



# WHEEL ALIGNMENT EQUIPMENT R1090

INSTALLATION AND SERVICE MANUAL  
FOR TESTS AND CALIBRATIONS



**RESERVED FOR AUTHORIZED  
SERVICE CENTERS**

## 0 INTRODUCTION

The purpose of this manual is to provide the installer with complete instructions for the connections and calibration of the 3D wheel alignment equipment of the "X6" series and subsequent ones, produced since 2021

The instructions for use and maintenance, reserved for the end user, are included in the specific manual supplied with the machine.

### Attention!



The "CALIBRATION" procedure and other special verification procedures illustrated in this manual are reserved for specialized technical assistance personnel; for this reason, access to them is linked to a password. This password, which must not be communicated to other people, is determined by the sequence of keys "**F8; F7; F6; F8**".

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# 1 INSTALLATION AND UPDATING OF THE PROGRAM

## 1.1. Installation

This process takes several minutes, it may require restarts.

You will install: Windows Power Shell; Microsoft SQL server; SW for the Smart Card reader; XVID Codec; .NET framework and finally the "AS9" series setup SW.

Note: The PC, not supplied by the manufacturer (supplied by the customer), must have the following minimum characteristics:

- 1.5 GHz clock CPU; 4 GB RAM;
- 120GB HD
- 4 USB 2.0;
- Windows 10 Operating System
- 1366x768 Pixels Video Output

The Smart Card reader is supplied by the factory, it must be connected to a USB port

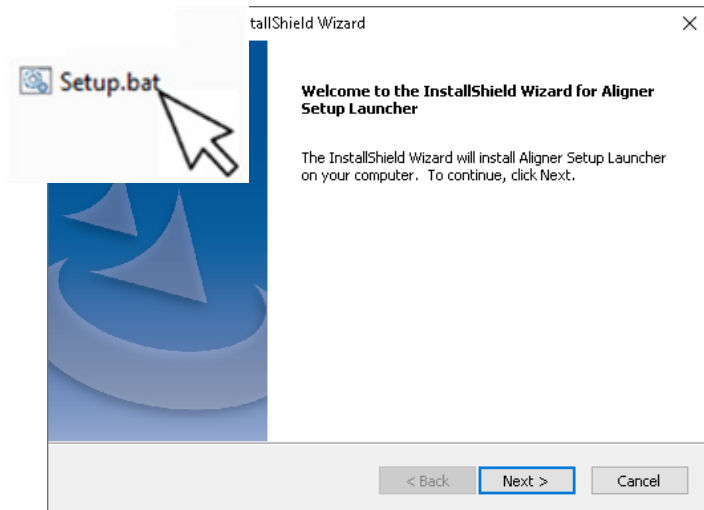


Turn on the PC and insert the USB key supplied with the equipment kit.



## 1.2. Start full installation

To install the 3D Wheel alignment equipment program, in Standard mode, it is necessary to launch the batch file Setup.bat (by double clicking). Instead, to install THE DEMO version only (with a demo database and without connection to the sensors) it is necessary to launch the SetupDEMO.bat file (again by double clicking).



**Figure 1**

Click on the "Next" key to finish the preparation phase and proceed to the installation (caution: the installation has not yet started).

The installation consists of four parts:

- Launcher (program that prepares and presides over the installation),
- Installing prerequisites,
- Main program,
- Upgrade.

### 1.3. Part 1 - Launcher installation

After launching through the setup.bat batch, the program prepares for the correct operation of the installation.

Note: Each of the four phases verifies the correctness of the installation and, if a critical problem is detected or if you want to terminate the installation earlier, the launcher indicates what steps to follow in order to restore the initial condition.

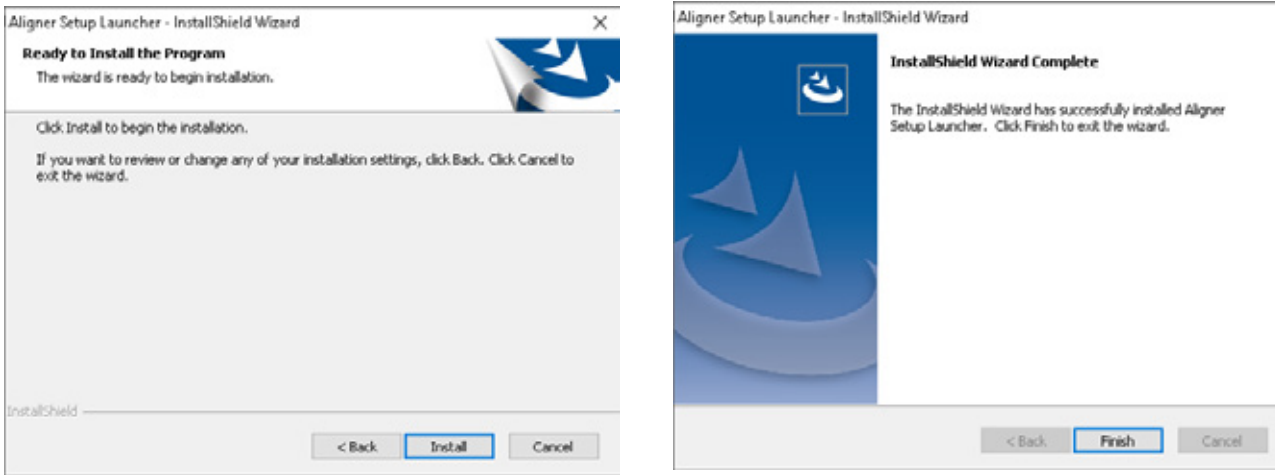


Figure 2

Click on the "Install" button and then on the "Finish" key to end the preparation phase and proceed to the installation.

### 1.4. Part 2 - Prerequisite installation

The installer can automatically recognize the operating system and installed programs. Based on this, it decides which prerequisites still need to be installed.

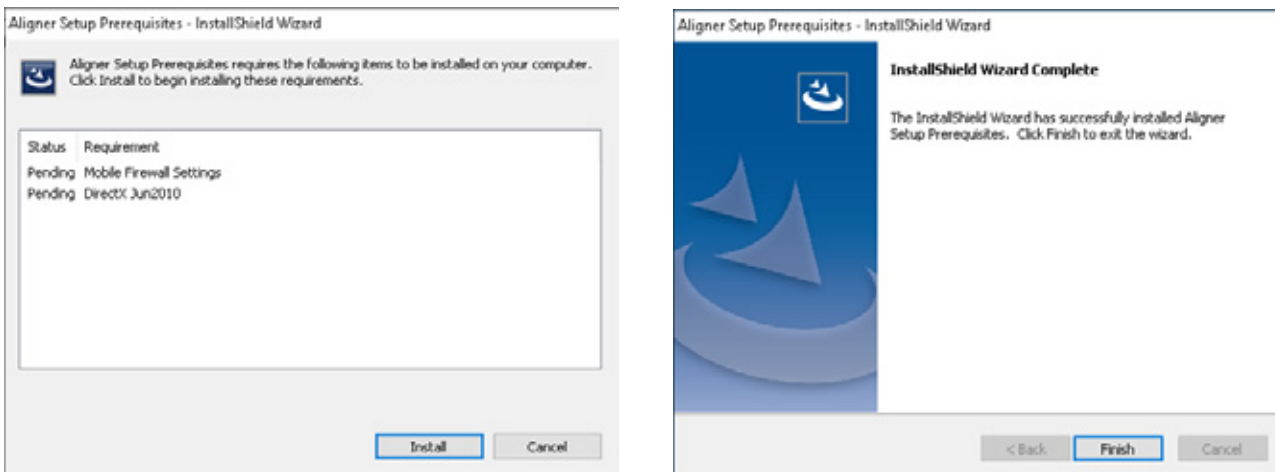


Figure 3

Click on the "Install" key and then on the "Finish" key to perform the prerequisite installation phase and move on to the next one.

## 1.5. Parts 3 and 4 – Main program and installation update

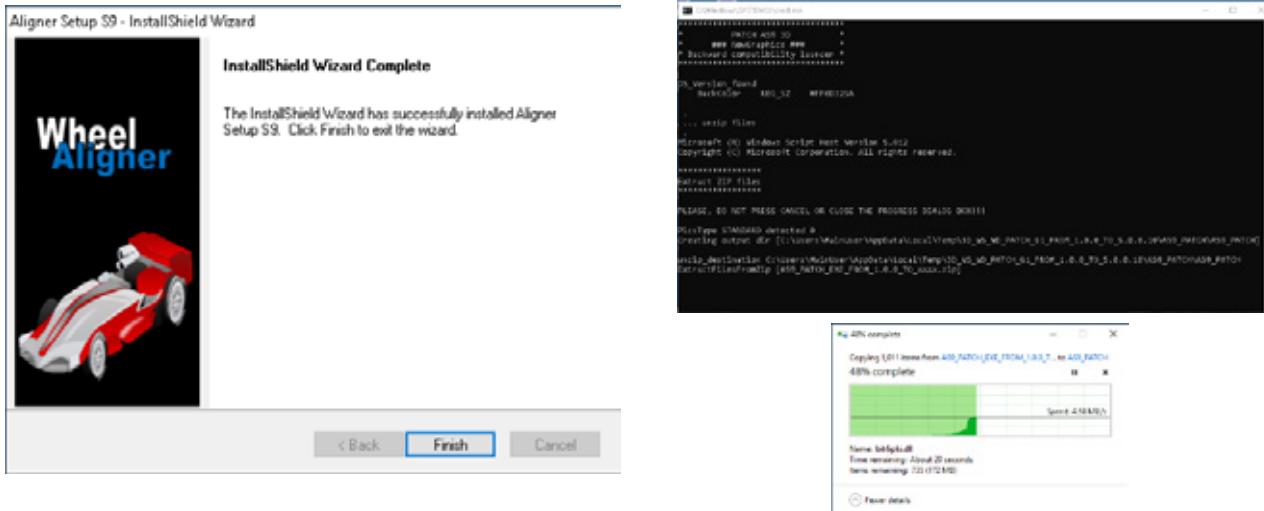


Figure 4

Click on the “Finish” key; this starts copying of the primary and secondary layout files to the hard disk:  
Following this, the PC reboots.

After the PC has restarted, the SW of the newly installed “3D Wheel alignment” equipment is automatically started, the screen shown below appears.



Figure 5

To complete the installation, you must now copy the “config” file contained in the USB key from the VAS9 folder to the folder on your PC C:\TMLAB\ALIGNERS9\System\

This file is unique and exclusive to the equipment purchased and is paired with the Smartcard supplied.


To copy the aforementioned file simply press the F3 key , the “config” file of the USB key is automatically copied to the correct folder on the PC.



Figure 6

After you have copied the “Config” file, you must restart the program again, so that the remaining files can be copied, depending on the equipment model specified in the “Config” file.  
The screen shown below appears:



Figure 7

Press the F1 key , all remaining files needed for the system are automatically copied.

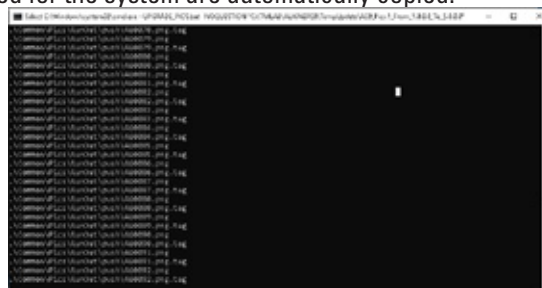


Figure 8

The installation is now complete.  
The program starts by displaying the screen on the side.

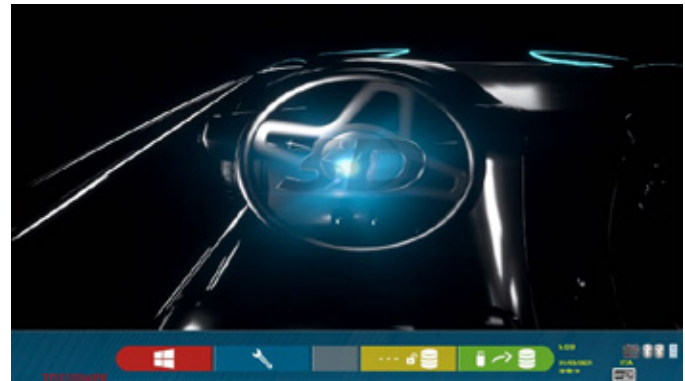


Figure 9

Subsequently, it is necessary to set the various options of the machine configuration and it will be necessary to define the connections of the sensors to the cabinet. See the next chapters for details.

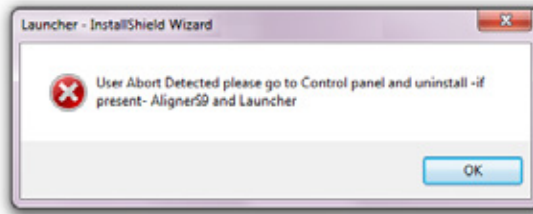
To conclude, it will be necessary to perform the “ACTIVATION” phase (installation of the “TOKEN” file), a circumstance in which the DATABASE becomes operational and the warranty start date begins.

To download and install the “Token”, please refer to manual M0251, available on the “DATABANK” website (it is indicated on the last line at the bottom of the SMARTCARD – see Figura 6 page 4).

*Note: If your PC has an Internet connection, THE ACTIVATION phase can also be performed within the setup SW. In this instance, always refer to manual M0251 available on the “DATABANK” website*

## 1.6. Uninstallation

In the event of a critical error or interruption by the user, the program suggests the procedure to be followed to restore the situation prior to installation.



In the Control Panel, select the “Programs and Features” item and uninstall the “AlignerS9” and “Aligner Launcher” programs.

Adobe Shockwave Player 11.6	Adobe Systems, Inc.	1/14/2013		11.6.8.638
AlignerS9	Samiro	3/4/2014	14.1 MB	1.01.0000
Beyond Com... Version 3.0.11	Scooter Software	1/25/2013		
...	Piriform	8/21/2013		4.05

When finished, restart the PC.

## 1.7. DEMO MODE

In a standard installation, to switch FROM NORMAL mode to DEMO mode (and vice versa), simply press keys Ctrl + D simultaneously.

In a “DEMO” installation you can choose any model from the entire range; at first, the above-mentioned page appears, select the model and press F4 to continue.

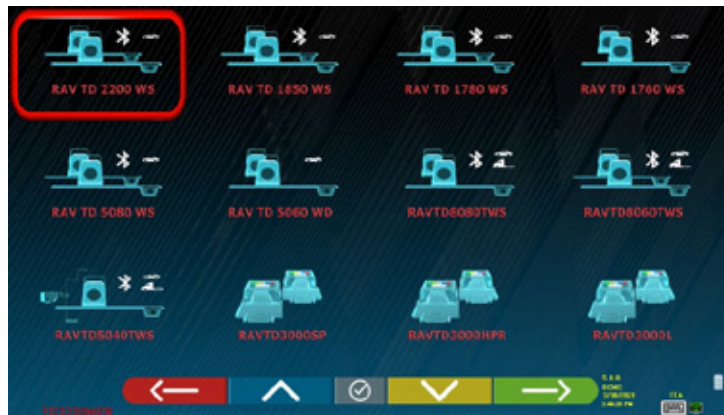


Figure 10

## 1.8. Upgrade

The SW update can be downloaded from the “DATABANK” website (it is indicated on the last line at the bottom of THE SMARTCARD – see Figura 6 page 4) where the latest version of the SW is always available.

Simply download the “Patch” which is proposed after entering your SMARTCARD number. The upgrade software of the alignment equipment consists of some files including a file “UPGRADE.bat”. To update the SW simply double-click UPGRADE.bat



## 1.9. Insertion of the distributor logo

The wheel alignment program gives the possibility to insert in the final print (top right), a figure with the distributor logo and a related text. The insertion procedure is as follows:

- Create a file representing the Distributor Logo by calling it "DEALER.PNG"; it must be in PNG format (300x192 pixels)
- Copy the file to the folder below:  
:\TMLAB\ALIGNERS9\PrintTemplate\images

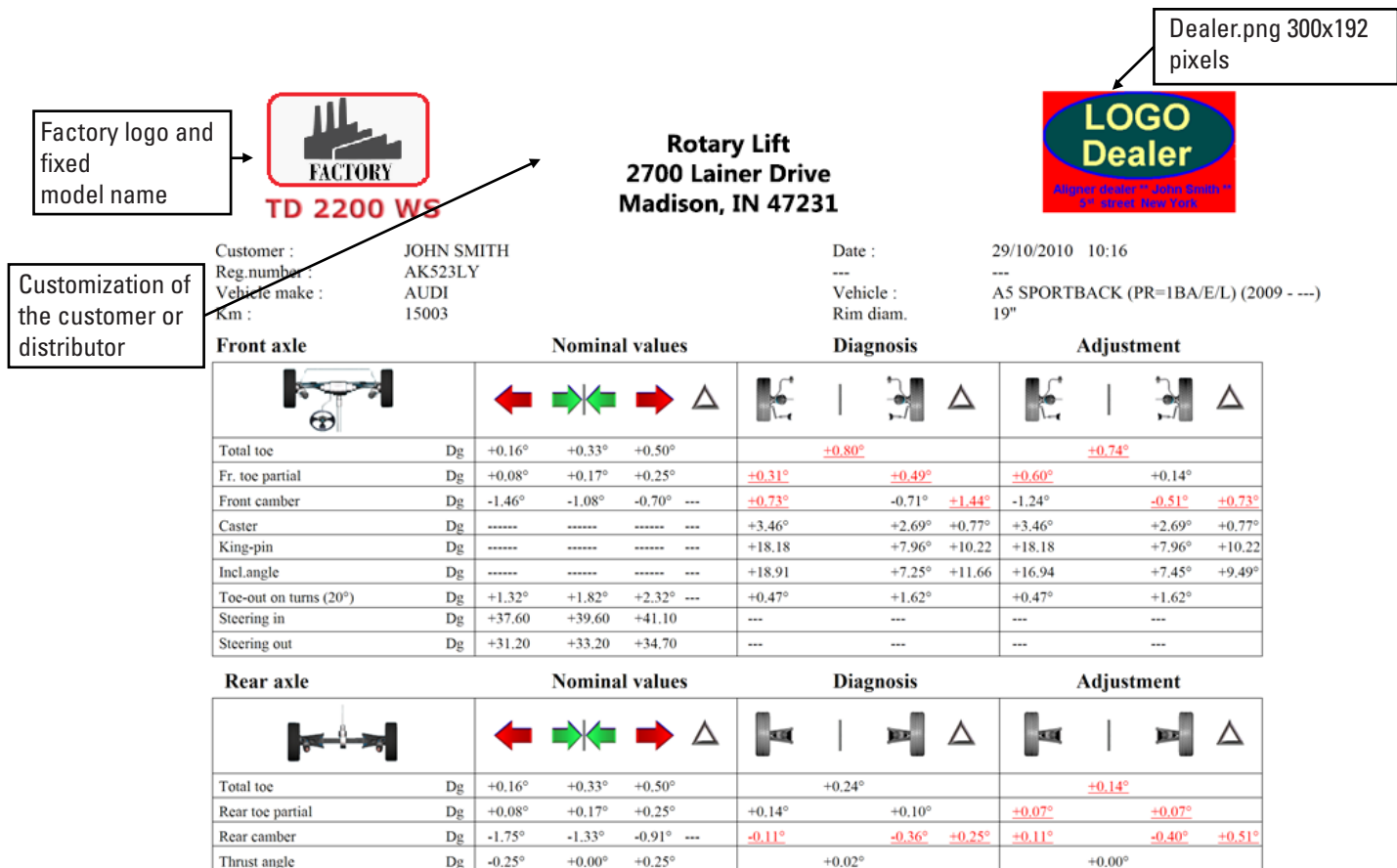


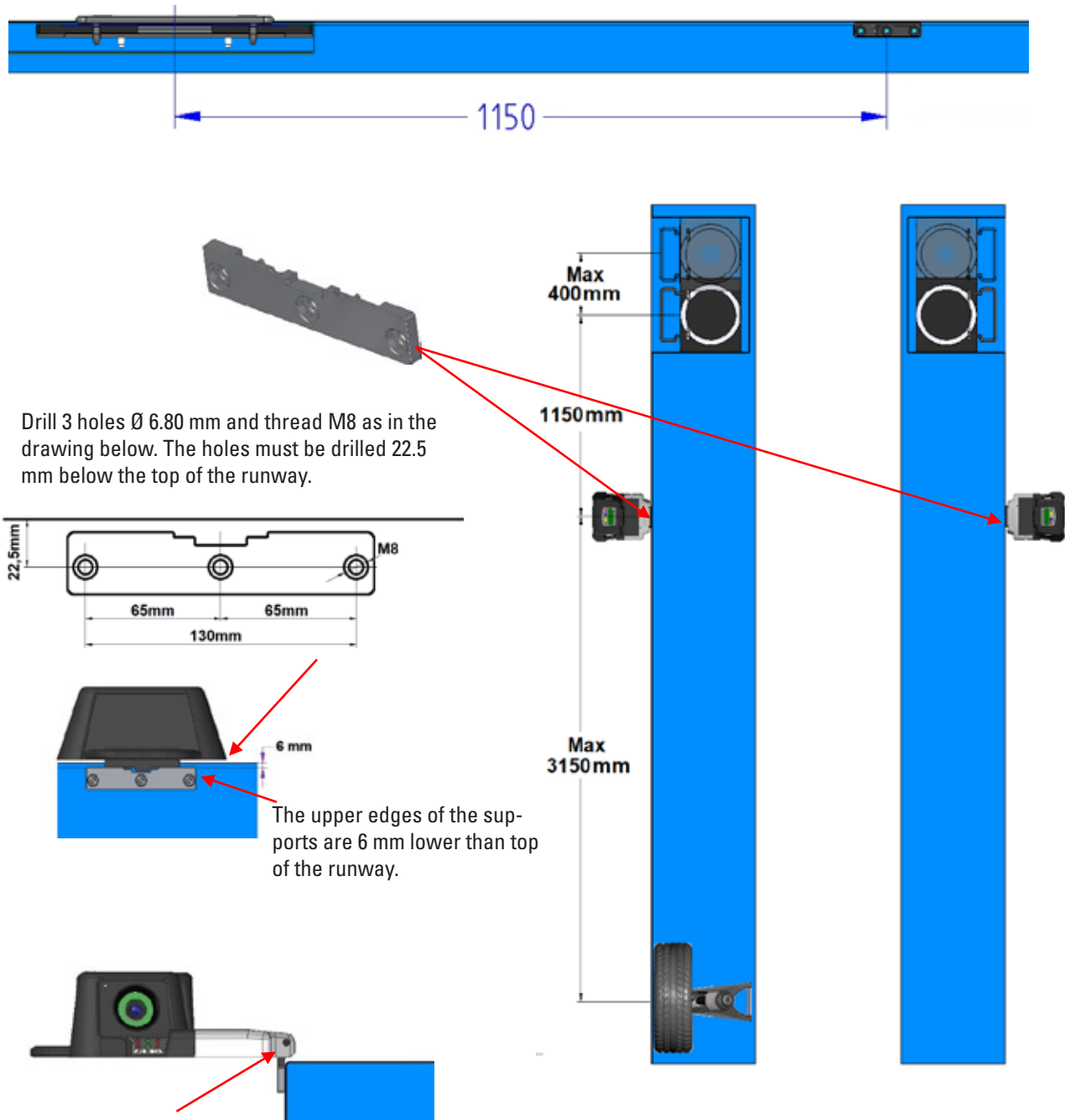
Figure 11

## 1.10. ATTACHING THE MEASURING HEAD SUPPORTS

It is necessary to drill 3 holes for M8 screws on each side of the bridge, in order to fix the supports of the measuring heads, making sure that the distance from the center of the heads to the center of the rotary plates is 1150 mm. If it is necessary to measure vehicles with a very long wheelbase, it is possible to move the turntable forward by a further 400 mm.

The maximum distance from the rear wheels to the center of the heads is 3150 mm.

Note: Be sure to drill holes at a distance of 1150 mm on both sides of the bridge.



## 2 CONNECTIONS

### 2.1. Power line connection

The alignment cabinet must be connected to the 100/240Vac 50/60Hz power line; the maximum power used is 500W.

Use the supplied power socket, located on the back of the cabinet.

**ATTENTION:** Do not unplug the the unit from the wall during the night as the batteries of the sensors must be recharged. For this reason, when the equipment is switched off, the system disconnects power to the PC, monitor and dedicated electronics, but not to the battery charging station.

### 2.2. Connecting the sensors to the cabinet

The cabinet of the “3D” alignment communicates with the measuring heads through a Bluetooth-compatible device inserted in a USB port of the PC, and the corresponding Bluetooth-compatible devices located inside the heads. These must be “paired” with each other through the procedure described below. The batteries are recharged on the charging station on the cabinet.

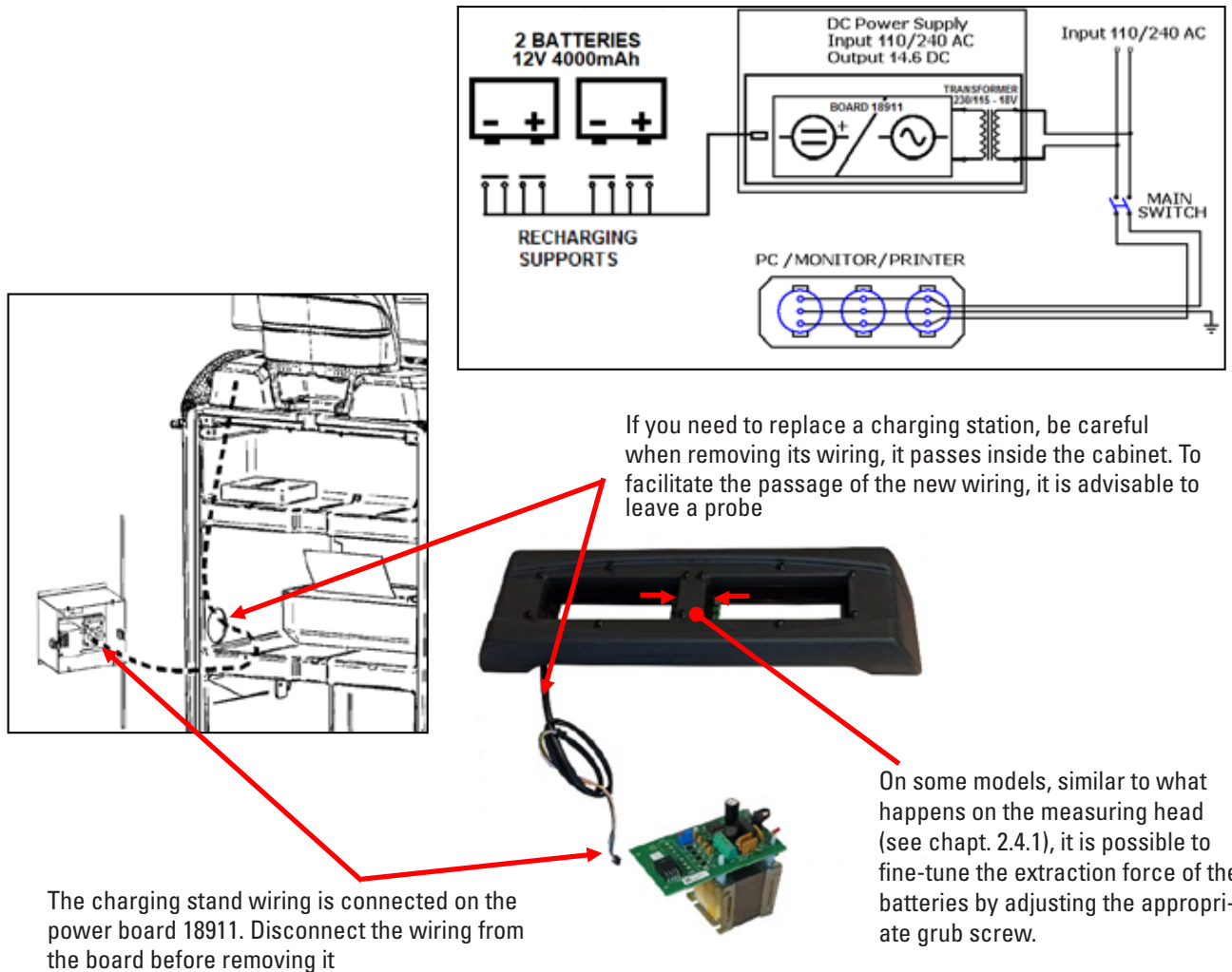


Figure 12

### 2.2.1. Pairing the sensors with the cabinet

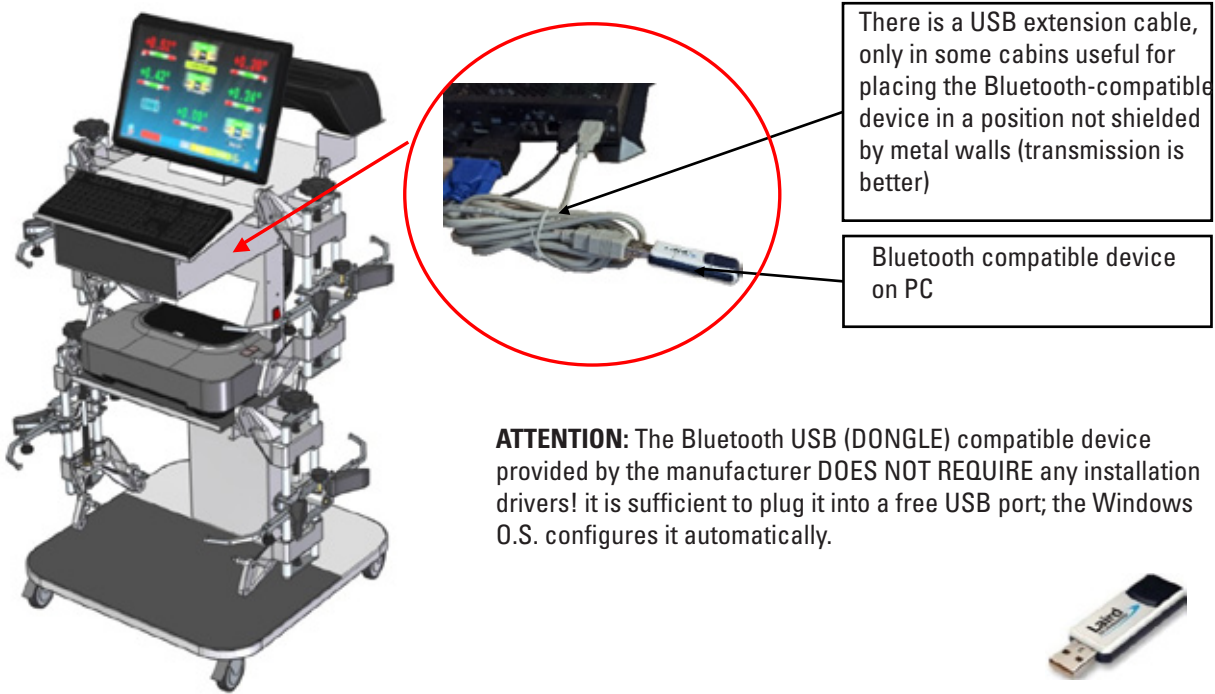
If the PC is not supplied by the manufacturer (supplied by the customer) or is replaced or formatted, the measuring heads must be “paired” with the PC as indicated below.

The cabinet of the “3D” series alignment communicates with the heads via a Bluetooth compatible device inserted into a USB port of the PC, and the corresponding modules mounted inside the measuring heads.

The transmission\reception mode of the “3D” system allows you to uniquely “pair” only one pair of heads, thus allowing you to be protected from external disturbances and also to be able to use multiple equipment in the same room.

The “pairing” procedure described in the following pages is already performed at the factory. It is necessary only if the customer obtains the PC, or if it is necessary to replace a detector or the PC as a spare one

Starting from the home, page press the F2 key to enter the System Menu, then use the F2/F3 keys to select the “System Configuration” option and confirm with F4.



**ATTENTION:** The Bluetooth USB (DONGLE) compatible device provided by the manufacturer DOES NOT REQUIRE any installation drivers! it is sufficient to plug it into a free USB port; the Windows O.S. configures it automatically.

Starting from the home, page press the F2 key to enter the System Menu, then use the F2/F3 keys to select the “System Configuration” option and confirm with F4.

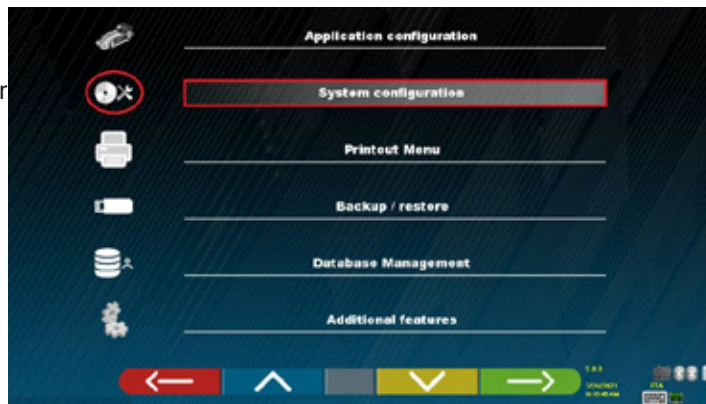


Figure 13

Use the F2/F3 keys to select the “Sensor search” option, then confirm with F4.

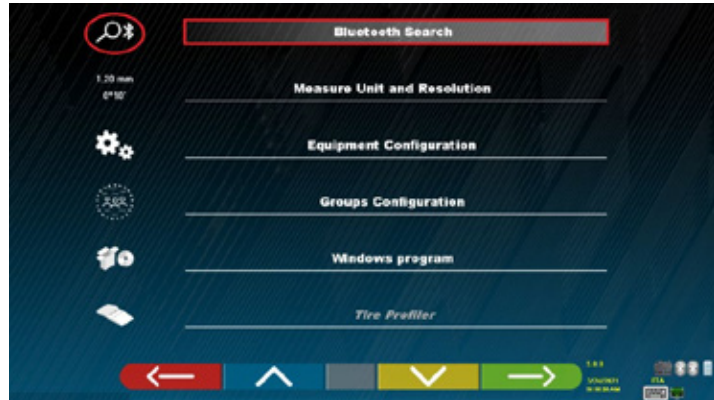


Figure 14

Turn on the sensors, then press the F5 key, the search for the sensors will start.



Figure 15

The two windows show the MAC addresses of all sensors with Bluetooth-compatible devices that have been found. Sensors configured as LEFT are indicated in the LEFT window, sensors configured as RIGHT are indicated in the RIGHT window. If more than 2 sensors are found, select the correct one via F2/F3, then press F4 to confirm.



Figure 16

When pairing is complete, the two icons at the bottom right turn BLUE. Instead, if the pairing has not been performed (or the front sensors are turned off) these icons are GRAY.

Note: the icons highlighted in red indicate that the driver SW that manages the system is not already running

Important: to test the actual connection with the sensors, use the communication test (release FW) described in par. 4.1

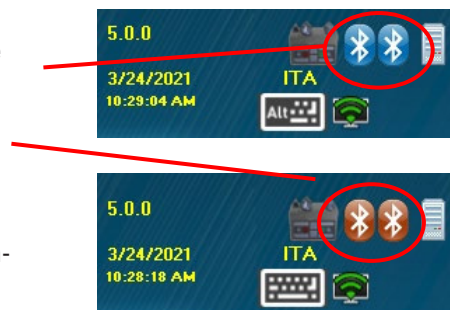
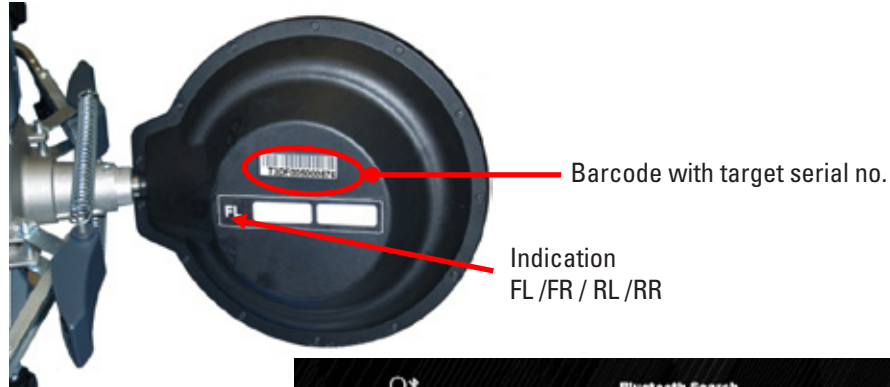


Figure 17



### 2.3. Entering target characterization files

It is necessary to enter the files with the description of the characterization of the 4 targets. These are included in the USB memory key supplied with the equipment.



From the “System Configuration” menu page (see Figura 13), select with keys F2/F3 the “Equipment Configuration” option, then confirm with F4.

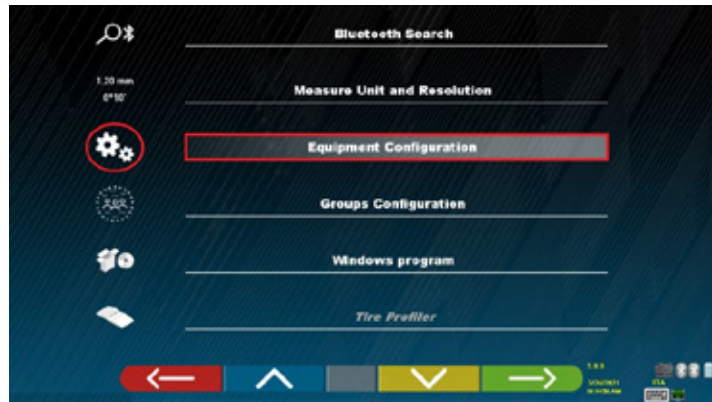


Figure 18

Confirm the “Equipment Configuration” option, then select “Target File” and confirm with F4.

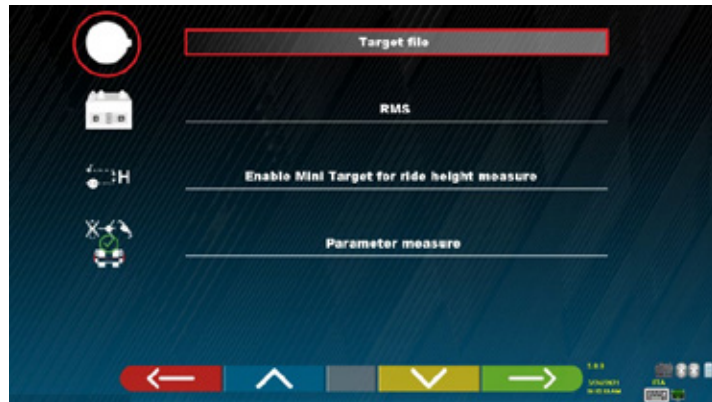


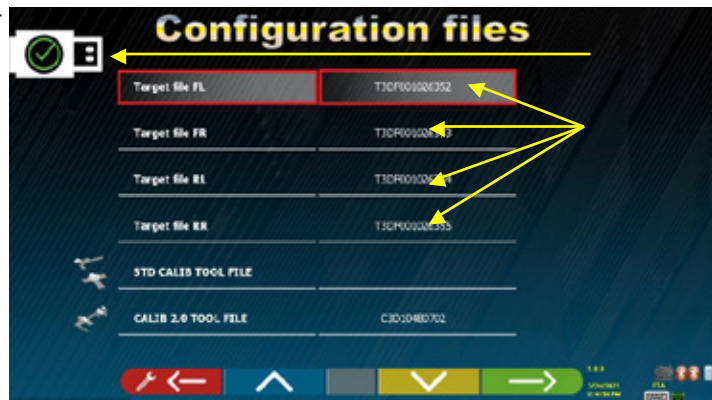
Figure 19

Enter the 13-character code reported on the back, for all four targets;

FL = Front Left, FR = Front Right, RL = Rear Left, RR= Rear Right.

Press F1 to confirm and exit;

The 4 target files will automatically be copied from the USB key to the appropriate PC folder.



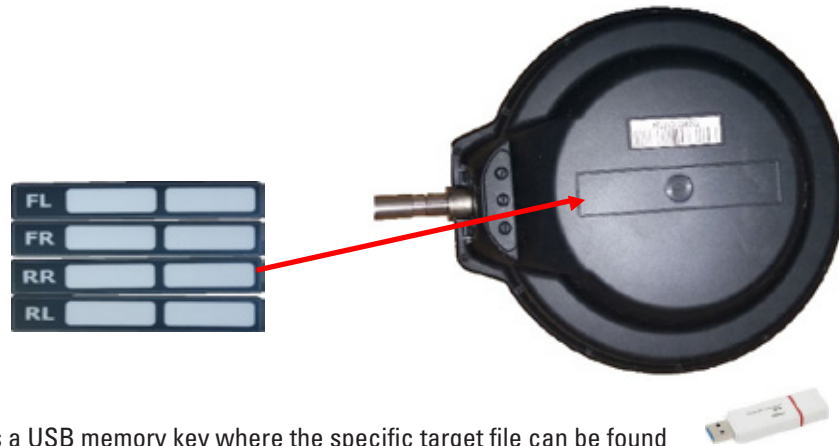
### 2.3.1. Target Replacement

A damaged target can be replaced with a new replacement target.

When you receive a generic replacement target, included with the kit there are labels marked with the initials: FL, FR, RL or RR.

One of them must be applied to the target, in relation to its use:

- FL = front left;
- FR= front right;
- RR= rear right;
- RL= rear left



The replacement kit also includes a USB memory key where the specific target file can be found

Insert the USB memory key into the PC of the equipment. The file inside has the same name as the one written on the Barcode label on the back of the target. Make a note of this name, you will need it later.

Run the wheel alignment program.

Press F2 to access the configuration menu.

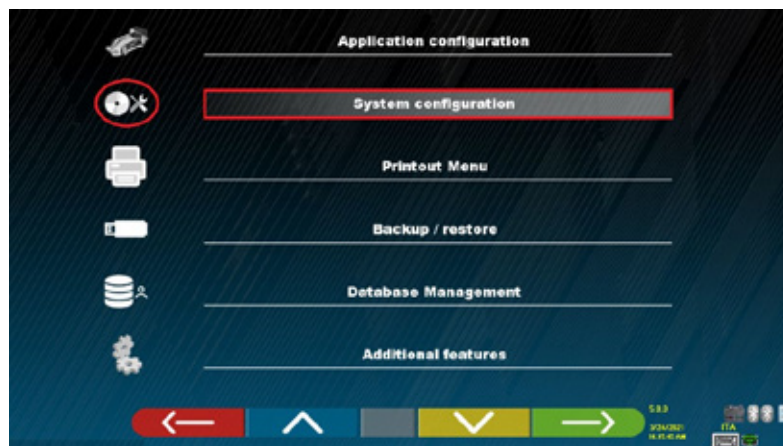


Figure 21

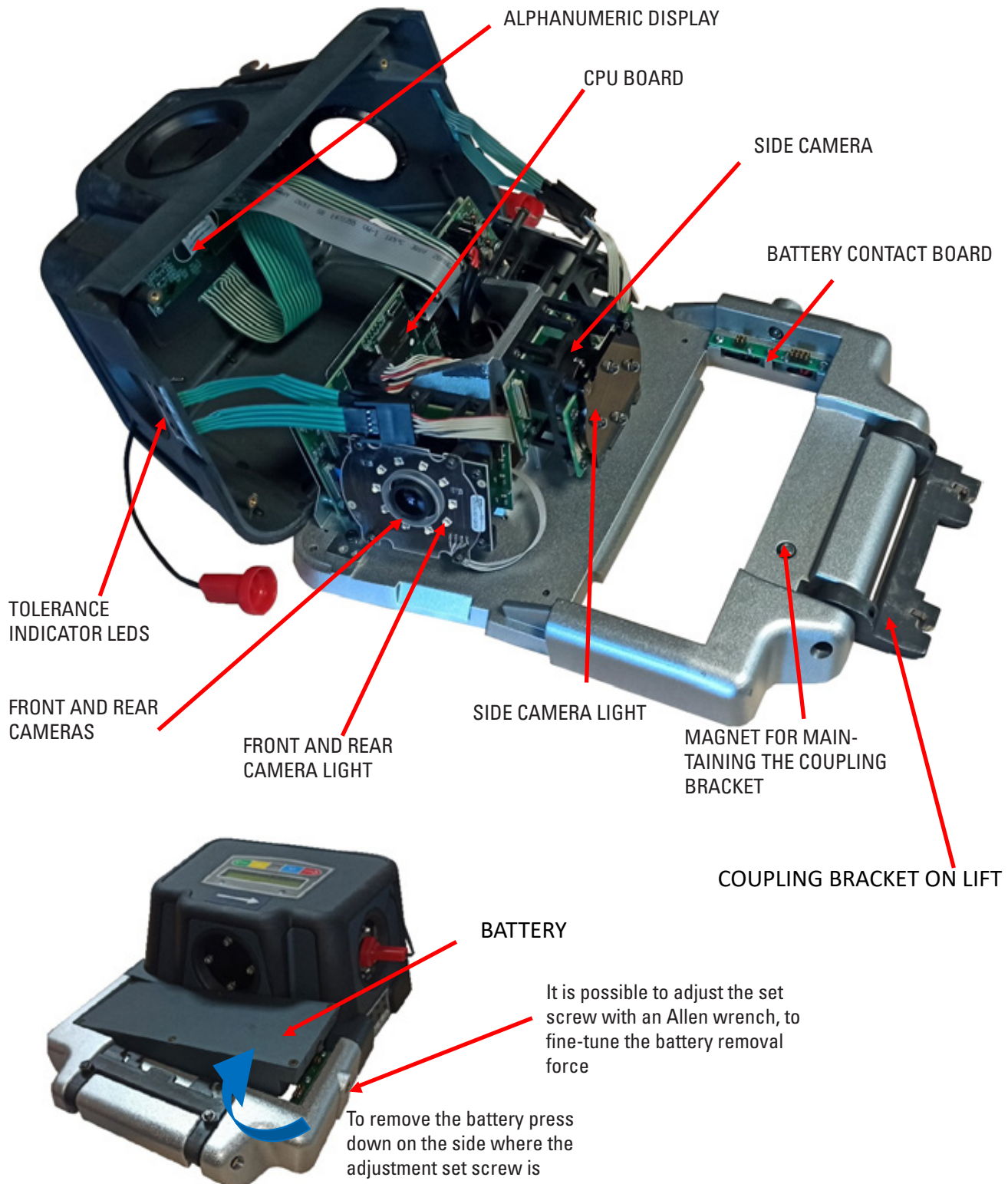
Using the keys F2 and F3, select the “system configuration” menu and confirm with F4. Then continue as described in chapt. 2.3.

## 2.4. Connecting the sensors and internal devices of the measuring heads

The connections inside the measuring heads have already been made at the factory, therefore you should never open them, except if you have to replace a component.

However, it is better to never remove the cover of the measuring head; in case of malfunctions, always contact the manufacturer. However, if it is necessary to carry out simple maintenance work, ensure to return the moved parts to their original position.

### 2.4.1. Measuring head - main components

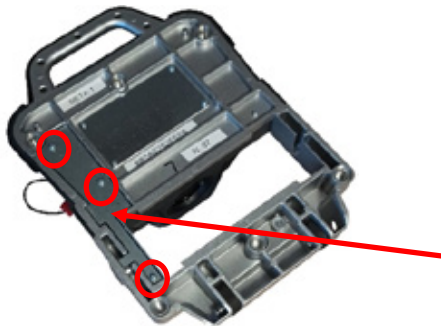




## 2.4.2. Measuring head cover



Remove the battery by pressing down on the side of the register, as shown in chapt. 2.4.1, and remove the camera lid



Remove the 3 screws and remove the sheet metal from the battery cable cover



Remove the 4 cover fixing screws



Remove the cover taking care to override the side camera LEDs



Position the cover sideways from the handle side of the measuring head

Below is a brief description of the connections on the CPU inside the measuring head.

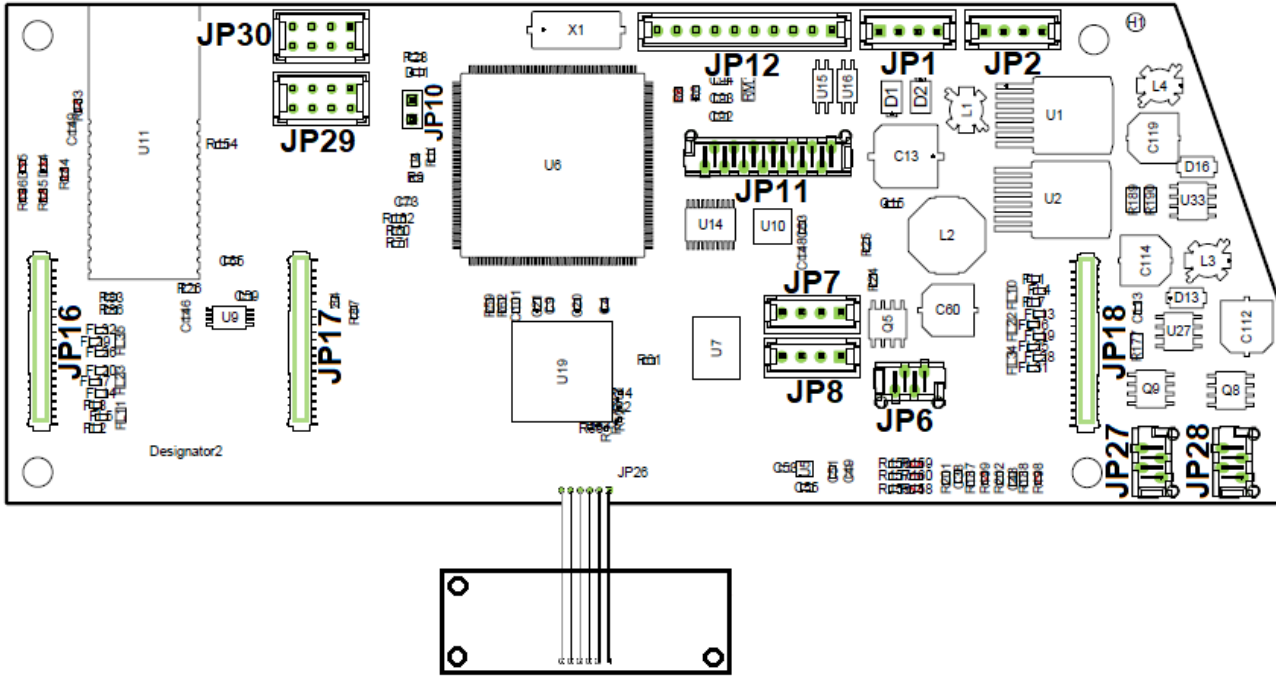
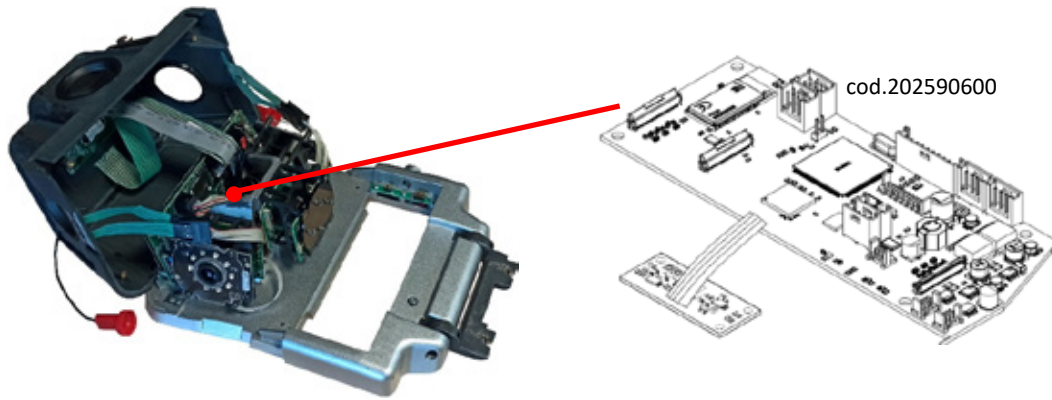


Figure 22

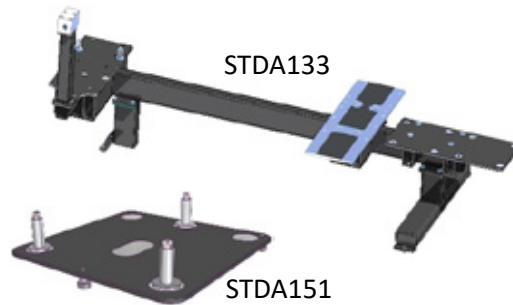
JP1	BATTERY WIRING
JP2	SECONDARY BATTERY INPUT - NOT USED
JP6	SIDE CAMERA ILLUMINATOR WIRING
JP7	SERIAL 1 - RESERVED
JP8	SERIAL 2- RESERVED
JP10	PROGRAMMING JUMPER - RESERVED
JP11	ALPHANUMERIC DISPLAY
JP12	KEYBOARD
JP16	CAMERA WIRING (on head Left Rear Side; on head Right Front Side) (paired with light with LONG WIRING)
JP17	SIDE CAMERA WIRING
JP18	CAMERA WIRING (on Left head Front side; on Right head Rear side) (paired with light with SHORT WIRING)
JP27	LIGHT WIRING (on Left head Rear side; on Right head Front side) - LONG WIRING ~240mm -
JP28	LIGHT WIRING (on head Left FRONT SIDE; on head Right rear side) - SHORT WIRING ~80mm -
JP29	LED WIRING REG. Tolerance (on Left Head Front Side; on Right Head Rear Side)
JP30	LED WIRING REG. Tolerance (on Left Head Rear Side; on Right Head Front Side)

### 2.4.3. Replacing the CPU board

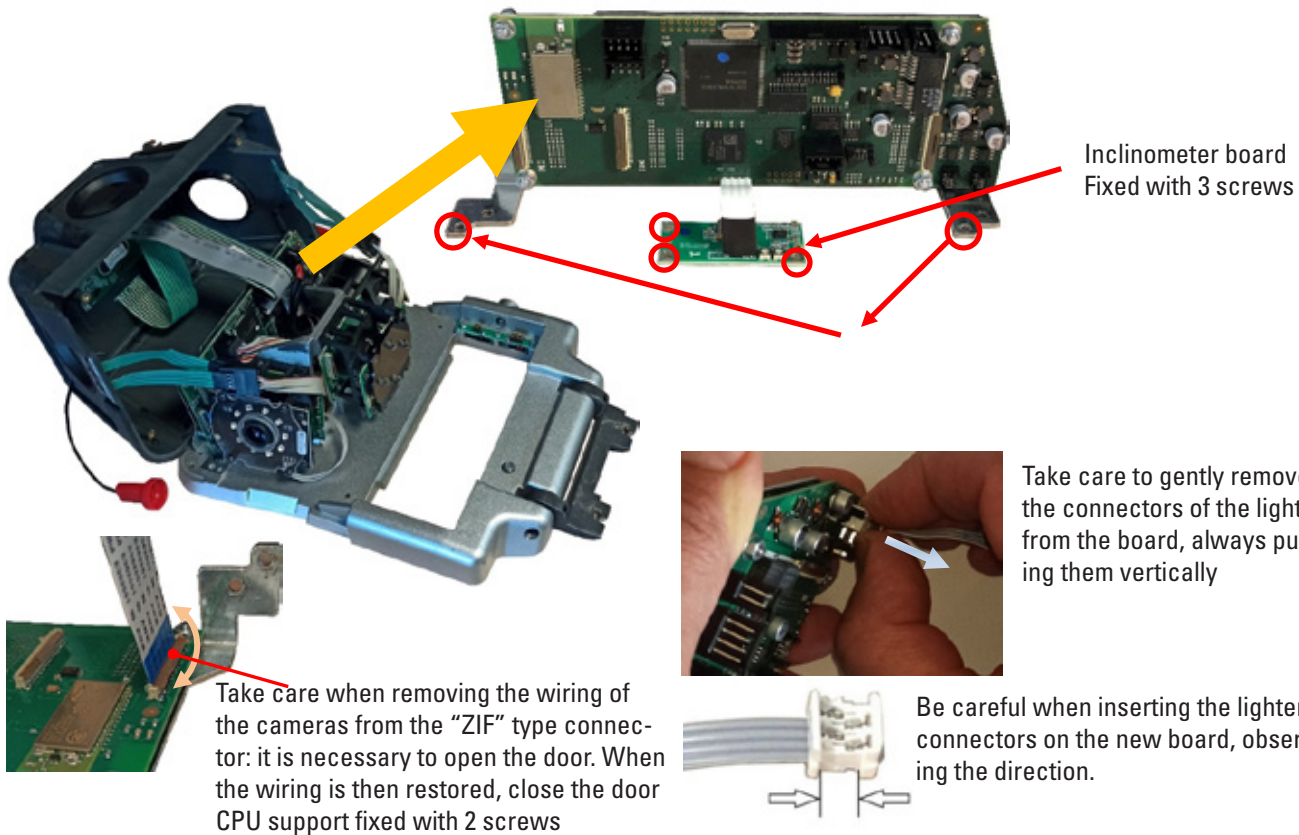
It is possible to replace the main CPU board.

Warning: the CPU is always equipped with the inclinometer board, connected to the CPU through a "flat" cable. When replacing this unit, it is necessary to calibrate the inclinometer. Only the first steps in which the "inclinometer" sensor is calibrated must be performed.

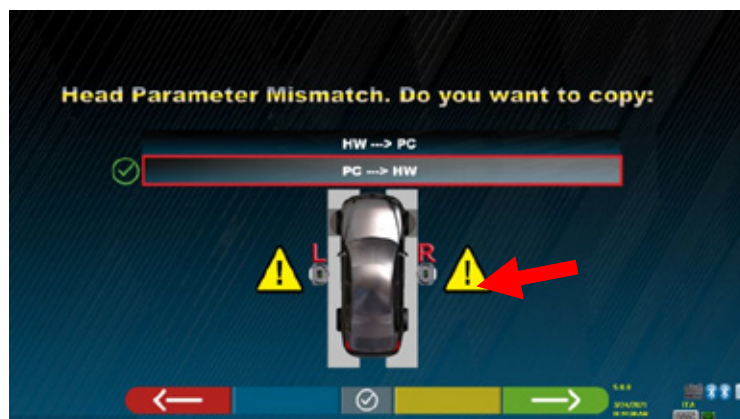
Note: For calibration of the inclinometer sensor only, it is possible to use the complete tool STDA133 or even the simple plate STDA151.



You must first remove the inclinometer by unscrewing the 3 screws on the base, then remove the 2 screws securing the CPU holder and gently remove it from its seat, then replace it with a new one, reconnecting all the wiring.



ATTENTION! The first time the PC is connected, the message shown on the side will appear with the words "Head Parameter Mismatch": select the option "PC HW" and confirm with F5, so that the calibration saved in the PC is copied correctly to the head with the new CPU, thus avoiding also performing the complete calibration procedure of the cameras.



## 2.4.4. Setting up the CPU board

Run Windows File Explorer and open the folder on your PC: TMLAB/ALIGNERS9/EXE folders. run the program "Superman.exe"

2. Click on the "Run" button

1. Enter the BTH address of the CPU to be configured

3. Close any error message indicating the inconsistent FW version

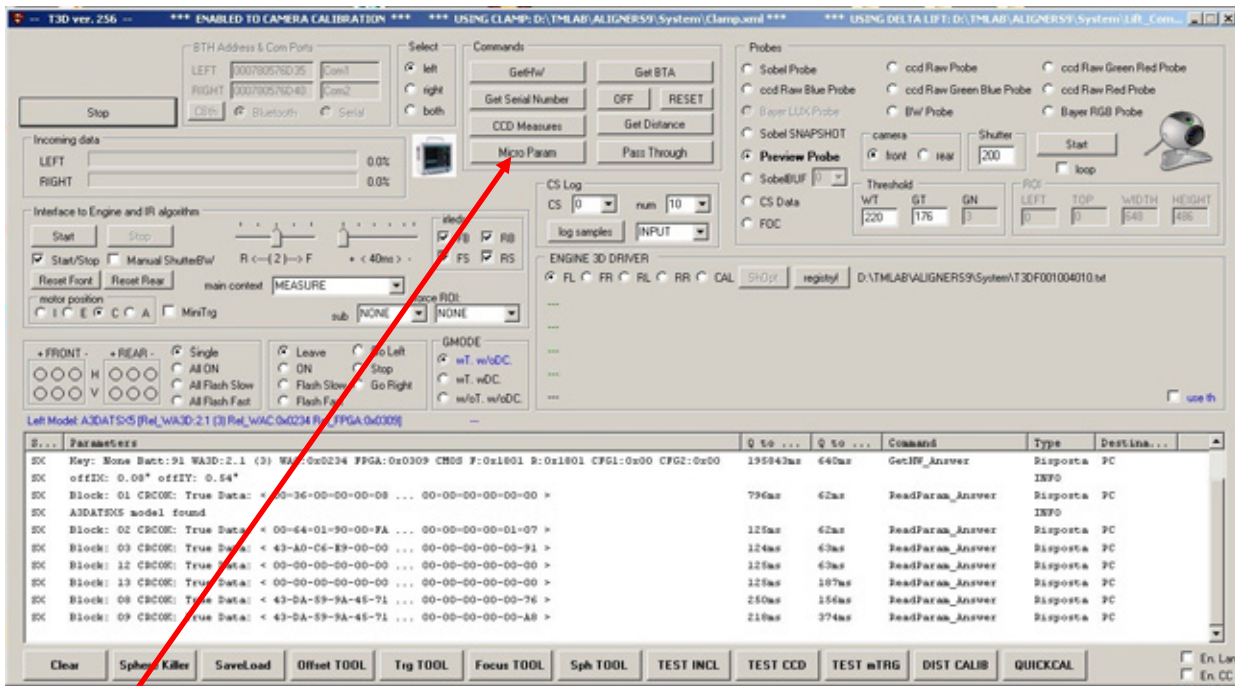
FW VERSION ERROR

Please check Pw/ version on HeadLeft

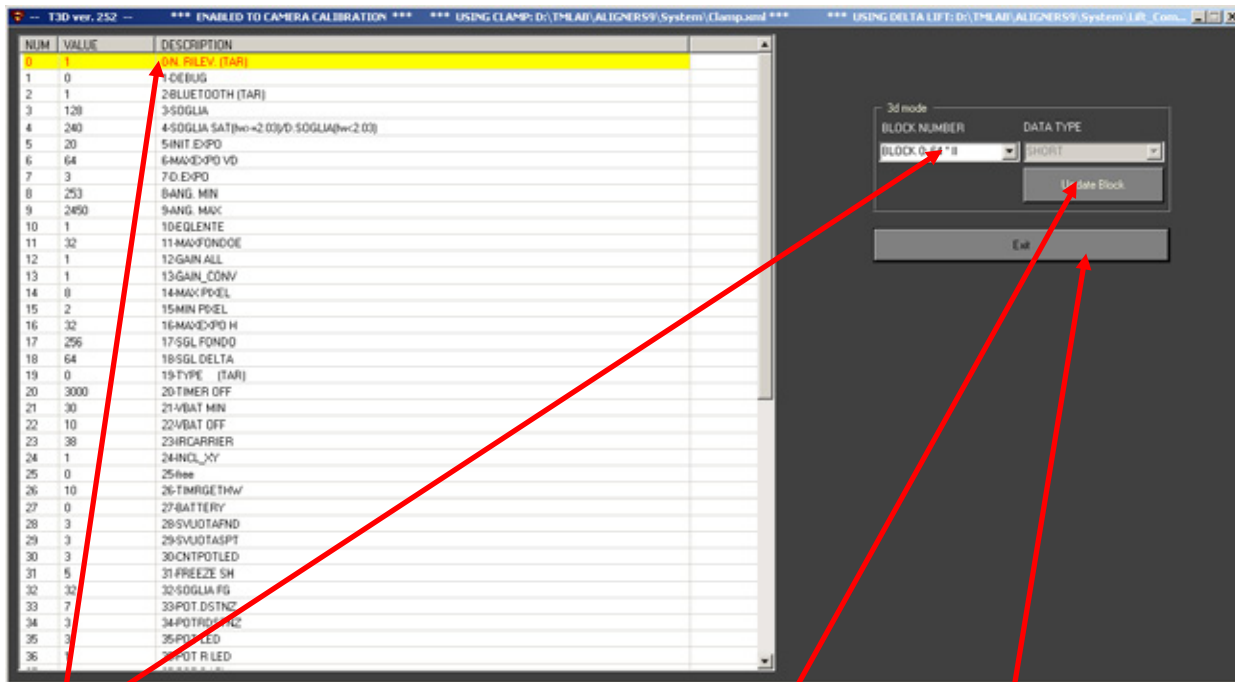
Rel\_WA3D: 2.0 (8) Rel\_WAC:04231 Rel\_FPGA:04309  
is different from:  
Rel\_WA3D: 2.0 (7) Rel\_WAC:04230 Rel\_FPGA:04309  
see CheckPwVersion.txt file



Normally the CPU board is configured to be mounted in a LEFT measuring head. Proceed as follows to configure it as RIGHT



1. Click on the "Micro Param" button



2. Select in block "0" "param. 0 - N. RILEV" Enter the value "1" for RIGHT ("0" is for LEFT)

3. Click on the "Update Block" button, The relative parameter is highlighted in yellow

4. Click on the "Exit" button

### 2.4.5. FW Update

The FW versions present in the heads can be verified using the appropriate test option, see chapt. 4.1. The FW may need to be updated when, for example, a CPU is replaced.

The “WA3D” and “FPGA” FW update files and the “FW\_LOADER” loading program can be downloaded from the technical support site.



To update the FWs on the measuring heads, run the “FW\_LOADER” program as shown below.

The screenshot shows the 'Firmware Loader' application window. The title bar reads 'Firmware Loader ver: 1.2.0.0 ALIGNER 3D MODE'. The interface includes several sections: 'BTH Address & Com Ports' with a text field containing '886B0FC48403' and radio buttons for 'Bluetooth' (selected) and 'Serial'; 'Firmwares' with a list box containing 'WA3D\_244.xmd'; 'FW type' with radio buttons for 'WA3D' (selected), 'WAC', and 'FPGA'; and a 'Parameters' table with columns for 'Command' and 'Type'. At the bottom are 'Clear' and 'exit' buttons. Red arrows point to specific elements with numbered instructions: 1 points to the BTH address field; 2 points to the 'Connect' button; 3 points to the 'FW type' radio buttons; 4 points to the 'Firmwares' list box; 5 points to the 'Upload' button; and 6 points to the 'exit' button.

**1** Enter head BTH address and select L or R

**2** Click on the “Connect” b

**3** Select the type of FW to load

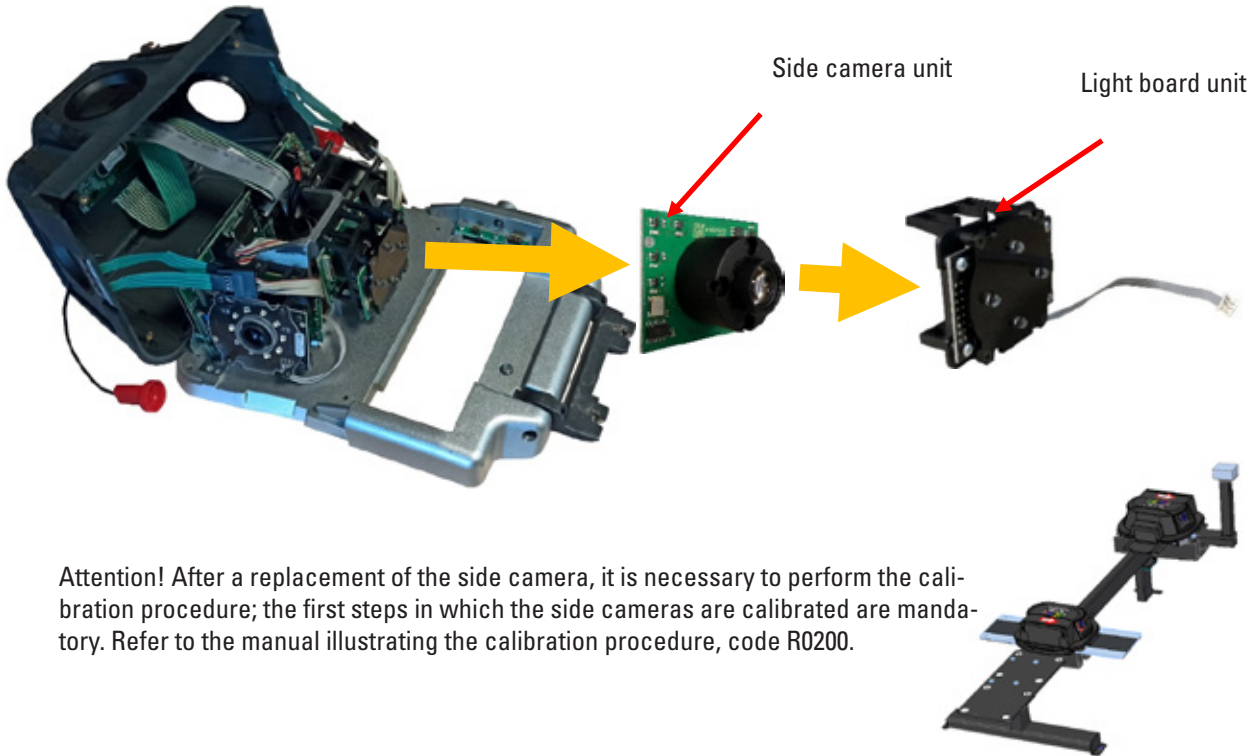
**4** Select the FW version to load

**5** Click on the “Up-load” button

**6** When the FW has been loaded, click on the “Exit” button

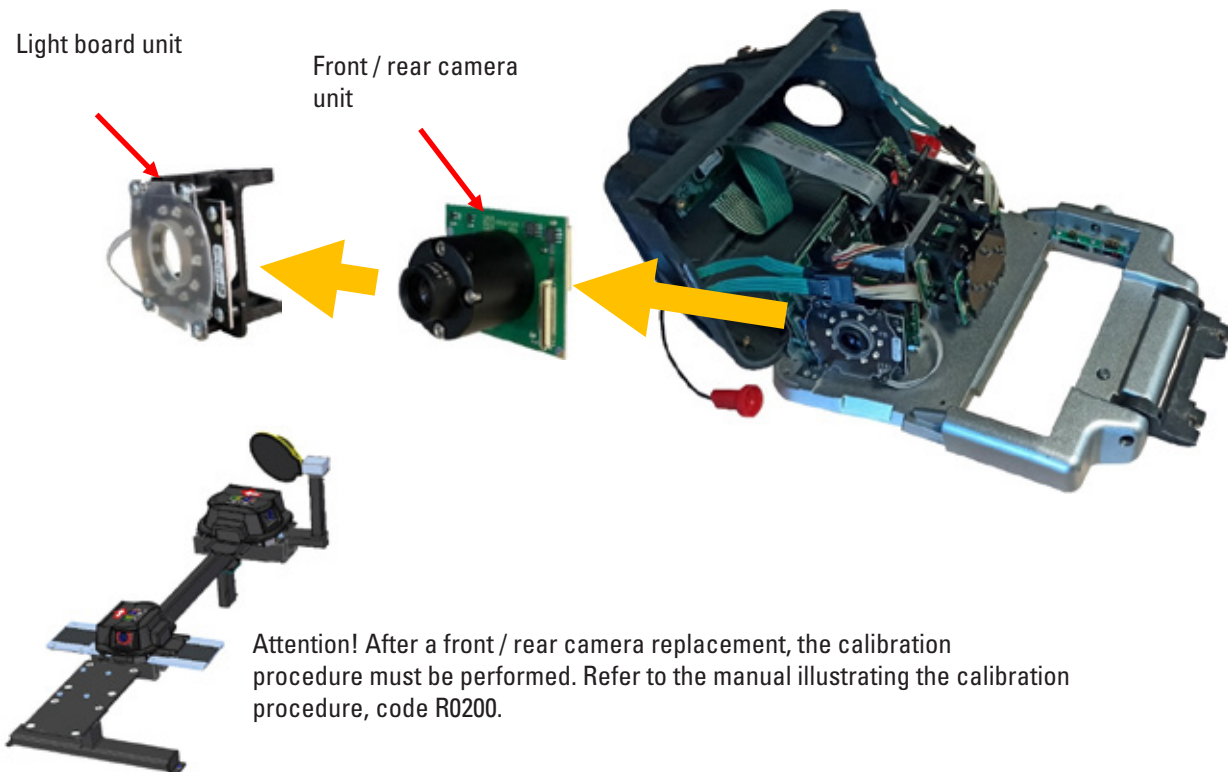
### 2.4.6. Replacing the side camera and light

You can replace the side camera unit as well as a lighting board unit with new parts.



### 2.4.7. Replacing front / rear cameras and lights

You can replace the front/rear camera unit as well as a light board unit with new parts.



### 3 CALIBRATIONS

#### 3.1. Complete procedure with calibration tool

The 3D wheel alignment measuring heads have already been calibrated at the factory; in addition, the calibration settings are stored in the CPU memory of the measuring head itself. At the time of installation, therefore, the equipment does not require calibration or configuration of the data. Calibration is only necessary if the transducers are changed or following repeated errors ascertained due to sensor movement (following falls, shocks, etc.).

Starting from the home page, press F2 to enter the System Menu, then use keys F2 / F3 to select the “Additional Functionalities” and confirm with F4.

Using keys F2 / F3, select the “Calibration Menu”, then confirm with F4.

You can log in using the following password: “F8; F7; F6; F8”

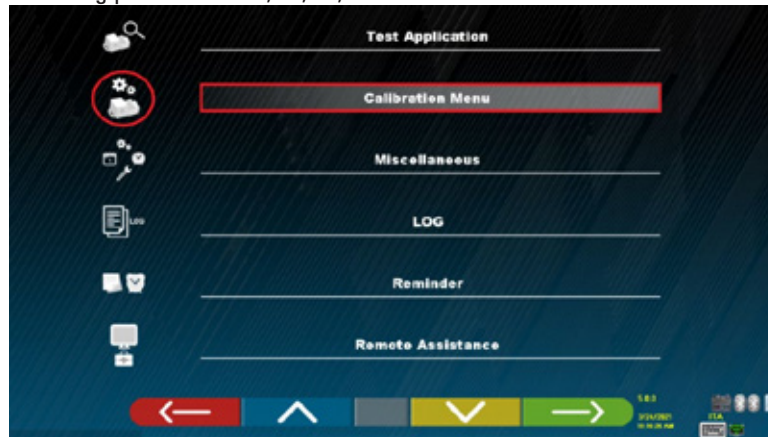


Figure 23

Complete calibration, using the STDA133 calibration system, is described in the manual R0200.



#### 3.1.1. Calibration procedure of the “Vertical” Central Cameras

The menu option “CCDs vertical calibration on lift”, for equipment with measurement sensors produced before 2021 (HW “X0” ÷ “X5”)



It is performed to enable compensation mode using vertical “CCD” sensors.

In the X6 series and later 3D heads, produced from 2021, the gains of the side cameras have been fixed at the factory. For this reason, with

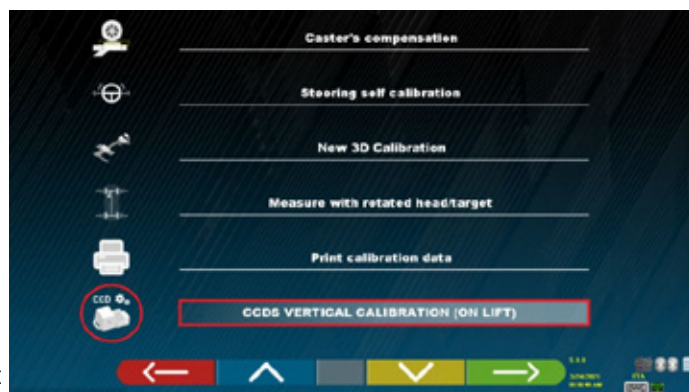


Figure 24



these sensors, the “on lift” calibration procedure is not necessary.

The option “CCDs vertical calibration on lift” in this case returns to the screen Figura 25 where it is only required to enable or disable the use of the side cameras to compensate for the vertical angles. It is also necessary to enter the distance between the heads for correct compensation of the corners (grip between the outer edges excluding the handles).

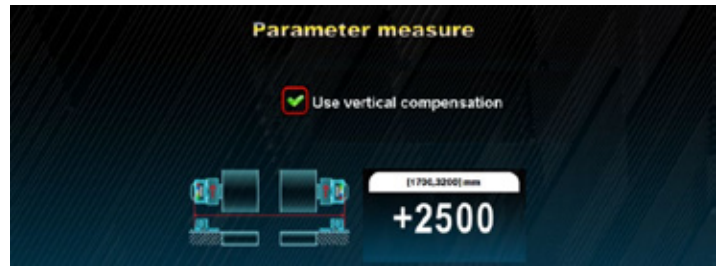


Figure 25



### 3.2. Incidence compensation adjustment

The first option of the calibration menu (see Figure 24) is used to correct the readings of the incidence angles caused by any “out of level” of the vehicle in a longitudinal direction. This can happen, for example, when the recesses of the lift for the rotating plates are of different heights of the plates themselves.

Simply set the difference between the height of the front wheel and the height of the rear wheel using keys F2 and F3 (see Figure 26).

The equipment automatically compensates for the read incidence value taking into account this difference in relation to the average pitch of the vehicle.

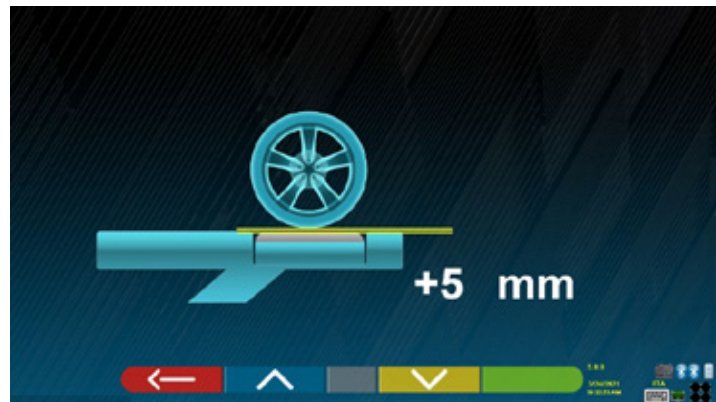


Figure 26

### 3.3. Steering wheel compensation adjustment

If the measuring sensors are not perfectly calibrated, it may happen that after registration the vehicle does not have a straight steering wheel. The second option of the calibration menu (see Figura 24) is used to compensate for the position of the steering wheel spokes.

Simply set the position of the current steering wheel using keys F2 and F3 (see Figura 27). The equipment automatically compensates for the reading so that the steering wheel spokes are straight.



Figure 27

## 4 TEST PROCEDURES

Through the TEST program it is possible to verify the correct operation of all the devices of the wheel alignment system. The TEST procedures menu must be selected as follows:

From the home page, simultaneously press CTRL-F2, the page Figura 28 appears.

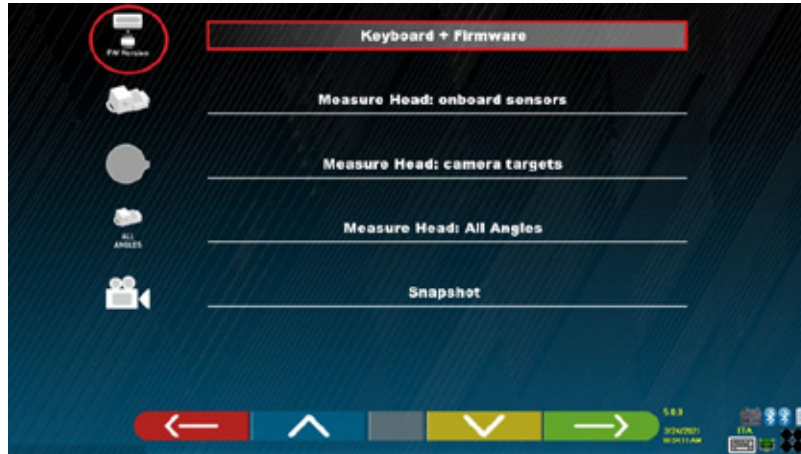


Figure 28

### 4.1. Keyboard Test and FW Release

(Communication Test)

With this test it is possible to verify the correct communication between the measuring heads and the cabinet.

This page shows the FW “FPGA” and “WA3D” versions of the measuring heads:

The measuring head keyboards are also shown here.

If a key is repeatedly pressed, the paired key on the video becomes colored and colorless alternately. Press the F1 key on the PC keyboard to exit.

The procedure for FW updating is described in chapt. 2.5.5. Please refer also to the manual code R0200 illustrating the calibration procedure.

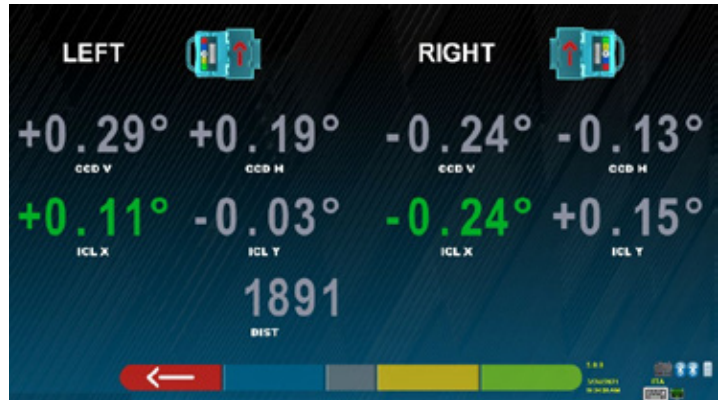


Figure 29

#### 4.2. Test of Inclinometers "X" and "Y" and central cameras "H" and "V"

This test displays the readings of the angles measured by the inclinometers "X" (transverse axis) and "Y" (longitudinal axis), and the angles measured by the central cameras "H" (horizontal measurement) and "V" (vertical measurement). Below is the measurement of the distance between the heads, introduced at the end of the calibration procedure of the vertical central cameras (par. 3.1.1)

*Note: This indication takes into account the difference between the actual measurement between the cameras and the point where the distance (between the outer edges) is measured.*



Press F1 to exit.

Figure 30

Adjust the level of the measuring heads using an Allen wrench, acting on the adjustment set screw as shown in Figure 31.

When finished, lock the locknuts.

The readings of the inclinometers "X" must be adjusted to  $0.00^\circ \pm 0.50^\circ$

*Note: the ICL X and ICL Y values are indicated in green between  $-3.50^\circ$  and  $+3.50^\circ$  because in the measurement procedure, beyond this value, an anomaly is reported and it is suggested to adjust the level.*



Figure 31

#### 4.3. Test for displaying the positions of the spheres in the targets

This test shows all the readings of the positions of the spheres in space.

The X, Y, Z coordinates are indicated.

The coordinates for each of the 12 outer spheres and 8 inner spheres.

Press key F1 to exit.

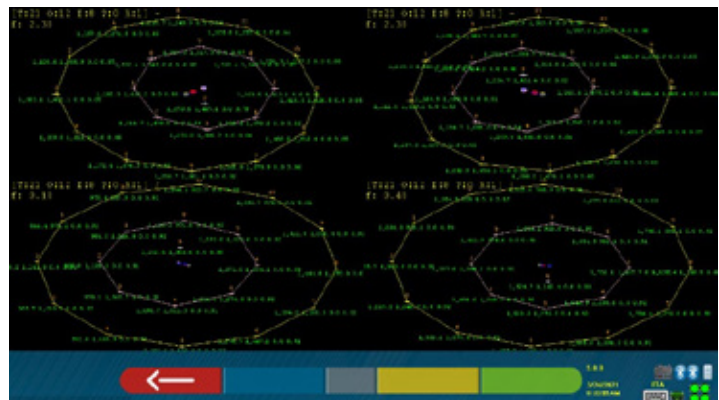


Figure 32



#### 4.4. Test of the measurement of angles measured by the cameras

All corners read by the cameras are displayed on the screen:

Alpha, Beta; Gamma; these are connected to the Convergence, Bell and Level angles respectively (see Figura 33).

Press key F1 to exit.

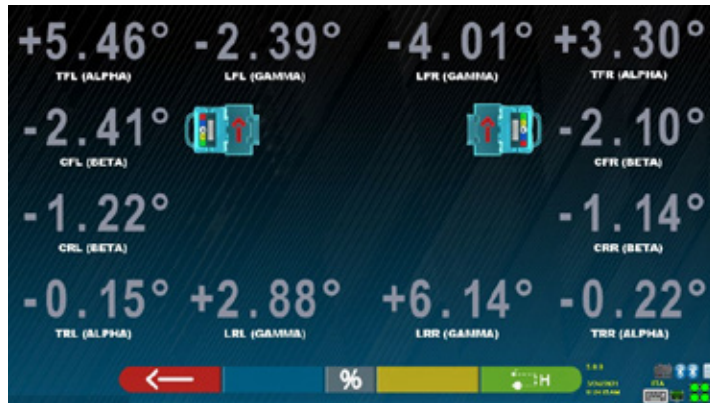



Figure 33

By pressing key F5  a page with the distances X, Y and Z of the target from the reference measuring head is displayed.

Press key F1 to exit.



Figure 34

By pressing key F4  a page with the heights measured by the "Minitargets" (if available) from the center of the wheel is displayed.

Press key F1 to exit.

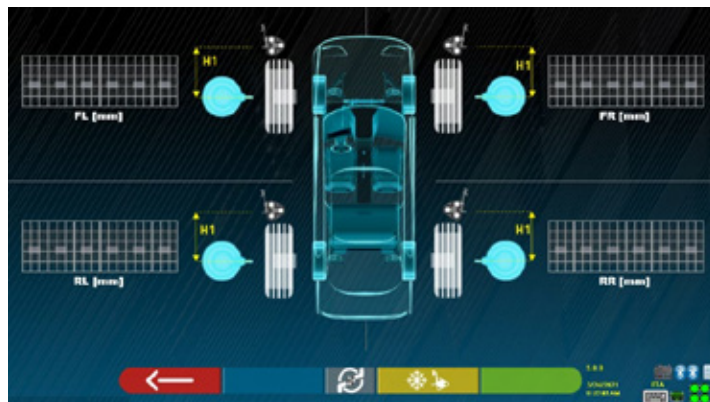


Figure 35

## 4.5. Testing Target and Side Camera

### Snapshots

With this test, photos of cameras are taken to depict their actual display:

Select if you want to snapshot targets or side cameras and press F4 to confirm

Press key F1 to exit.

With this test, photos are taken on repeat from the front and rear cameras to show the actual representation of the spheres in the targets.



Figure 36

Press key F5 to take photos on the Front Left Target, F6 for the Front Right, F7 and F8 for the Rear Left and Right.

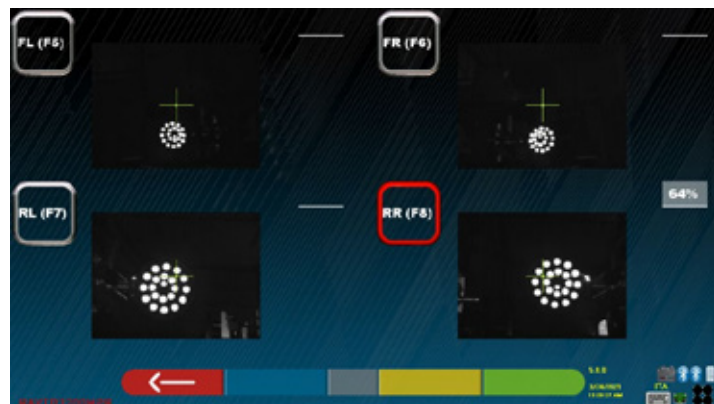


Figure 37

Press key F1 to exit

With this test, photos are taken of side cameras, which are used to measure the vertical and horizontal deviation between each other.

Press F2 to take photos from the Left Head Side Camera, F3 to take photos from the Right Camera

The right side of the screen also shows the measured angular values "CCD V" (vertical) and "CCD H" (horizontal)

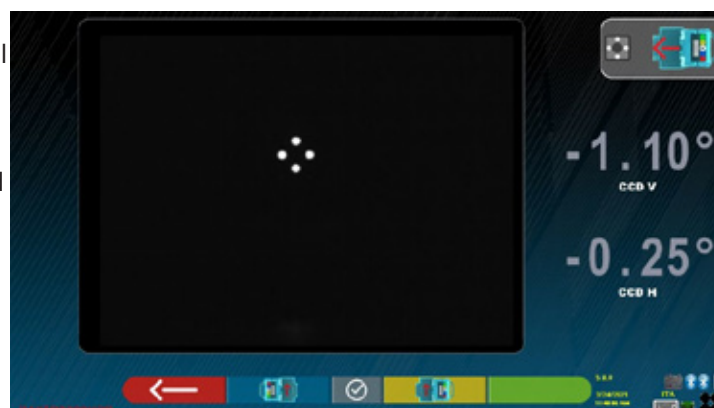


Figure 38

Press key F1 to exit.

#### 4.6. Count of number of tests performed

Starting from the home page, simultaneously press the Ctrl-F12 keys, the page with the count of the tests performed appears (see Figura 39).

The meaning is the following:

DC = Diagnosed vehicles

RC = Registered vehicles

SC = Saved vehicles

NOTE: The counters are kept even after the SW is updated.

NOTE 2: By pressing key F2, a "Log" file is saved in the USB memory key, such as "filename#.log" in the "AS9" directory.

If no USB memory key is inserted in the PC ports, by pressing key F2, the "Log" file is saved in the PC folder:

"/TMLAB/ALIGNERS9/Temp".



Figure 39

**Installer:** Please keep this manual in your Rotary Wheel service repair manual master book.

***Thank You***

Trained Operators and Regular Maintenance Ensures Satisfactory Performance of Your Wheel Service Equipment.

Contact Your Nearest Authorized Rotary Wheel Service Equipment Parts Distributor for Genuine Replacement Parts. See Literature Package for Parts Breakdown.

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