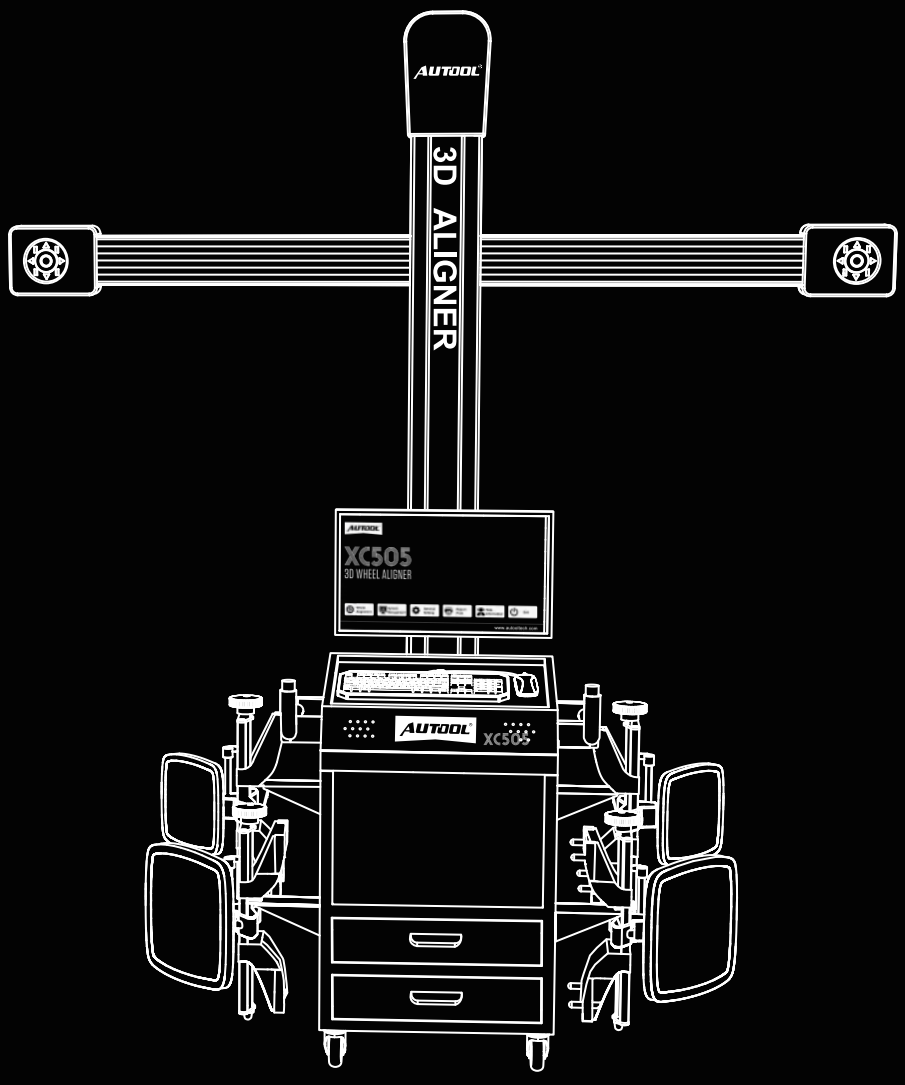
AUTOOL XC503 XC505

3D Wheel Aligner

User Manual

用户手册



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CAUTIONS

Precautions

⚠ Please read the user's manual and the installation and parts manual carefully before operating our 3D series wheel aligner.

- Only the qualified technician can operate the Wheel Aligner.
- The operator must have knowledge of computer application and basic theory of wheel alignment.
- The power voltage of 3D series wheel aligner is AC110~240V ±10% 50±1Hz / 60±1Hz. The power outlet must be a Three PIN socket and its earth pin must be well grounded. If the power voltage is not stable, please purchase and use AC voltage stabilizer.
- 3D series wheel aligner is operated with image sensing; by analyze target images recorded by high-resolution video camera. Avoid reflect Infrared light or direct sun light to the targets.
- 3D series wheel aligner is high precision equipment; special care should be taken during installation and operation to prevent the casing from being distorted and the internal parts from being damaged.
- Install the lift according to the lift specifications before installing 3D series wheel aligner. Check the lift regularly for fixedness and levelness to ensure personal safety and correct measurement. Remove the obstacles around the lift for convenient operation.
- Don't place 3D series wheel aligner on a vibrated object or an oblique surface. Avoid direct sunlight and moisture.
- Avoid splashing water on the surface of 3D series wheel aligner, for it may cause permanent damage to the system.
- The targets are major components for wheel alignment, be careful in storage or operation. Clean the dirt with neutral detergent or ethanol.
- Accurate calibration is made during manufacturing, and the design doesn't require calibration work for a few years, install 3D series wheel aligner according to the user / installation manual. Do not move the column, open or adjust cameras, or else the warranty is expired automatically, and end user will bear the cost of damage.
- Video cameras are high precision parts; the filters shall be kept clean.
- Turn off the power after operation. Check all bolts and parts after maintenance, and tighten the slackened bolts and parts in turn for safety.
- Check the packing list before installing. Do not hesitate to contact us or our distributors for any questions.

General safety instructions

- The chassis measurement system may only be used to measure vehicle axles according to specifications.
- Only trained professional may operate the system.

  Safety equipment may not be removed and / or disabled.
- Repairs may only be performed by trained customer service personnel.
- Arbitrary modifications of the system exclude any liability by our company for any resulting damages.
- Any work on the electrical installation may only be performed by electricians.
- The wheel aligner system may not be operated in explosion- prone surroundings.
- The operator must provide appropriate fire protection measures at the measuring platform. In particular, any flammable or self- combusting items (such as cloths soaked in solvents or oil) and fluids, or foreign items and other ignition sources, should not be stored in the tool trolley.

⚠ Obligation by the operator to be considerate and avoid negligent acts:

- The equipment was designed and constructed with consideration to required harmonized standards, as well as additional technical specifications. It therefore corresponds with the current state of technology and provides the maximum standard in safety during the operation.
- The machine safety, however, can only be implemented during the operation, if all of the required steps have been taken. The operator of the machine has the obligation to plan these actions and check their compliance.

⚠ The operator must specifically verify that:

- The machine is only used according to specifications.
- The machine is only operated in perfect operational condition and that the safety equipment is routinely inspected as to their operational condition.
- The necessary personal safety equipment for operating, maintenance and repair personnel is available and being worn.
- The operating instructions are always in a legible condition and are completely available at the machine location.
- The machine is only operated, maintained and repaired by qualified and authorized personnel.
- This personnel is instructed routinely in all pertaining questions of work safety and environmental protection, and knows the operating instructions, especially the safety instructions contained therein.
- All safety and warning labels attached to the machine are not removed and are legible.

Concrete safety instructions and applied symbols

Concrete safety instructions are provided in the following operating instructions which will point out any unavoidable remaining risks during the machine operation. These remaining risks contain hazards for:

- Persons
- Product and machine
- The environment

⚠ Basic safety measures during normal operations:

- The machine may only be operated by trained and authorized personnel who know the operating instructions and capable of working with the equipment!

⚠ Prior to switching the machine on, check and verify that:

- Only authorized personnel are located within the working range of the machine.
- No one can be injured when the machine is activated!
- Check the machine for visible damages prior to use and verify that it is only operated in perfect condition!
- Report any problems immediately to the supervisor!
- Prior to each operating start, check and verify that all safety equipment operates perfectly!

⚠ Basic safety measures during service and maintenance:

- Adhere to the inspection and maintenance intervals specified in the operating instructions!

	• Block access to the work area of the machine to unauthorized personnel prior to performing maintenance or repairs! Attach or set up a warning sign that points out maintenance or repair work!
	• Pull the power plug prior to any maintenance or repair work or switch off the main switch for the power supply and secure with a lock, if the power supply is installed. • The key to this lock must be in the hands of the person that is completing the maintenance or repair work! Only use perfect load suspension and lifting equipment when replacing heavy machine parts!

 user oil	• Properly dispose of environmentally hazardous lubricants, coolants or cleaning agents!

⚠ Working on the electrical equipment:

	• Repairs on electrical equipment of the machine may only be performed by trained electricians! • Re-attach any loose connections! • Immediately replace damaged lines / cables! • Always keep housings of electrical equipment closed! • Access is only permitted for authorized personnel with key / tools! • Never spray the housing of electrical equipment with a hose when cleaning!

⚠ Observe environmental regulations:

	• The legal regulations for waste prevention and proper recycling / disposal must be adhered to for all operations on and with the machine. • Especially during installation, repair and maintenance operations, water-polluting materials, such as: Lubricants and oils-hydraulic oils-coolants. • Solvent-containing cleaning liquids may not pollute the ground or reach the sewage system! • These materials must be stored, transported, collected and disposed of in suitable containers!

CHAPTER 1 INTRODUCTION

1.1 Definition

- 3D series wheel alignment system is to test wheel parameters and provide reference of manufacturer specs, by compare the two set of parameters, operator can adjust the vehicle wheel parameters to reasonable range, make the vehicle wheels in good condition and avoid unreasonable tire worn.

1.2 When wheel alignment will be needed

At the following circumstance, wheel alignment will be necessary:

- Vehicle pull to one side when release steering wheel.
- Uneven tire worn.
- Steering wheel too heavy, too light or shake when driving at high speed.
- After tire change, chassis parts replacement.
- After collision.
- After 3000km's drive of new car.
- At regular vehicle maintenance.

1.3 Major alignment parameter

- Wheel alignment angles are relative angle of the chassis parts, which makes the vehicle running stable and reduce tire worn.
- Major wheel alignment angle include: Camber, Toe, Caster, SAI, Toe-out on Turn.

1.3.1 Camber

- Camber is the leaning of the wheel inwards or outwards from the vertical. If the road wheel leans outwards from the vertical, it has positive camber and when leaning inwards from the vertical - negative camber, looking from the front or rear of the vehicle. See Fig.1.1. Camber is measured in degrees. Without camber, the wheels will tilt to the inside at full load;in-crease the possibility of uneven tire worn. Hence, this parameter can extend the life of tire and related axis.

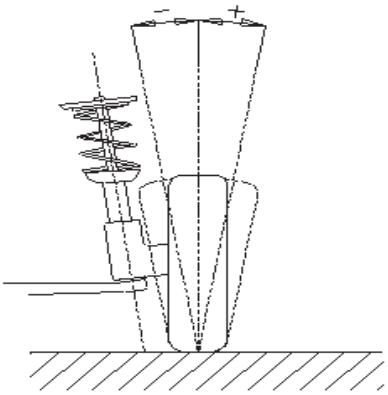

Figure 1.1

1.3.2 Toe-in

- The toe setting is the amount by which the front or rear wheels point inwards or outwards at the front of the wheel in relation to each other (see Fig.1.2). When the wheels point inwards they are said to toe-in. Toe-in figures are given a positive value. Conversely when the wheels point outwards they are toe-out and the figures are shown as a negative value.

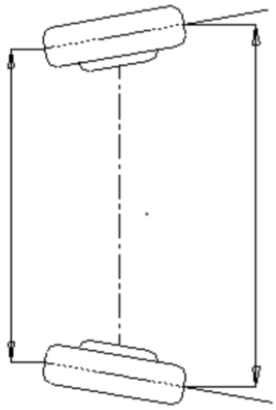

Figure 1.2

- The purpose of correct toe is to ensure that the wheels run parallel when the vehicle is driving. An incorrect toe setting may affect the stability and controllability of the vehicle.

1.3.3 Steering Axle Inclination

- Steering Axle Inclination (SAI) is the angle of steering axis and vertical line (vehicle front view). As show in Figure 1.3. Correct Kingpin Inclination can equalize the loads applied on bearings so that the life of bearings can be prolonged and the controllability of steering is improved. Without the inclination, the controllability of the steering may be affected; further more, the vehicle weight and the ground counterforce may cause significant stress in the axle and finally damage the axle. Correct inclination of king pin is also helpful for the vehicle to restore its straight-ahead position after steering. Kingpin Inclination is determined when the vehicle suspension is designed. It is not service adjustable.

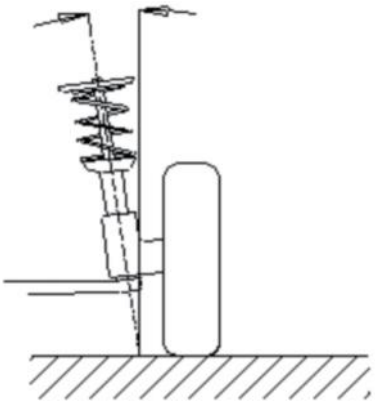

Figure 1.3

1.3.4 Caster

- Caster is the tilting of the kingpin either forwards or backwards from vertical, as viewed from side of the vehicle. See Figure 1. 4. When the king pin is tilted backwards from the vertical, caster is positive. When the king pin is tilted forwards, caster is negative. Caster angle influences the directional stability of the steering. To increase the tendency of the steering to self-centre, the steering will normally be designed with positive caster. Normally caster angle of a vehicle is between 1~4 degrees.

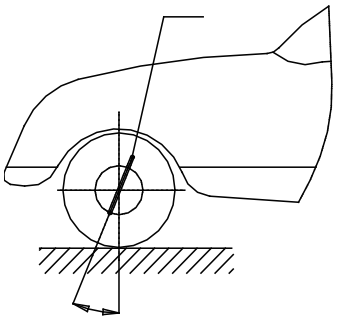

Figure 1.4

1.3.5 Toe-out On Turn

- Toe-out on turns is defined as the difference of the steering angle between the two front wheels when turning left or right by 20°. see Figure 1.5.When the vehicle turns, the inner wheel angle is always bigger than the outer wheel, difference is about 2 degrees, the purpose is to make the vehicle turn by referenced to the instant center point of the extend line of back axis.

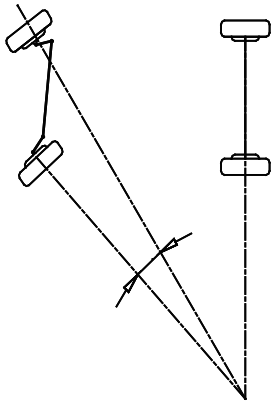

Figure 1.5

1.3.6 Thrust Angle

- Definition: The angle between the vehicle's centerline and the vehicle thrust line.
- When driving, the front wheels and the rear wheels should pull to the same side if the thrust angle is not zero. When thrust line is at the left side of the vehicle's centerline, the thrust angle is positive, otherwise is negative. The existence of the thrust angle causes the vehicle's rear body pull

to one side. In order to drive the vehicle straight-ahead, the front wheels have to turn to the direction of thrust line. If thrust angle compensation is not done for front toe, the steering wheel must be turned to one side when driving straight-ahead. If rear toe can be adjusted, the thrust angle should be adjusted close to zero. The direction of thrust line is the actual driving direction of the vehicle, which is determined by rear toe. When the direction of thrust line doesn't coincide with the geometric centerline of the vehicle, the steering wheel must be turned by some degrees to keep the vehicle driving straight-ahead, so that unbalance phenomenon of the steering wheel is caused. At the same time, the traveling paths of rear wheels don't coincide with that of front wheels. This kind of phenomenon is called Rear Wheel Lateral Move. If ignore the thrust line, the veracity of alignment cannot be ensured. This is the main reason of the steering deflection.

- If you select the thrust line as the measurement datum, you can perform the following operation procedures:

  After adjusting rear toe to the specified value (OEM Specifications), the thrust line will coincide with the vehicle's centerline. For the vehicle with adjustable rear suspension, rear toe should be adjusted to keep the thrust angle close to zero.

  No matter the thrust angle is zero or not, the steering wheel can be adjusted balanced if you take the thrust line as alignment datum. If rear toe cannot be adjusted, please adjust front toe, and keep it be same with rear toe, and then set them to the angle by which the steering wheel can be balanced.

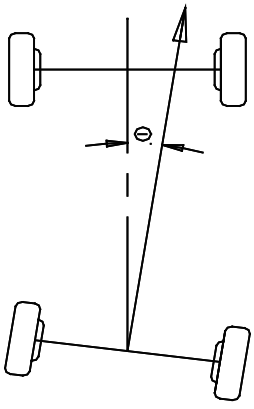

Figure 1.6

1.3.7 Wheelbase Diff.

- Wheelbase difference is defined as the angle between the joint line of the centre of two rear wheels and that of the front wheels. It is positive when distance between the centre of the right wheels is large than that of left wheels; and negative otherwise. If the tread is available from the vehicle specifications, then the wheelbase difference can be also expressed by angle. See Figure. 1.7.

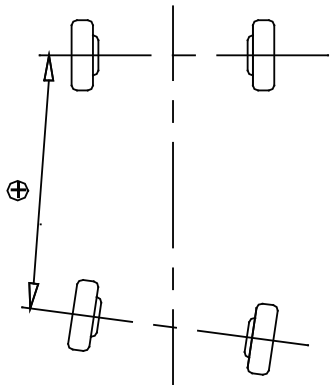

Figure 1.7

1.3.8 Track Width Diff.

- Track width (Tread) difference is defined as the angle between the joint line of the ground-contact point of left wheels and that of the right wheels. It is positive when distance between the centre of the rear wheels is large than that of front wheels; and negative otherwise. If the wheelbases are available from the vehicle specifications, then the tread difference can be also expressed by angle. See Figure 1.8.

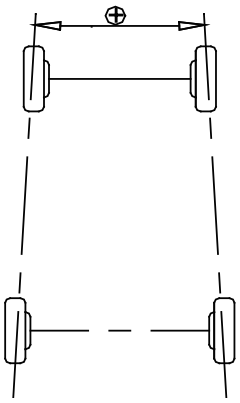

Figure 1.8

1.3.9 Left (Right) Lateral Offset (Angle)

- The offset of rear left (right) wheel and front left (right) wheel at the vehicle's lateral direction. When rear left (right) wheel is outside of front left (right) wheel, left (right) lateral is positive, otherwise, it's negative. The angle between the trust angle and the left (right) front / back wheel center line is the left (right) lateral offset angle.

1.3.10 Axle Offset (Angle)

- The relative off set of front axle and rear axle at the vehicle's lateral direction is defined as Axle offset.When rear axle is more to the right side than front axle, axle offset is positive, otherwise, it's negative. The angle between the center line of the difference angle and the trust angle is defined as axle offset angle.

1.3.11 Delay (Angle)

- The same axle's relative offset in longitudinal direction of the vehicle is called the delay. When the right wheel is behind of the left wheel on the same axle, the delay is positive, otherwise, it's negative. The angle between the wheel center line and the vehicle longitudinal geometric center line vertical is called the delay angle.

1.3.12 Included Angle

- The sum of Kingpin inclination angle and camber angle is called the included angle.

1.4 Function and feature

- All new three dimension computer visual measurement: adopted high performance camera to automatically detect the alignment parameter. The equipment was calibrated at production, does not need on-site calibration at installation.
- Electric component free target: no electric component or wiring on the target, which ensure the equipment to be more convenient and durable.
- 3D (Fixed Height) wheel aligner can be installed at any height according to user's interest.
- 3D (Auto Focus) wheel aligner can detect the lift position and follow the lift up and down, to ensure the equipment always in best working height.
- Extremely simplified test procedure.
- Complete parameter measurement: Capable of test of front / rear toe-in, front / rear camber, thrust angle, caster, SAI / Kingpin, wheelbase, track (thread) etc.
- Large database: More than 20000records of vehicle all over the world, and user can add data at will.
- Historical data storage for client management.
- Real-time help system.

1.5 Tech specs

Power Supply	**AC 110/220V 50/60 Hz**
Computer Host	**ASUS (or all in one computer)**
Monitor	**18.5 inch color monitor (all in one computer comes with 23 inch monitor)**
Toe-in	**0~±20 degree**
Camber	**0~±8 degree**

SAI / Kingpin	**0~±20 degree**
Caster	**0~±20 degree**
Thrust Angle	**0~±5 degree**
Rim diameter	**10~23 inch**

⚠ CAUTION

- We preserve the right to change design without prior notification.
- The measure range can only be assure when operate the wheel aligner according to this user manual.

1.6 Requirements on surroundings

Ambient temperature	**0~50°C**
Relative humidity	**≤85%**
Light condition	**No direct Infrared light to the targets**
Lift platform height difference	**Front / End height difference < 5mm**

1.7 Working principle

- 3D series wheel aligner working principle is as show in figure 1.9.
- The entire system can be divided into two categories: data acquisition and data processing.

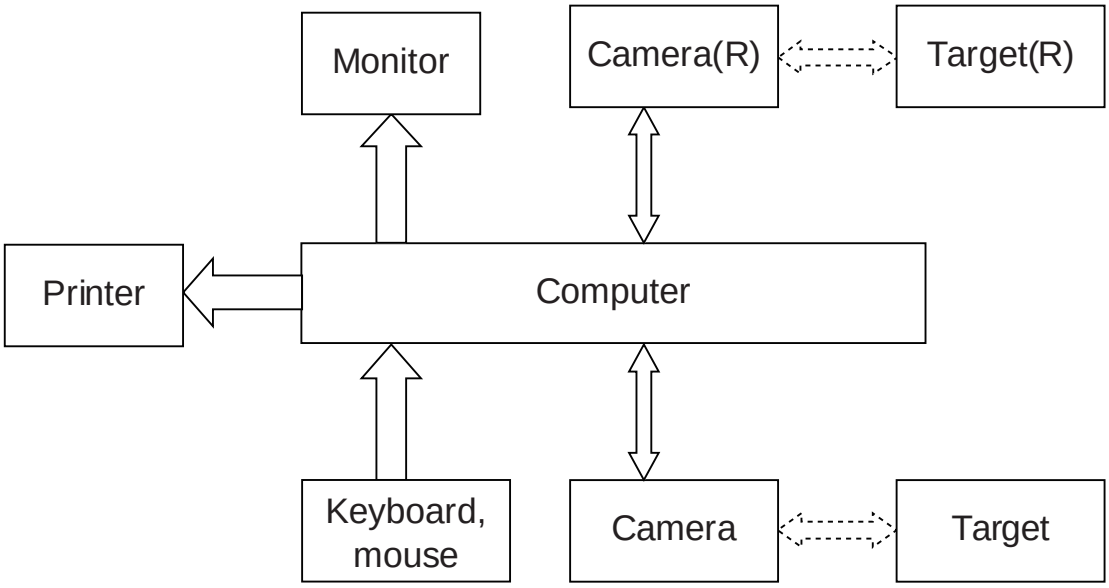

Figure 1.9

- Data acquisition category consists of 2 high definition cameras and 4 targets. Left and right side camera get target image and send to data processing citatory. Target was mounted onto the wheel via clamps.
- Data processing category is the core component of 3D wheel aligner, consist of computer system, power supply system and interface. The function is to realize operator's instruction, automatically guide the measurement, and calculate data and display together with manufacture data, at the same time, guide the operator to do adjustment on the vehicle. Finally, print out the report.
- Since 3D series wheel alignment system need to compare tested data with manufacturer data, and provide guidance of adjustment, database is very important to provide reference data. 3D series wheel aligner database covers over 20000 records of vehicle data worldwide. At the same time, 3D series wheel aligner system provides function for operator to input and save customized data.

CHAPTER 2 HARDWARE STRUCTURE

2.1 Overall Structure

- 3D series wheel aligner mainly consist of column assembly, lateral beam assembly (include 2 sets of camera assembly), cabinet, computer host, monitor, printer, targets, clamps, communication cables, turntables, steering wheel holder, brake pedal depressor etc.

2.2 Target and clamps

- 3D series wheel aligner has 4 targets (come together with 4 clamps), is a key component for acquire raw data of wheel alignment (Figure 2.1), Cameras will capture target image for data processing. On the back of the target, there's identification label for target position.

Figure 2.1

2.3 Communication cable

- 3D series wheel aligner has two cables between computer and lateral beam, one is USB data cable, another one is power supply cable, shall keep them in good condition to avoid damage to the entire alignment system.

2.4 Turntable and passing bridge

- 3D series wheel aligner comes with 2 mechanical turntables, as show in figure 2.2. Turntable shall be placed on the front wheel position on the lift, each turntable has a passing bridge, to ensure vehicle move smooth when do rolling compensation.

Figure 2.2

2.5 Steering wheel holder

- 3D series wheel aligner equipped with a steering wheel holder, as show in figure 2.3. The steering wheel holder is mainly used when do rolling compensation.

Figure 2.3

2.6 Brake pedal depressor

- 3D series wheel aligner equipped with a brake pedal depressor, as show in figure 2.4. it's used to press down the brake pedal, to prevent vehicle from moving at certain measurement stage, e.g., caster swing.

Figure 2.4

CHAPTER 3 BASIC OPERATION PROCEDURE

3.1 Precheck

- Ask the owner for vehicle drivability problems, symptoms, and wheel alignment history, and find out vehicle information such as make, model and year, etc. Check each chassis part carefully, include dust cover, bearing, rock arm, tripod-ball, shock absorber, tie rod ball and steering mechanism, for any loose or wear. Then check to see if the tire pressure, tire treads of the left and right wheels are alike. Perform the wheel alignment checking after the initial condition is known. If the measuring values do not accord with the specifications given in the databank, the wheel alignment should be adjusted. After finishing the wheel alignment, test the vehicle to see if the abnormal conditions are eliminated. Re-adjust the wheel alignment if necessary.

3.2 Alignment measurement

- After precheck, can start alignment measurement.

3.3 Adjustment

- In the alignment measurement, based on the measurement results, combined with the actual vehicle alignment fault phenomena, with reference of the OEM specs, to make corresponding adjustments according to the actual situation.

3.4 Test run

- The vehicle shall be test derived, after alignment adjustment, to confirm if the fault phenomena are eliminated. Otherwise, shall redo the adjustment.

CHAPTER 4 OPERATION INSTRUCTION

4.1 Preparation before test

- Ask the owner for vehicle drivability problems, symptoms, and wheel alignment history, and find out vehicle information such as make, model and year, etc.
- Check and lock turntables and side slip plates, place the passing bridge, drive the vehicle onto the lift, make front wheel about to be on the turntable center. When the vehicle well on desired position, center the steering wheel, lock the steering wheel with steering wheel holder. Place the parking rubber at back wheel, then release handbrake. Lift the vehicle up to the alignment height.
- Check each chassis part carefully, include dust cover, bearing, rock arm, tripod-ball, shock absorber, tie rod ball and steering mechanism, for any loose or wear. Then check to see if the tire pressure, tire treads of the left and right wheels are alike.
- Mount the clamps and target onto the wheels, and lock the clamps.
- Power up the wheel aligner computer.

4.2 Software operation

- Switch on power, boot the computer, then the wheel alignment software will automatically start.
- There are 6 function buttons on the main interface: alignment check, System Settins, General Settings, Print Report, help, exit. As show in Figure 4.1

Figure 4.1

4.2.1 Alignment Check

- Click [Alignment check] at main interface to start alignment procedure.

4.2.1.1 Select vehicle

- Before alignment measurement, reference vehicle data shall be selected, as show below:

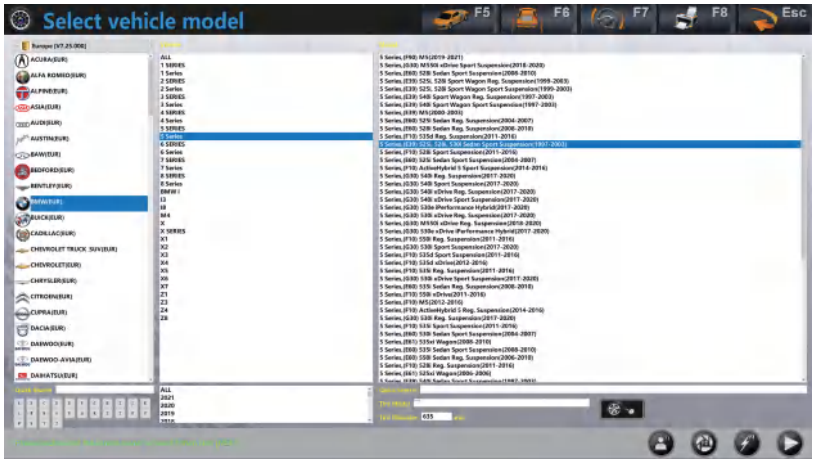

Figure 4.2

- **[Navigation Bar] :**
  Can access to independent measurement steps instead of follow the default sequence.
- **[Database Selection] :**
  Can select data record from different database category. If it's the first time to use Frequently Used Specs, the list shall be empty, need to import from OEM specs at [main interface] ->Frequently Used Specs.
- **[Manufacturer, Vehicle List] :**
  Select the desired vehicle by navigating the list, click and continue the measurement.
- **[Quick Index Letter Selection Area]** :
  Quick index manufacturer by input the letters.
- **[Quick Vehicle Index] :**
  At the bottom of the screen, quick index is provided. E.g. KIA, click 'K' 'I' 'A' or input 'KIA' with keyboard, to fast allocate the vehicle make.
- **[Help Information] :**
  Help system and tips for the current page.
- **[Target Monitor] :**
  Can find out the reason in target monitor screen when system prompt target blocked. Also can adjust the lateral beam height manually in this screen.
- **[Quick Measurement] :**
  If exit program accidently after rolling compensation, can access quick measurement, but the result might be a bit inaccurate.
- **[Next] :**
  To make the measurement follow the default sequence (select vehicle->rolling compensation->Caster swing->report print).

4.2.1.2 Push compensation

- Push Compensation is to eliminate the error caused by the physical defect of rim and tire as well as the installation of clamps. Accuracy level could be higher after eliminate these error. As show in the follow graph:

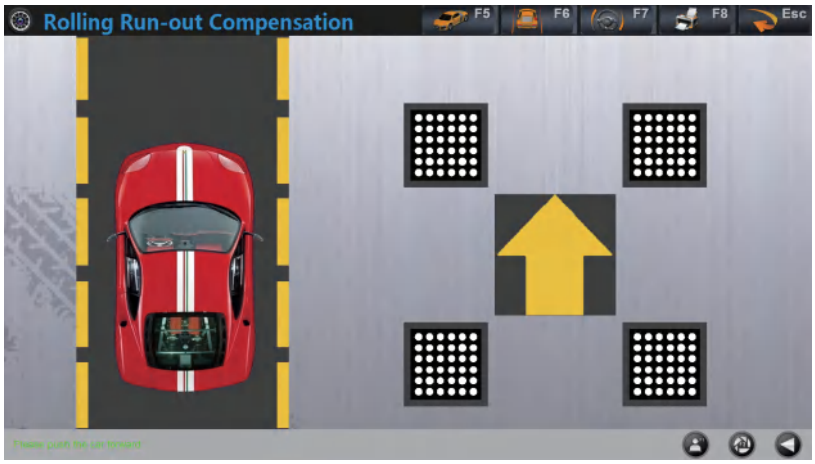

Figure 4.3

- **Operation Instruction:**

  1. Mount the clamps and targets.
  2. Place the passing bridge.
  3. Center steering wheel, lock the steering wheel, and remove brake pedal depressor.
  4. Push the vehicle back and forward as instructed by the screen.

⚠ CAUTION

- Before push compensation, the steering wheel shall be well locked, otherwise, the wheel will not be stable when do push compensation, and this will cause inaccurate result of push compensation.
- When push vehicle back and forward, shall not block the camera view.
- Make sure the pushing is steady and stable.
- The target initial position shall be vertical to the ground, otherwise, might make the target tilting angle too big and cause error.
- Remove passing bridge when compensation finished.

- **[Target Red Color Status] :**
  Indicate the captured image is not applicable for measurement; possible reason shall be blockage between camera and target.
- **[Help Information] :**
  Help system and tips for the current page.
- **[Target Monitor] :**

Can find out the reason in target monitor screen when system prompt target blocked. Also can adjust the lateral beam height manually in this screen.

- **[Previous] :**
  Return to the previous step to do rolling compensation again.

Figure 4.4

- The screen will display real time toe, camber of each wheel after push compensation. Can adjust the vehicle at this page, if caster swing is not considered important. when do adjustment, there might be requirement of lifting the vehicle up or lower the vehicle down, can operate the lift and the lateral beam will follow the lift movement to raise up or lower down. (this feature only applicable on auto focus model)

4.2.1.3 Caster swing

- Caster Swing is only for front wheels, including Caster and SAI. The right SAI value can keep the weight load even on both wheels, protect the axis from damage, and smooth steering. Caster generate a force to keep the front wheel go straight.

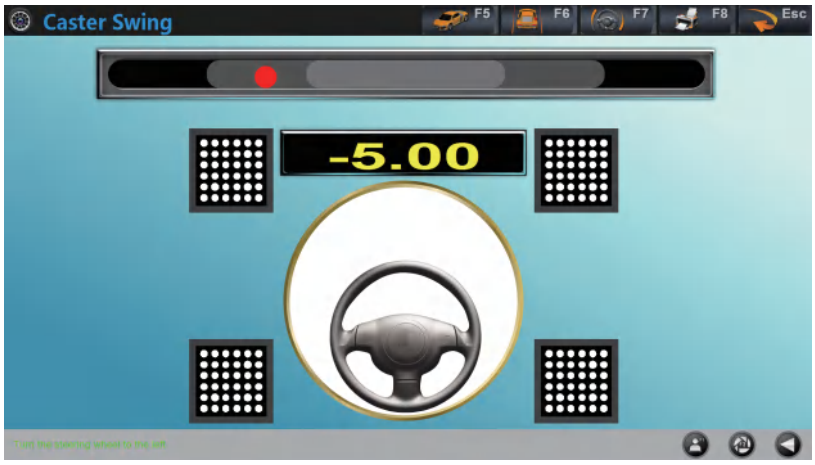

Figure 4.5

- **Operation Instruction:**

1. Turn the steering wheel to make the wheel straight, prompt arrow will display on the screen.
2. Turn the steering wheel to the right as instructed by the screen.
3. Turn the steering wheel to the left as instructed by the screen.
4. Turn the steering wheel back till the indication ball turns from red to green.

- After calculation, the system will automatically prompt the result page, as show below:

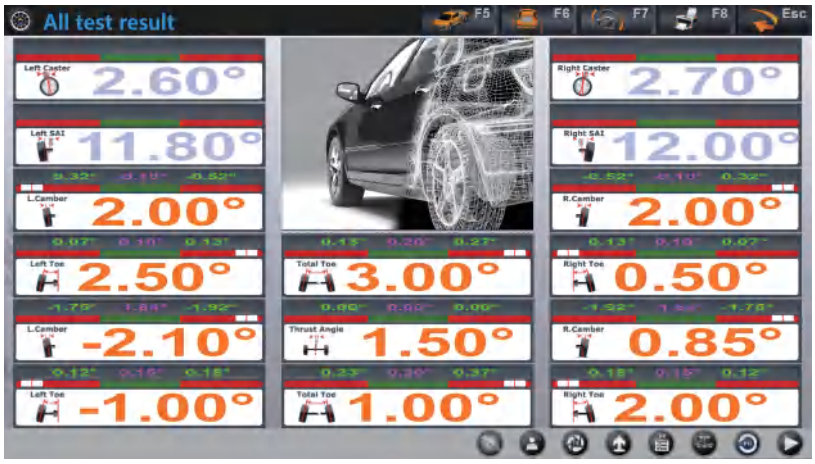

Figure 4.6

- Can adjust the vehicle at this page. when do adjustment, there might be requirement of lifting the vehicle up or lower the vehicle down, can operate the lift and the lateral beam will follow the lift movement to raise up or lower down. (this feature only applicable on auto focus model)
- **[Additional Measurement] :**
  Can measure track width, wheelbase, etc. as show below:

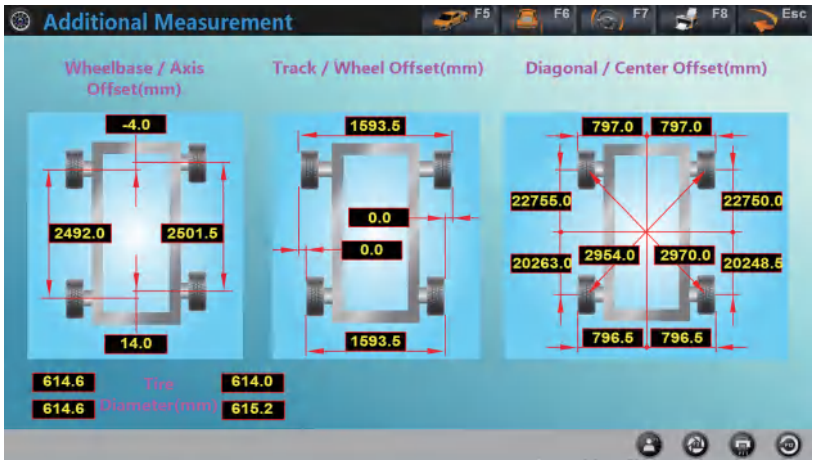

Figure 4.7

⚠ CAUTION

▶ Before Caster Swing, be sure to mount the brake pedal depressor and remove the steering wheel holder.

▶ At each measurement result page, the measurement result is displayed with different color.

1) Green: Value within standard range (OEM specs Min. ~Max. Range).

2) Bright orange: Value exceeded standard range (OEM specs Min. ~ Max. Range).

3) White: No reference value available.

4.2.1.4 Print report

- Report Print can print the measurement report and save the data into measurement history database. As show below:

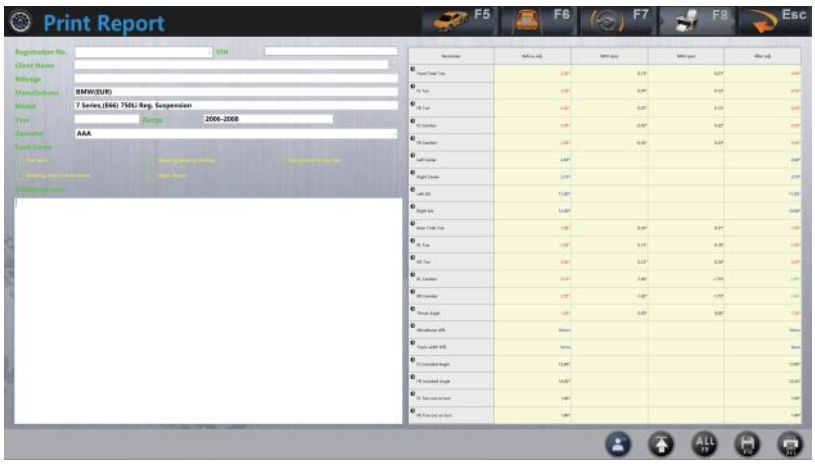

Figure 4.8

- **[License No.] :**
  License No. of the tested vehicle.
- **[Client Name] :**
  The related information of the vehicle owner. Client Information could be inputted directly with keyboard at this page.
- **[Vehicle Info.] :**
  The related information of the current vehicle, including mileage, manufacturer, model, start year, end year. Vehicle information can not input with keyboard at this page, if a vehicle model is selected beforehand, the corresponding vehicle information will be displayed.
- **[Fault Cause] :**
  Fault of the tested vehicle. Including: tire worn, pull to one side, steering wheel not center, steering wheel shaking, or other cause.
- **[View All] :**
  Can check all tested data of the vehicle.
- **[Save] :**
  To save the measurement result, license No. shall be inputted.

⚠ CAUTION

▶ The print function on this page is only applicable for the most recent measurement, while for historical report print, has to access [report print] from the main interface.

- **[Return] :**
  Return to main interface

4.2.2 System settings

- Click [System settings] at main interface to enter system management page. The screen is as follows:

Figure 4.9

4.2.2.1 Workshop information

- Workshop information mainly used to set workshop contact information and operator information. These information will be imported to the report for print out. For data management and track service record.

Figure 4.10

- **[General Setting] :**
  The content in this page is only editable when click [edit] button. After information edit, the system will save the change and return to the previous page.

⚠ CAUTION

- If has more than one operator in the workshop, can use '#' to separate different operator's name. E.g. Adam#Bob#David.

4.2.2.2 Client information

- [Client Information] can manage client related information, for better service follow up, the interface is show below:

Figure 4.11

- **[Quick Index] :**
  At the bottom of the screen, quick index is provided.
- **[Add Client] :**
  Click [Add Client], and add client information by fill the form.

Figure 4.12

- **[Edit] :**
  To modify / edit client information.
- **[Delete] :**
  When delete a client entry, the system will also delete all information including the measurement result of all the vehicles under his name. Please confirm before delete, since the data is not recoverable.

- **[Print] :**
  To print client list.

4.2.2.3 Language selection

- 3D series wheel aligner provide various language selections, the screen layout is as follows:

Figure 4.13

- **Operation Instruction :**
  Choose wanted language, and then click [OK]. The alignment system will restart with the selected language.

4.2.2.4 OEM specs

- This page provides OEM specs of vehicle alignment data when it's manufactured. The database contains as many as possible records for various vehicles, Also it provide function to add user defined data into the database, in case some vehicle alignment data is not included in the database. We will provide periodical update after database update, user defined data won't disappear. Screen layout as below:

Figure 4.14

- **[Quick Index] :**

At the bottom of the screen, quick index is provided.

- **[Add New] :**
  To add vehicle data which not listed in the standard database, click this button, and add detailed specs on the prompted window. Inputted data will be stored in standard database after confirmation. Layout show as below:

Figure 4.15

- **[Edit] :**
  The edit / modify function only applicable for user defined data, while the OEM specs are fixed, can not be modified or delete.
- **[Delete] :**
  The edit / modify function only applicable for user defined data, while the OEM specs are fixed, can not be modified or delete.
- **Operation Instruction:**
  Select the manufacturer, and the vehicle model to view the standard specs of the vehicle.

4.2.2.5 Frequently used data management

- Frequently Used Specs management could sort the most often used data out of the standard OEM specs, and reduce time cost of finding the desired vehicle model.

Figure 4.16

- **[Add From OEM Specs] :**
  To activate the OEM specs list, select desired entry, confirm to add it into frequently used specs.
- **[Delete] :**
  This function is to delete record in frequently used data.
- **[Exit] :**
  Return to main interface.

4.2.3 General Settings

- At main interface to enter [General settings] page. In this page, some change could be made onto the software to suit operator's need.

Figure 4.17

- **[Client List] :**
  ALL client lists that did alignment measurement.
- **[Kingpin Turning Setting] :**
  Select a client entry in the client list will show the service records.
- **[Print] :**
  Print vehicle alignment data in table format or chart format. (The print format setting please refer to [system management]-[report setting].

4.2.4 Print Report

- At main interface, click [Report Print] to enter report page. In this page, operator could navigate or print clients' service record.

Figure 4.18

- **[Client List] :**
  ALL client lists that did alignment measurement.
- **[Record List] :**
  Select a client entry in the client list will show the service records.
- **[Number Plate Search] :**
  Can search with the license No. To locate the measurement history of this vehicle.
- **[Print] :**
  print the measurement report

4.2.5 Help Information

- Help system could provide detailed operation instruction:

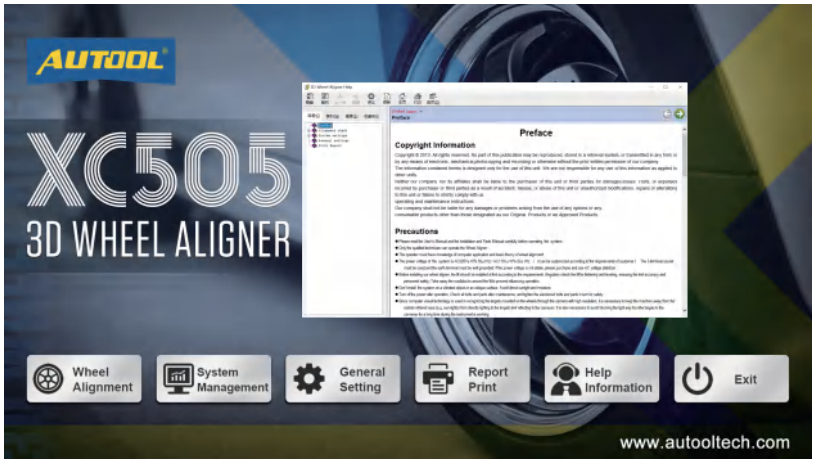

Figure 4.19

4.2.6 Exit

- Click to exit alignment software.

CHAPTER 5 FREQUENT ASKED QUESTION

5.1 Computer Operation

5.1.1 Computer Can Not Boot

- Check the power supply of computer.
- Check if the power button is clicked on both the computer host and monitor, whether the indication LED is flashing.
- Check the brightness and contract of the monitor.

5.1.2 Can Not Enter WINDOWS 7 Desktop

- Computer boot file missing.
- BIOS error.
- Hardware failure.

5.1.3 Mouse / Keyboard Not Functional

- Mouse / keyboard connection to the computer host is faulty.
- Mouse / Keyboard not compatible with computer host
- Mouse / Keyboard faulty.

5.1.4 Printer Not Functional

- Check power supply of print, signal cable connection to computer host, and if the print is on linked mode.
- Check installation and setting of Driver for printer.
- Check if the computer is virus affected.

5.1.5 Can Not Run Wheel Aligner Software

- Software core file missing.
- Registry error.

5.2 Standard measurement

- When turn steering wheel, there's no camera / target block prompt when block rear targets.
- This is normal. Won't affect the measurement result.

MAINTENANCE SERVICE

Our products are made of long-lasting and durable materials, and we insist on perfect production process. Each product leaves the factory after 35 procedures and 12 times of testing and inspection work, which ensures that each product has excellent quality and performance.

Maintenance

To maintain the performance and appearance of the product, it is recommended that the following product care guidelines be read carefully:

- Be careful not to rub the product against rough surfaces or wear the product, especially the sheet metal housing.
- Please regularly check the product parts that need to be tightened and connected. If found loose, please tighten it in time to ensure the safe operation of the equipment. The external and internal parts of the equipment in contact with various chemical media should be frequently treated with anti-corrosion treatment such as rust removal and painting to improve the corrosion resistance of the equipment and extend its service life.
- Comply with the safe operating procedures and do not overload the equipment. The safety guards of the products are complete and reliable. Unsafe factors are to be eliminated in time. The circuit part should be checked thoroughly and the aging wires should be replaced in time.
- Adjust the clearance of various parts and replace worn (broken) parts. Avoid contact with corrosive liquids.
- When not in use, please store the product in a dry place. Do not store the product in hot, humid, or non-ventilated places.

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From the date of receipt, we provide a three-year warranty for the main unit and all the accessories included are covered by a one-year warranty.

Warranty access

- The repair or replacement of products is determined by the actual break-down situation of product.
- It is guaranteed that AUTOOL will use brand new component, accessory or device in terms of repair or replacement.
- If the product fails within 90 days after the customer receives it, the buyer should provide both video and picture, and we will bear the shipping cost and provide the accessories for the customer to replace it free of charge. While the product is received for more than 90 days, the customer will bear the appropriate cost and we will provide the parts to the customer for replacement free of charge.

These conditions below shall not be in warranty range

- The product is not purchased through official or authorized channels.
- The product breakdown because the user does not follow product instructions to use or maintain the product.

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Return & Exchange

- If you are an AUTOOL user and are not satisfied with the AUTOOL products purchased from the online authorized shopping platform and offline authorized dealers, you can return the products within seven days from the date of receipt; or you may exchange it for another product of the same value within 30 days from the date of delivery.
- Returned and exchanged products must be in fully saleable condition with documentation of the relevant bill of sale, all relevant accessories and original packaging.
- AUTOOL will inspect the returned items to ensure that they are in good condition and eligible. Any item that does not pass inspection will be returned to you and you will not receive a refund for the item.
- You can exchange the product through the customer service center or AUTOOL authorized distributors; the policy of return and exchange is to return the product from where it was purchased. If there are difficulties or problems with your return or exchange, please contact AUTOOL Customer Service.

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目 录

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注意

⚠ 在使用本仪器之前，请先仔细地通读一遍本手册，熟悉一下产品，避免造成人身伤害和仪器产品损坏事故。

- 安装调试前应详细阅读本说明书，检查设备清单，如有疑问立即与经销商或本公司联系。
- 仪器安装者须为经过本公司相关安装技术培训的技术服务人员。
- 仪器操作者须经过本公司认可的相关产品技术培训，合格后方可上岗。
- 操作者必须有一定的计算机应用基本知识，操作者须了解3D四轮定位的基本知识。
- 操作者必须具有使用举升机等设备和维修汽车的安全常识；
- 3D四轮定位仪使用交流市电1PH AC220V±10% 50Hz或1PH AC110V±10% 60Hz，定期检查电源连接线接触是否可靠，有无破损。如电源电压不稳，请自行配备交流稳压器。
- 车辆维修结束后，需检查所有放松的螺栓和部件，按要求上紧上齐以保证安全。
- 3D四轮定位仪运用计算机视觉技术，通过高分辨率摄像机识别安装在车轮上的标靶，故仪器工作中应避免长时间遮住标靶至摄像机之间的光路。
- 不能将3D四轮定位仪安装在振动的物体上或倾斜的平面上，应当避免日光直射与潮湿。
- 3D四轮定位仪的标靶是进行检测的关键部件，使用和存放时不能损伤其结构，保持标靶表面清洁。出现污迹请用软布蘸适量中性清洁剂或无水酒精擦拭。
- 3D四轮定位仪立柱和摄像机横梁中的导线连接紧密。在首次安装之后，禁止随意触动导线。
- 摄像机在出厂前进行了精确的位置标定，用户无论在使用中还是使用后，禁止随意打开、调节摄像机!
- 未得到商授权，禁止拆卸立柱、横梁、标靶，以免造成部件损坏、影响检测，增加维修难度和费用。对于擅自拆卸造成的损坏，本公司一律不予保修。
- 安装轮夹时应根据轮辋的实际情况灵活、正确地选择安装方式；旋紧时用力均匀，旋紧后轻拉轮夹以确认轮夹是否安装牢固。
- 3D四轮定位仪的摄像机是检测的关键光学部件，要保持滤镜表面清洁；如果出现污迹，请用镜头纸轻轻擦拭。
- 使用各旋钮时须用力均匀，适当旋紧，切勿过分用力，以免损坏锁紧机构或造成其它的损坏。

▶ 使用完毕后，请及时切断所有电源。

安全信息

▶ 不得在易燃易爆的环境中操作四轮定位系统。

▶ 操作人员必须在测量平台处提供适当的防火措施。特别地，不得在工具推车上贮存任何易燃或自燃物（如沾有机油或可燃溶剂的布块），要使设备远离火源。

设备使用过程中操作人员应慎重考虑，避免误操作。操作人员须明确核实：

▶ 设备只能按照技术规范使用。

▶ 有关操作、维修人员必需的人身安全设备是否可用、是否老化。

▶ 工作场地的操作规程是否清晰可用。

▶ 只有具有相应资质并经授权的相关人员才能操作和维修该设备。

▶ 上述人员在日常工作中必须牢记有关操作规程，特别是安全操作规程。

▶ 张贴在设备上的所有安全及警告标志必须清晰易读，且不得移作它用。

正常操作过程中的基本安全措施：

▶ 操作人员应熟知操作规程并能够依据操作规程进行工作!

▶ 开机之前须检查确认以下几个方面：

▶ 未经授权的人员不得停留在设备工作区域之内。

▶ 设备启动时不能伤到任何人!

▶ 设备使用前要检查是否有明显的损坏，并确认设备是否在理想状态下工作!发现问题应立即向主管人员汇报!

▶ 开始操作之前，检查并确认所有的安全设备是否都运行良好!

维护保养过程中的基本安全措施：

▶ 坚持按照操作规程中规定的时间间隔对设备进行定期检查和维修!

- 设备维修之前要阻止未经授权人员进入工作区域! 设置相关警告标志!

第一章 概述

1.1 定义

- 3D四轮定位仪用于检测汽车车轮的定位参数，并与原厂的设计参数进行对比，指导使用者对车轮定位参数进行相应的调整，使其符合原设计要求，以达到理想的汽车行驶性能，操纵轻便、行驶稳定可靠，并减少轮胎的偏磨损。

1.2 何时需做四轮定位

当出现以下情形之一时，需做四轮定位：

- 直行时需紧握方向盘，否则汽车会跑偏。
- 轮胎出现异常磨损，如轮胎单侧磨损或出现凹凸状、羽毛状磨损。
- 转向时方向盘太重、太轻以及快速行驶时方向盘发抖。
- 车辆更换轮胎、车辆转向节以及减振器等悬挂系统配件后。
- 车辆发生碰撞事故后。
- 当新车行驶3000公里。
- 每次例行保养时。

1.3 汽车有哪些主要定位参数

- 四轮定位角度是存在于悬架系统和各活动机件间的相对角度。保持正确的四轮定位角度可确保车辆的行驶稳定性，减少轮胎磨损。
- 汽车的四轮定位角度主要包括了：外倾角(Camber)、前束角(Toe-in)、后倾角(Cast er)、内倾角(Steering Axle Inclination)、转向20°时前张角(Toe-out on Turn)等。

1.3.1 外倾角(Camber)

- 外倾角定义为由车前方看轮胎中心线与垂直线所成的角度，向外为正，向内为负，如图1.1。其角度的不同能改变轮胎与地面的接触点及施力点，直接影响轮胎的附着力及磨损状况，并改变车重在车轴上的受力分布，避免轴承产生异常磨损。此外，外倾角的存在可用来抵消车身受负荷后，悬架系统机件变形及活动面间隙所产生的角度变化。
- 外倾角的存在也会影响汽车的行进方向，这正如摩托车可利用倾斜车身来转弯。因此左右轮的外倾角必须相等，在力的平衡下不致影响汽车的直进性，再与前束(Toe-in)配合，提高直进稳定性及避免轮胎磨损不均。如果没有这个外倾角，满载时车轮就会过于向内侧倾斜，从而加速轮胎偏磨和车轮轴承磨损。因此，这个参数可以延长轮胎和车轮轴承的寿命。

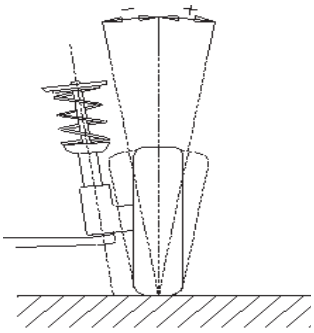

图1.1 外倾角示意图

1.3.2 前束（角）(Toe-in)

- 前束角定义为由车正上方向下看，轮胎中心线与汽车纵向轴线所成的角度，向内为正，向外为负，如图1.2。总前束值等于两个车轮的前束值之和，即两个轮胎中心线的夹角。前束角的功用在于补偿轮胎因外倾角及路面阻力所导致的向内或向外滚动的趋势，以确保汽车的直进性。
- 与前束角相关的一个参数为前张角（Toe-out），亦定义为由车上方看左右两个轮胎所成的角度，但符号定义与前束角相反，向内为负，向外为正。由于有些人习惯使用前张角，所以需特别注意前束角与前张角的差别。

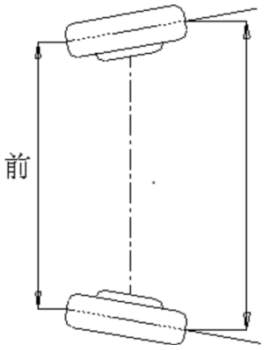

图1.2 前束示意图

1.3.3 主销内倾角

- 主销内倾角(Steering Axle Inclination)定义为由车前看转向轴中心线与垂直线所成的角度，如图1.3。有了主销内倾角可使车重平均分布在轴承之上，保护轴承不易受损，并使转向力平均，转向轻盈。反之，若主销内倾角为0，则车重和地面的反作用力会在车轴产生很大的横向切应力，易使车轴受损，转向也会变得沉重。此外，主销内倾角也是前轮转向后回正力的来源。主销内倾角在车辆悬架设计之初就已设定好，通常是不可调整的。

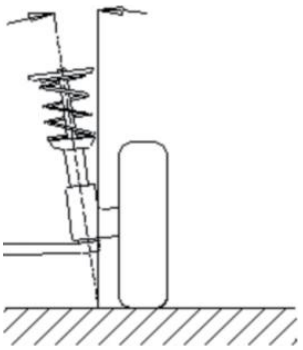

图1.3 主销内倾角示意图

1.3.4 主销后倾角

- 主销后倾角(Caster)定义为由车侧看转向轴中心线与垂直线所成的夹角，向前为负，向后为正，如图1.4。主销后倾角的存在可使转向轴线与路面的交会点在轮胎接地点的前方，可利用路面对轮胎的阻力让汽车保持直进，其原理就如购物推车的前轮会自动转至你施力的方向并保持直进一般。主销后倾角越大汽车的直进性越好，转向后方向盘的回复性也越好，但却会使转向变得沉重。一般汽车的主销后倾角大约在1~4°之间。

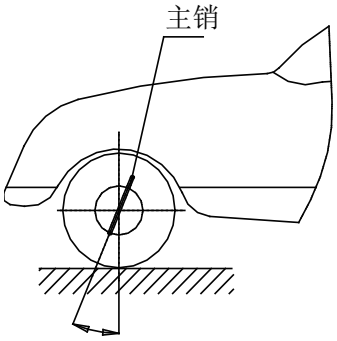

图1.4 主销后倾角示意图

1.3.5 转向20°时前张角

- 转向时前张角(Toe-out on Turn)定义为转向20°时两前轮转向角度之差，如图1.5。转弯时内轮所转的角度通常大于外轮，相差在2°左右，其目的是为了在转弯时使汽车能以后轴延伸线的瞬时中心为圆心顺利转弯。此外当内轮转角较大时，阻力也较大，阻力的不同可使汽车偏向阻力大的一方，使转向容易。

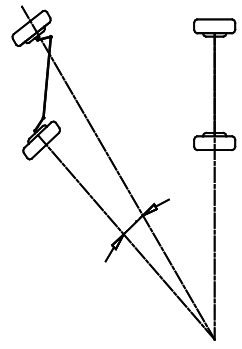

图1.5

1.3.6 推力角

- 推力角 (Thrust　Angle) 定义为由车后轮总前束的夹角平分线 (推进线) 与几何中心线所成的角度 (见图1.6)。一般规定推进线朝左为正值，朝右为负值。如果推力角不为0，则车辆存在侧向运动的趋势。如果出现这种情况，需要对后轮前束进行调节。

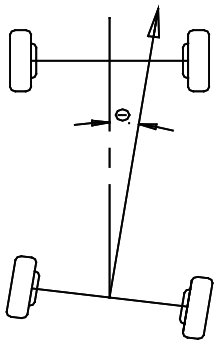

图1.6

1.3.7 轴距差

- 两前轮中心的连线与两后轮中心的连线之间的夹角称为汽车的轴距差 (也称为轴距偏差)。当右侧车轮的距离比左侧车轮的距离大时，此状态下规定轴距差为正值，反之当右侧车轮的距离比左侧车轮的距离小时，此状态下规定轴距差为负值，如果在汽车的规格值中，汽车的前后轮距已经知道，则轴距差可以用角度值来表示，如图1.7。

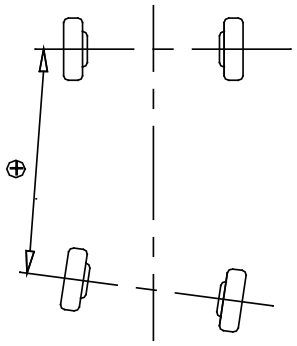

图1.7

1.3.8 轮距差

- 左前轮和左后轮与地接触点之间的连线，与右前轮和右后轮与地接触点之间的连线所形成的夹角称为汽车的轮距差 (也称为轮迹宽度偏差)。当两后轮中心的连线距离比两前轮中心的连线距离大时，此状态下规定轮距差为正值，反之规定轮距差为负值，如果在汽车的规格值中，汽车的左右轴距已经知道，则轮距差可以用角度值来表示，如图1.8。

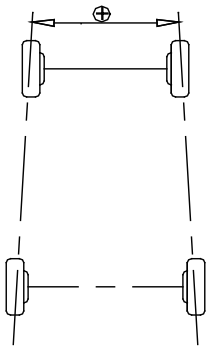

图1.8

1.3.9 左（右）横向偏置（角）

- 左（右）后轮与左（右）前轮在汽车横向上的相对偏置量为左（右）横向偏置。当左（右）后轮比左（右）前轮向外偏时，左（右）横向偏置为正值，反之为负。左（右）侧前后轮中心的连线与推进线之间的夹角为左（右）横向偏置角。

1.3.10 轴偏置（角）

- 前、后轴在汽车横向上的相对偏置量称为轴偏置。当后轮轴比前轮轴向右偏时，轴偏置为正值，反之为负值。轮距差角的平分线与推进线之间的夹角称为轴偏置角。

1.3.11 延迟（角）

- 同一轮轴上的两侧车轮在汽车纵向上的相对偏置量称为延迟。当前（后）轴上的右轮在左轮后面时，前（后）延迟为正值，反之为负值。两前（后）轮的中心连线与汽车纵向几何中心线垂线之间的夹角称为前（后）延迟角。

1.3.12 包容角

- 主销内倾角与车轮外倾角之和称为包容角。

1.4 功能和特点

- 全新三维计算机视觉测量：采用高性能摄像机对定位角进行自动检测,出厂前相机已进行精确标定，现场安装好后即可直接使用，无需现场再次标定。
- 无源标靶：其中无任何电子元件，与主机间没有导线，使用可靠、方便。
- 3D四轮定位仪可根据客户自定义常用举升高度，来安装定位仪横梁组件 。
- 3D自动升降式四轮定位仪，横梁组件自动检测标靶高度，可随举升机自动上下移动，使定位仪始终保持最佳测量效果。
- 最精简的自主测试流程，图形操作界面，简单明了，整个检测过程可自主选择，备有人性化提示。
- 测量参数全面：

可以测量前(后)轮前束、前（后）轮外倾角、汽车推力角、主销后倾角、主销内倾角等（附加检测可以测量轴距、轮距、对角等各个角度）。

- 数据齐全:
  带有世界上20，000多种汽车的车轮定位数据及调整方法，用户还可自行扩展补充新的汽车数据资料。
- 提供历史数据保存功能，便于管理客户。
- 自带帮助系统，提供实时操作指南。

1.5 技术指标

电源	**交流市电 1PH AC220V±10% 50Hz 或 1PH AC110V±10% 60Hz**
主机	**联想品牌机（或中柏高配置一体机）**
显示器	**18.5″彩色液晶显示器（或中柏高配置23″一体机）**
前束角	**测试范围 0～±20°**
外倾角	**测试范围 0～±20°**
主销内倾	**测试范围 0～±20°**
主销后倾	**测试范围 0～±20°**
推力角	**测试范围 0～±5°**
可测轮辋尺寸	**10″～23″**

⚠ 注意

▶ 制造厂家保留更改设计的权利;

▶ 只有严格按照本说明书规定和测量程序界面提示操作，才能保证所指示的测试范围。

1.6 使用环境要求

环境温度	**0～50°C**
相对湿度	**≤85%**
光线要求	**无强红外光直接照射相机**
举升机车道高度差	**前后差值<5mm**

1.7 工作原理

- 3D四轮定位仪的电气工作原理框图如图1.9所示。整个系统共分为数据采集和数据处理2个部分。

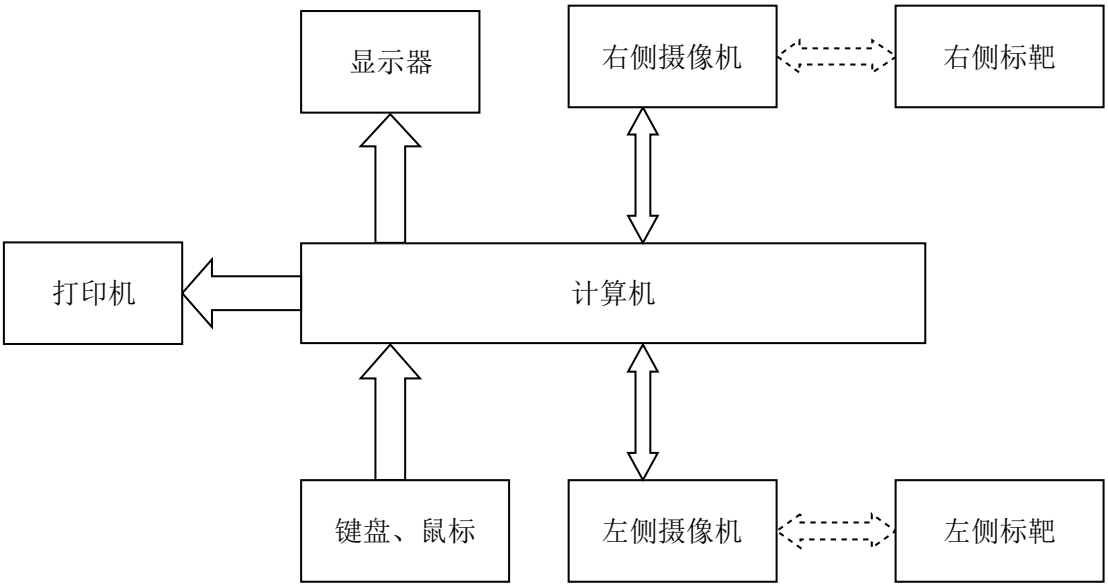

图1.9

- 数据采集部分的组成部件为两部高分辨率摄像机和标靶。左、右侧摄像机分别摄取汽车左右侧标靶图像，并通传输给数据处理部分。标靶通过轮夹与被测车轮固定连接在一起，从而由标靶上的目标点计算确定车轮的位置关系，并确定车轮的定位参数。
- 数据处理部分为3D四轮定位仪的核心部分，主要包括一套计算机系统、电源系统及接口系统。其作用是实现用户对3D四轮定位仪的操作指令，自动引导并指示主要操作过程，对数据进行处理并与原厂设计参数一起显示出来，同时指导用户对汽车进行调整。最后打印出相应的报表。
- 由于3D四轮定位仪需要把测试结果与原厂标准数据进行对比，并根据对比结果指导用户进行调节，所以数据库是否齐全是决定3D四轮定位仪实用性的一个重要因素。3D四轮定位仪数据库涵盖20，000种以上车型的四轮定位数据。同时用户还可自己输入新车型的四轮定位标准参数，对标准定位数据库进行扩充。

第二章 仪器结构

2.1 整体结构

- 3D四轮定位仪主要由立柱组件、横梁组件（包括摄像机）、机柜（开放式无机柜，包含一个轮夹挂架）、主机、显示器、打印机、标靶、轮夹、通讯线、转角盘（标配）、方向盘固定架、刹车板固定架等组成。

2.2 标靶和轮夹

- 3D四轮定位仪共有四个标靶（配套4个轮夹），是整个检测系统的关键部件（如图2.1所示），为摄像机监测的目标，在标靶背面有安装车轮的标识。

图2.1

2.3 通讯线

- 3D四轮定位仪电脑主机与横梁组件之间有两根线，一根USB信号线和一根电源线，在使用时应注意防护，以免对其造成损伤。

2.4 转角盘及过渡桥

- 3D四轮定位仪配有两个机械转角盘（标准配置，见图2.2）。转角盘放置于举升机的汽车前轮位置处；每个转角盘配有一个过渡桥，放置于转角盘与举升机之间，确保车轮在转盘上移动平稳。

图2.2

2.5 方向盘固定架

- 3D四轮定位仪带有一个方向盘固定架（图2.3）。在测试中，需根据提示放置方向盘固定架，以保证测试过程中汽车方向不会发生变化。

图2.3

2.6 刹车板固定架

- 3D四轮定位仪带有一个刹车板固定架（图2.4），用于固定汽车刹车板，使汽车在测试中不会发生前后移动的现象，在主销测试中必须固定踏下刹车板，使车辆制动。

图2.4

第三章 基本操作流程

3.1 了解情况

- 在对汽车进行四轮常规检测时，应首先询问车主关于车辆行驶方面的问题和出现的现象，以及过去四轮定位的检测情况，了解汽车的生产国家、生产厂家、车款、车型及出厂年代等有关情况。然后仔细检查底盘各零部件，包括胶套、轴承、摆臂、三角架球头、减震器、拉杆球头和方向盘是否有松动及磨损，再检查轮胎气压和轮胎规格以及两前轮花纹是否相同，两后轮花纹深浅是否一致，如果发现有异常现象，应与车主进行沟通，必要时，会同车主一起试车，确认问题，并采取相应措施，保证测量准确。

3.2 定位检测

- 当初步情况确定后，便可以开始进行常规检测。

3.3 调整

- 在常规检测中，根据测量结果，结合实际定位故障现象，参考汽车制造商提供的标准数据，根据实际情况做相应调整。

3.4 试车

- 四轮定位调整完毕后，应进行试车，以检查车辆的行驶异常情况是否消除，如果未达到标准应重新进行测量调整。

第四章 操作说明

4.1 测试前准备工作

- 询问车主关于车辆有关行驶方面的问题和出现的现象，过去四轮方面的检测情况，必要时，会同车主一起进行试车，确认问题，并了解汽车的生产国家、生产厂家、车款、车型及出厂年代等有关情况。
- 检查并插入转角盘和侧滑板固定销，安放过渡桥，将汽车驶到举升机或定位平台上，使前轮大约位于转盘中心。车停稳后，使方向盘居中，将方向盘固定架放在驾驶座座椅上，压下手把使之顶住方向盘以锁定方向盘，用驻车楔块固定车轮，然后松开手刹，确保车辆不移动和人员安全，并将车辆举升到四轮定位固定标定高度。
- 仔细检查底盘各零部件，包括胶套、轴承、摆臂、三角架球头、减震器、拉杆球头和方向盘是否有松动及磨损，再检查轮胎气压和轮胎规格以及两前轮花纹是否相同，两后轮花纹深浅是否一致。
- 将轮夹和标靶的合成体安装在四个车轮上，并旋转手柄以便锁紧轮夹。
- 将3D四轮定位仪的电源插头插入标准的市电三端电源插座中。

4.2 程序操作

- 打开电源，启动电脑，直接进入测量程序主界面。主界面显示有6项功能：定位检测、系统管理、常用设置、报表打印、帮助系统、退出。如图4.1所示：

图4.1

4.2.1 定位检测

- 在主界面下，点击 [定位检测] 图标进入测量界面。

4.2.1.1 车型选择

- 在做四轮定位之前，必须先选择该车型的标准数据，界面如下图所示：

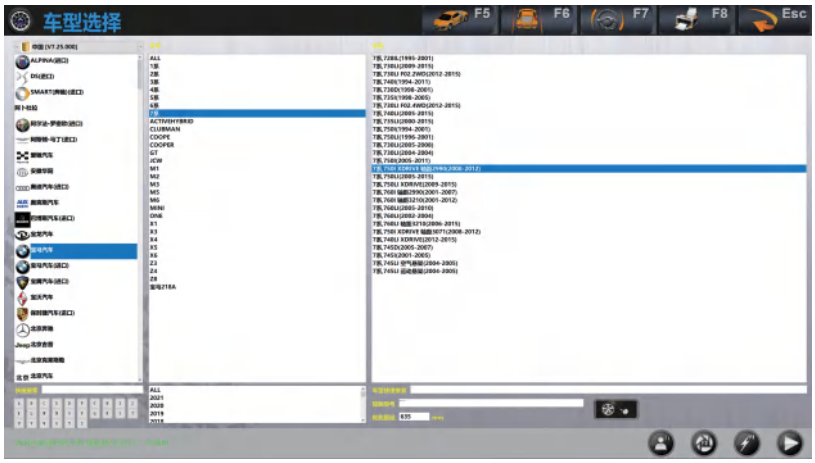

图4.2

- **[导航栏]**
  可以使你不按照系统的默认顺序进行操作，而直接进入要测试的项目。
- **[数据库选择]**
  可以使你直接选择从常用/中国/美洲/欧洲数据库进入。如果您是第一次使用常用数据库，此数据库是空的，需要在主界面点击系统管理，然后进入常用数据管理，添加您的常用数据，方便您选择常用的车型，提高工作效率。
- **[厂商、车系、车型列表]**
  可以直接选择列表中的车型，进行下一步的操作。如果您是第一次使用，此列表是空的，必须要先点选某一厂商，从车型列表中选中，才可以使用。
- **[厂商快速检索字母点选栏]**
  厂商快速检索字母只能由点选栏来选择，不能直接输入。
- **[车型快速检索]**
  车型下方提供了针对车型型号快速检索的输入框，对于中文只需输入车型汉字拼音的首字母即可进行检索，对于英文则输入英文名称的首字母或更多字母即可。
- **[帮助]**
  当前界面的操作及注意事项说明。
- **[标靶监视]**
  当界面提示标靶被挡或找到的圆不够时，可以打开查看遮挡原因。进入后可使用横梁组件手动升降或者自动升降。
- **[快速测量]**
  如果推车后意外退出或者试车后二次测量时，可以使用此快速测量模式，此时因未做滚动补偿，可能数据会有一定偏差。
- **[下一步]**
  能够使整个测量过程按照系统的默认顺序（车型选择->滚动补偿->主销测量->报表打印）进行操作。

4.2.1.2 滚动补偿

- 滚动补偿是为了减小由于钢圈、轮胎的变形和轮夹的安装而引起的误差，直接采用车轮运动轴线进行定位的操作方式，界面如下图所示：

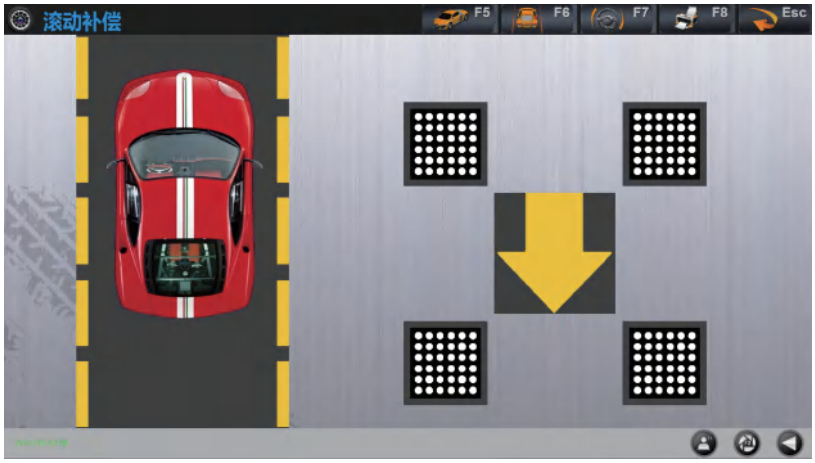

图4.1

- **操作步骤：**

  1. 分别安装四个轮夹标靶。
  2. 将过渡桥安放于转角盘与举升机之间的适当位置上。
  3. 使车轮平直，用方向盘固定架固定方向盘，取下刹车板固定架，向后移动驻车楔块约35cm（若车轮直径大于700mm，需适当增加），使车辆可以在此范围内自由移动。
  4. 按照系统提示操作，往后推动汽车至要求位置后，再将汽车拉回原位。

⚠ 注意

- 一定要按照要求将方向盘固定死，以免车轮发生左右摆动的情况，造成轴线不稳；
- 在推车和拉车的过程中，不可挡住所有摄像机的视线；
- 推拉车用力均匀，运动的平台平整，车辆移动平稳无晃动；
- 标靶面基本与地面垂直，否则，可能造成标靶在运动中仰角过度，引起标靶图像异常；
- 滚动补偿结束后，请拆下过渡桥。

- **[标靶红色外框状态]**
  表示摄像机采集到的标靶图像不合测量要求，通常是由于相机与标靶之间被阻挡。
- **[帮助]**
  当前界面的操作及注意事项说明。
- **[标靶监视]**

当界面提示标靶被挡或找到的圆不够时，可以打开查看遮挡原因。进入后可使用横梁组件手动升降或者自动升降。

- **[上一步]**
  返回上一步重新推车。

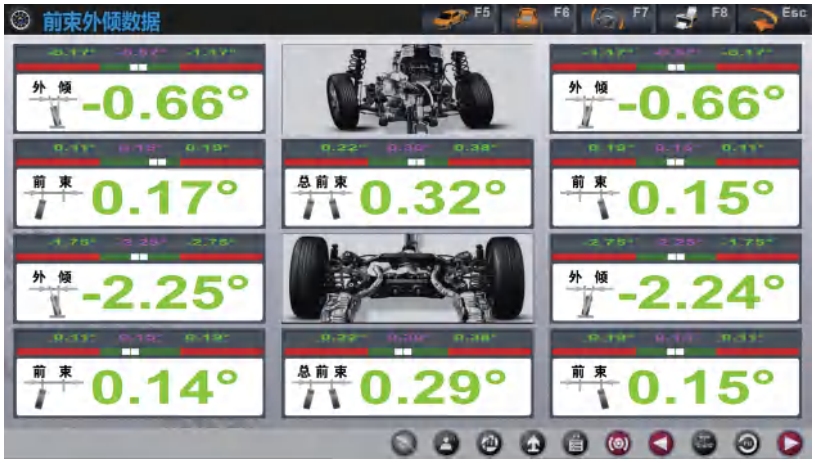

图4.4

- 推车结束后会显示四个车轮的前束外倾数据，此界面为实时显示界面，如果不需要测量主销数据时，可在此界面进行四轮定位数据调整。调整时如需对车辆进行举升或者降低，可以在直接操作举升机，定位仪的自动升降功能会在举升机动作时同步动作，使定位仪一直处于最佳工作状态（此自动升降功能只有全自动跟踪豪华版有）。

4.2.1.3 主销测量

- 主销测量是针对前轮而言的，包括主销内倾及主销后倾。主销内倾角可使车重平均分布在轴承之上，保护轴承不易受损，并使转向力平均，转向轻盈。主销后倾角的存在可使转向轴线与路面的交会点在轮胎接地点的前方，可利用路面对轮胎的阻力让汽车保持直进，界面如下图所示：

图4.5

- **操作步骤：**

1.方向盘调整至正前打直状态，即两前轮分前束相等的时候，操作界面上的圆形小球会移动到中间位置并且由红色变成绿色；

2.按照系统提示，向右转动方向盘，车轮右转角度达到或超过设定角度（10°或20°），系统提示左转；

3.按照系统提示，向左转动方向盘，车轮左转角度达到或超过设定角度（10°或20°），系统提示回正方向盘；

4.按照系统提示，回正方向盘至初始位置，小球变成绿色，采样工作完毕。

- 计算结束后，系统自动弹出测量结果，界面如下图所示：

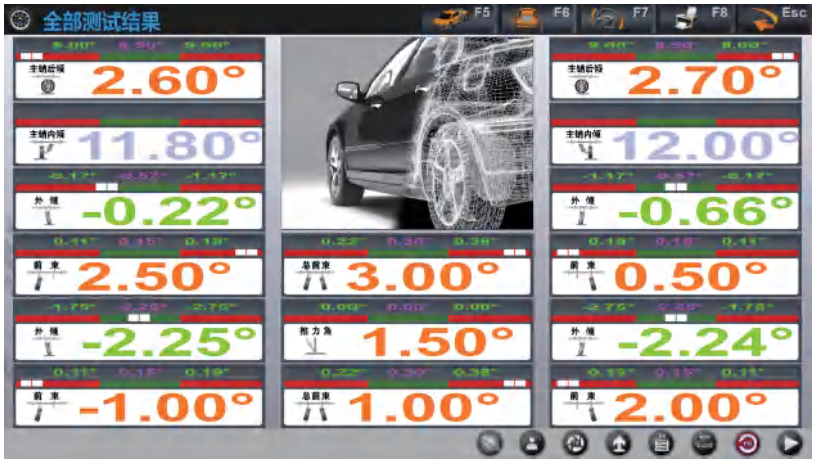

图4.6

- 可在此界面进行四轮定位数据调整。调整时如需对车辆进行举升或者降低可以在直接操作举升机，定位仪的自动升降功能会在举升机动作时同步动作，使定位仪一直处于最佳工作状态（此自动升降功能只有全自动跟踪豪华版有）。
- **[附加测试]**

  可测量轴距、轮距、对角等各个角度，界面如下图所示：

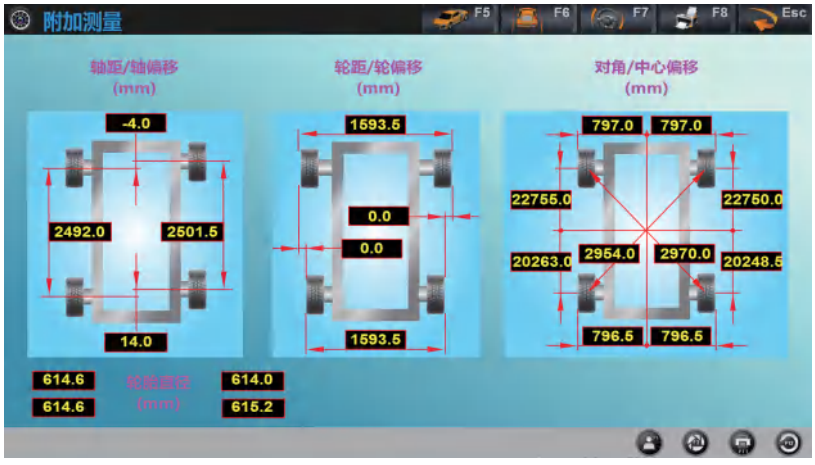

图4.7

⚠ 注意

▶ 做主销测量前，请先安装刹车板固定架，以确保车轮不会发生滚动，并去掉方向盘固定架。

▶ 在各测量界面，测量值用不同种类的颜色来表示。

1) 绿色：测量值在标准范围之内；

2) 亮橙色：测量值在标准范围之外；

3) 白色：该测量参数没有标准范围。

4.2.1.4 报表打印

- 报表打印可以打印并储存当前车辆的定位数据，界面如下图所示：

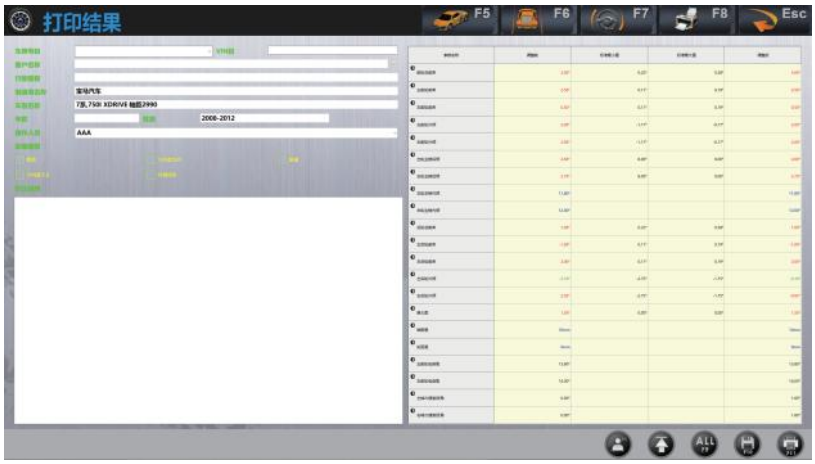

图4.8

- **[车牌号码]**
  当前车辆的车牌号码。
- **[客户名称]**
  当前车主的相关信息。客户信息在此界面可以直接通过键盘输入。
- **[车辆信息]**
  当前车辆的相关信息，包括[行驶公里数]、[制造厂商]、[型号]、[起始年]、[终止年]。[车辆信息]在此界面是不能直接用键盘输入的，如果在[常规检测]—[选择车型]界面中选择了汽车型号，则此界面会显示被选择的车型的相关信息。
- **[故障原因]**
  当前车辆的不良症状。包括[磨胎]、[跑偏]、[方向盘不正]，[方向盘发抖]、[其他]5个选项。
- **[查看全部]**
  可查看前、后轮及主销的全部数据。
- **[保存]**
  储存当前车辆的定位数据（至少必须输入[车牌号码]才能成功储存）。

⚠ 注意

▶ 此界面提供的打印功能，只是针对本次检测的单个信息报表，而主界面上的报表打印功能是针对所有以前做过并保存的信息报表。

4.2.1.5 返回

- 返回主界面。

4.2.2 系统管理

- 在主界面下，点击[系统管理]图标进入系统管理界面，界面如下图所示：

图4.9

4.2.2.1 维修站信息

- 维修站信息主要用于记录本维修站的联系方式及操作员信息。该信息能导入到报表信息当中，使打印出来的报表上能显示该维修站的信息。便于您进行数据的管理和跟踪操作，界面如下图所示：

图4.10

- [设置]

进入该界面后信息框内文本点击无反应，此状态下只提供查看功能，点击编辑按钮后即能进行信息编辑操作。信息输入完毕后再点击保存按钮，系统自动保存信息并退出到上一级的界面。

⚠ 注意

▶ 如果维修站有多个操作员，则在维修站信息中记录多个操作员的输入方法是用“#”符号把每个操作员的名字隔开，如，张三#李四#王五。

4.2.2.2 客户信息

- 客户信息能够管理和维护客户的相关信息，这样对于跟进问题的处理、提高服务的质量将会起到至关重要的作用，界面如下图所示：

图4.11

- **[快速检索]**
  界面底部提供了针对客户名称快速检索的输入框，对于中文只需输入汉字拼音的首字母即可进行检索。
- **[添加客户]**
  点击该按钮，在弹出的客户详细信息窗口中添加客户的信息，界面如下图所示：

图4.12

- **[修改]**
  选择需要修改的条目，点击该按钮，在弹出的客户详细信息窗口中修改客户信息即可。
- **[删除]**
  删除客户信息，请操作员注意此操作会把该客户的相关信息，包括他曾经做的测试信息等都会删除掉。请确认是否需要删除，再进行操作。
- **[打印]**

4.2.2.3 语言选择

- 语言选择系统提供多种语言选择，界面如下图所示：

图4.13

- **操作步骤：**
  选择所需的语言，然后点击[确定]按钮，系统将重新启动并切换到所选语言。

4.2.2.4 标准数据

- 语该界面提供了各型号的汽车出厂设置的参数信息。数据库内囊括了国内外众多制造厂商所生产的各个系列的产品在其生产期内的信息，并且能够通过系统升级的操作来及时的更新数据库中的内容，除此以外还提供了添加自定义数据的功能，能把标准数据内所没有的车型信息由操作员自行添加，使系统更适合于维修站的应用（说明：数据库升级后，原自定义数据不会丢失），界面如下图所示：

图4.14

- **[型号快速检索]**
  提供了针对车型型号快速检索的功能，对于中文只需输入汉字拼音的首字母即可进行检索。
- **[新增]**
  添加标准数据库内没有的车型数据，点击该按钮，在弹出的自定义数据详细信息窗口中可以添加自定义信息。确认后便能把信息保存到标准数据表中，界面如下图所示：

图4.15

- **[修改]**
  此功能既适用于修改表中的自定义信息，也可以对原厂标准数据中的信息进行修改。
- **[删除]**
  此功能只适用于删除表中的自定义信息，对于原厂标准数据中的信息无法进行删除。
- **操作步骤：**
  直接点选制造厂商，选择相应型号即可查看其车型的标准数据。

4.2.2.5 常用数据管理

常用数据管理能够把标准数据内的汽车信息单独的添加到常用数据中，提高操作员的信息检索速度，界面如下图所示：

图4.16

- **[从标准数据添加]**
  点击该按钮，[标准数据管理]窗口就会被激活，从标准数据列表中选择所需车型，确定后便能把该信息从标准数据中添加到常用数据表中。
- **[删除]**
  此功能用于删除常用数据表中的信息。
- **操作步骤：**
  直接点选制造厂商，选择相应型号即可查看其车型的标准数据。

4.2.2.6 退出

- 退回主界面。

4.2.3 常用设置

- 在主界面下，点击[常用设置]图标进入设置界面，常用设置使用户可以很方便的设置常用模式或者习惯，界面如下图所示：

图4.17

- **[模式设置]**
  所有做过常规检测的客户的列表。
- **[主销转向设置]**
  在[客户列表]中选择一个客户信息后，此列表会显示该客户一次或多次的常规检测信息记录。
- **[打印]**
  以表格或图形的格式打印当前车辆的定位数据（报表的格式设置请参考[系统管理]-[报表设置]）。

4.2.4 报表打印

- 在主界面下，点击[报表打印]图标进入报表打印界面，报表打印使用户可以很方便的查询或打印客户的常规检测记录，界面如下图所示：

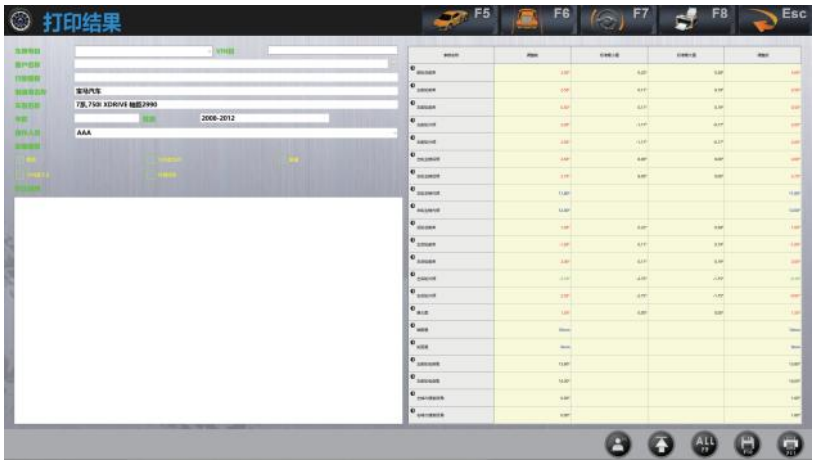

图4.18

- **[客户列表]**
  所有做过常规检测的客户的列表。
- **[记录列表]**
  在[客户列表]中选择一个客户信息后，此列表会显示该客户一次或多次的常规检测信息记录。
- **[车牌搜索]**
  可输入需要查询的车牌号码，快速搜索出此车牌的定位记录。
- **[打印]**
  打印当前车辆的定位数据。

4.2.5 帮助系统

- 帮助系统可以提供比较详细的操作帮助说明，界面如下图所示：

图4.19

4.2.6 退出

- 点击后退出定位仪程序。

第五章 常见问题解答

5.1 计算机操作方面

5.1.1 计算机无法启动，无信息提示

- 检查电源插座是否有电，插头是否接触良好。
- 检查各接头是否连接良好，检查电脑主机和显示器的电源开关是否打开，指示灯是否点亮。
- 检查显示器的对比度和亮度是否合适。

5.1.2 无法进入WIN 7界面

- 计算机硬盘启动文件丢失。
- BIOS设置错误。
- 硬件出现问题。

5.1.3 鼠标或键盘无反应

- 鼠标或键盘连接不正确。
- 鼠标或键盘与主机不匹配。
- 鼠标或键盘损坏。

5.1.4 打印机无反应

- 检查打印机电源线、电缆线是否连接正确，打印机是否处于联机状态。
- 检查打印机驱动程序是否安装和设置正确。
- 检查电脑是否有病毒。

5.1.5 无法运行3D四轮定位仪程序

- 程序运行文件丢失或程序文件错误。
- 程序注册表被破坏。

5.2 常规检测方面

5.2.1 转动方向盘时，遮挡后轮标靶不出现遮挡提示框，为什么?

- 这是正常现象。不出现遮挡提示框不影响检测结果，但是在极值点、20°附近尽量不要遮住任一前轮标靶。

5.2.2 转动方向盘时，标靶光路被遮挡，出现了遮挡提示框，如何进行处理?

- 若在20°区域之内出现遮挡提示框，请停止转动方向盘，移去遮挡物，继续转动方向盘即可。

5.2.3 进行四轮定位后，车轮的左右最小转弯半径明显不同，为什么？

- 这种情况是由于方向盘与转向柱错位造成的。本系统对汽车定位角的检测是以正常状态下的“方向盘居中”为标准进行的，实际上是以方向盘居中为基础进行的，所以检测前需询问客户有关方向盘的维修和使用历史，排除方向盘与转向柱错位的干扰，凭经验使方向盘居中。

5.2.4 在标靶监视界面中，有些标靶没有图像，如何处理？

- 这种情况下，判断一下对应摄像机与对应标靶的光路有无遮挡，对应的摄像机的照明灯是否点亮，检查对应的摄像机的线缆接触是否良好。由于系统的2台摄像机的硬件完全对等，可以使用交换法排查出现故障的部件。注意交换排查法后将系统还原。

第六章 日常维护

6.1 计算机的维护

- 使用者必须具有一定的计算机软件和硬件知识，以确保计算机的正常工作。
- 电脑主机应安装在立柱后下方的机箱内；显示器应牢固地应安装在立柱前面工作台上方的插口上；严禁将电脑主机和显示器放置在有放射源和热源的地方，或放置在其它爆晒、酷热、严寒及潮湿的环境中。
- 不要把任何东西通过缝隙塞进电脑主机和显示器内。
- 电脑工作时不要随意搬动或剧烈振动。
- 尽量避免频繁开机。
- 不要随意修改BIOS设定。
- 不要随意删除硬盘上你不了解的文件，以免电脑运行异常或瘫痪。
- 电脑病毒隐藏在微机系统内部或依附在其它文件上，通过复制自身达到扩散的目的，并破坏和干扰系统的正常运行，主机出厂前都经过检测，确保无病毒的存在。
- 电脑主机为3D四轮定位仪专用设备，禁止外来软件在本设备上使用，以避免病毒的传染。由于病毒感染而使系统出现问题本公司不予保修。
- 长期使用会在电脑主机、显示器和键盘上积累一定的灰尘和油污，因此，要定期用中性清洁剂或无水酒精清洗，禁止油性和腐蚀性物质接触计算机，避免清洗液进入主机和显示器内部。
- 禁止将计算机拆开，乱动内部连线和板卡，以免造成内部设备损坏。

6.2 打印机的维护

- 仔细阅读打印机用户指南中的有关规定。
- 安装正确的打印机驱动程序，保证打印机设置无误。
- 使用一段时间后，如果出现打印字迹不清的情况，可能是因为墨水用尽，这时请及时。
- 更换打印机墨盒，更换墨盒后即可恢复打印效果。

6.3 标靶、轮夹的维护

- 轮夹应定时清洁和加注少量润滑油，保证丝杠伸缩自如和卡爪的装夹可靠。
- 标靶由钢化玻璃和塑料等制成，长期使用会在表面累积一定的灰尘和油污，因此，要定期使用中性清洁剂或无水酒精清洗，禁止用水、油性和腐蚀性物质清洗。
- 标靶、轮夹是进行检测的关键部件，拆卸或受外力发生变形后，会造成相对位置关系改变，严重影响检测结果。对于擅自拆开标靶、轮夹造成的损坏，本公司一律不予保修。

6.4 立柱、横梁及信号线的维护

- 固定在立柱上方的横梁内装有位置固定的精密摄像机，并在首次安装时进行了位置标定。用户无论在使用中还是使用后，务必防止拆开相机盒。如摄像机出现问题，请及时与我们的经销商联系，以便对摄像机进行维护或更换。
- 摄像机滤镜，长期不用时要注意防尘。如果在使用中发现在滤镜上积有尘土，请使用镜头纸轻轻擦拭，切忌用力过猛，避免压碎滤镜或移动摄像机。

6.5 转盘的维护

- 加注少量润滑油，保证转盘运动灵活；在转盘上移动车辆时，请插上锁紧销，防止转盘滑动。

维修保养服务

您所拥有的AUTOOL产品选用持久耐用的材料，AUTOOL坚持精益求精的生产工艺，每一件产品出厂都经过35道工序及12次质检工作，从而确保每一件产品都拥有卓越的品质及性能。所以您的AUTOOL产品值得您定期维护保养，使其产品将能够长期稳定地工作。

维修保养

维护保养是为了保持产品性能和外观，我们建议您仔细阅读以下产品保养指南:

- 注意不要将产品与粗糙表面摩擦或揉搓产品，特别是钣金外壳。
- 对产品中需要紧固和连接的部位经常进行检查，如发现松动应及时紧固，以保证产品的安全运行。对与各种化学介质接触的产品外部和内部零件要经常进行除锈、喷漆等防腐处理，以提高产品的抗腐蚀能力，延长产品的使用寿命。
- 遵守安全操作规程，不超负荷使用产品。产品的安全防护装置齐全可靠，及时消除不安全因素。电路部分彻底检查，老化电线要及时更换。
- 定期清洗和更换易耗部件；调整各部位配合间隙和更换磨损（已坏）部件清洁时，避免产品接触带腐蚀性的液态物品。
- 不使用时，请将产品存放于干燥的位置。不要将产品存放在高温、潮湿或不通风的地方。

保修服务

AUTOOL主机自客户签收日起享有3年保修期。其所含附件自客户签收日起享有1年保修期。

保修方式

- 根据具体的故障情况对产品进行免费修理或更换;
- 我方保证所有更换的部件、附件或产品都是全新;
- 在客户收到产品90天内出现故障同时提供视频和图片，我方承担运费并免费提供相应配件给客户更换。收到产品超过90天，客户承担相应的费用，我方免费提供配件给客户更换;

以下情况不在免费保修范围:

- 非正规渠道购买AUTOOL的产品;
- 未按产品说明书要求使用和维护造成的损坏;

在AUTOOL，我们为精湛的设计和卓越的服务感到自豪。我们很乐意为您提供更多的支持或服务。

声明

- 偶然公司保留更改产品设计与规格的权利，届时恕不另行通知。实物外观与颜色可能与说明书中显示的有差别，请以实物为准。我们已尽最大努力力求使书中所有描述准确，但仍难免有不妥之处。如有疑问，请联系经销商或偶然售后服务中心。本公司对产品拥有最终解释权，不承担任何因误解而产生的后果。

退换货服务

退换货

- 如果您对从线上授权购物平台和线下授权经销商所购买的AUTOOL产品不满意，根据《AUTOOL全球销售条款》，您可以自收到产品之日起七日内退货；或者在产品交付之日起的30日内调换等值的其他产品。
- 退回及调换的产品必须处于完全可销售状态，并附上相关销售单单据，所有相关配件、纸质发票（如有）。
- AUTOOL将会对寄回退货的商品进行检查，以确保其处于完好无损的状态并且符合条件，相关条件详情请参阅《AUTOOL全球销售条款》。任何未通过检查的商品将退还给您，您将不会获得商品退款。
- 您可以通过客户服务中心或AUTOOL授权经销商调换产品；退换货原则为从哪里购买，就从哪里退换货。如果您退换货遇见困难或者阻碍，请联系AUTOOL客户服务中心。通过客户服务中心退换货时，我们建议您通过下面的方式进行：

中国区域致电	400-032-0988 / 18929303778
售后微信号	18929303778
海外区域致电	+86 0755 23304822
E-mail	aftersale@autooltech.com
Facebook	https://www.facebook.com/autool.vip
YouTube	https://www.youtube.com/c/autooltech

- 如您的退换货得到确认，您将收到确认信息和邮件。