a very precise position, it is at this stage that the geo pointer product intervenes.



It is imperative to adjust a right steering wheel position (visually, the angle of rotation given to the steering wheel must be that of a steering wheel which maintains the perfectly straight trajectory of the vehicle on a straight line road, i.e. say 0 degrees of angle)

Lock this position with the tool supplied by the supplier of the geometry device .

3) Human intervention in the aftermath of operations

Like all workshop interventions, even using machines, tools, instruments, there is human intervention to put these tools in place or even interpret the results given by these tools. Here in our running gear adjustment chain, we are not going to list all the steps where the operator must operate.

On the other hand, he must pay particular attention to a crucial point which determines the whole continuation of operations, all the "correct" continuation of operations because at the end of the work, during the dynamic test of the vehicle, if an anomaly is noted (and it is not that rare), one could always ask the question: "was the steering wheel really straight".

These tests failed due to a poorly positioned steering wheel at the start of the global geometry operation represents 5 to 7% of cases .

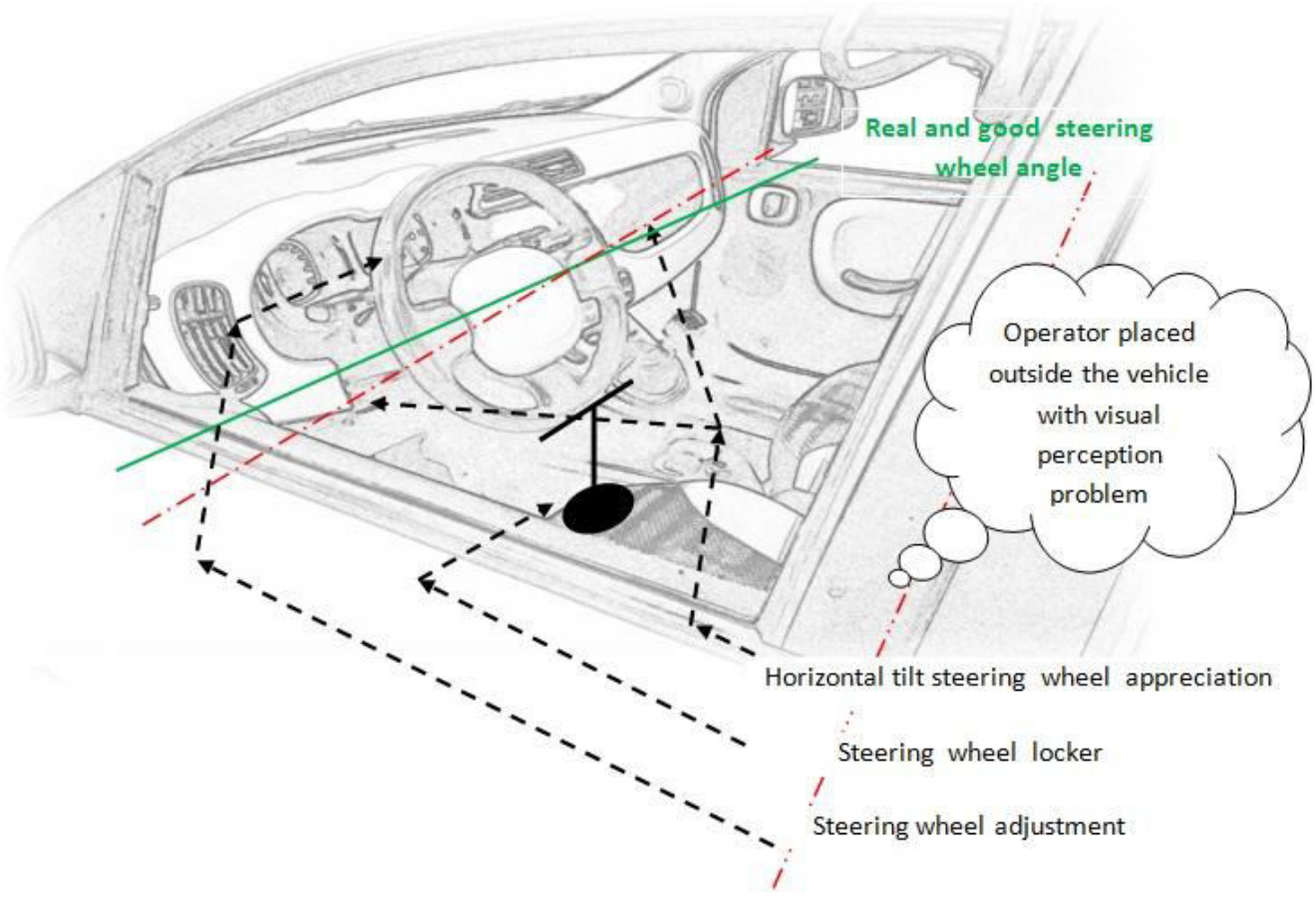
Before even calling into question the other stages of the operation, **the laser system definitively dismisses this hypothesis** all the more since - before removing the steering wheel lock **at the end of operations - it is still possible to check the accuracy of the position given initially .**Indeed, it also remains possible that by exerting the mechanical forces necessary for tightening the chassis adjustment members, despite the steering wheel lock, a minimal rotation of the steering wheel could have occurred where the operator could not notice it or will not even suspect it.

The direct consequence of a steering wheel that is poorly positioned from the start or that may have moved during the geometry operation leads to a failure of the road test with inevitable consequences:

Let's go back to the right-hand steering wheel positioning and the use of the wheel lock where, moreover, there is no machine or mechanical device that could guide the operator in this task. The operation therefore results from an approximation and variable depending on the operator. In addition, the progress of this cannot be carried out in place and place in the driver's position seat because the steering wheel lock, once placed will prevent the operator to get out of the vehicle, or at least to get out of it but so delicately that it risks varying the position of the steering wheel that it has just adjusted.

So, commonly practiced in the workshop, it is agreed that this adjustment and fitting operation of the steering wheel lock is done from the outside of the vehicle, either with the door open or by the door with the driver's window down. **In all cases, it is impossible for the operator to be facing the steering wheel .**

Diagram of the visual parallax error :



4) Technical product solution

By functioning of the human brain, the visual perception is clearly degraded as soon as there are effects of perspectives, overlays or misalignments because our brain will try to reconstitute a three-dimensional image visually acceptable of the whole but which will not be reality .

In this right-hand steering positioning step, the operator intervenes from the outside or at best through the vehicle door threshold (door open), a fortiori this residual interpretation error. Even if he tries to get rid of it by contorting, objectively, he will never find the position of the driver seated in his seat, occupying the natural driving position, facing the driving position. It will therefore commit a steering wheel positioning error

Remember that the entire operation of adjusting the undercarriage of the vehicle is based on the correct steering position

The product provides the solution to the above mentioned problem:

It is an aid to the exact positioning of the steering wheel.

Its novelty consists in producing a light effect materialized by a luminous cross projected on the target surface to initially visualize a horizontal virtual line in the passenger compartment

To increase the efficiency of the system, this cross is produced by a laser which points at the target whatever its material or color (including black) and whatever its shape, flat or complex. It constitutes a real light alignment in the passenger compartment and crosses it right through and through the steering wheel (the prior difference between our system faced to all of other systems : leveling). **By projection made on surfaces**, even viewed from the outside, there can **no longer be any problem of visual interpretation and no parallax error.**

Also, to perfect the use, in addition to the properties of the laser beam, the system is capable of illuminating the area around the target in order to allow the user to effectively visualize the nearby environment in which he must operate.

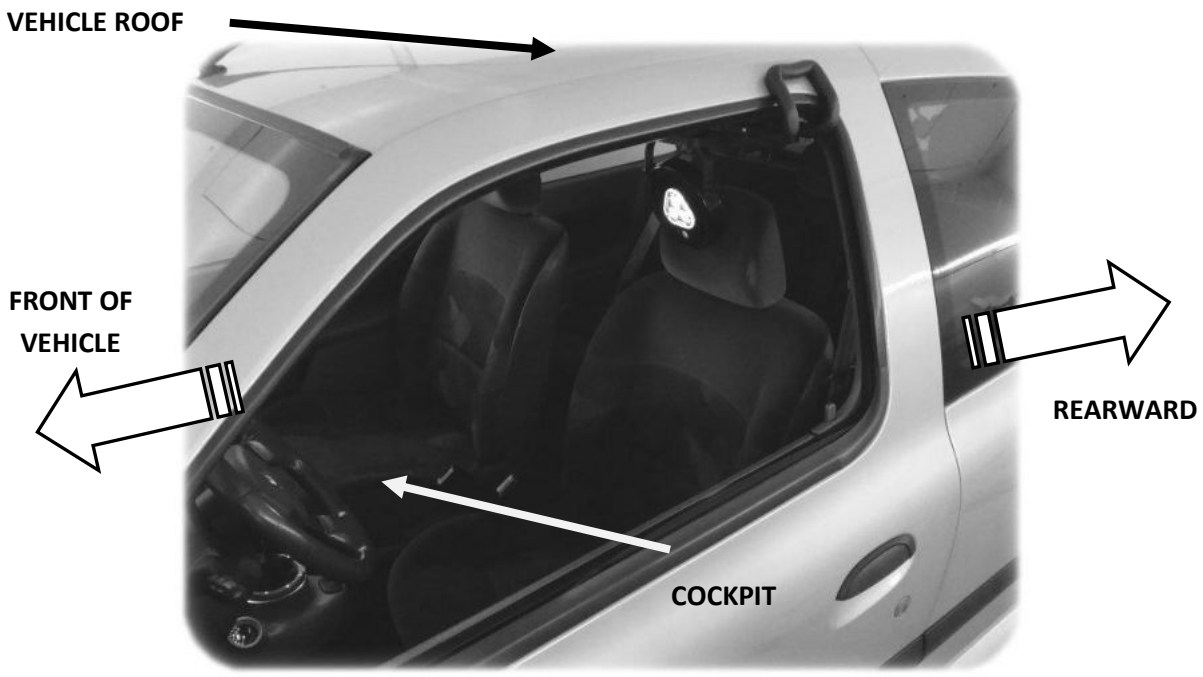
5) Product detail

Excluding the laser level principle which ensures the function, the new product consists of :

- a) Maintain the pointing device in the vehicle with recommended and optimal placement
- b) Generate passenger compartment light flux as well as laser flux)
- c) Ensure the possibility adjusting beam horizontally (by rotation of the pointer)
- d) Propose a height adjustment of the beam in the passenger compartment (tilt of the device)
- e) Move the target area in the passenger compartment towards the steering wheel

a) Maintain the pointing device in the vehicle with recommended and optimal placement :

The best possible placement is that of holding from the roof of the car through the opening of vehicle because they are perfectly symmetrical and guarantee a positioning base perfectly parallel to the dashboard. The retracted position of the system allows (towards rear of vehicle), helps on the opening angle of the laser lens, to project a light trace whose width then becomes maximum and covers the entire width of the dashboard. The sliding roof bar is a self-tightening telescopic bar which clings to the structure of the vehicle



Placement recommandation

It is preferable to set up the system from outside the vehicle having previously lowered the openings on the driver and passenger sides. The door corners are, by construction, typically perfectly symmetrical points, they ensure the best possible positioning of the tool. In the case of certain 3-door vehicles, the corner of the door jambs being more located in the central part of the vehicle, it may be necessary to move the seats back to allow the tool to move / or having the maximum amplitude for laser light spread .

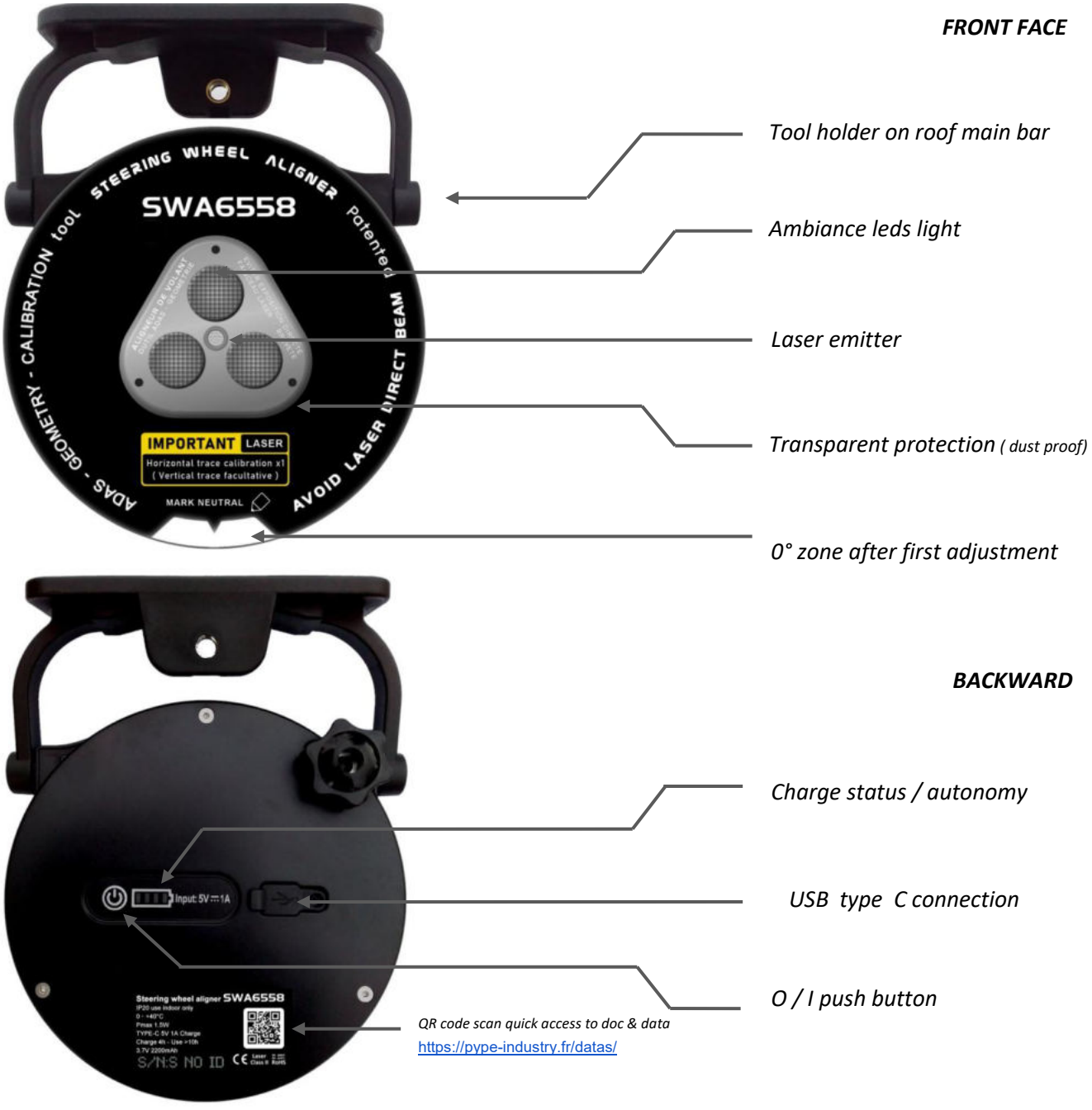
IMPLEMENTATION OF THE WHOLE GEOMETRY DEVICEs / TYPICAL PROCEDURE

1) Place and immobilize the vehicle on the bridge *(including free turntables plates under concerned wheels)* , open the driver and passenger windows before leaving the vehicle .
2) Set up all of equipment of geometry device *(cells …)*
3) If the geometry equipment has veiled wheels controller / checker , carry out the operation of revealing the wheels, then refit the vehicle and check again its immobilization on the bridge
4) Place the brake pedal press and close vehicle door to avoid obstructing the beams for the rest of the steps .
5) Continue the operations requested by the geo device *(measurement of angles …)* , in particular by manipulating the steering wheel by the side of the vehicle passing the arm through the window .
6) Always closed doors, through the driver's side window, pass the steering wheel aligner by positioning its auto clamps on the upper right and left amounts of the vehicle.
7) Proceed to steering wheel alignment with **aligner tool** and place the steering wheel locker .
8) Continue and complete the operations asked as typical geometry method requires
9) At the end of operation , recheck the exact position and / or position initially given to steering wheel by using laser still placed and activated .
10) Remove and replace all of the equipment *(not forgetting to put back in charge electrical devices used !)* and carry out the vehicle test.

System composition :

b) Generate cockpit light flux as well as laser flux)

It is a mono-bloc, autonomous and rechargeable system which illuminates the area towards which it simultaneously projects a laser trace forming a cross .
The laser cross is used to position the steering wheel . The lighting provided by 3 LEDs makes it possible to properly illuminate the work are it the ambient lighting at the workshop is not sufficient .



c) Ensure the possibility adjusting beam horizontally (by rotation of the pointer)

The installation of sliding roof bar according to the manipulation described above implies that the laser line projected on the passenger compartment will be perfectly horizontal since the anchor points to the roof are perfectly symmetrical, the case being true for the vast majority cars .

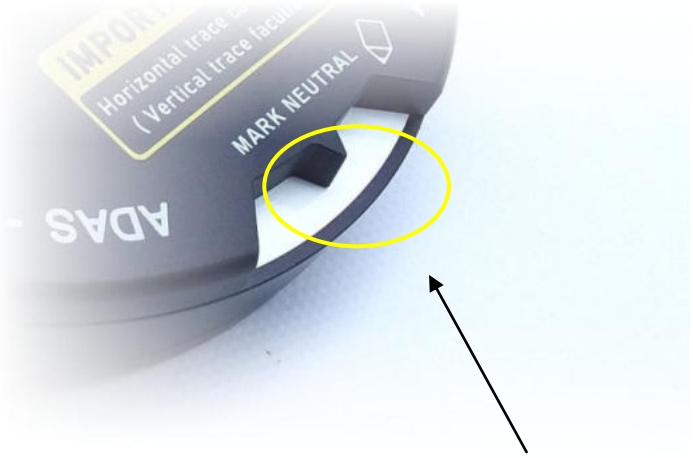
However, the system still offers a possibility of readjustment (+/- 10 degrees), which is provided by tool holder . It responds to the following cases :

- human intervention with an approximate placement of the device on the vehicle
- the impossibility of placing not the device with the doors closed and the windows open according to the recommendation, but the device on the frame of the door frame – doors smoothly opened - because the opening of the windows does not allow the procedure to be applied . These are very rare situations and apply to the following cases :
    - Vehicles fitted with air deflectors
    - Vehicles equipped with lateral blackout whose thickness of the mechanism makes it impossible to correctly install the roof ruler. Typical example: camping car
    - Cars placed on body car repair shop : when one of door is on painting

In this specific case, the sliding roof bar is often positioned with doors half-opened , in particular taking hold catching of the door seal and constitutes a flexible positioning point, therefore less "reliable" .. hence the advantage of the possibility of line adjustment

However, according to we are in most cases with standard vehicles where the attachment method described above applies (5-a), **in accordance with the recommendation for setting up the tool**, it is possible to leave the pointer rotation adjustment into **tool holder on neutral position** (see below), the projected **laser beam is then horizontal** .

To keep this setting, a toolless screw on the back of tool holder allows you to block the rotation of the pointer in it .



Mark 0° position after the first tool adjustment

Locking wheel *(Toolless screw) after first / initial calibration – see P10*

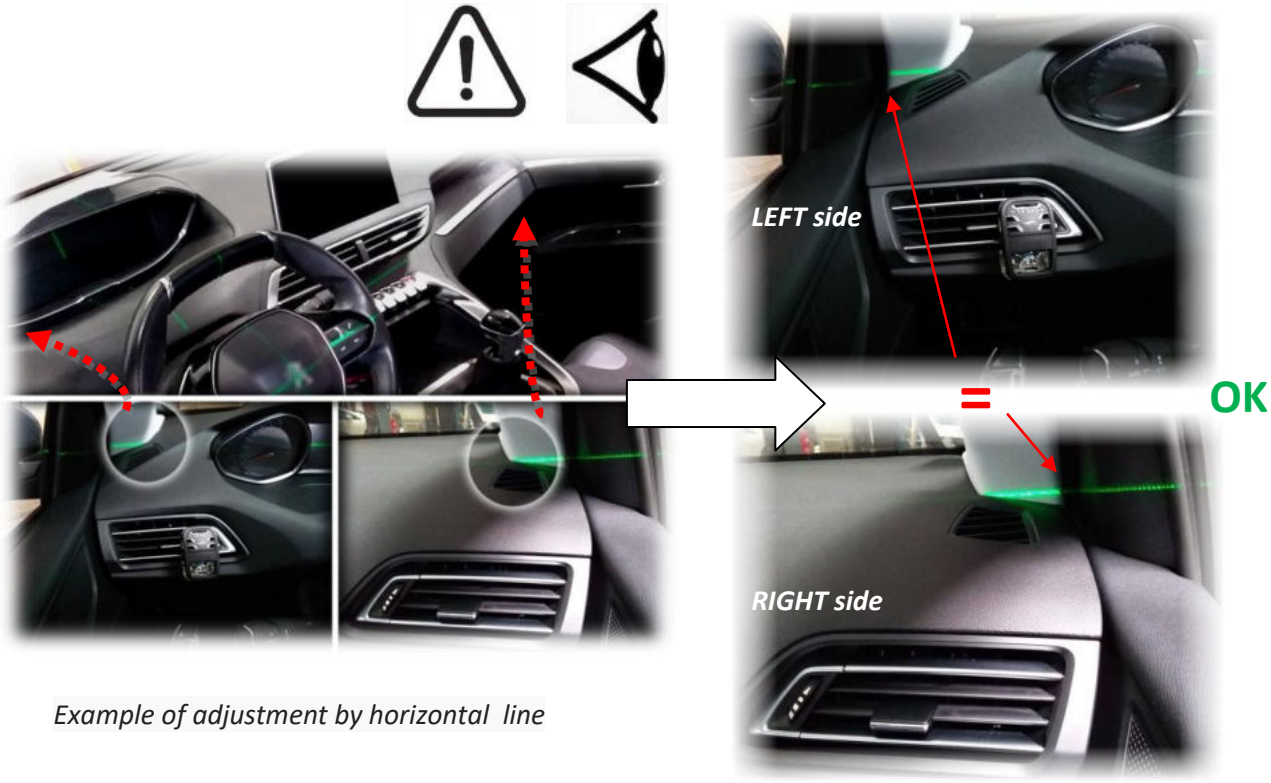
Complement to the horizontal beam adjustment:

It may happen that we cannot use the symmetrical points of the dashboard (ventilation grids, distinct or remarkable lines of the dashboard or not clear).

This is the reason why, even if the horizontal line is the one that we will use later to position the right steering wheel, the system also has a vertical laser line useful for adjustment .

It can refine the adjustment or the verification of the horizontality since the cross is made of perpendicular right angles, especially in case of difficulty to visualize symmetrical reference points absent in the passenger compartment. Here we use dashboard symmetrical points as reference

Once the device is adjusted properly – this adjustment still always true for all vehicles – no need to re-adjust each device use



Example of adjustment by horizontal line

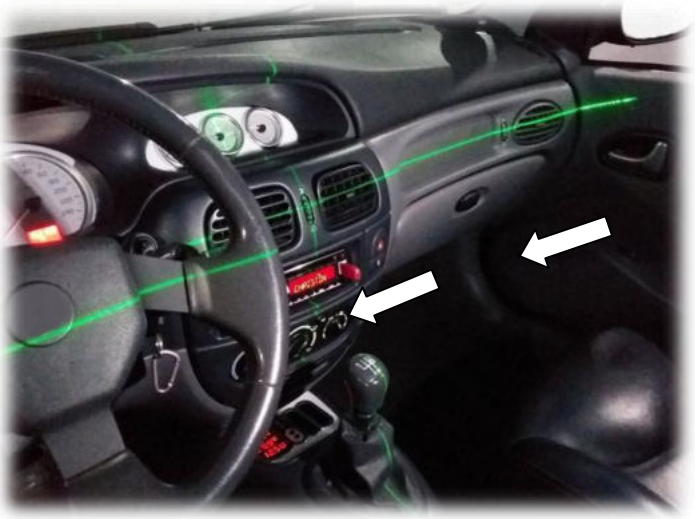
d) Propose a height adjustment of the beam in the passenger compartment (tilt of the device)

The tool holder is articulated on the roof ruler, so it is possible to vary the inclination and necessarily vary the position of the laser line projected on the passenger compartment in the vertical direction .

e) Move the target area in the passenger compartment towards the steering wheel

The tool holder slides on sliding roof bar . The horizontal line position established is retained because the translations are made with a roughly perfect mechanical translation .

The operation consists in bringing the horizontal beam towards the steering wheel. Optional (not imposed to center cockpit before) , but recommended because handling is very simple, also bring the vertical laser line to the flying zone … … …

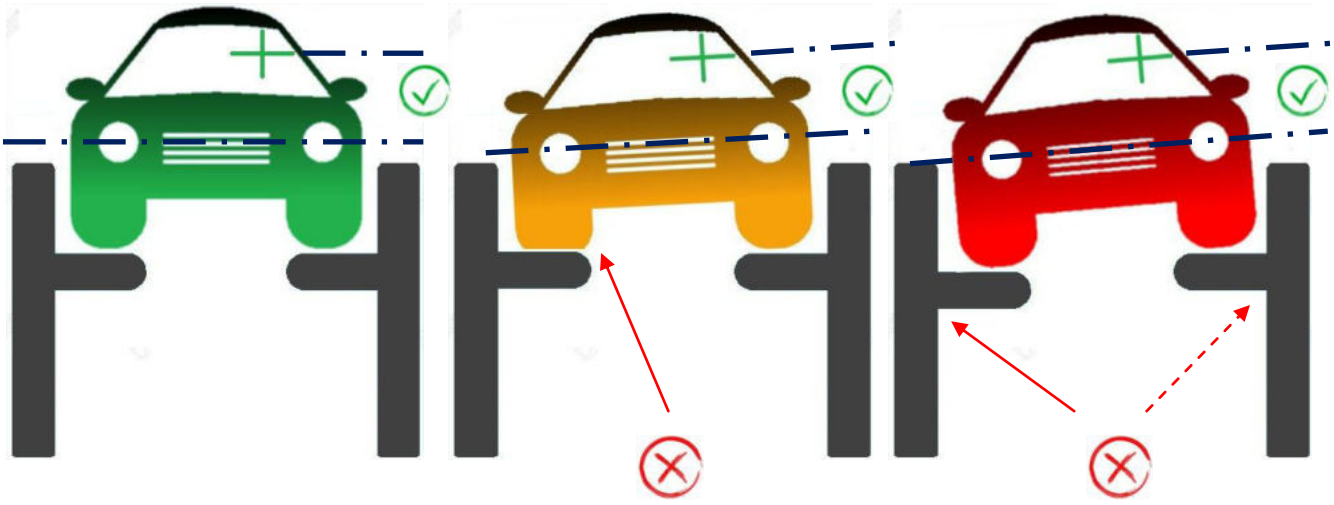


… … … The **laser cross** system (photo on the right above) provides additional security when positioning the right steering wheel - here the lower branch of the steering wheel makes it possible to identify its **good overall positioning perfectly** . Vertical line is not a requirement really

Always on the same principle as mentioned above, it is facultative ,but it is possible to use the vertical laser line as a guide to best position the steering wheel lock with a force exerted between the seat of the driver's seat and the steering wheel perfectly centered and vertical which avoids the risk of shifting of the steering wheel lock, including shifting well after the installation of the latter. Indeed, linked to the memory effect of the foam constituting the seat, more or less smooth surfaces (leather, leatherette for example, attached seat covers), an eccentric force exerted by the steering wheel block can shift its position "insidiously" while the operator is already under the vehicle making "mechanical" adjustments.

IMPORTANT NOTE : *Linked to the fact that the system has its anchor points taken from the vehicle itself, the steering wheel position laser alignment system is independent of the inclination of the vehicle: either of the vehicle itself (tire pressure fault - poor load distribution inside the vehicle), or of the bridge itself, quite simply linked to an imbalance in the lifting of the bridge. In fact, this product method makes the system insensitive to any defect in positioning the vehicle in the workshop, but also makes it perfectly compatible with all 3D reconstruction technologies for the positioning of the vehicle on the bridge, despite a potentially bad tilt .*

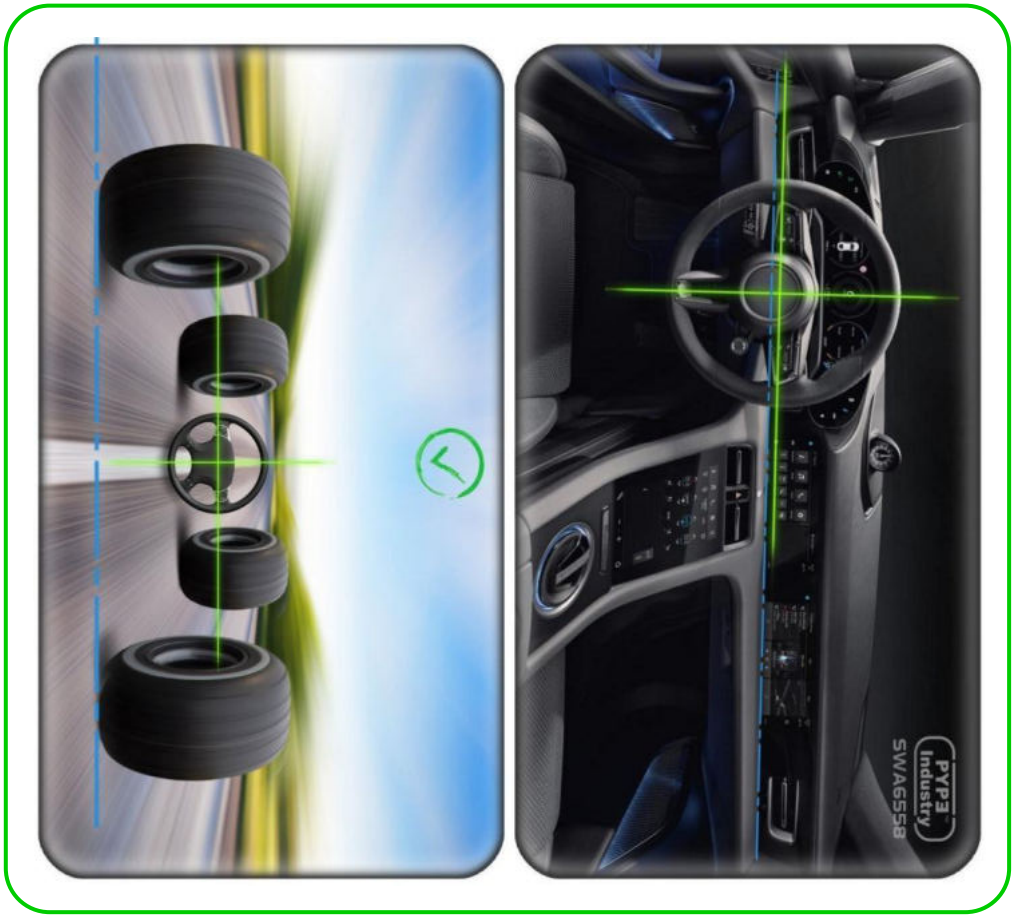
IN ALL CASES, THE INDICATION GIVEN BY THE LASER TRACE ON THE STEERING WHEEL REMAINS ACCURATE WICH IS COMPLETELY DIFFERENT THAN ANY SYSTEM BASED ON SPIRIT LEVEL SOLUTION



Correct placement (ideal) *Unbalanced vehicle* *Unbalanced lift*

ALIGNMENT

LEVELING



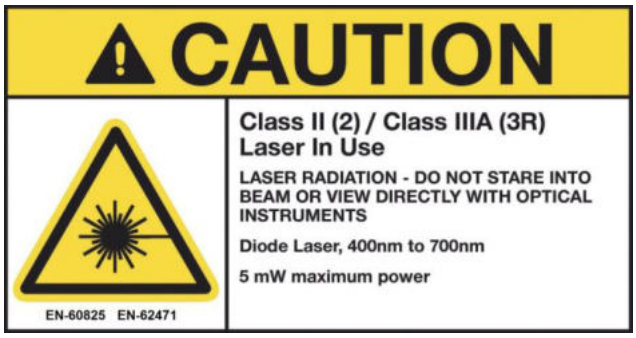
6) Material / Assembly :

 # 1 – Laser device – steering wheel alignement **# 2** – Power sector (USB / DC 12C) + power cord **# 3** – Bar , tool holder – have to be assembled (THM01) (+ ebar extension (THEB) **# 4** – Lamp type day light **# 5** – spacer. **# 6** Tool organiser T-ORG – kit delivered , have to be assebled (separated notice) T-ORG

Note :

The main bar THMB01 can support either SWA or LPCM (when no wheel adjustment are operated) .

If no T-ORG is used , SWA and LPCM base is magnetic , means could be organized plugged to a metallic surface



Regarding the light intensities used, there is no major risk to the exposure, neither for the skin, nor the eyes and without danger for the materials (heating or risk of explosion), however the Laser pictogram is reported on the front of the pointer, class 2 laser, power less than 5 mW, avoid direct and prolonged exposure

RoHS compliant
EN-60825
EN-62471

7) Summary technical data :

LASER POINTING SYSTEM

Material : ABS & PMMA

Light source : 3 x led < 100mW – 1 x laser 515 nm < 200mW

Battery : 1 x Li-ion 3.7V 2200 mAh

Charging method : USB 5V DC

Charge / autonomy : bargraph 4 leds – 3 green leds charge OK – full time charge : 3h

Performance : >10 h continuously (operate to a full charge before first use)

Battery maintenance / health : charge battery each 3 month even if device is not used

IP class / using temperature : IP 40 – indoor use only – 0 à 40°C

Weight : tool + holder / roof bar : ~ 500 g / ~ 1000 g

Dimensions : 160 x 190 x 55 mm (Geo tool) / 1200 to 1900 mm (roof bar extension capacity)

ROOF BAR

Main material : aluminum

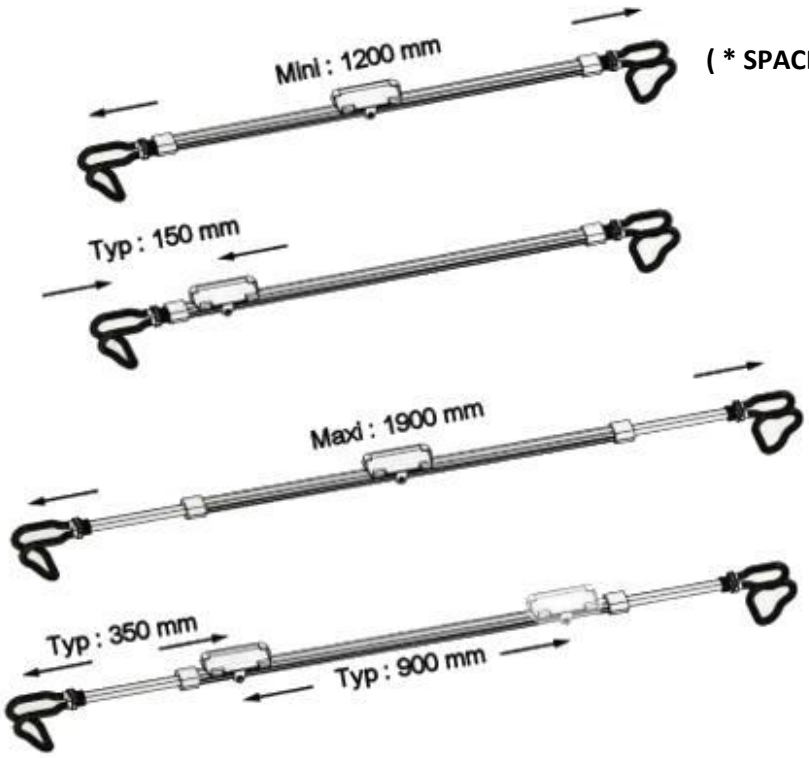
Typical clamp size capacity (un extended) : 1200 mm

Maximum clamp size capacity : 1900 mm – better use THEB > 1800 mm

Minimum size capacity (using Spacer) : 1100 mm

Maximum clamp size capacity (using THEB) : 2300 mm

Translation tool holder (lamp or SWA placed) : 900 mm



(* SPACER) mini = 1100 mm

(* THEB) maxi = 2300 mm

 # LAMP accessory #

Material : Aluminum

Light source : 20W COB Led / dimmable from 900 & 1800 lumens

Battery : 2 x Li-ion 7.4V 2200 mAh

Charge method : 5 V DC

Charge indicator : bargraph 4 leds – 3 green leds charge OK – full charge time : 4h

Performance : 1.5h @ 100% full light / 3h Std (operate to a full charge before first use)

Battery maintenance / health : charge battery each 3 month even if device is not used

IP Class / using temperature : IP 65 – indoor use preferable -20 to 40°C

Weight : Lamp + holder / roof bar : ~ 700 g / ~ 1000 g

Dimensions : 170 x 157 x 55 mm (lamp)