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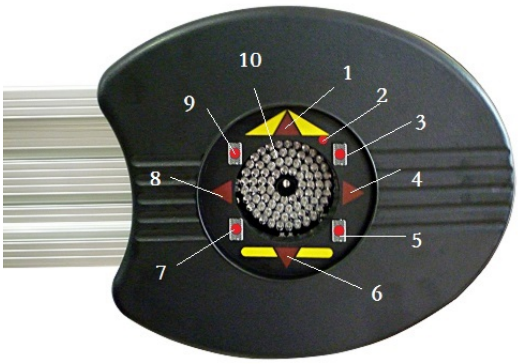
Chapter 1 Overview

1.1 System composition

This operation manual applies to all models of our 3D four-wheel aligner. The 3D four-wheel aligner is composed of post, beam, two special detection cameras, four targets, clamp, computer, monitor, printer and cabinet. The cameras are fixed on both ends of the beam and protected by two protective cover respectively. Both the computer and printer are set inside the cabinet. The 3D software is installed by hardware directly. Simplified four-wheel aligner has no control cabinet and all its supporting accessories are fixed on post. The aligner with automatic lifting system is provided with control system on the basis of the common aligner system.

One professional customized industrial camera is installed within the camera cover and is used for capturing the change of target image during the process of four-wheel positioning. The camera cover is provided with power and direction indicator. See below for details:



The direction indicating arrow 1, 4, 6 and 8 in the figure stand for the rotation direction of target during the four-wheel positioning. +5V power supply is normal if the indicator 3, 5 7 and 9 are on (red or green). These four LED lamps are also used to check if four targets of wheel are covered. Green means the target is normal while red means the target is covered. LED lamp 3 represents the right front wheel, while LED lamp 5 is the right rear wheel, LED lamp 7 is left rear wheel and LED lamp 9 is the left front wheel. LED lamp 2 indicates if +12V power works normally. If it is red, it means the +12V power works normally, otherwise it means the +12V power does not work. Eighty LED lights (No. 10) within the circle are flashing when the camera is working. If not, it means no target image is appeared in the camera viewer.

The left figure shows an arrow indicating upper direction, which means pushing vehicle forward during the positioning. The four arrows will be on if the vehicle is pushed to the certain position and it will not be pushed any longer.

The left figure shows an arrow indicating down direction, which means pulling vehicle backward during the positioning. The four arrows will be on if the vehicle is pulled to the certain position and it will not be pulled any longer.

The left figure shows an arrow indicating right direction, which means rotating the steering to the right side during the test of the caster. Stop rotating the steering when “STOP" sign appears on the screen and four arrow indicator lamps are all on.

The left figure shows an arrow indicating the left direction, which means rotating the steering to the left side during the test of the caster. Stop rotating the steering when “STOP" sign appears on the screen and four arrow indicator lamps are all on.

If four direction indicator lamps in the right figure are all on, it means the computer is processing the data during the four wheel position or caster measurement. If so, never rotate steering wheel or push/pull the vehicle. If four direction indicator lamps are always flashing, it means the camera s are working in the sleep mode.

1.2 Important Prompt

The aligner must be installed under the guidance of the manufacturer’s trained technician. The user shall neither open the protective shields, nor change the relative position of the two cameras. The working site of aligner shall be provided with stable power supply and reliable earthing device. If there is no earthing device on site, please use earthing copper bar provided by the equipment supplier. The computer is specialized for the aligner and cannot be used for other purpose or installed with other application software.

The post of the aligner shall be fixed on the ground permanently. Always make sure the reliable connection of the power cables and USB cables when moving the cabinet.

The software must be run under a special encryption key, which looks like a USB disk

externally and has been installed inside computer case. As shown in the figure, the encryption key is within the yellow circle.

The encryption key shall be properly kept when using or repairing the computer. If the encryption key is damaged during use, please replace a new one by contacting the supplier. If the encryption key is lost, Please connect with the supplier and purchase new one.

The connection of encryption key is shown in the right figure. If the customer want to change the encryption key and has no idea about how to connect encryption key correctly please insert encryption key to any USB port of the computer directly.

Chapter 2 Aligner Installation

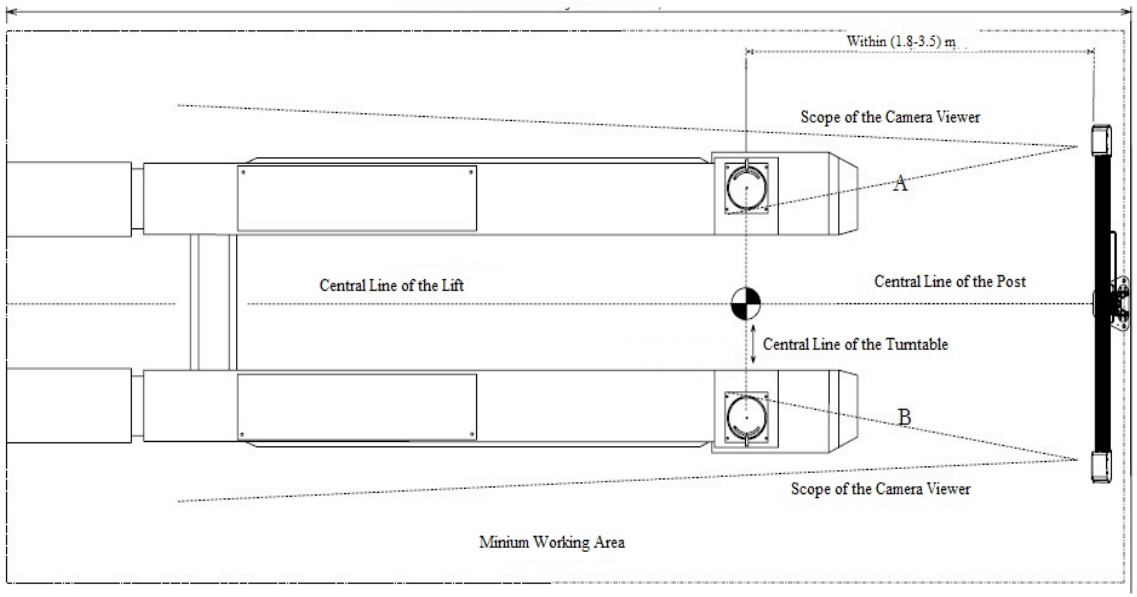
To ensure the smooth installation of aligner and normal operation after installation, please pay attention to the followings on site:

1. Use standard AC power 220V, 50Hz, with no power noise and good earthing;
2. The lifting machine shall be provided with reliable locking device and two traces shall be basically on the same plane. The front and back of each trace shall be horizontal to ensure push the vehicle easily. No barrier is allowed within the test scope and the camera shall be made to capture the target smoothly during the alignment;
3. Heater, welding machine, large emission light source, fan and electromagnetic radiation equipment shall be avoided around the equipment;
4. The space must be enough to install the aligner system.

2.1 Aligner installation

Below is the installation diagram of the aligner. Pay attention to the followings in installation:

1. Always make sure the installation central line of stand column is in consistency with the center of lifting machine;
2. Make sure the beam is horizontal;
3. Always make sure the distance A and B from two cameras to the turntable should be almost same;
4. The distance from post to the central line of the turntables shall be within (1.8-3.5)m and the best test distance is 2.5m;
5. Adjust the height of beam and make sure the imaging position of two targets is in the middle of the camera vision;
6. As for Automatic lifting aligner, never move the beam up and down by force before turning on the power in order to avoid damaging motor and gear box.
7. Never change the relative position of camera during the installation.
8. Make sure no barrier is within the vision field of camera.



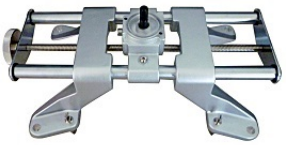
2.2 Target Installation

Prior to delivery, the target has been fixed on the clamp where the left front wheel, right front wheel, left rear wheel and right rear wheel have been marked. The machine can be used after installing the hook to the clamp on site. The small target shall be fixed on front wheel while the big one on the rear wheel, as shown in the figure below:

The front wheel and rear clamp of the aligner are different. The front wheel clamp is a bit higher than the rear one, as shown in the figure below:

Rear Clamp

Front Clamp



It is important to pay attention to the installation of copper sleeve and alignment pin when fixing the target. The copper sleeve is used to ensure the tightness of target and clamp installation while alignment pin is mainly used to fix the installation angle of target, as shown in the figure below:

Big Target

Small Target

Chapter 3 Software Installation and Uninstalling and Camera Drive

3.1 Software installation

3D alignment software is the professional software which are researched and developed by the company independently. The lowest configuration of computer required is as follows:

Operation system: Windows XP or 32-bit Windows 7
Processor: Intel processor
Memory: 2G
Hard drive capacity: 100G

The software is operated together with an encryption key. If the computer is not provided with an encryption key, the software is run in the demonstration mode and cannot finish complete positioning test. The camera drive, calibration data, defaulted factory settings and other application programs which are required for software operation are saved in the Disk D of the computer. It is very important to back up the data in Disk D before formatting the computer.

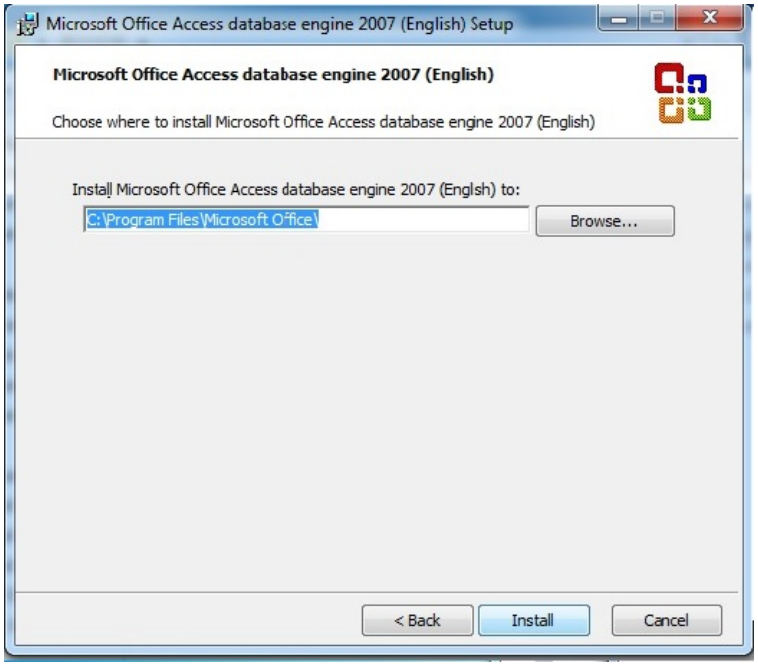
3.1.1 Installation of Adobe Reader

Adobe Reader is free software which can be downloaded online directly or installed from Disk D directly. It is intended for reading the help files of the software.

3.1.2 Installation of Access Database Engine

As a database tool provided by Microsoft, Access Database Engine can be downloaded online directly or installed in Disk D directly. Double click “AccessDatabaseEngine.exe” and the prompt shown in the right figure will appear on the screen. Tick the square and click “next” to continue installation.

Select installation path, in general it is not necessary to modify. Click “install”, the installation will continue.



The screen will prompt successful installation after installation is finished. Click “OK” to finish installation.

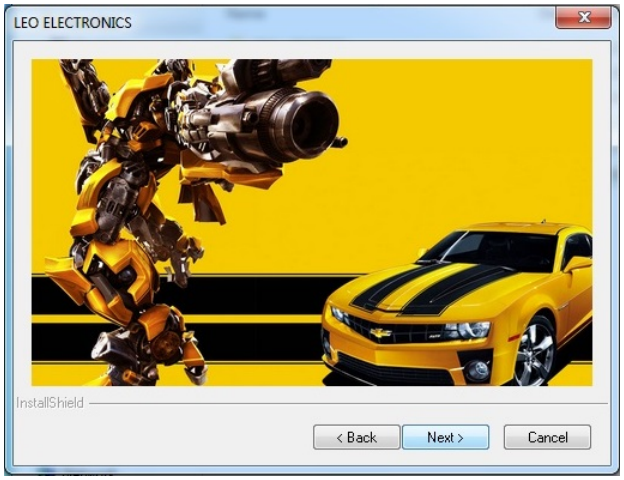
3.1.3

Installation of 3D four-wheel aligner software

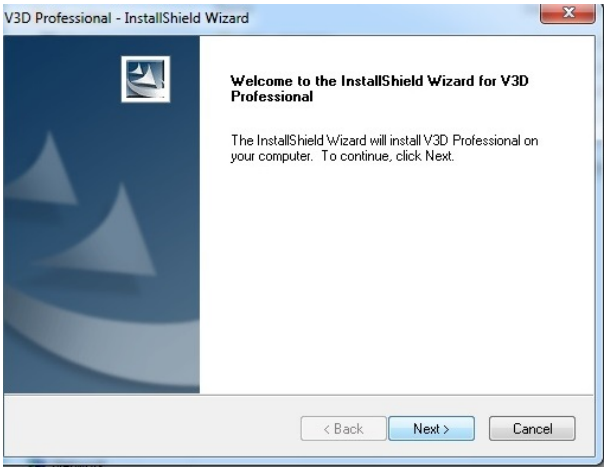
The software is supplied to the custom in DVD disk or the electronic document. Click program name and the software will be installed directly.

Language prompt window will appear on the screen and the installation language shall be selected based on Windows language. The client can select it and continue installation by pressing “OK” key.

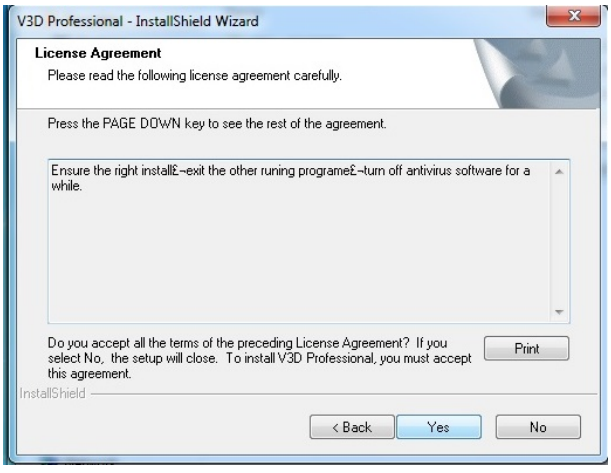
If the software installation guidance picture appears on the screen, click “next”, the installation will continue.



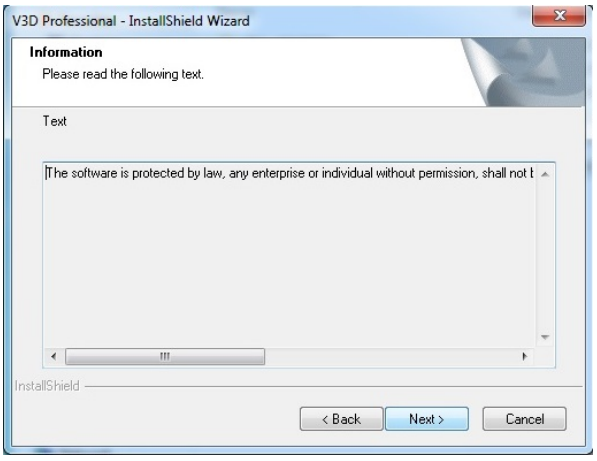
Click “next” to continue.



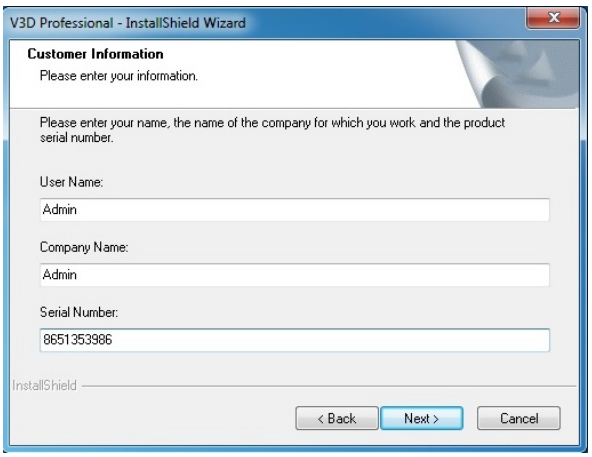
Click “next” to continue.



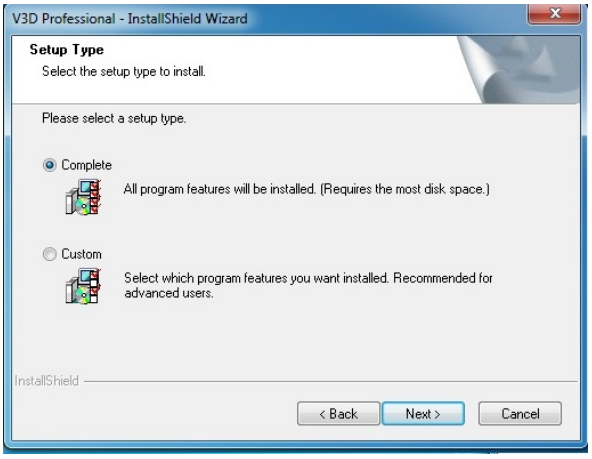
Click “next” to continue.



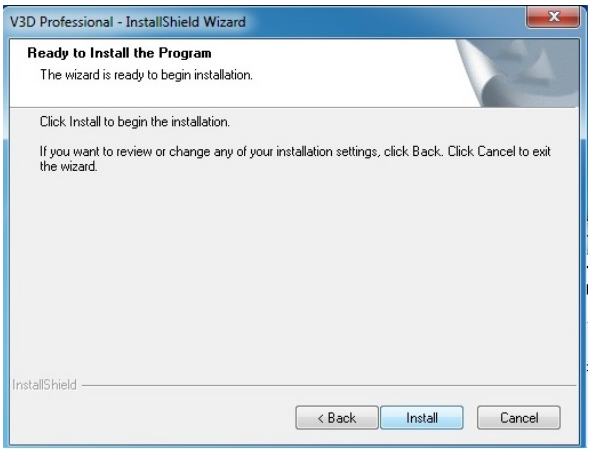
The user's name and company name have been set in the installation operation system in "client's information". The user can also modify it based on habit. Please ask the dealer for the serial number for software installation. Click "next" to continue.



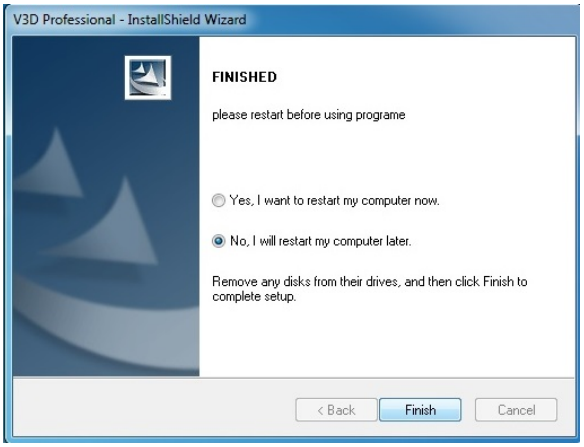
Tick "Complete" based on the installation type. Press "next" to continue.



Click "install" to continue.



Click "finish" and the program installation will be finished. it is strongly recommended to restart the computer.



The software will run automatically after restarting the computer and one shortcut of this software will appear on the desktop.

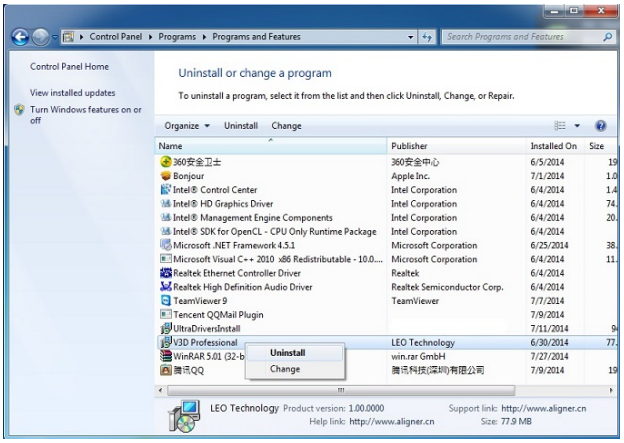
3.1.4 Database recovery

The installation software excludes the calibration data of the client's equipment. The data is backed up in the Disk D of computer in the form of "CPC_********"and the ******** actually means the serial number of the aligner which must be in consistency with the ID number of the beam. The ID number of the beam is marked in the back of the beam. Copy all files in "Configure" folder to C:\program Files\Aligner\Configure and replace the old ones. It is suggested to check if the recovery data is same as the data in the Disk D. If the calibration data cannot be found in Disk D or the serial number following the calibration file is not matched with the ID number of the beam, please feel free to contact the manufacturer.

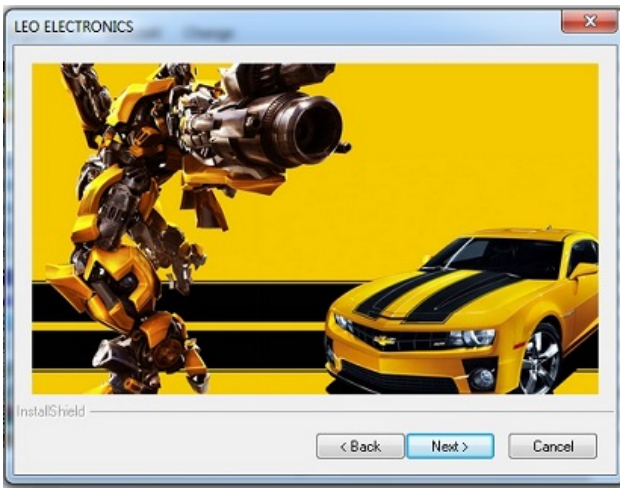
3.2 Software uninstalling

It is strongly recommended to uninstall programs through control panel. Prior to uninstalling, please back up the calibration data of the aligner by naming the folder as "Configure" under C:\Program Files\Aligner.

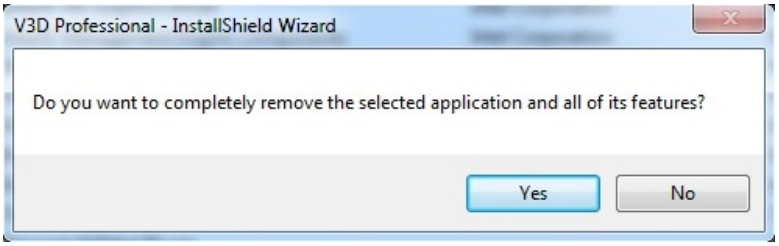
Click "Start - Control Panel- Program- Uninstall program" in sequence and right click the "3D Professional "and click "uninstall", then operate according to the prompt of the computer.



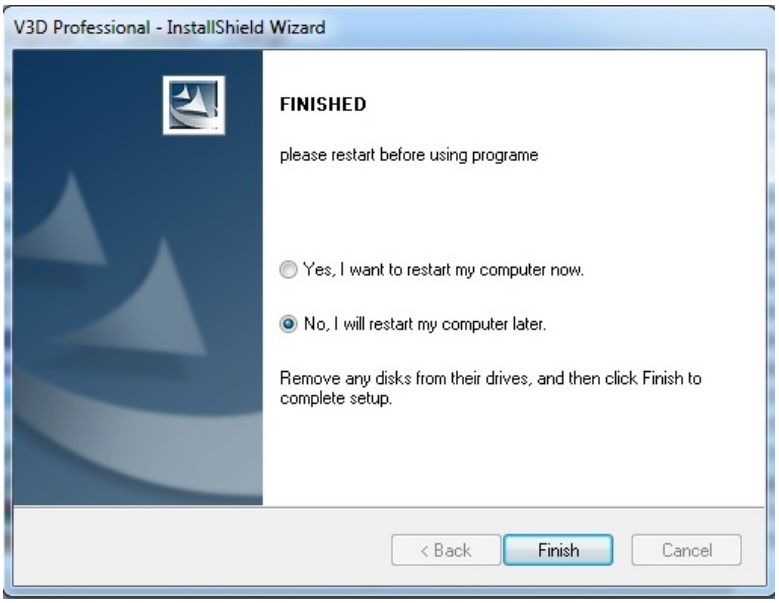
Click "next" to continue uninstalling.



Select “yes” to continue uninstalling.



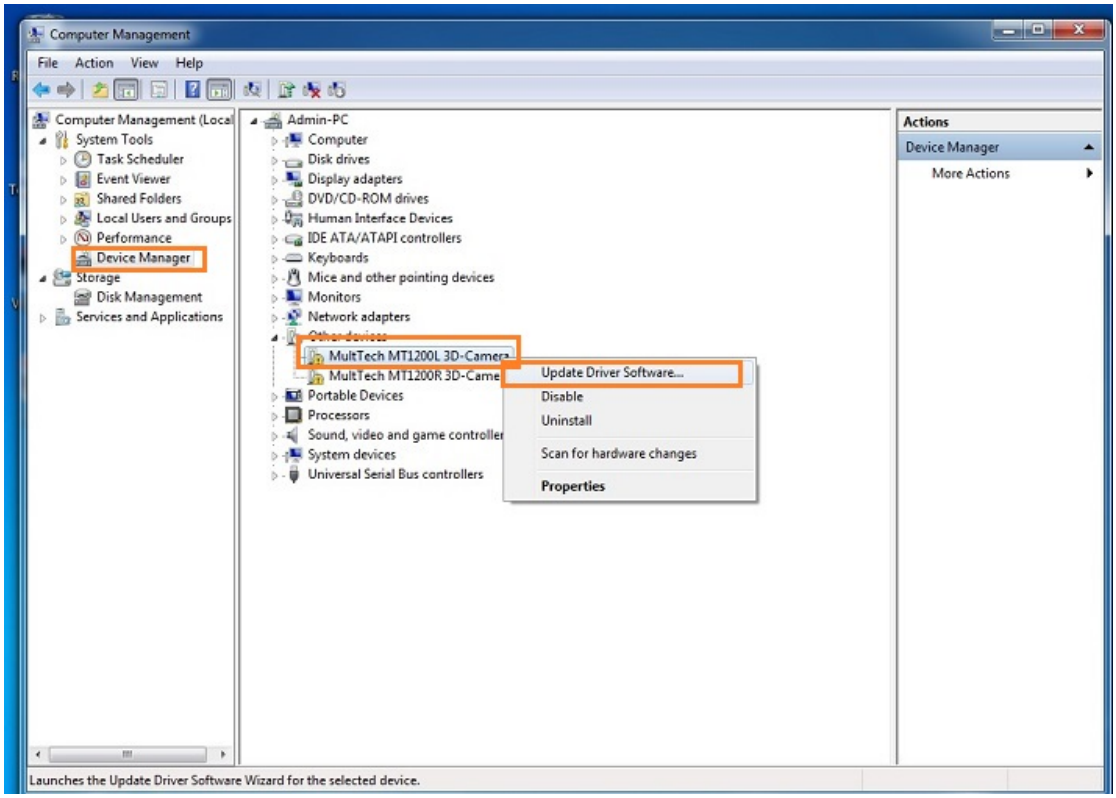
Click “finish” to finish uninstalling.



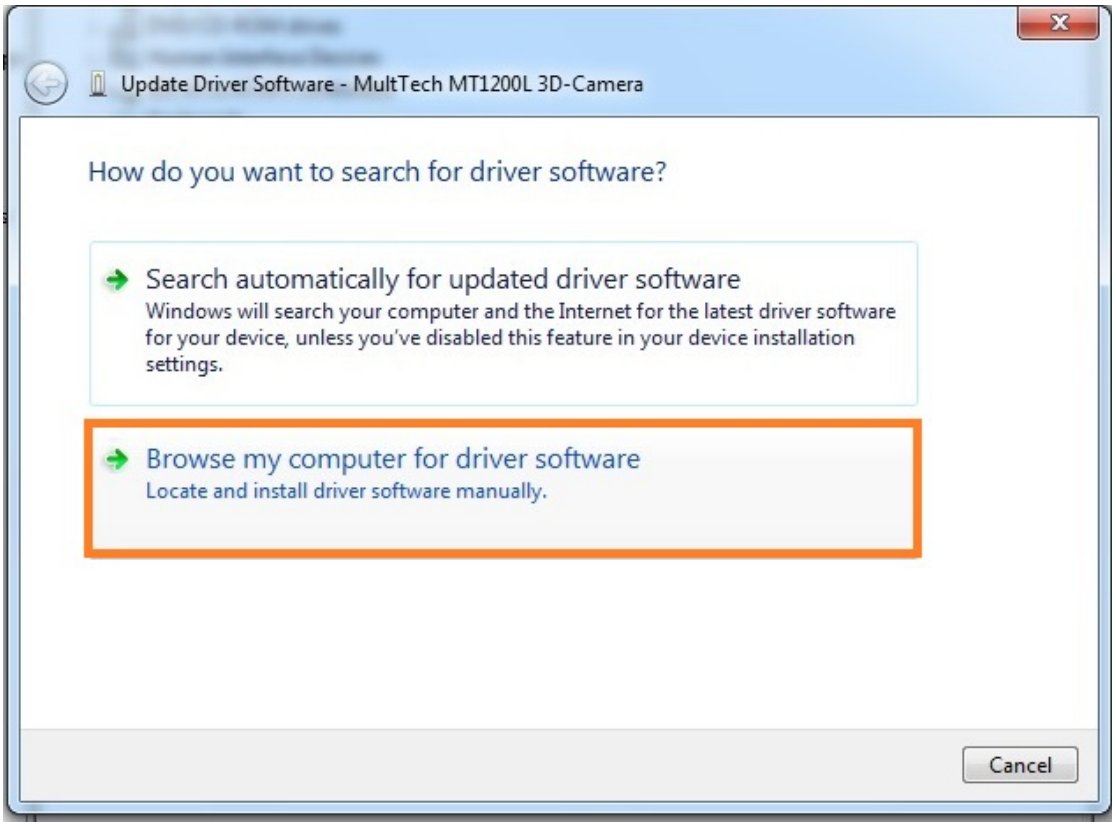
It is strongly recommended to restart computer after uninstalling the program. To uninstall program thoroughly, please check and delete the “Aligner” folder under C:\Program Files.

3.3 Camera drive

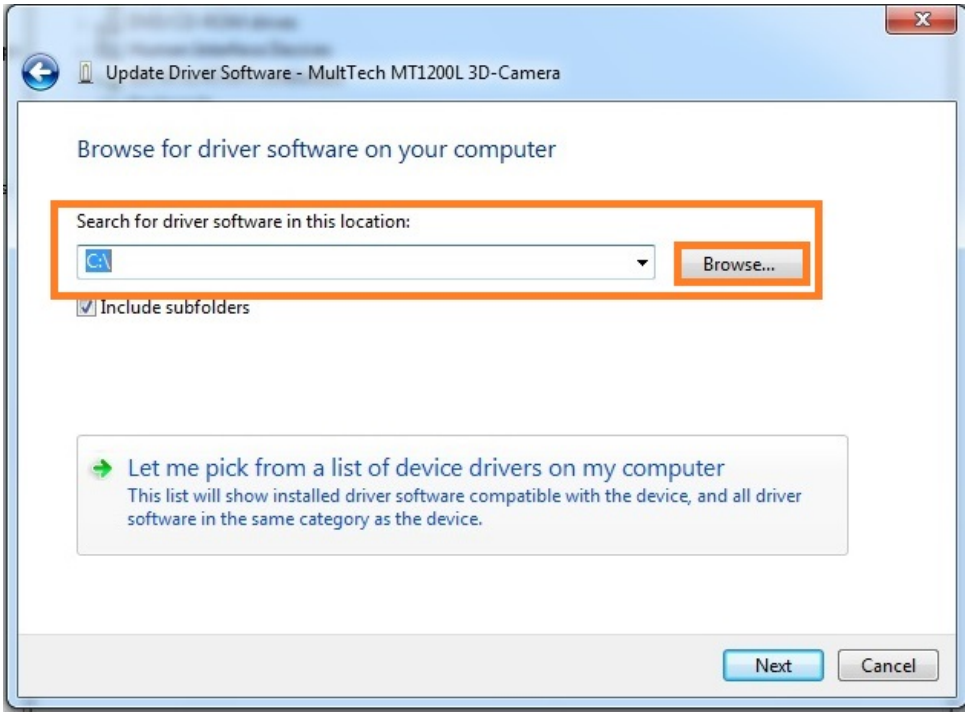
The drive program of camera has been installed prior to the delivery, which will be detected and loaded by Windows system automatically. If the computer operation system is reinstalled or the equipment is unable to work normally, please check if the camera drive is properly installed. To do this, please run "Start – My Computer- Right key - Governance – Device Manager" in sequence to check the camera drive, as shown in the figure below. If the computer has found camera, prompt will appear in other equipment. Right click to select “upgrade drive program". If there are no other devices in equipment administrator, please feel free to contact the service.



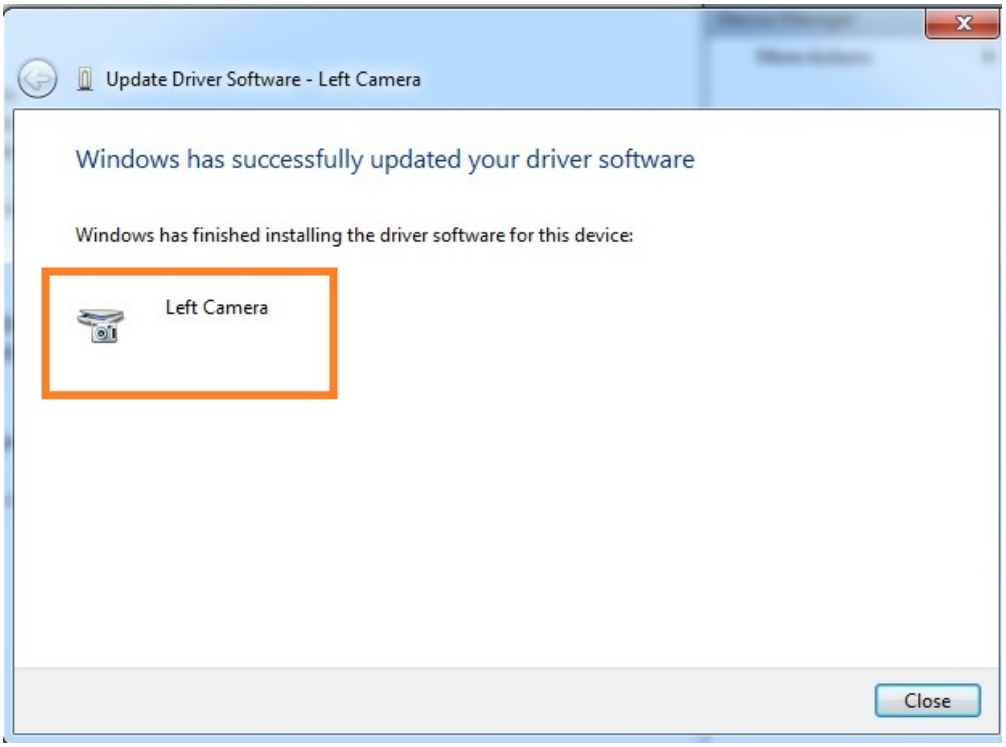
Select “Browse my computer for drive program software” in the interface of “How do you want to search for driver software”, as shown in the figure below:



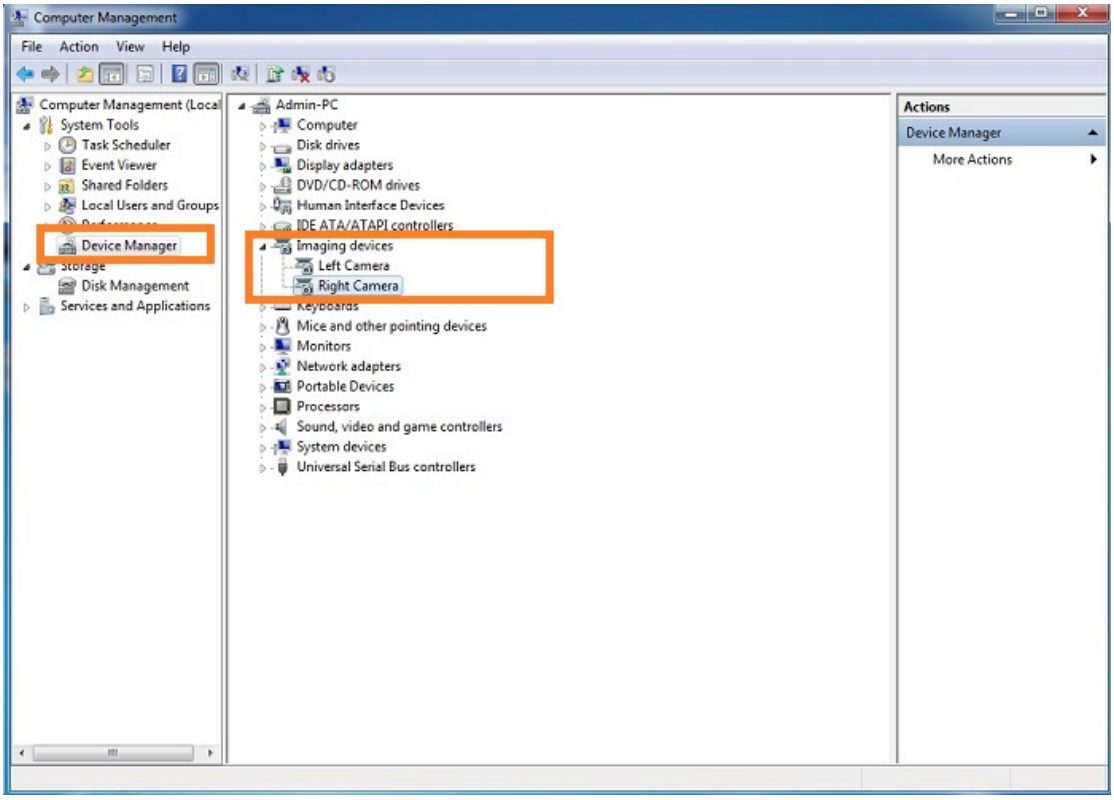
Select Disk C in “Browse for drive software on your computer” or seek for Disc C by “browse”; click “next” and the computer will install drive program automatically.



After drive program is installed, “Windows has upgraded drive program files successfully” will appear on screen and click “close” to finish installing drive program of the camera.



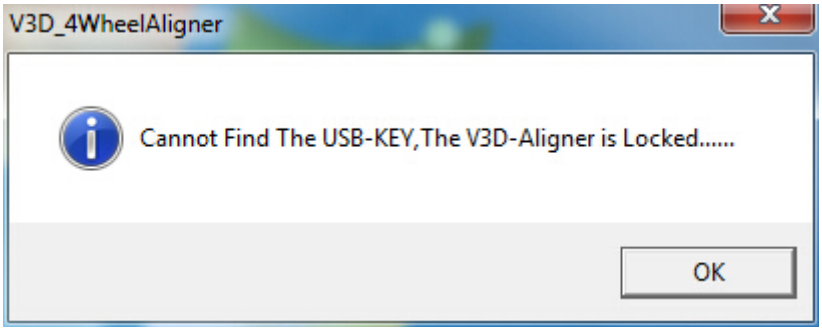
Install the drive program for another camera in the same way. After the drive programs of both cameras are installed, “Left Camera” and “Right Camera” will appear under “imaging devices” of equipment administrator, as shown in the figure below:



Chapter 4 System Software

The main power switch of aligner system is at the back side of cabinet. The computer, printer, monitor, camera power will be electrified by turn on the main power. Turn on the monitor, printer and computer in sequence and the computer will automatically recognize the cameras and begin to run the 3D software. **It is strongly recommended to close the computer first and then turn off the power of the cabinet after finishing working each day. If there is camera switch, close the camera power.**

The software must be run under Windows XP or 32-bit Windows 7 operation system. The software will detect encryption key first. If no encryption key is detected, the software will be locked and cannot be operated for real alignment. The following prompt will also appear on the screen:



Click “OK” key and the program will operate continuously and execute demonstration mode. One floating icon will also appear on the desktop, as shown in the figure below. If the computer is installed with encryption key, the software will enter the state of desktop floating icon directly after it is started.

The right and left instrument boards as shown in the figure mean the right and left camera. After the camera is electrified, 3D four-wheel positioning program will be operated and the computer will load the data to the camera. The pointer of instrument board will rotate accordingly. The pointer will point to 100% after loading the data. The corresponding OK pattern near the

instrument board will turn green from gray, which means the camera has entered working state. The four-wheel positioning detection cannot be conducted until both cameras enter working state. If the computer does not detect encryption key or cameras, the pointer in the figure will not rotate. Click “OK” in the middle and lower part of the pattern and the program will enter demonstration mode directly. Click “EXIT” to exit program operation.

After the successful loading of program the system will enter software main menu automatically, as shown in the figure below:

The main menu is divided into three parts, i.e., top, middle part and bottom.

The first line at the top of the picture:

1) The current function is displayed at the left side.

2) The title column is in the middle and used for displaying the store name of the aligner user.

3) Company Logo is at the right side and can be changed based on the demand. Click this mark and the program will display in minimum.

The middle part of the picture is function icons. If the mouse puts on icon, the word of the executive function will appear on the screen.

Some shortcut keys are at the bottom of the main menu so that the user can execute the function quickly during the alignment. This is a very unique design of this software so that the user can carry out the test of four-wheel positioning, test of caster, adjust the front wheel and rear wheel, and print the report very quickly.

4.1 Icon of function keys of main menu

Click this icon to finish one standard four-wheel positioning process set by the system, including selection of vehicle type, vehicle measurement, vehicle adjustment and user's data and printing function.

Click this icon to select the vehicle to be tested and display its specifications. The vehicle specifications include system database and customer database. The system

database is integrated by software while the database is defined by the user. Database can be edited. It is not suggested to edit the system database.

Click this icon to select some measurement functions individually, including the measurement of four-wheel positioning, caster and chassis parameters.

Click this icon to enter the data screen. Click the shortcut keys of front wheel and rear wheel in sequence to adjust the vehicle.

Input the information of customer..

Enter the system settings interface by clicking this icon and the system settings include the settings of unit, store name, language and system information.

Enter into system maintenance interface by clicking this icon. The system maintenance is composed of CPC calibration, CTC calibration and camera detection.

4.2 Function of shortcut key

The system will enter main menu by clicking this shortcut key under any circumstance. It is used for another new four-wheel positioning measurement or system settings or equipment recalibration.

The fast four-wheel positioning neither the vehicle is selected nor the client's data are filled in.

It is used for the fast measurement of caster angle of main pin.

The system will enter the picture of rear wheel adjustment by clicking this shortcut key in the data screen.

Click this shortcut key to enter the picture of front wheel adjustment. There are two pictures of the front wheel adjustment which can be switched mutually.

Shortcut key for printing. Select printing or save data after clicking printing shortcut key. The data cannot be consulted in client's data until they are saved.

Shortcut key of camera viewer.

Click this shortcut key and the system will exit automatically.

It is strongly recommended to exit four-wheel positioning software before powering camera off.

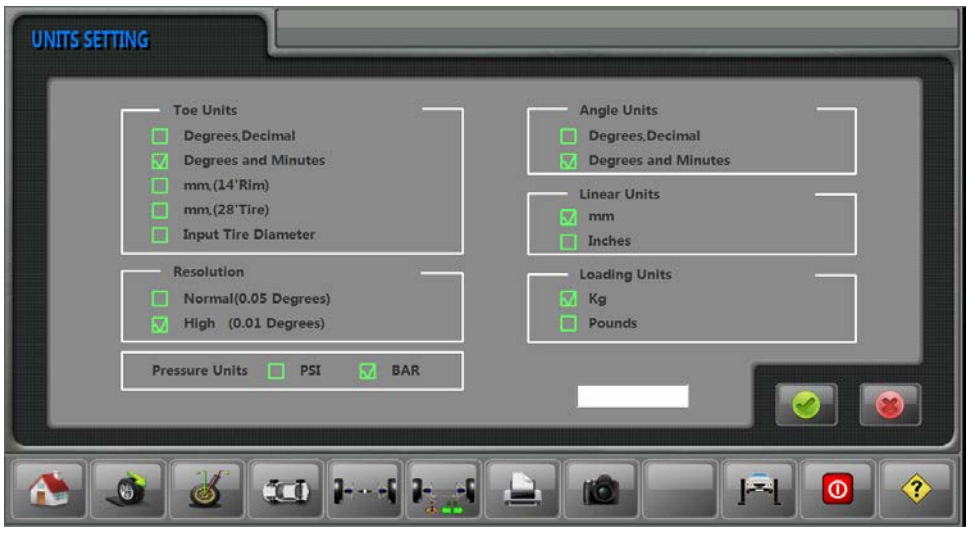
Assistance shortcut key is used. The user is recommended to read the operation manual of software carefully before operating this system.

Chapter 5 System Settings

System settings include the settings of unit, store name, language and system information. The screen will display the followings by clicking system settings icon in the main menu:

5.1 Unit settings

The interface of unit settings will appear on the screen by clicking the icon of unit settings on the left side. The operator can select proper detection unit according to the user's habit and requirements of vehicle manufacturer. Once the specified measurement unit is selected, the data displayed on the screen will be applied to this unit. The angle unit is divided into "degree and minute" and the distance is mm-based. There are two resolutions. The display precision of normal resolution is 0.05º while that of high resolution is 0.01º. Either will not affect the final detection precision. The number of bits and size of data displayed are rounded off. The white square at the right lower angle of figure is used to input the diameter of customized tire.



5.2 Store information

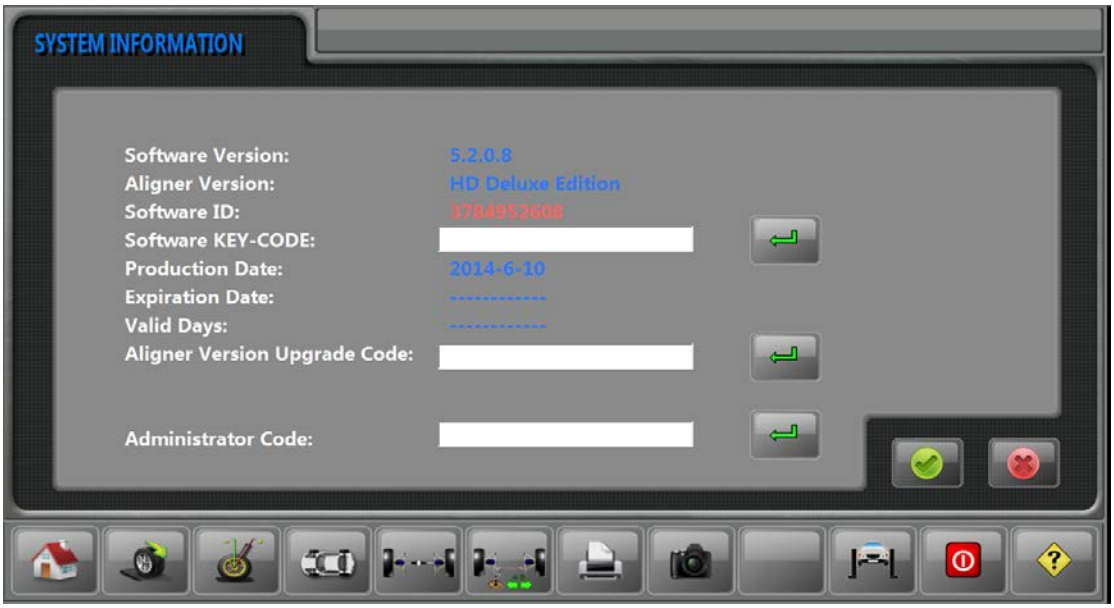
Enter the interface of “STORE NAME” settings by clicking the left icon. The store name will be displayed in the report and in the middle of the first line of detection report as long as it is set. Below is the specific information of store name:

5.3 Language selection

Enter the interface of “language selection” by clicking the left icon. The user can select their preferred language and press “OK” key. After the software is restarted, the prompt words appearing are just the one you set. This system adopts UNICODE character encoding scheme. The language selected is not affected by the computer operation system. The client can operate multi-language function under the operation system of one language. Another function of this system is to display the current language in the green square at the right side of language settings with different languages at the same time so that the users speaking different languages can use it very conveniently.

5.4 System information

The system enters the picture of system information by clicking the left icon. System information actually includes software version, aligner version, software ID, software KEY-CODE, production date, expiration date, valid days, aligner version upgrade code and administrator code. The software version displays the version information of the software currently used. The version of aligner shall be set by the manufacturer before delivery. If the user has to upgrade it, please contact with the dealer to get the upgrade code of the aligner version. The production date, effective date and effective days shall be controlled based on the software ID. The administrator code is used by equipment maintenance personnel to control “gain” and “mode” in the vision field of camera as well as the effective date and effective days of the camera.



In case of prompt about the expiration of software, please tell software ID of the equipment to your dealer who will tell you a software key code. Please input this key code into the square at the back side of software KEY-CODE and click the “enter” key at the back side. If the key code is correct, the computer will prompt that the password is correct and exit automatically.

Chapter 6 System Maintenance

System maintenance includes the calibration of CPC (**C**alibration the **P**osition of the **C**amera), CTC (**C**alibration the error of the **T**arget & **C**lamps) and camera detection and the software interface is shown in the figure below:

6.1 CPC calibration

The left is CPC calibration icon. CPC calibration has been made before the delivery of products so it becomes unnecessary on site. The camera needs calibrating again in any of the following circumstances. Please contact our after-sales service personnel or the dealer for calibration which shall not be conducted by client arbitrarily.

1. The camera was ever maintained by technicians;
2. The position of the camera is changed;
3. Either camera is changed;
4. Obvious error happens to the measurement result.

CPC calibration data is backed up in Disk D of the computer. When reinstalling computer system, never format Disk D. If required, please back up the data there before formatting.

The interface displayed at the right side of the screen will appear on the computer by double clicking CPC icon. Input CPC password and click “enter” key. Calibration is started after the system prompts “CPC password correct”. Below are the specific steps for CPC calibration:

Step 1 Slide the right steering wheel outward. Put the calibration frame on the right treadmill at the right side to make the small target at the external side of the turntable and the large one in the back central point of the deviation turntable. Press “OK” button to continue with the program.

Step 2 Press the rear foot pin of the calibration frame and lock it. Press “OK” key to continue with it. The next step can not be executed until the calibration frame is put in the designated place and “OK” appears.

Step 3 Pin recovery. Put the small target of calibration frame on the right treadmill and put the large one on the left treadmill. The front and rear supporting pins of the calibration frame shall be put on the turntable. If required, slide the turntable inward. Press “OK” button to continue with the program.

Step 4 Move the calibration frame on the treadmill 60cm backward. Press “OK” button to continue with the program.

Step 5 Move the calibration frame on the treadmill 60cm backward again. Press “OK” button to continue with the program.

Step 6: Move back the calibration frame to turntable. Put small target on the right treadmill while the large one on the left treadmill. The front and rear support frames of the calibration frame shall be set on the turntable. Press “OK” button to continue with the program.

Step 7 Put calibration frame on the left treadmill of lifting machine. Put small target in the center of the turntable while large one at the back side and beyond the treadmill. Press “OK” button to continue with the program.

Step 8 Press rear foot pin and lock it. Press “next” button to continue with the program.

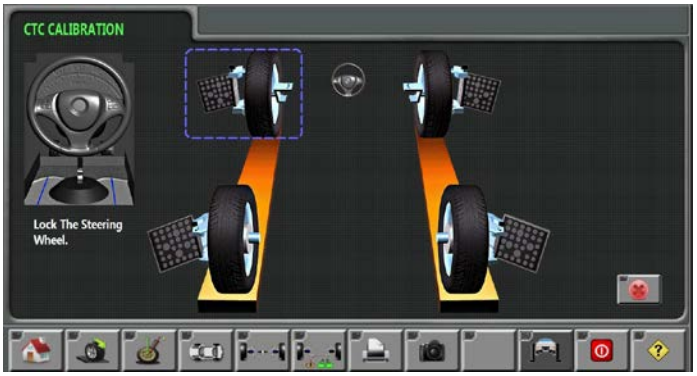
Calibration finished! Press “OK” button and the program will exit automatically. Restart the program to execute new four-wheel positioning operation.

6.2 CTC calibration

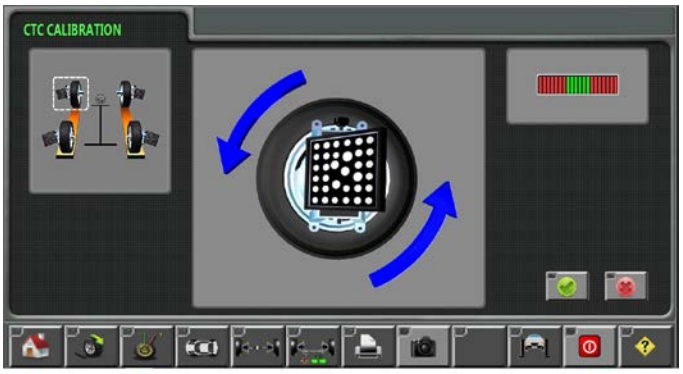
CTC calibration icon. CTC calibration is mainly used for compensating the assembly tightness between fixture and target. The fixture may be certainly deviated in terms of mechanical coordination after being used for certain period, to reduce measurement error, it is suggested to compensate fixture primarily after reinstalling the target.

Below are the general steps for CTC calibration:

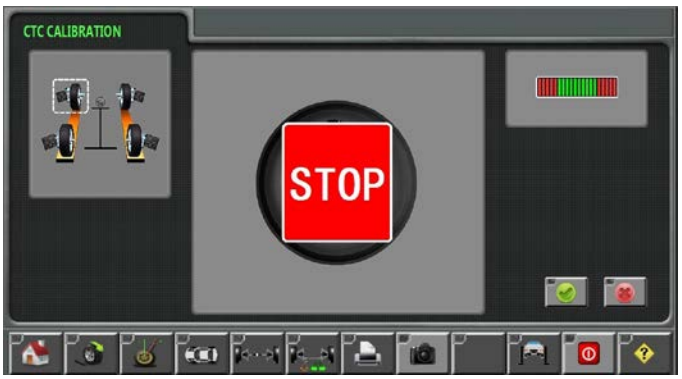
Step 1 Lift vehicle, make wheel hang in the air, adjust steering wheel and fix it with steering wheel fixing apparatus. Click CTC icon in the figure above and the screen will display those as shown in the right figure. Move the mouse and double click the icon of fixture to be compensated after selecting it. Move the tire back and forth slightly according to the indication of direction indicator lamp of the camera. If “STOP” appears on the screen or camera, stabilize the tire and the computer will read the information about the starting position.



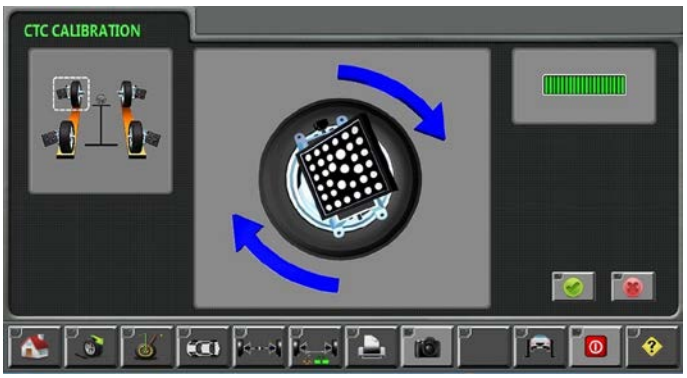
Step 2 Rotate tire towards the front wheel according to the direction of computer screen arrow and the direction indicator lamp of camera after the starting position is determined until it reaches the position required. If it is rotated excessively, the computer will remind the operator to rotate the wheel to the reverse direction.



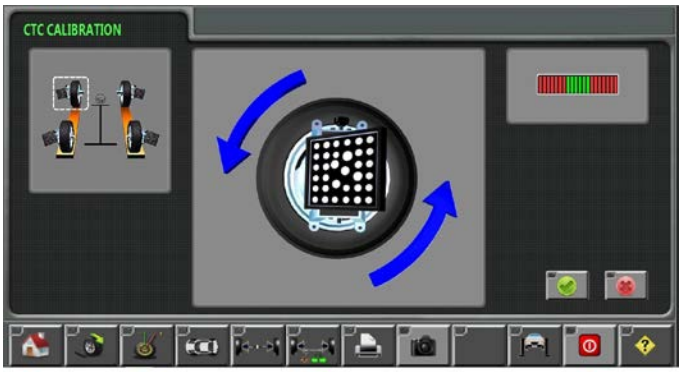
Step 3 The screen will prompt that the rotation is stopped and the computer starts to read values after the tire is rotated to certain position. See to it that the operator shall hold the tire stably when reading values.



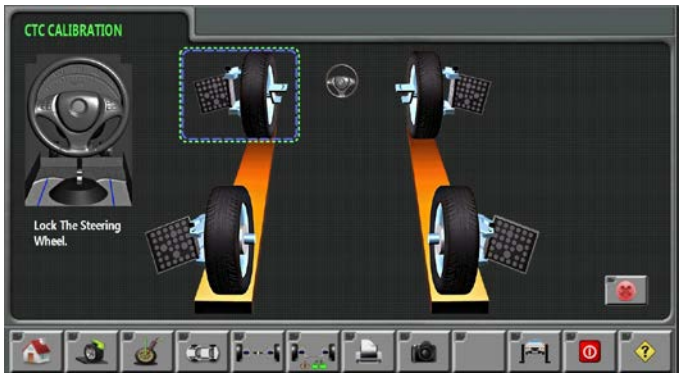
Step 4 The system will prompt that the tire shall be rotated backward after finishing reading the values until the system again prompts to stop rotation and starts to read values.



Step 5 The system will again prompt that the tire shall be rotated forward after finishing reading the values until the system again prompts to stop rotation and starts to read values.



Step 6 The system will adjust the wheel after finishing reading values. The fixture and target of this wheel have been calibrated. One green hidden line square appears surrounding the corresponding wheel.



Note: the vehicle cannot drop during the whole CTC calibration process. Otherwise, the calibration data are inaccurate, affecting the accuracy of measurement result.

Carry out compensation calibration to the fixtures and targets of the rest three wheels with the same method. The right figure will appear on computer screen after four wheels are calibrated. One green hidden line square appears surrounding four wheels.

6.3 Camera detection

Camera detection icon is mainly used to detect the working state of camera during the system test process. Click this icon and the screen will display the picture as shown in the figure. This interface is also called the picture of field of version of lens.

The square in the figure displays real-time footages. Both sides of the figure display real-time parameters which are used to monitor working state (i.e. point number of the target, number of photos and matching of computer and camera). The icons of two targets must be displayed in the middle of screen during normal four-wheel positioning measurement.

The picture of field of version of lens also integrates functions of automatic lifting and parameter adjustment.

6.3.1 Function of parameter adjustment

No one but after-sales service personnel is allowed to adjust camera parameters. The parameter adjustment includes the two parts of camera gain (gain) and working mode of camera (mode). Camera gain (gain) refers to magnification of camera and working mode (mode) refers to the speed for taking photos, as shown in the figure below. The higher the gain is, the higher the magnification is; the higher the mode is, the faster the speed for taking photos is. Default state of system is Gain=0 and Mode=0. It is suggested that users should use this product under default state.

The function of each key is as follows:


Camera gain increases;


Camera gain decreases;

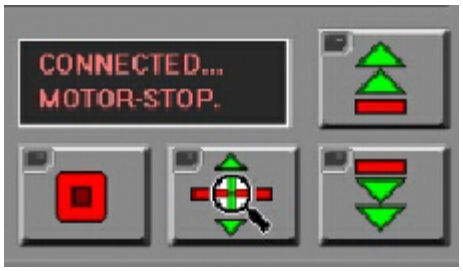

Speed of taking photos increases;


Speed of taking photos decreases;


Used to switch color of the vision field of camera;


Used to recover default setting.

6.4 Automatic lifting system



As a customized product, automatic lifting system module has been set prior to the delivery of product, and control module is integrated in interface of the vision field of camera. Lifting has two modes, i.e. automatic and manual lifting.

Manual lifting can be working under the situation where any target cannot be founded and its control module is shown in the left figure.

Function of each key for manual lifting control:

"UP" key: click this key with mouse to control the lifting of cross beam manually. Click this key again or click "STOP" key to stop lifting of cross beam during lifting.

"DOWN" key: click this key with the mouse to control the lifting of cross beam manually. Click this key again or click "STOP" key to stop falling of cross beam during falling.

"STOP" key: click this key with the mouse, and cross beam will stop lifting or falling.

"Single tracking" key for target: click this key with the mouse, and target will be sought once.

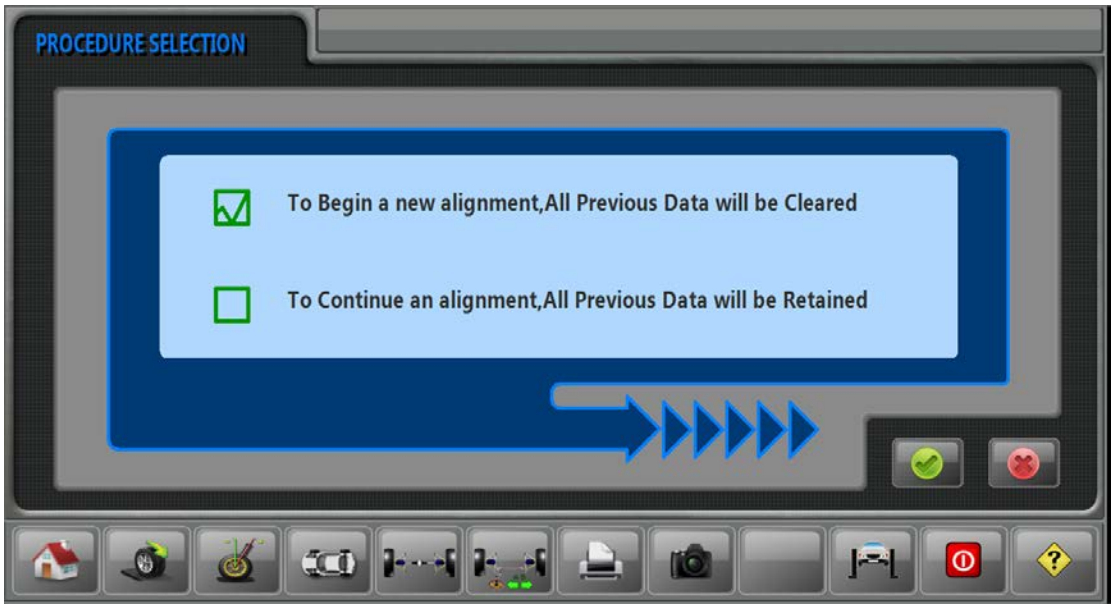
Indication of motor working state: "MOTOR—RISE" will be displayed during working state of lifting, while "MOTOR-DOWN" will be displayed during working state of falling.

There is a limit switch respectively above and below the column. Motor will stop working when cross beam reaches specified position and motor state will display "MOTOR-LOCK" at this moment. Motor state will display "MOTOR-STOP" when cross beam stops movement.

Press "Ctrl+A" in the picture of field of version of lens, and lifting system will turn into automatic lifting and red cross mark will appear in the center of target image in the field of version of lens. Cross beam will lift automatically along with the lifting of target at this moment. Press "Ctrl+P" or any function key of manual lifting, and users will exit automatic lifting system. Camera must find two targets before automatic lifting.

Chapter 7 Measurement and Adjustment of Vehicle

The software designs a set of standard four-wheel positioning program for users. Press “Standard positioning mode” icon, and system will display “Procedure Selection” as shown in the figure below:

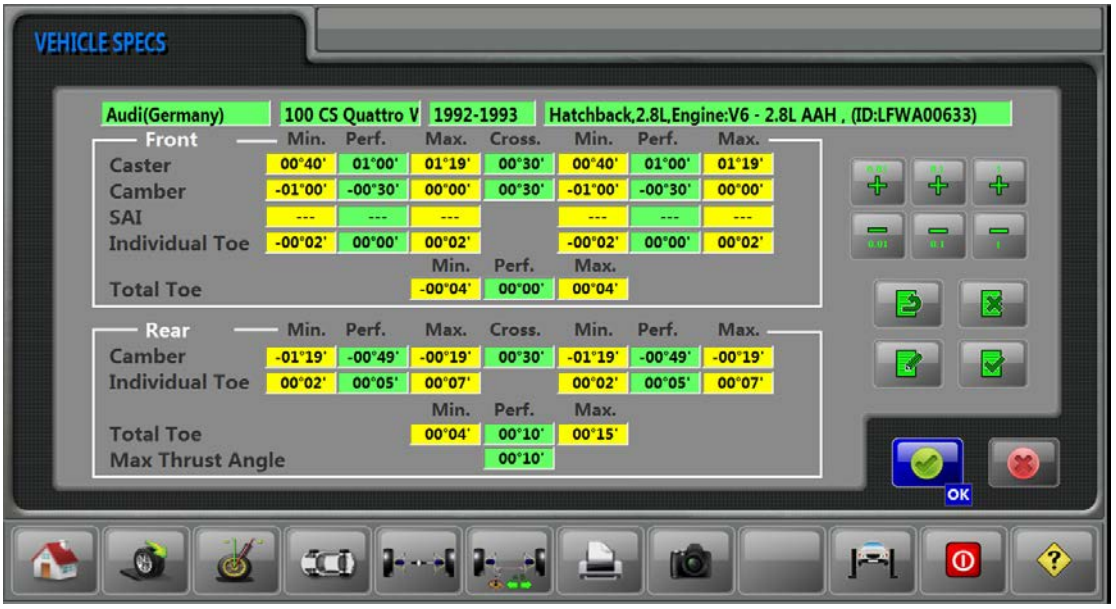


To conduct a new positioning, the user can select the first option and pervious measurement result will be reset and canceled. If users continue the previous four-wheel positioning, they can select the second option.

7.1 Vehicle selection

Firstly, select brand and model of vehicle in turns when users select vehicles. Finally, select the vehicle to be tested according to the production date as shown in the screen below. Icon  here is mainly used to switch circularly between database defined by user and standard database.

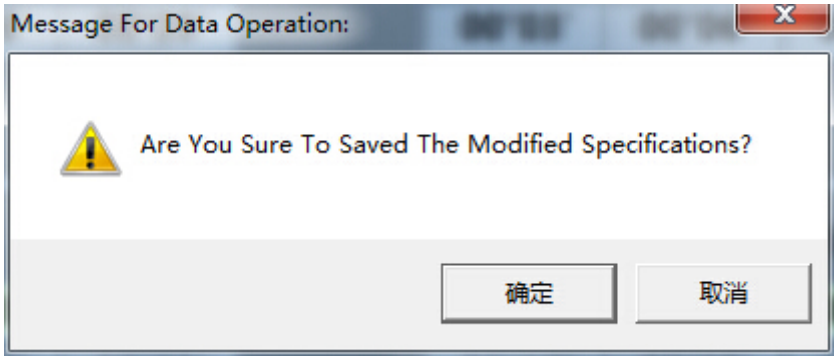
Input Chinese or English of vehicle brand for quick positioning of vehicle data during selection of vehicle. Click “+” before Figure A6L to select any vehicle there. Press “OK” key, and principal data of this vehicle will be displayed behind screen and its structure is shown in the figure below:



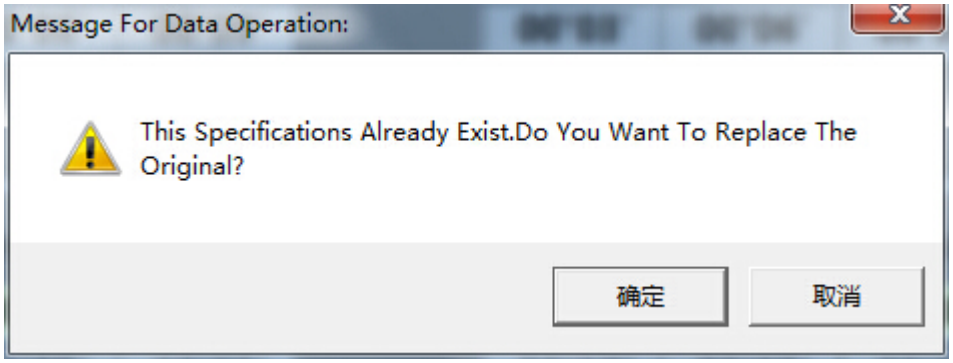
The first line in the figure is information of vehicle selected, which includes brand, model, production date, and model description. The following left side displays specific data of vehicle tested and the right side is edit keys of data used to edit and add database. The principal functions are as follows:

Edit key of data. Click this key, and database picture will become grey. We can edit data of vehicle selected and vehicle information can be input directly with keyboard. Data of vehicle selected can be added or subtracted according to the three kinds of step size (0.01, 0.1 and 1) up to required data.

Save key of data. Press this key and the prompt below will occur on the screen.



Click “OK”; the data will become green if it is to add vehicle data, and the editing and saving are completed. The screen to edit vehicle data is as shown in figure below; press “OK” to save and the database will be green.

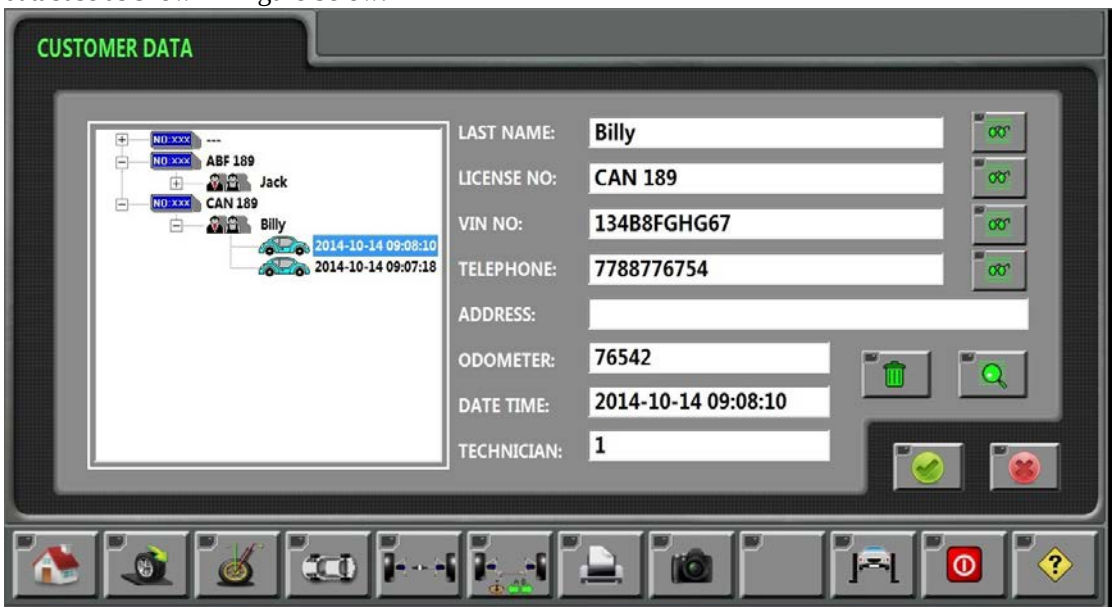


Selected parameters displayed as "---" means the data that are not provided by the system.

Delete the selected database.

7.2 Client data

After the database of vehicle tested is found, the software will prompt you to establish the client database as shown in figure below.



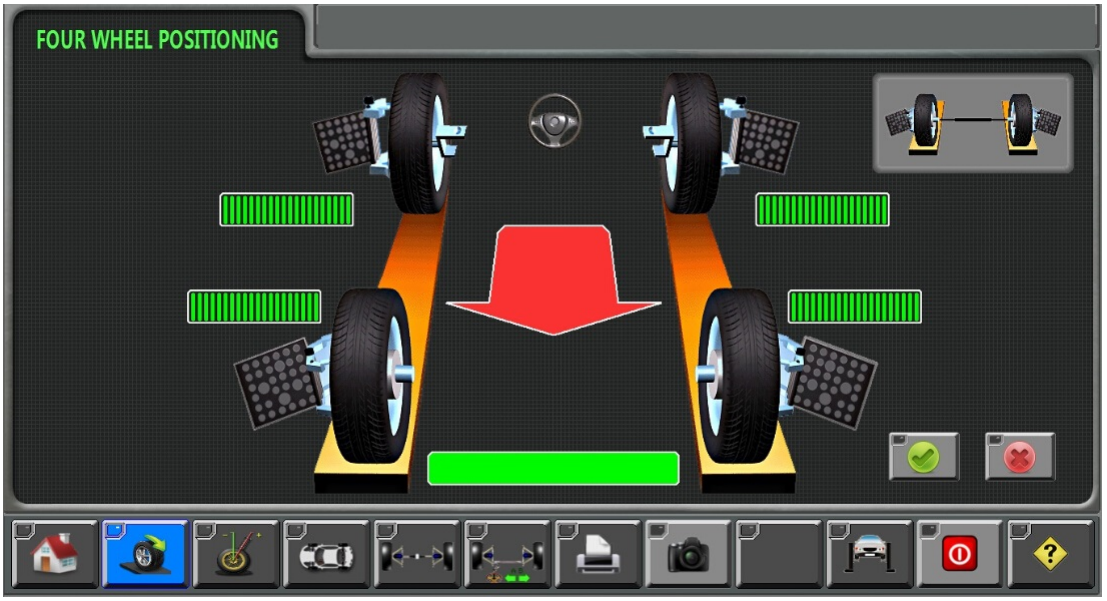
The default client name and license plate number are "---"; press "---" to select records and press "Delete" key to delete all "---" records if there are too many records in the left diagrams.

Click "Save" in print interface to save the client information and present detection result after the detection of vehicle. Input client name or license plate number in table above to find the history date of measurement and detection results for additional detection of vehicle by pressing icon  .

Select the detection date and click  to view the detection data. Click  to delete the detection records. Click "Date time" to carry out new positioning and measurement under the client's name.

7.3 Four-wheel positioning

The picture of pushing vehicle will be automatically displayed after client database is established or by pressing shortcut key; four-wheel positioning will be implemented according to prompts of computer screen or direction indicator lamp of camera after four targets are found by camera, as shown in figure below:



The red arrow in the figure means direction of pushing vehicle; four squares near wheels means the conditions of reading value of wheels; the squares are orange during reading of value and they will become green after reading is completed, which means the inspection of pushing vehicle or next operation can be implemented; check if the target is covered or its surface is polluted if the length of a wheel is in red area.

Attentions in pushing vehicle:

① Make sure the four targets are within viewing range of camera during pushing vehicle; otherwise, the state square near target is orange;

② Fix the pin of turntable;

③ Never allow anyone to run through test area during the measurement;

④ Carry out additional measurement of positioning if the value during measurement are too high or unreasonable.

⑤ Keep stable pushing of vehicle; it means the parking position is close if indicator lamp of camera has rapid flashing.

7.4 Measurement of caster angle

The system will prompt installation of fixing apparatus of pedal after measurement of pushing vehicle; pull out pin of turntable and release the rear sliding plate to measure turning angle as shown in figure below.

The top of screen is provided with some icons of measuring positions of turning angle, three of which are used for measuring right turning angle and another three icons for left turning angle and the middle icon is steering wheel. The measuring angles from left to right are:

Maximum left turning angle

Toe-out on turn of left wheel

Caster angle of left main pin and SAI

Central position of steering wheel

Caster angle of right main pin and SAI

Toe-out on turn of right wheel

Maximum right turning angle

The green indicating arrow will show direction when turning steering wheel; the red arrow at top of screen will move along with the rotation of steering wheel; the green arrow will become red

"STOP" if a wheel is close to measuring target to remind the test personnel to stop turning steering wheel and the computer starts calculating; green square will occur on the pattern of corresponding position after calculation is completed; continue turning steering wheel until the calculation is completed and make sure the steering wheel is in the central position.

Note: the measurement result will not be affected if the target of rear wheel is lost during steering test but steering will be terminated if the target of front wheel is lost. Align the steering wheel and the camera will recalculate the toe and trust after finding target of rear wheel. Real-time images of front target during measurement are displayed at two sides of figure and it means this target is covered if it is red.

7.5 Reading

All data display picture will occur after measuring turning angle. Provided with three-dimensional format, all data picture can clearly display the measurement results of vehicle tested. Four targets at two sides are used to monitor the coverage conditions of targets during measurement. The corresponding targets will become red if the targets are covered, and the measurement results displayed in all data picture cannot truly reflect the real conditions of vehicle tested.

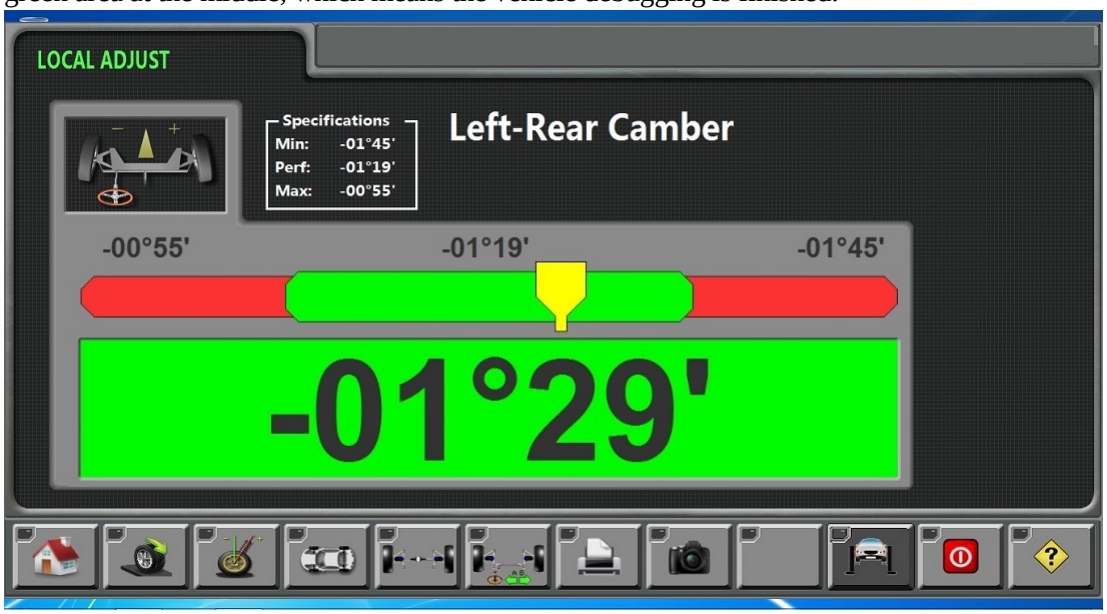
Camber is displayed at top of wheel and the black line means the mutual relation with standard value. The toe-in project of wheel is on the ground in front of wheel; arrow means the toe and caster angle of main pin is displayed at inner side of wheels. Green icon means the measurement values are within specified range. Red icon containing green means the direction to be adjusted and gray icon means this parameter has no standard.

Make sure that the brake pedal is fixed and steering wheel is centered and locked before correcting any angle since the value displayed on icons is actual measured value. The displayed value will change along with the adjustment of angle. **It shall be noted that the steering wheel must be centered during reading value of screen.**

7.6 Adjustment of rear wheel

Click shortcut key of “Rear wheel adjustment” to enter rear wheel adjustment picture; the camber, sub toe, total toe and thrust will be displayed in turns from top to bottom and the difference value of camber will be displayed at the middle as shown in figure below:

Click any angle in the figure to enlarge its adjustment picture for convenience of reference by user during vehicle debugging. The figure below is the enlarged figure of camber of left rear wheel and it shows the standard value and actual value of vehicle tested; the value will change along with the adjustment of engineering technician until the yellow pointer enters the green area at the middle, which means the vehicle debugging is finished.



7.7 Adjustment of front wheel

Click shortcut key of “Front wheel adjustment” to enter adjustment picture of front wheel, which is composed of “Front wheel adjustment 1” and “Front wheel adjustment 2”; repeat clicking of shortcut key of “Front wheel adjustment” to switch between the two pictures. The caster angle, camber and sub toe will be displayed in turns from top to bottom and the difference value of caster angle, camber and total toe will be displayed at the middle of “Front wheel adjustment 1”; the jack mark near camber icon means the lifting adjusting function as shown in figure below:

The camber, sub toe, total toe and straight forward are displayed in turns from top to bottom of “Front wheel adjustment 2” interface as shown in figure below:

7.8 Lifting adjusting

The software is provided with lifting adjusting function for the convenience of user's adjustment. Enter lifting adjusting function through "Measuring" interface of main menu or from "Front wheel adjustment" or "Rear wheel adjustment" interface. It will be introduced by taking "Front wheel adjustment" interface as example.

Step 1: enter "Front wheel adjustment" interface, click "Lifting adjusting" button and lift the lifting machine according to prompts of screen.

Step 2: lift the vehicle with lifting machine and press "Lifting adjusting" button to adjust camber after the data stabilization.

Step 3: put down vehicle after adjustment of camber; press “Lifting adjusting” button again and confirm that the lifting adjusting is finished.

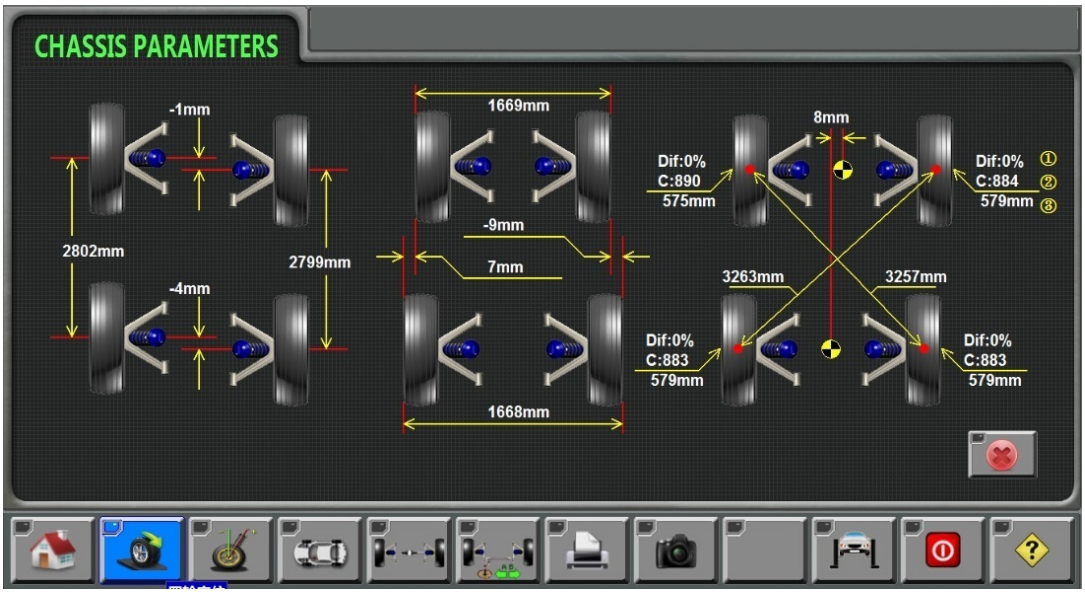
7.9 Two-wheel positioning

As a method for fast positioning measurement, two-wheel positioning is used to measure the total toe of front wheel and the camber of front wheel. If two rear targets are covered or only two targets of front wheels are used for measurement during the process, please click the icon at the right upper part of the screen to enter two-wheel positioning mode, as shown in the figure below.

The measurement method and attentions of two-wheel positioning mode are the same as those of four-wheel positioning. It shall be noted that the two-wheel positioning is mainly used for measuring the total toe and camber and the measurement result is for the user's reference. Four-wheel positioning mode is strongly recommended for accurate measurement. The measurement result of two-wheel position is shown as follows:

7.10 Measurement of chassis parameter

The measurement function of chassis parameter has integrated in the measurement menu of the software and it can measure the axle base, wheel base and axle deviation without pulling vehicles. The rotation speed, tire diameter and deviation of tire diameter must be measured at the back side of the vehicle pulled, as shown in the figure below.



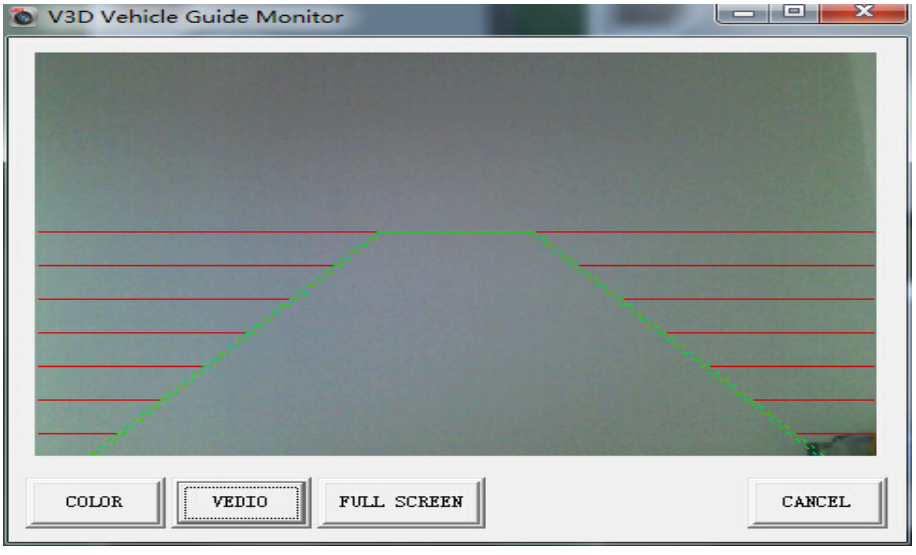
① means the deviation of tire diameter;

② means rotation speed.

③ means tire diameter.

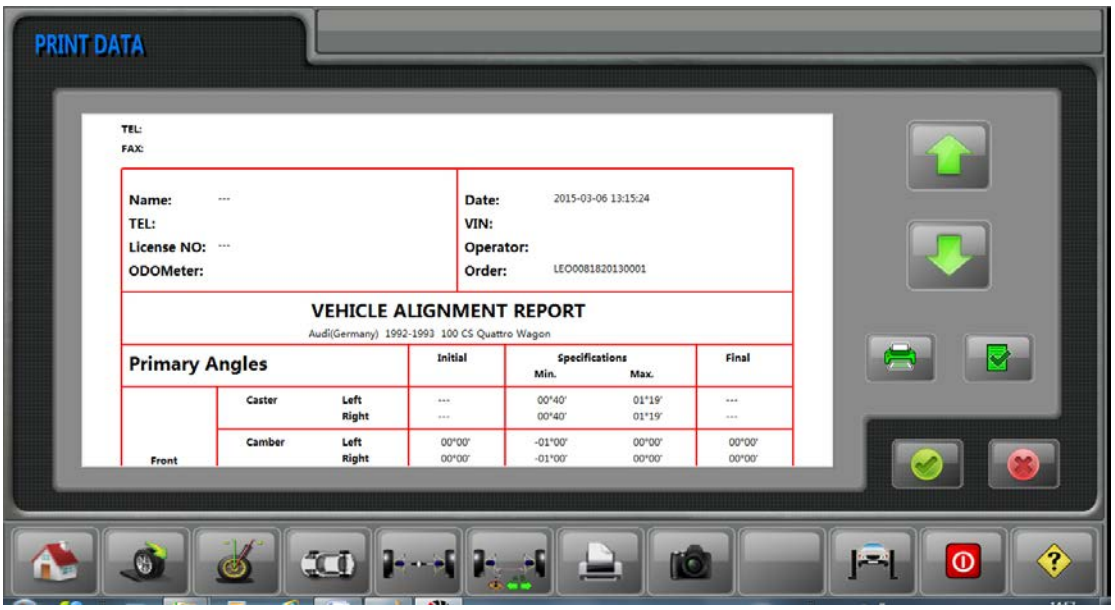
7.11 Lifting guidance system

The right figure shows the shortcut key of lifting guidance system. As one of the special functions of this software, lifting guidance system can help client to drive the vehicle to lifting machine in a safe and reliable manner. Click this key and the computer screen will display the followings. The green area in the picture is safe region. Click “FULL SCREEN” to enter full screen state. Click “ESC” key to exit the guidance picture and then enter four-wheel positioning program after guidance is finished.

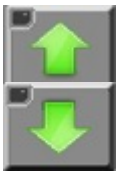


Chapter 8 Printing and Saving of Measurement Result

The right figure shows the “printing” shortcut key which is in the lower part of the screen. Click this shortcut key after detection is finished and "printing” software enters the printing interface, as shown in the figure below:



The functions of all function keys are as follows:

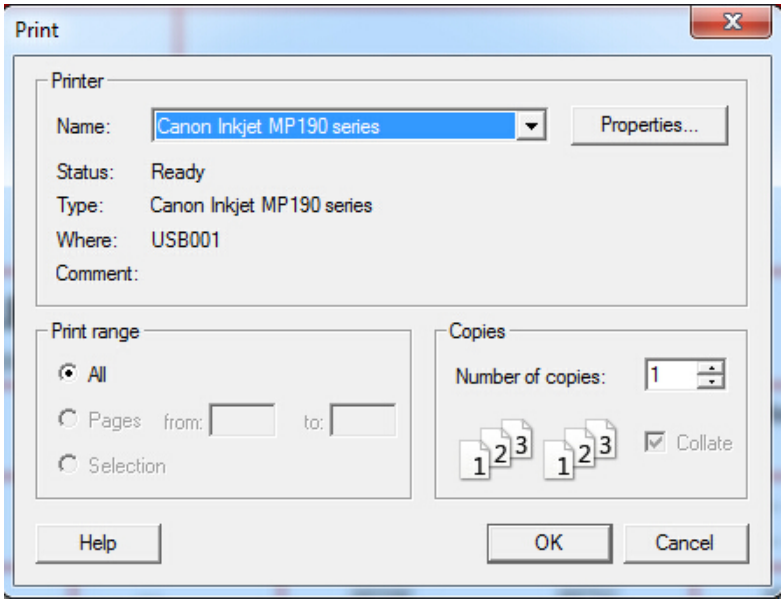


Up key: click this key to check the printing files upward.

Down key: click this key to check the printing files downward.

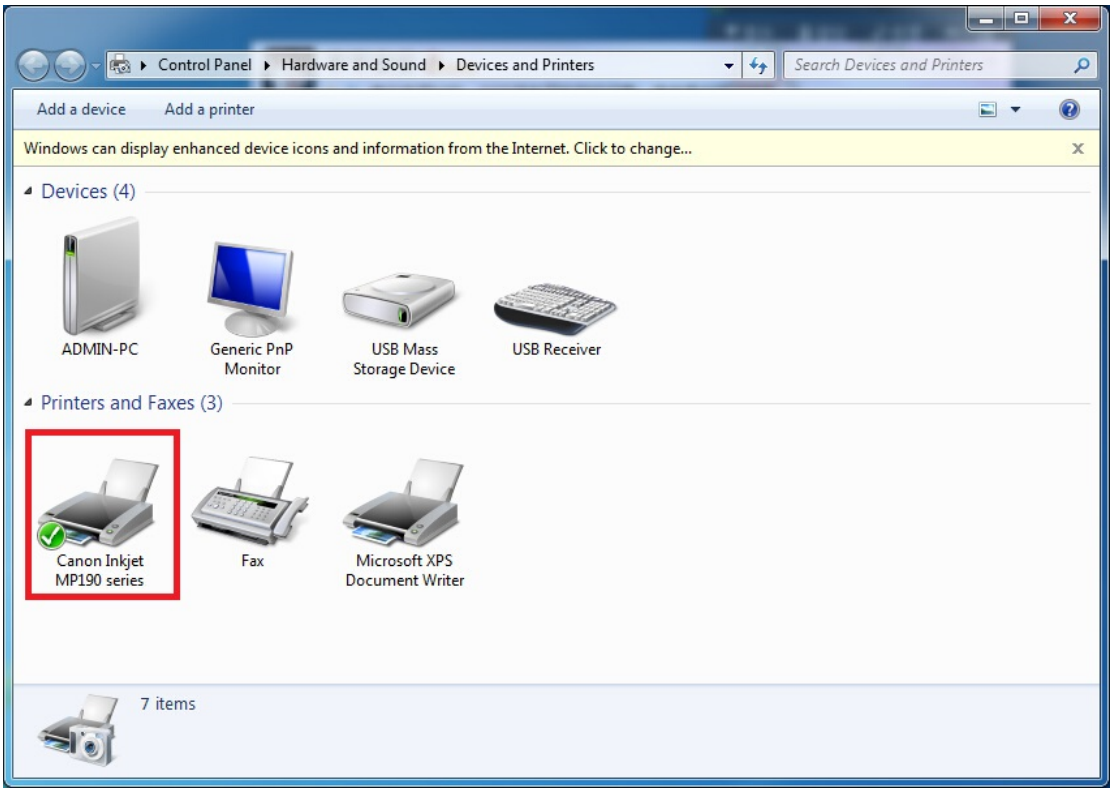
Save key: click this key to save the client's current test record. **This information can not be consulted in the following test until it is saved.**

Printed file: click this key to print detection report and the screen will display the followings:



Select printer by drop-down key, click “OK” and the computer will start to print detection report. Cannon MP190 series printer is taken as an example in the figure.

The drive program of printer has been installed prior to the delivery of equipment. Only by connecting the printer can the computer searches and install automatically. Prior to printing, the user shall check if the computer has installed printer successfully in Windows “Devices and Printers”, as shown in the figure below (Cannon MP190 series printer is in the figure). If the computer is unable to print, please uninstall this printer from control panel and reinstall the driver of printer as saved in Disk D of computer.



Chapter 9 Troubleshooting

I. The program is always under demonstration working state

1. Please check if the camera is driven successfully in the image equipment of equipment administrator;

2. Check if the software dongle is burn or lost.

II. Failure in driving camera normally

1. Check if the power line of cabinet is normal. There are two kinds of power sockets in the cabinet, as shown in the figure below:

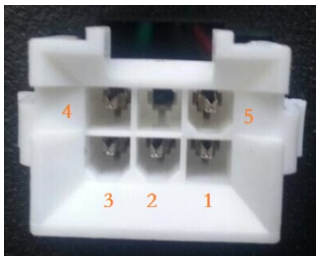


Fig. A

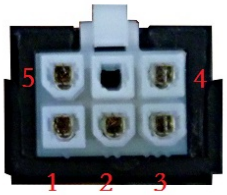


Fig. B

Fig. A and Fig. B are the power sockets of cabinet while Fig. B is the connector terminal of power line. The numbers in the figure have the following meanings:

1-- +5V (red line)

2 -- -5V (black line)

3-- +12V (white line)

4 -- -12V (green line)

5 -- shielded layer (the voltage between 1 and 2 and 1 and 5 is +5V)

2. Check if the indicator lamp on the camera panel is correct, as shown in the figure below. If the voltage of cabinet is normal but the indicator lamp of panel is abnormal, it means something wrong with the power line.

12V 指示灯	12V indicator lamp
方向指示灯	Direction indicator lamp
5V 指示灯	5V indicator lamp

3. Please check if there is any new equipment or unknown one in the equipment administrator. If

so, please upgrade drive program. If not, please shut down the computer and the camera power and then move HUB to computer. All USB lines and power lines between camera and HUB panel shall be plugged and inserted once. The lines must be inserted thoroughly. Alternatively, change USB port of computer or USB line between HUB panel and computer. Restart the power and computer to check the camera drive;

4. Dismantle camera cover and connect USB lines and power line between HUB panel and cabinet to the camera directly. It means the camera has no problems if the camera can be driven normally but there may be something wrong with HUB panel or USB line between HUB panel and camera or the power line.

III. Failure in loading startup program successfully

1. Change USB port of computer or USB line between HUB panel and cabinet;
2. Check if the power system works normally.

IV. Camera fails to find target or screen turns black or gray in the vision field of camera

1. Check if the indicator lamp of camera panel is normal or if LED lamp is burnt;
2. Check the power system of cabinet;
3. Change USB port of computer or USB line between HUB panel and cabinet;

V. Abnormal data sometimes appear in pulling or debugging vehicle

1. Never allow anyone to run through test region during the measurement;

2. Make sure the vehicle is not interfered externally when being moved, check if there is gap or hollow place between front turntable and trace and check other items that cause wheel jump when moving wheels;

3. Make sure the pin of turntable is locked firmly when pulling vehicle;

4. Always make the target surface bright and tidy.

VI. Failure in finding the previous detection records

Select “save” button on printing interface after the test is finished.

VII. The camera keeps flashing after upgrading the program

Shut down the camera before upgrading program and then restart the camera

VIII. Failure in printing

1. Check if the drive program of printer has been installed;

2. Check if the printer configured by the system has been selected in printing option;

3. If the problem still can not be resolved, please uninstall the installed printer from control panel and then reinstall it.

Legal Liabilities