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Precautions

- Please read the User's Manual and the Installation and Parts Manual carefully before operating X-931.
- 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 X-931 is AC220V±10% 50±1Hz / AC110V±10% 60±1Hz (It can be customized according to the requirements of customer). The 3-terminal socket must be used, and the earth terminal must be well grounded. If the power voltage is not stable, please purchase and use AC voltage stabilizer.
- Before installing X-931 Touchless Wheel Aligner, the lift should be installed at first according to the requirements. Regularly check the lift for fastening and leveling, ensuring the test accuracy and personnel safety; Take away the roadblocks around the lift to prevent influencing operation.
- Don't install X-931 on a vibrated object or an oblique surface. Avoid direct sunlight and moisture.
- Turn off the power after operation. Check all bolts and parts after maintenance, and tighten the slackened bolts and parts in turn for safety.
- After using, please cut off all power supply timely.
- The cameras and the laser projectors of X-931 Touchless Wheel Aligner are the key optical components for testing. Do not impact them when using, keep the surface of the protection filter lens clean. Please use the lens paper to wipe the surface of the protection filter lens lightly if there are some smuts on it.

General Safety Instructions



Safety equipment may not be removed and/or disabled.



Any work on the electrical installation may only be performed by electricians.



The wheel alignment 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.

Warning symbol tags used:



Legend: Pull the power plug before opening the housing!

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.
- The related 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

Symbols used in the operating instructions should draw attention to the safety signs!



This symbol points out that specifically personal injury risks may be anticipated (Mortal danger, risk of injuries).



This symbol signifies that especially hazards for the machine, material and the environment may be encountered.

The most important objective of the safety signs exists in the prevention of personal injuries.

If the warning triangle with the wording "danger" is on a safety notice, hazards for the machine, material and the environment are not excluded.

If the warning triangle with the wording "caution" is on a safety reference, personal injuries are not anticipated.

The applied symbol cannot replace the text of the safety reference. The text must therefore always be completely read!

Basic safety measures during normal operations:

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

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!



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! Electrical equipment must be routinely inspected!

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!

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Introduction

Thank you for using **X-931 Touchless Wheel Aligner** manufactured by **LAUNCH TECH CO., LTD.**

Definition

X-931 Touchless Wheel Aligner is a precision measurement instrument. It is a kind of equipment which can accurately measure the wheel alignment parameters without any component touching with the vehicle tire or wheel rim. X-931 Touchless Wheel Aligner can measure the wheel alignment parameters and compare them with the specifications provided by vehicle manufacturer. It also gives instructions to the user for performing corresponding adjustments so as to get the best steering performance and reduce tire wear.

When Is Wheel Alignment Required

- The driver must firmly hold the steering wheel to maintain a straight-ahead driving.
- Abnormal wear of tires occurred, such as single side wear, concave-convexity wear and featheriness wear.
- Too heavy or too light steering, or shaking at high-speed driving.
- When the tire(s), steering joint or shock absorber are replaced.
- When the vehicle is impacted.
- After the vehicle has run for the first 3000km or 10000km.

Main Vehicle Alignment Parameter

The wheel alignment mainly consists of camber, caster, toe-in, steering axis inclination, toe-out on turns, wheelbase difference, track width difference, etc. They are designed mainly to improve the steering performance and driving stability of the vehicle, and reduce tire wear.

Toe-in and Toe-out

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.1.1).

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 said to be toe-out and the figures are shown as a negative value.

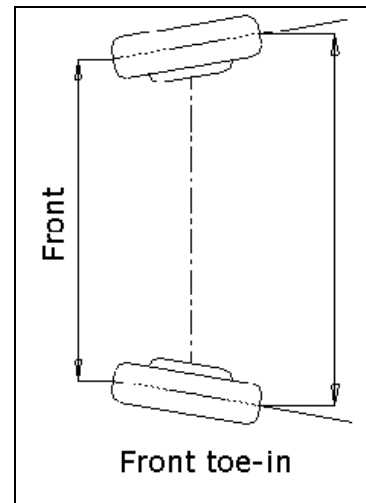


Fig.1.1

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.

Camber

Camber is the leaning of the wheel inwards or outwards from the vertical.

If the road wheel leans outwards from the vertical, it is said to have positive camber and when leaning inwards from the vertical - negative camber, looking from the front or rear of the vehicle. See Fig.1.2.

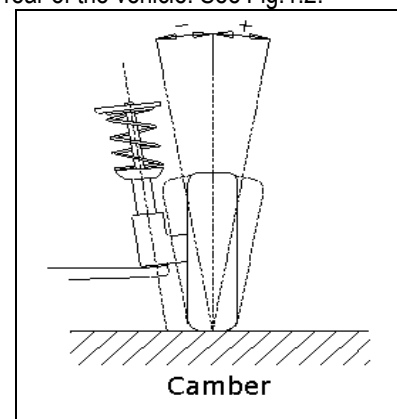


Fig.1.2

Camber is measured in degrees.

Steering Axis Inclination

Steering Axis Inclination (SAI) is the angle of inclination of the kingpin towards the center-line of the vehicle from the vertical (see Fig.1.3).

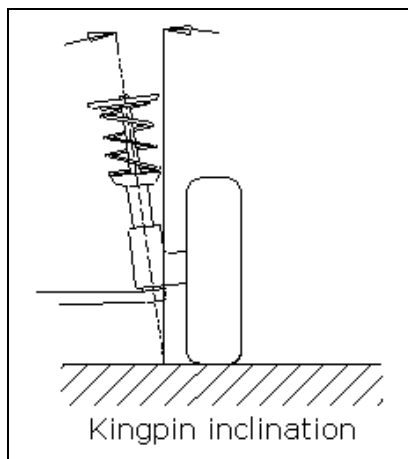


Fig.1.3

Correct steering axis 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 kingpin is also helpful for the vehicle to restore its straight-ahead position after steering.

Steering axis inclination is determined when the vehicle suspension is designed. It is not service adjustable.

Caster

Caster is the tilting of the kingpin either forwards or backwards from vertical, as viewed from side of the vehicle. See Fig.1.4

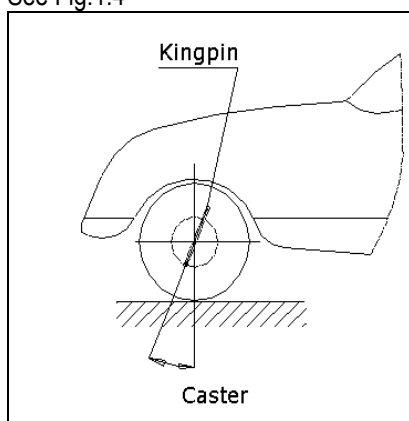


Fig.1.4

When the kingpin is tilted backwards from the vertical, caster is positive. When the kingpin 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.

Toe-out on Turns

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° as shown in Figure 1.5. The inner wheel will turn more degrees than the outer wheel when the vehicle is steered, the difference is usually about 2° . This angle is designed to reduce steering resistance.

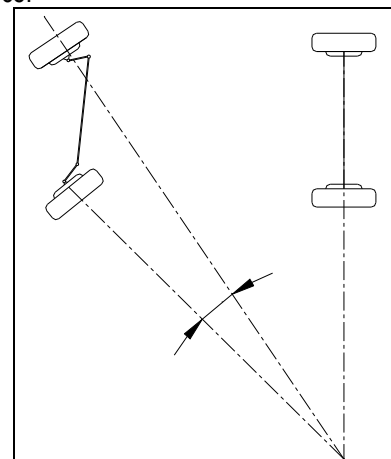


Fig.1.5

Note: This angle can be tested when a turntable is equipped for X-931.

Thrust angle

The thrust angle is defined according to the driven mode of vehicle.

- Rear wheel driven: The thrust angle equals half of the toe-in difference between the two rear wheels. As shown in Fig.1.6.
- Front wheel driven: The thrust angle equals half of the toe-in difference between the two front wheels.
- Four-wheel driven: The thrust angle equals half of the toe-in difference between the two front wheels plus half of the toe-in difference between the two rear wheels.

The thrust angle is defined as positive when the thrust line is towards left, and negative when the line is towards right.

If the thrust angle is not zero, the vehicle will have the side-moving trend. In this case, adjust the front toe-in of the drive wheels first, and then adjust the toe-in of driven wheels.

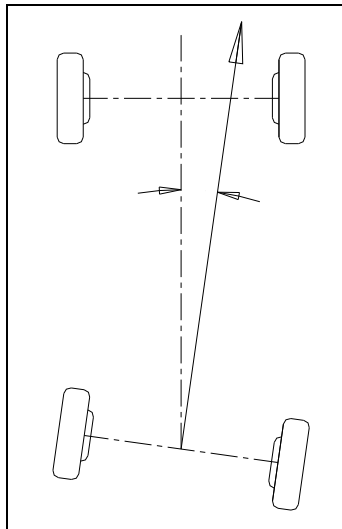


Fig.1.6

Wheelbase Difference

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 track width is available from the vehicle specifications, then the wheelbase difference can be also expressed by angle. See Fig. 1.7

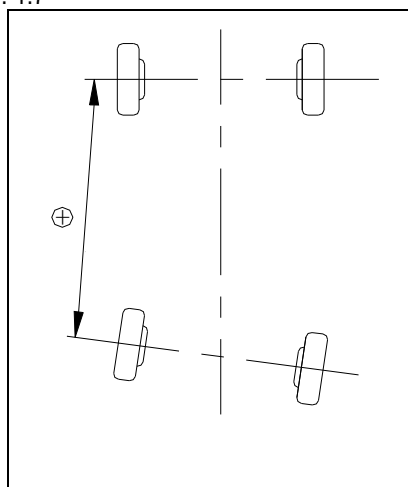


Fig. 1.7

Track width Difference

Track width 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 track width difference can be also expressed by angle. See Fig. 1.8.

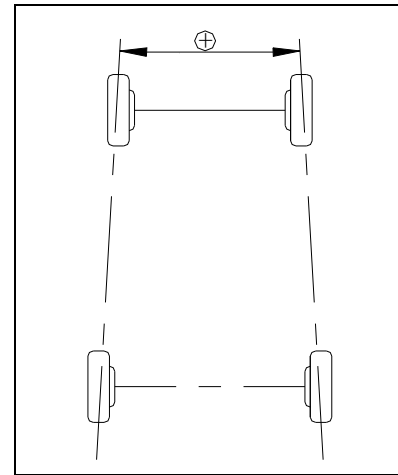


Fig. 1.8

Left (right) lateral offset angle

The relative offset in lateral direction between front axle and rear axle of vehicle is axle offset. When rear wheel axle is offset to right from the front wheel, the axle offset is positive, otherwise is negative. The angle between the bisector of the track width difference angle and the thrust line is axle offset angle.

Axle offset angle

The relative offset in lateral direction between front and rear axle of vehicle is axle offset. When LR (RR) wheel is offset outside from LF (RF) wheel, the left (right) lateral offset is positive, otherwise is negative. The angle between the connecting line from the front wheel center point to the rear wheel center point (same side) and the thrust line is left (right) lateral offset.

Delay angle

The angle between the connecting line from the LF (LR) wheel center point to the RF (RR) wheel center point and the perpendicular of the longitudinal geometry center line is called front (rear) delay angle. When the right wheel on the front (rear) axle is behind the left wheel, the front (rear) delay (angle) is positive, otherwise is negative.

Included angle

The sum of the SAI (Steering Axis Inclination) and the wheel camber is called included angle.

Functions and Features

- Real touch-less measurement, no injury to the wheel rim, increasing the degree of customer satisfaction.
- Complete test: The X-931 Touchless Wheel Aligner can be used to measure the most wheel alignment parameters, such as front wheel toe-in, front wheel camber, caster, steering axis inclination, thrust angle, rear wheel toe-in, rear wheel camber,

- wheelbase difference, track width difference, etc.
- Easy to measure, greatly reduce the work frequency and work intensity (unnecessary to mount and demount the wheel clamps and the targets).
- Provides many kinds of auto test processes and diagram operating interfaces, very simple and clear to operate; the whole test process can be performed automatically, and there are some humanity tips on the corresponding interfaces.
- Greatly increase the measurement work efficiency (unnecessary to perform the vehicle-pushing compensation operation).
- Complete databank: Wheel alignment data of over 20,000 vehicle models is stored in the system. User can also add new data to the databank.
- It can save the history data, easy for customer measurement.
- Profuse vehicle adjustment animation and HELP information.
- Provide real-time help with help system.
- Provide the function of data back-up and restoration, and of software upgrade.
- Providing one stop solution (including the lift), saving space, and suit for sites.

Specifications

Item	Test Range
Toe-in	$0 \sim \pm 20^\circ$
Camber	$0 \sim \pm 8^\circ$
Caster	$0 \sim \pm 20^\circ$
Steering axis inclination	$0 \sim \pm 20^\circ$
Thrust angle	$0 \sim \pm 5^\circ$

Notes:

1. The right of changing the design will be reserved by manufacturer;
2. The above test range can be confirmed only when the user follows the specified operation procedures.

Requirements on Surroundings

Item	Specifications
Storage temperature	$-20^\circ\text{C} \sim +70^\circ\text{C}$
Working temperature	$-10^\circ\text{C} \sim +50^\circ\text{C}$
Relative humidity	$\leq 85\%$
Light requirement	No direct strong lights irradiate the camera
The height difference between the left rail and right rail of lift	$< 2\text{mm}$ (front to rear)

Working Principle

The working framework of X-931 Touchless Wheel Aligner is as shown in Fig.1.9. The whole system is composed of data collecting system and data processing system.

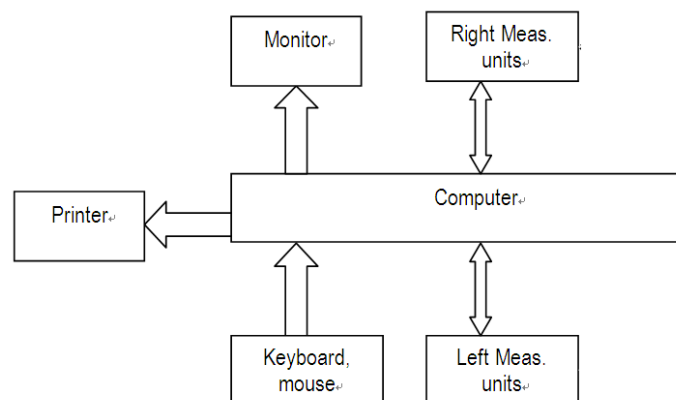


Fig.1.9

The data collecting system consists of 4 measurement units. The left and right measurement units capture the images of left and right wheels, and transmit them to the data processing system to confirm the aligning parameters of the wheels.

The data processing system is the core part of X-931 Touchless Wheel Aligner. It consists of a computer, power supply system and interfaces. Its function is to execute the operation commands, process the data and display the information together with the original data of vehicle manufacturer. It also gives instructions for making adjustment to the vehicle and print out corresponding report.

The wheel aligner compares the measured results with the original data of vehicle manufacturer and gives instructions to the user for adjustment, so its databank should contain enough information. X-931 Touchless Wheel Aligner's databank contains over 20,000 models alignment data, and user can also add new vehicle wheel alignment data into the databank when necessary.

Structures

Overall Structures

X-931 Touchless Wheel Aligner mainly consists of the

cabinet (including computer host, monitor, keyboard and mouse), measurement unit assembly (including cameras and laser projectors), communication cables, slide slots, mechanical turntables, steering wheel holder and brake pedal depressor, etc. The overall structure of X-931 Touchless Wheel Aligner is as shown in Fig.2.1.



Fig.2.1

Measurement Unit Assembly

X-931 Touchless Wheel Aligner has 4 measurement unit assemblies, which are the key components for whole test system as shown in Fig.2.2.



Fig.2.2

Turntable and Transition Bridge

X-931 has two mechanical turntables (standard configuration, see Fig.2.3).



Fig.2.3 mechanical turntables

The turntables are placed at the front wheel positions of the vehicle on the lift. Each turntable is equipped with a transition bridge, the transition bridge is placed between the turntable and the lift to ensure the wheel move on the turntable smoothly.

Basic Operation Procedures

Get Vehicle Information

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, including rubber boot, bearing, rock arm, tripod end, shock absorber, tie rod end and steering mechanism, for any looseness or wear. Then check to see if the tire pressure, tire track widths of the left and right wheels are alike.

Wheel Alignment Checking

Perform the wheel alignment checking after the initial condition is known.

Adjustment

If the measured values are not in accordance with the specifications given in the databank, the appropriate wheel alignment adjustment should be performed.

Test-drive

After finishing the wheel alignment, test the vehicle to see if the abnormal conditions are eliminated. Re-perform the wheel alignment if necessary.

Operation Instructions

Preparation

1. Ask the owner for vehicle drivability problems and symptoms, wheel alignment history, and find out vehicle information such as make, model and year, etc.
2. Drive the vehicle onto the lift or over the pit, ensure that the front wheels are centered with the turntables; Apply hand brake to ensure human safety. To prevent the turntable from turning, lock the turntables with the lock pins before driving the vehicle; release the lock pins after the vehicle is placed well.
3. Check each chassis part carefully, include dust cover, bearing, rock arm, tripod end, shock absorber, tie rod end and steering mechanism, for any looseness or wear. Then check to see if the tire pressure and track widths of the left and right wheels are alike.
4. Insert the power plug of the wheel aligner into the standard 3-pole power receptacle.

Program Operation

Turn on the power switch, start the computer and enter the main interface of the measurement program. The screen displays the main function menu. There are 5 functions available in the main menu: [Standard measurement], [Quick measurement], [System management], [Print] and [Help]. See Fig.4.1.

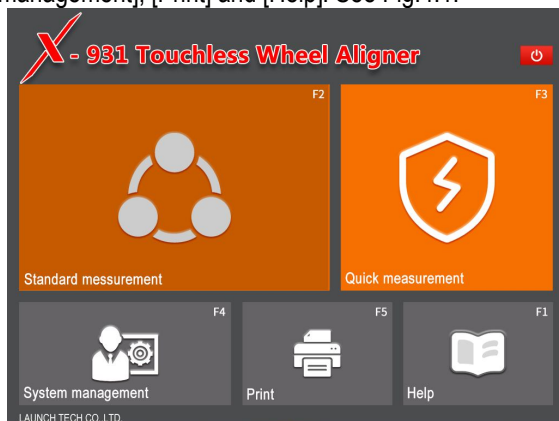


Fig.4.1

Standard Measurement

Click [Standard measurement] in the interface as shown in Fig.4.1. The screen system will enter the standard measurement interface.

Select Vehicle Model

Before alignment, the standard data of the vehicle model

must be selected first. The interface is as shown in Fig.4.2:

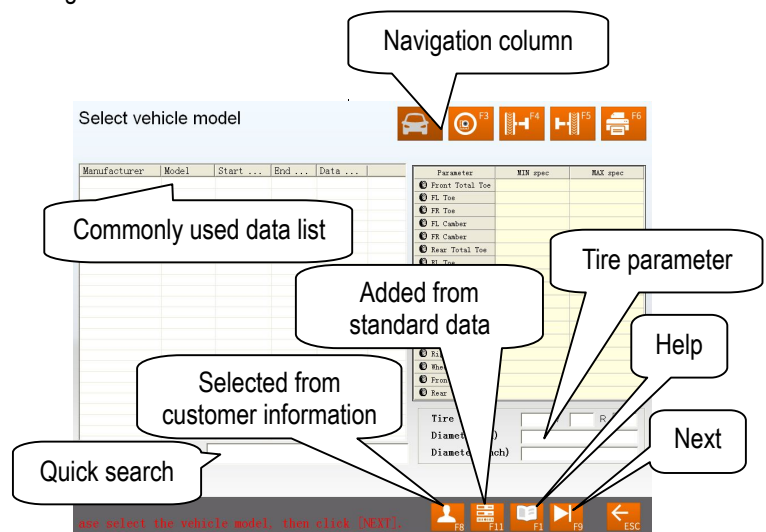


Fig.4.2

[Next]: To perform the test according to the default sequence (Select vehicle model → Caster swing → Rear axle → Front axle → Print report) of the system.

[Navigation column]: To enter into the item you want to test in spite of the default sequence.

[Commonly used data list]: The vehicle model in the list can be directly selected to perform the next-step operation. It is blank when firstly used. Only the vehicle model data must be added into this list from the standard database, can the list be used (See [System management] - [Commonly used data management]).

[Added from standard data]: If there is no the vehicle model you want, you can directly search for the vehicle model you want from the standard database, and directly perform the next-step operation (This vehicle model is no longer saved in the commonly used data list). If you want to add this vehicle model into the commonly used data list, please select it from the interface of [System management] - [Commonly Used Data Management], and then add it from the interface of [Added from Standard Data]).

[Selected from customer information]

For old customer, you can directly search for the vehicle model from the customer information database, and directly perform the next-step operation.

[Quick search]: The input box for quick search aiming at the vehicle model is provided at the bottom of the interface. Please input the first letter of the vehicle model to perform the searching operation.

[Tire parameter]: When the unit of toe-in is used in mm or In (The unit of toe-in can be set in [System

management] – [System setting]), the diameter or model of the present tire must be input.


[Help]: To provide the description of operating method and note.

Operating procedures:

Select the corresponding vehicle model item in [Commonly used data list], then click [Next].

Note:

1. When the toe of the system uses linear measure, it is required to enter the vehicle tire diameter at the right bottom corner on this interface, otherwise the system cannot enter the next operating procedure
2. The form currently provided is the same form with Commonly Used Data Management in the System Management interface, in the

same way, you can click  button to add the standard data provided by the system into this form. If you want to add user-defined data, you need to add it from Standard Data Management interface of System Management. The unit of Wheelbase, Front wheelbase and Rear wheelbase is mm.

Caster Swing

Kingpin measurement is aimed at the front wheels, which includes kingpin inclination and caster. 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. The existence of kingpin inclination can make the intersection point of steering axis and road surface be in front of the adherent point between tire and the ground, which can make use of the resistance from the road surface to the tire to keep the vehicle driven straight-ahead. The interface is as shown in Fig.4.3.



Fig.4.3

Operation Procedures:

1. Adjust the steering wheel to straight-ahead status, i.e. when the toe-in of FL wheel is equal to the

toe-in of FR wheel, the small round ball on the operating interface will move to middle position and turn green from red.

2. According to the system prompts, turn the steering wheel left by about -10 degrees. After arriving at the desired position, the small ball turns green from red. Stop steering at the time, the system starts data acquisition until the prompt sound emits. Now the data acquisition is finished, you can continue to turn steering wheel left to -20-degree position. After arriving at the desired position, the small ball turns green from red. Stop steering at the time, the system starts data acquisition until the prompt sound emits. Now the data acquisition is finished, and the interface prompts that you can turn the steering wheel right.
3. According to the system prompts, turn the steering wheel right by about +10 degrees. After arriving at the desired position, the small ball turns green from red. Stop steering at the time, the system starts data acquisition until the prompt sound emits. Now the data acquisition is finished, you can continue to turn steering wheel left to +20-degree position. After arriving at the desired position, the small ball turns green from red. Stop steering at the time, the system starts data acquisition until the prompt sound emits. Now the data acquisition is finished, and the interface prompts that you can center the steering wheel.
4. After test finished, please center the steering wheel. The system will automatically return to the next page to check the measurement result. The interface is as shown in Fig.4.4.

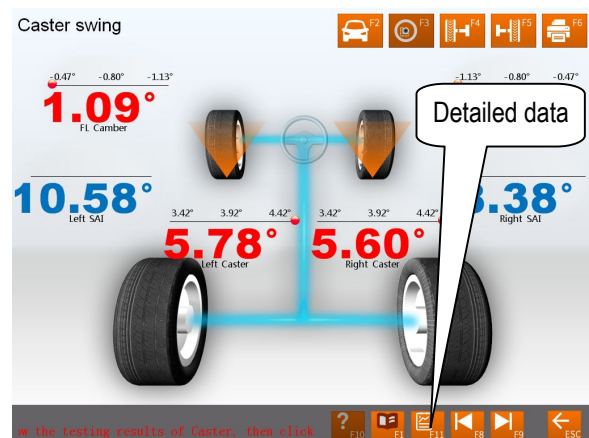


Fig.4.4

Note: If it is required to measure maximum steering angle, during above-mentioned procedures, you can continue to turn the steering wheel to the left or right when arriving at -20-degree position or +20-degree position until the steering wheel cannot be turned further. The system will automatically start data acquisition. After the acquisition finished, you can see the measured values of the maximum steering angles in the test report form for the test result.

[Detailed data]: This interface provides the result outputs for whole testing operations, which includes the measured values of each parameter for front and rear wheels. The interface is as shown in Fig.4.5.

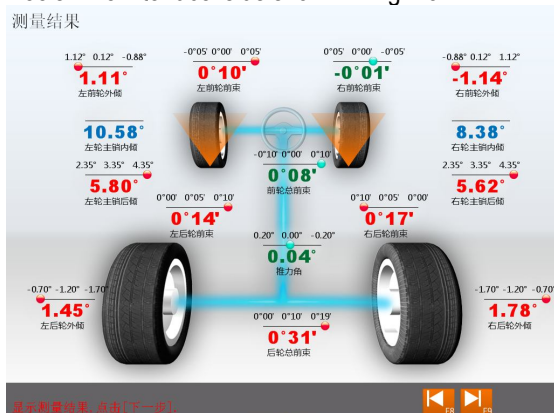


Fig.4.5

Caution:

1. Before perform kingpin measurement, please install brake pedal depressor and lock the hand brake first, in order to ensure the vehicle wheels cannot move; remove the steering wheel holder finally.
2. The measured values are displayed with different colors on each measurement interface.
 - Green, it indicates that the measured values are within the standard specifications.
 - Red, it indicates that the measured values are beyond the standard specifications.
 - Blue, it indicates that this measured parameter has not the standard specification.

Rear axle measurement

This interface can provide the real-time result related to rear axle measurement, the operator can compare the measurement result with the standard data while adjusting the vehicle, until the vehicle is adjusted to the best status. The interface is as shown in Fig.4.6.



Fig.4.6

[Double click]: Double click (with left key of the mouse) on the data display forms for camber and toe-in of RL and RR wheels, the corresponding displayed data will be enlarged. The interface is as shown in Fig.4.7.

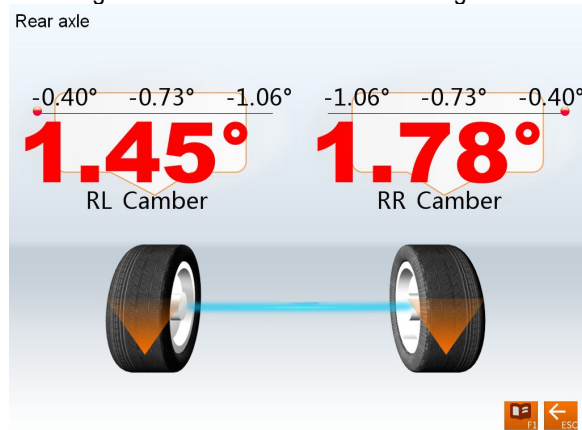


Fig.4.7

[Additional measurement]: This interface provides an operating platform for special measurement, which can measure and display left lateral offset, right lateral offset, axle offset, front setback, rear setback, track width difference and wheelbase difference, etc. The interface is as shown in Fig.4.8.

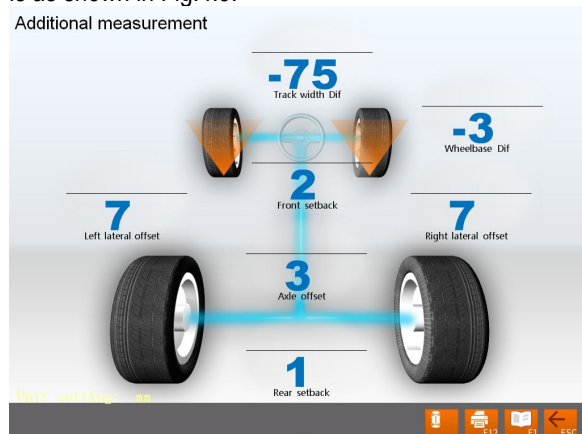


Fig.4.8

Caution:

The system provides the dynamic measurement and display for these special values, but the measurement result will not be saved in the database.

[Lift up the vehicle body]: Sometimes it is required to lift the vehicle body up in order to be convenient to adjust front/rear camber and caster. When the vehicle wheels are lifted up, the inclinometers will move, and the corresponding measured values will change, too. In this case, please use Lifting Adjustment function. Click



button, and then lift up the vehicle body according to the prompts on the screen. The software will automatically compensate the offset of inclinometer in order to realize accurate adjustment.

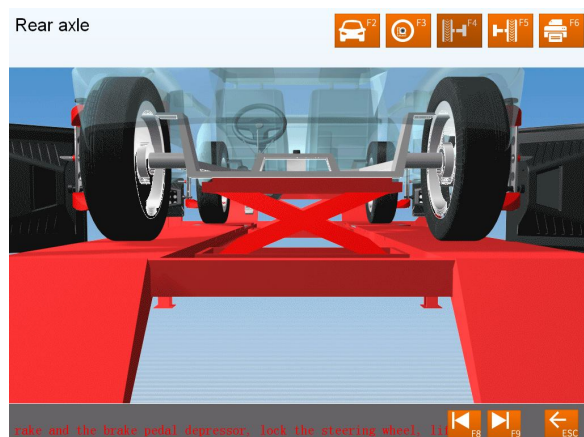



Fig.4.9

Attention: After adjustment, please remember to

click  button, and then put down the vehicle body according to the prompts on the screen. If the lift is not put down, it will be limited to select the other interfaces (except for [Front axle measurement] interface) as shown in Fig.4.10.

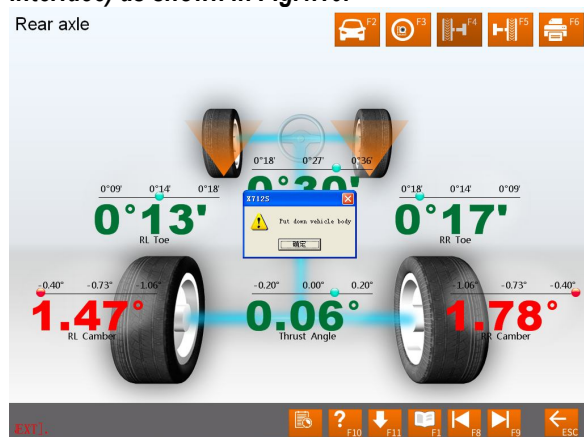


Fig.4.10

Front axle measurement

This interface can provide the real-time result related to front axle measurement, the operator can compare the measurement result with the standard data while adjusting the vehicle, until the vehicle is adjusted to the best status. The interface is as shown in Fig.4.11.

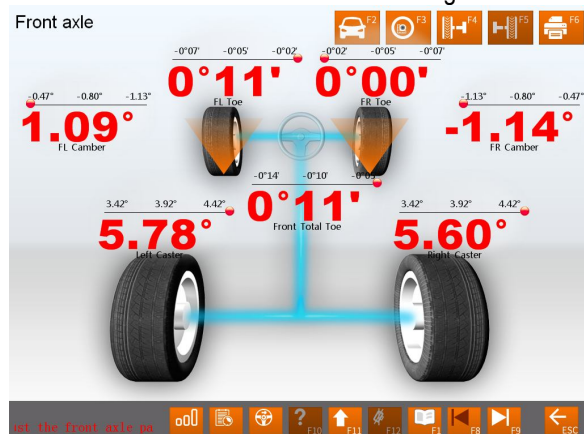


Fig.4.11

[Double click]: Double click (with left key of the mouse) on the data display forms for camber and toe-in of FL and FR wheels, the corresponding displayed data will be enlarged.

[Additional measurement]: This interface provides an operating platform for special measurement, which can measure and display left lateral offset, right lateral offset, axle offset, front setback, rear setback, track width difference and wheelbase difference, etc.

Caution:

The system provides the dynamic measurement and display for these special values, but the measurement result will not be saved in the database.

[Lift up vehicle body]: Sometimes it is required to lift the vehicle body up in order to be convenient to adjust front/rear camber and caster. When the vehicle wheels are lifted up, the inclinometers will move, and the corresponding measured values will change, too. In this case, please use Lifting Adjustment function. Click



button, and then lift up the vehicle body according to the prompts on the screen. The software will automatically compensate the offset of inclinometer in order to realize accurate adjustment.

Attention: After adjustment, please remember to click



button, and then put down the vehicle body according to the prompts on the screen. If the lift is not put down, it will be limited to select the other interfaces (except for [Rear axle measurement] interface) as shown in Fig.4.12.



Fig.4.12

Print Report

Print Report can print and save the alignment data of the vehicle under test. The interface is as shown in Fig.4.13.

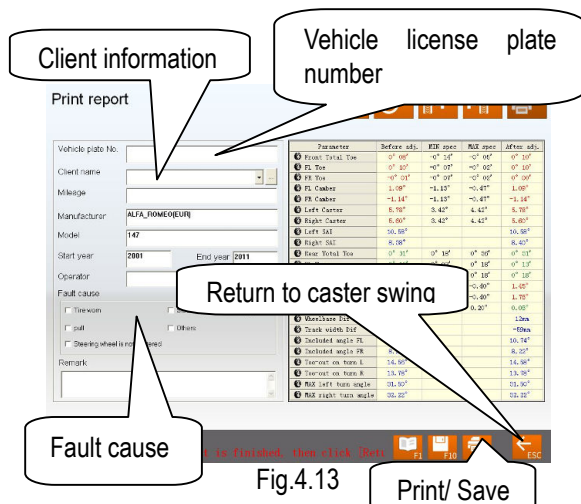


Fig.4.13

[Vehicle license plate number]: The license plate number of the vehicle under test.

[Client information]: The corresponding information for the owner of the vehicle under test, including [Client name], [Contact], [Telephone] and [Address]. The client information can be directly entered in this interface with the keyboard.

[Vehicle information]: The corresponding information of the vehicle under test, including [Mileage], [Manufacturer], [Model], [Start year] and [End year]. The vehicle information cannot be directly entered in this interface with the keyboard. If the vehicle model has been selected in [Measurement] – [Select vehicle model], the corresponding information of the vehicle model selected will be displayed in this interface.

[Operator]: Name of the operator who is operating the instrument now. The corresponding [Operator] can be selected only after the [Operator] column of [Information for service station] is added (Please refer to [System management] – [User information]).

[Fault cause]: The symptoms of the vehicle under test. There are 5 options: [Tire wear], [Pull], [Steering wheel is not centered], [Steering wheel swings] and [Others].

[Return to caster swing]: If you are not satisfied with the measurement results, you can click this button to return to the interface of [Caster Swing] to perform the measurement operation again.

[Print/Save]: To print the alignment data of the vehicle under test in the format of form or image (Please refer to [System management] – [Report setting] for the format setting of the report form); To save the alignment data of the vehicle under test ([Vehicle plate number] and [Client name] must be entered, and [Fault cause] must be selected first before saving).

Caution: The report form print function provided by this

interface only aims at the individual information report form for the test at this time; the report form print function provided by the main interface aims at all the information report forms saved and done before.

Quick Measurement

Select [Quick measurement] icon on the main menu, the system will enter the [Quick measurement] interface. This interface provides an operating platform for quick measurement, which can test and display toe-in and camber of front and rear wheels at the same time. The interface is as shown in the following figure:

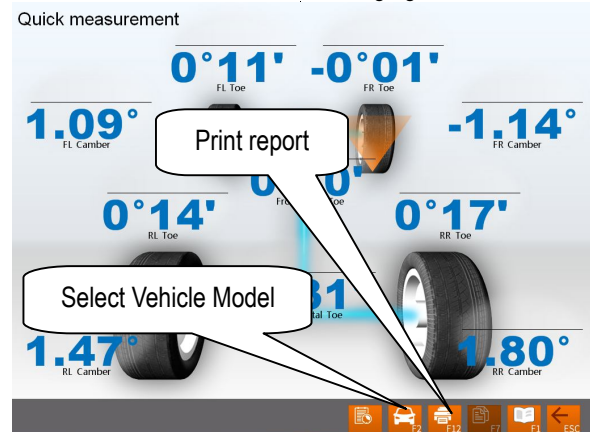


Fig.4.14

[Select Vehicle Model]: You can select the parameters of standard vehicle models to be convenient for vehicle adjustment (Please refer to [Standard Measurement]-[Select Vehicle Model]);

[Print Report]: To provide the functions for saving and printing the test data (Please refer to [Standard Measurement]-[Print Report]).

Note:

- This interface provides only the functions of the test and adjustment for front and rear toe-in and camber. For other functions, please select them on the interface of [Standard Measurement].**
- The default unit for toe-in on this interface is centigrade. The display unit for toe-in is in accordance with the toe-in unit set on the interface of [System Management]-[System Setting].**

Additional Measurement

This interface provides an operating platform for special measurement, which can measure and display left lateral offset, right lateral offset, axle offset, front setback, rear setback, track width difference and wheelbase difference, etc. The interface is as shown in Fig.4.15.

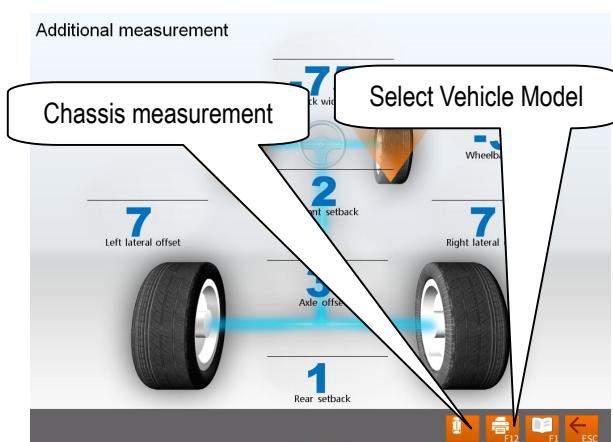


Fig.4.15

[Select Vehicle Model]: Click this button to select the parameters of standard vehicle model.

[Chassis measurement]: Click this button, the interface is as shown in Fig.4.16.

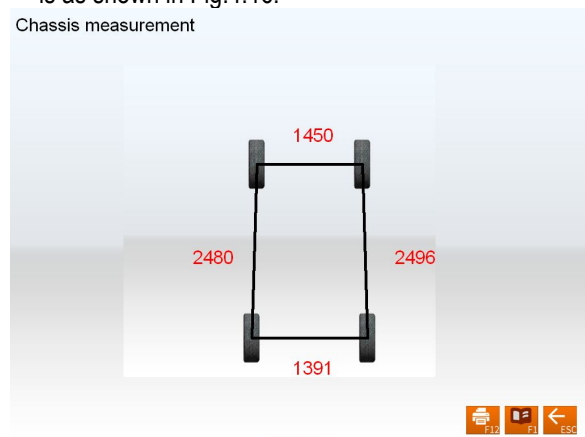


Fig.4.16

Caution:

1. The system provides the dynamic measurement and display for these special values, but the measurement result will not be saved in the database.

System Management

On the main menu, please click the icon of [System measurement] to enter the System management interface as shown in Fig.4.17.



Fig.4.17

User Information

The information of maintenance station is mainly used to record the contact method of the maintenance station and the information of the maintenance technician. This kind of information can be imported to report forms, which can make the information of maintenance station be displayed on the report form printed out, and is convenient for your data management and tracing operation. The interface is as shown in Fig.4.18.

User Information

Name	Setting of Garage name
Address	Setting of Garage address
Tel	Setting of Garage telephone
Fax	Setting of Garage fax
Post Code	Setting of Garage post code
Operator	

Fig.4.18

[Setting]: After entering this interface, the information box will be displayed with French gray background, in this state the system only provides view function.

Click button to perform information editing operation.

After entering the information, please click button, the system will automatically save the information and return to the previous interface.

Note: If there are multi-operators for performing wheel alignment, the input method of recording or saving the operators' names is using "#" to separate every operator's name. For instance, Tom#John#Paul#Steven#.

Client Management

Client information is very important in our daily routine, so we must manage and maintain these data very well, which can ensure us to solve the problem in time and improve our service quality. The interface is as shown in Fig.4.19.

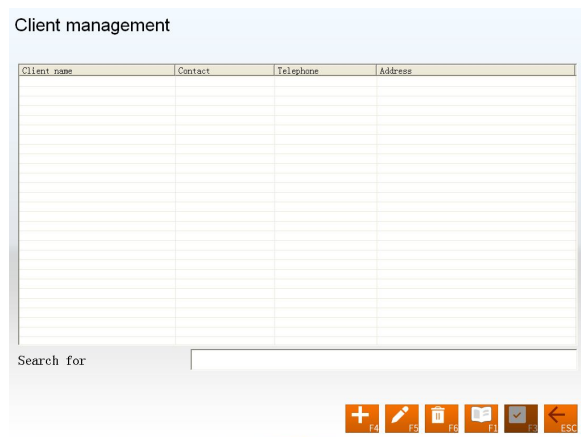


Fig.4.19

[Quick search]: Directly input the first letter of the customer name in the text box, the system will automatically perform the search operation.

[Add]: Click this button, and then add the client information in the pop-up window for detailed information of the client. The interface is as shown in Fig.4.20.

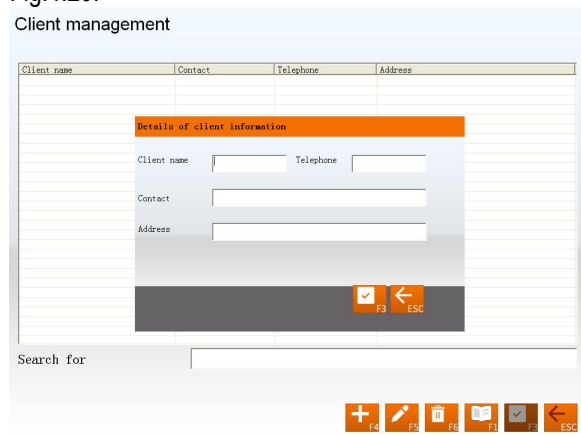


Fig.4.20

[Modify]: Select the items required to modify, and then click this button, modifying the client information in the popped-up window for the detailed information of client.

[Delete]: Delete the items selected in client information data form. When performing Delete operation, please note that Delete operation will delete all the corresponding information (including previous testing information) of client. Ensure that you do want to delete the information before performing Delete operation.

[Print]: Print client information data form.

The input box for Quick search aiming at the vehicle model provided at the bottom of the interface

OEM Specs

This interface provides the parameter information (These parameter information has been set before the vehicles leave factory) for the vehicles with various models. The database contains the information of

various kinds of vehicles manufactured by many manufacturers all over the world, and the contents in database can be updated in time via system upgrade. In addition, this interface provides the function of adding the user-defined data. The operator can add by him-self (or her-self) all the vehicle model information which the standard database does not has. This system is fit more for the service data application (Note: After the old database upgraded, the original user-defined data will still exist in the new database). The interface is as shown in Fig.4.21.

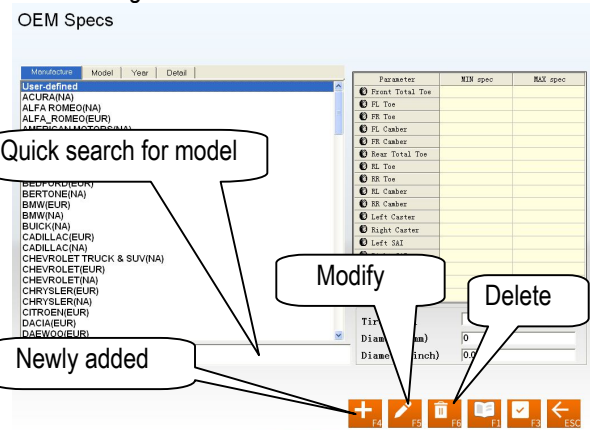


Fig.4.21

[Quick search for model]: To provide the function of Quick search for vehicle model. Directly input the first letter of the model name of the vehicle under test in the text box, the system will automatically perform the search operation.

[Newly added]: To add the vehicle models which are not included in the standard database. Click this button, you can add the user-defined information in the popped-up window (as shown in the following figure) for the detailed information of the user-defined data. After confirming, you can save the information into the data list.

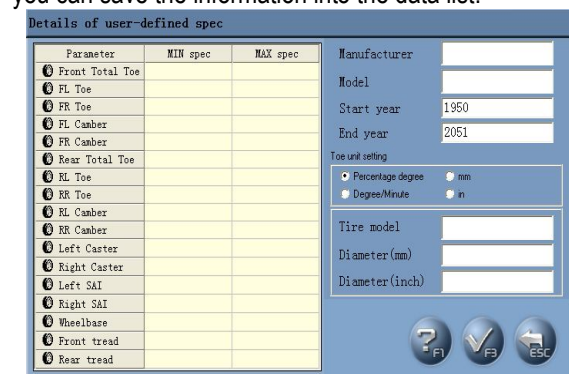


Fig.4.22

[Modify]: This function is either applied to modifying the user-defined information in the list or it can modify the information imported from the standard data.

[Delete]: This function is only applied to deleting the user-defined information in the list. It cannot delete the information imported from the standard data.

Operating procedures:

Directly click manufacturer to select corresponding vehicle model, in order to give the operator a convenient view for the standard data of the vehicle model.

Frequent Model

In order to speed up the information search, the system provides the commonly used data management function which can individually add the vehicle information in the standard data into the commonly used data. The interface is as shown in Fig.4.23.

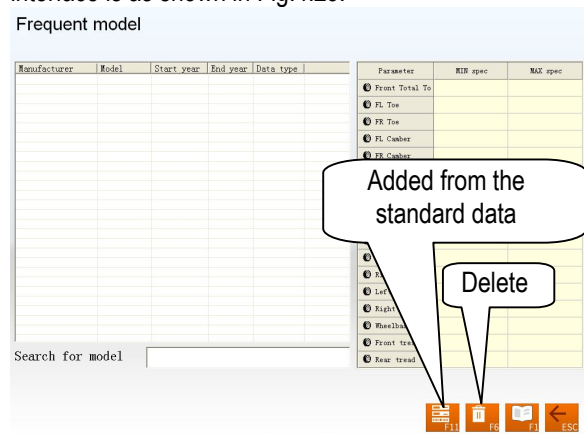


Fig.4.23

[Added from the standard data]: Click this button, the standard data window will be activated. Select the required vehicle model from the standard data list. After confirming, the information can be added from the standard data to the commonly used data list.

[Delete]: Delete the items selected from the commonly used data.

System Setting

System setting function is used to adjust the function and display effect of software system. The interface is as shown in Fig.4.24.

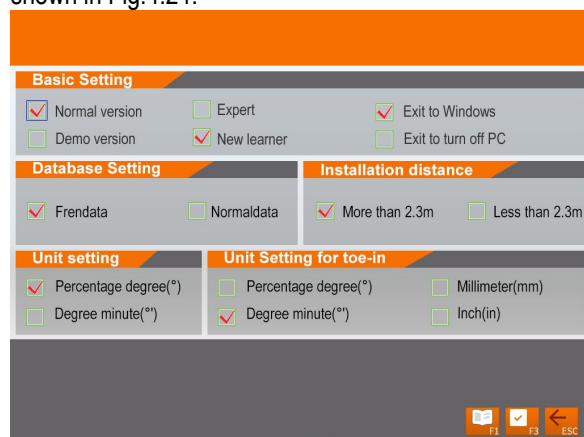


Fig.4.24

[Basic setting]: With this function the system can be switched between Normal version and Demo version, and between Expert and New learner. [Normal version]:

is the version directly applied in actual testing operation; [Demo version]: this version can, in stand-alone status, simulate the testing process without external hardware equipments, it hasn't testing ability, only used to demonstrate the testing process; [New learner]: this version provides all-around HELP information and operating demo animation to fully help the testing personnel who contacts this system for the first time; [Expert]: for experienced operator, too much HELP information will, on the contrary, become encumbrance, so this version provides the necessary HELP information only to make the operator be working with more high efficiency. Also the system provides the options of directly turning off PC or quitting to WINDOWS when quitting the system.

[Database setting] the system provides two types of Database setting: 1) Frendata; 2) Normaldata.

[Safe distance]: The system provides two types of Safe distance: 1) more than 2.3m; 2) less than 2.3m.

[Unit setting]: Used to set the displayed unit system of system data, two types of unit systems can be selected: percentage degree system and degree/minute system.

[Unit setting for toe-in]: Aiming to the particularity of the unit for toe-in, the system adds the units of mm and inch.

Note:

If you want to use long measure as the unit of toe-in, during performing standard measurement, the system will require the operator to enter the diameter of the tires when entering the operating interface of Select Vehicle Model.

Report Setting

Report setting can set the format type of the report form. The interface is as shown in Fig.4.25.

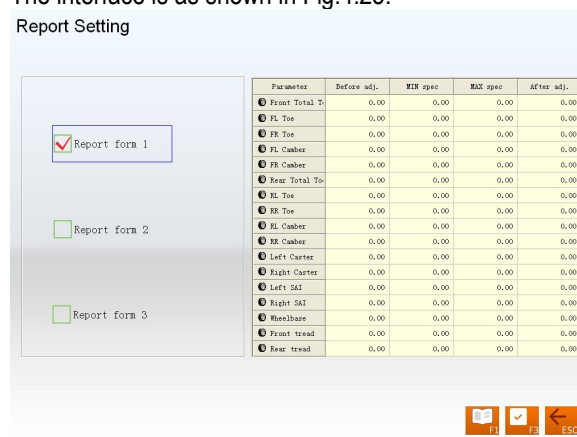


Fig.4.25

[Report form 1]: Format 1 is for detailed report form, which includes the items of Before Adjustment, After Adjustment, Standard maximum and minimum values.

[Report form 2]: Format 2 is for concise report form, which lists the data information before and after adjustment only.

[Report form 3]: Format 3 is for fig report form. The interface is as shown in Fig.4.26.

Report Setting

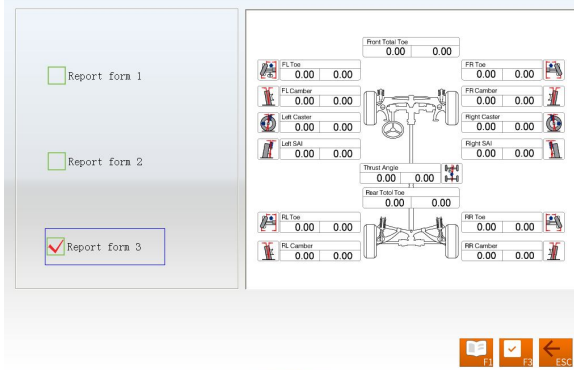


Fig.4.26

Select Language

The system has provided many languages to select. The interface is as shown in Fig.4.27

Select language

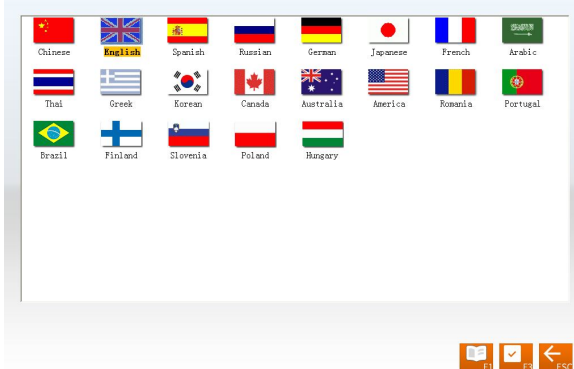



Fig.4.27

Operating procedures:

Select your desired language, and then click  button, the system will restart and switch to the interface with the language you selected.

Data Backup and Restore

The function is used in system data backup application, so as to prevent the WINDOWS system from abnormality caused by external factors (such as virus), and help you to avoid unnecessary loss. The backup function we provide is mainly used to backup the contents of three parts: user and business data information, system configuration file and probe calibration information. The interface is as shown in Fig.4.28.

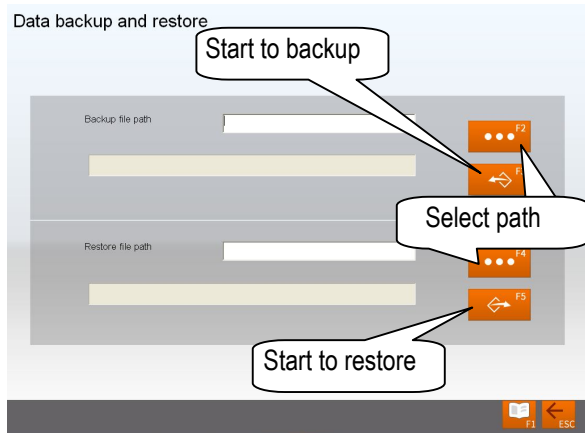


Fig.4.28

Operating procedures:



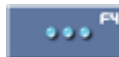

1. Backup: Click  button, find the position of the file you expect to save in pop-up dialogue box (The interface is as shown in Fig.4.29) or enter the path address directly in the blank of exported file path, and then click  button finally.



Fig.4.29

2. Restore: The similar operation can be performed when the backed-up data need to be imported into the system. Click  button, find the position of the file you expect to import in popped-up window or enter the path address directly in the blank of imported file path, then click  button, the system will automatically import this back-up file.

Log Review

Log is the important recorded information for the system running. We can check the system conditions by viewing the log, so we can say that the log is an important window for us to monitor and diagnose the system. During running and testing operation, the system will record some main operations or signals, in this way the information records in log file are built. The interface is as shown in Fig.4.30.

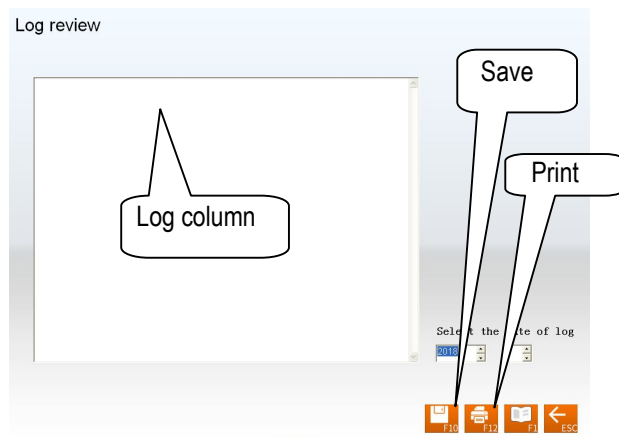



Fig.4.30

Operating procedures:

[Log column]: To show the abnormal conditions of the equipment usage in each year.

[Save]: When there are records in the log file of system, the required records can be saved by clicking  button, and viewed by technical personnel, checking the running conditions of equipment.

[Print]: The system has provided the printing function which is convenient to view.

Note:

Besides the client information needs backup operation regularly, we recommend that the log records need back-up operation regularly, too, so as to be convenient to repair and maintain the equipment.

Print

In main interface, click the icon of [Print] to enter the interface of report form print. It is mainly used to check or print the normal testing records of the client. The interface is as shown in Fig.4.31.

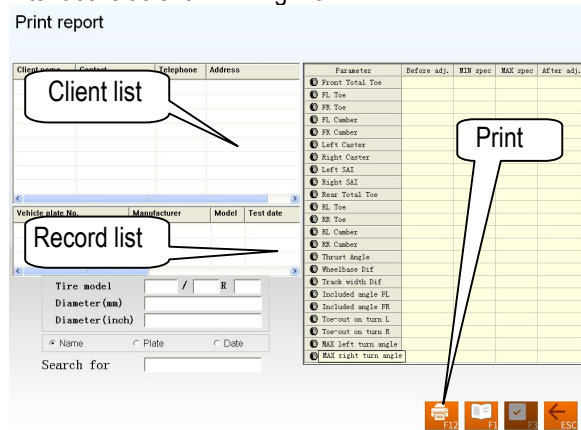


Fig.4.31

[Client list]: To list all the clients who have been serviced by the alignment test.

[Record list]: This list can display the alignment test records (for one time or many times) of the client selected from [Client list].

[Print]: To print the alignment data of the vehicle under test with form or figure format (Please refer to [System management] – [Report setting] for the format setting of report form).

Help

User can press F1 key or click [HELP] button to enter the help system on any interface. The help subject depends on the content of the current screen. User can also select [Content] or [Index] to enter the help subject after entering the help system, see Fig.4.32.

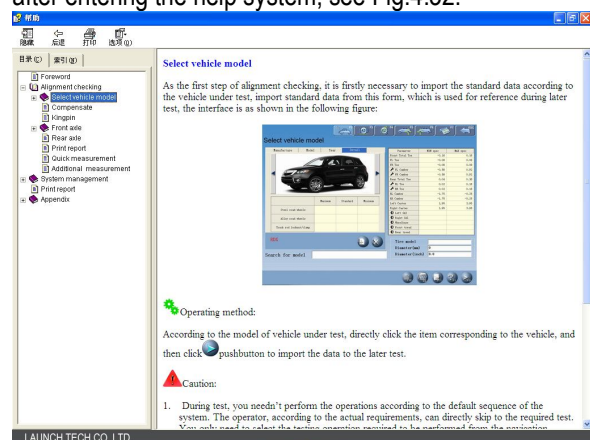


Fig.4.32

The help system includes the following information:

- Operation of wheel aligner software
- Basic knowledge on 4-wheel alignment

Exit

EXIT system has two kinds of prompts: Exit from the system and return to WINDOWS operating interface or Exit and shutdown (Please refer to [System management] – [System setting] for the detailed settings). The interface is as shown in Fig.4.33.

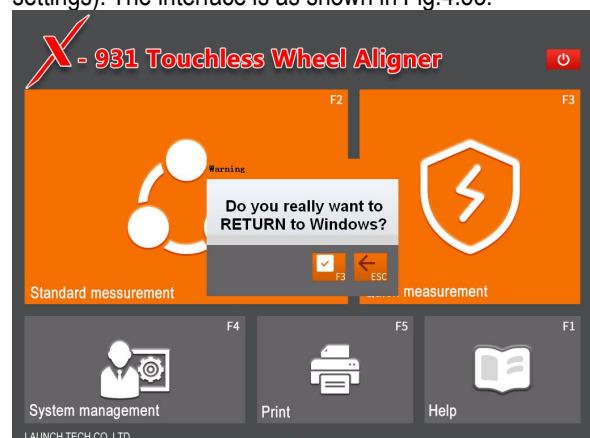


Fig.4.33

Frequently Asked Questions (FAQ)

Industrial Computer Cannot Start Up, Without Any Prompts.

- Check the power socket and plug.
- Check the connection. Check the power switches of computer host and monitor. Check the indicator.
- Check the contrast and brightness.

Computer Cannot Enter Windows Interface.

- The hardware start files are lost.
- BISO setting error.
- Hardware malfunction.

Mouse and Keyboard does not Respond.

- Check the connection of mouse and/or keyboard.
- Check the matching of mouse and/or keyboard to computer host.
- Mouse or keyboard damaged.

Printer does not Respond.

- Check connection of printer cables.
- Check printer drive program and settings.
- Check computer virus.

X-931 Program does not Run.

- Program file lost or error.
- Program registry list damaged.

Why does it have obvious difference between left and right minimum turning radius after alignment?

It is caused by the mistaken position between the steering wheel and the steering column. Alignment in this system is performed in the normal case of Steering Wheel Centered, i.e. it is based on Steering Wheel Centered, so it is necessary to ask the user about the maintenance and use history of the steering wheel, eliminating the interference of the mistaken position between the steering wheel and the steering column, centering the steering wheel according to the experience.

Maintenance

To prolong the service life of the equipment, the user should maintain it with care. The X-931 Touchless Wheel Aligner is of precision equipment which requires periodical maintenance.

Computer

- User should have a basic knowledge about computer software and hardware to insure the normal operation of the computer.
- The computer host and the monitor should be firmly secured on the right positions. Do not put them in a freezing, wet, extremely hot or direct sunlight place, or near the source of radiation and heat.
- Don't foist anything into the computer host and the monitor through the gap.
- Do not switch on/off the computer too frequently.
- Don't change the BIOS setting at will.
- Don't delete the unknown files in the hard disc at will to avoid abnormal computer operation or death.
- The computer is used only for X-931 Touchless Wheel Aligner; don't install other software to the Wheel Aligner computer to avoid computer virus. The computer is scanned to ensure it is free of virus before leaving factory.
- Don't use other software to avoid possible virus. LAUNCH warranty does not cover the system problem arising from the virus.
- After a long period of use, the dust and oil dirt will

be accumulated on the computer host and the monitor. Please cleanout it with neutral detergent or dehydrated alcohol. Avoid using oil or caustic product.

- Never disassemble the computer and move the inside cables and cards to avoid damage of the inside components.

Printer

- Read the operation instruction of the printer carefully.
- Install suitable printer drive program, and apply right printer setting.
- If the printed words are not clear, it may be that the ink is used out. Please replace the printer ink cartridge in time to resume the printing quality.
- For other printer related problems, please contact the customer service center.

Turntables

The mechanical turntables are precision components. Avoid hitting during operation and never splash water on them.

When moving the vehicle on the turntable, please insert the locking pin to avoid the turntable sliding.

Generally speaking, it is not necessary to lubricate the turntables frequently.

Banxuegang,
Longgang,
Shenzhen, Guangdong,
P. R. China, 518129

Warranty

THIS WARRANTY IS EXPRESSLY LIMITED TO PERSONS WHO PURCHASE LAUNCH PRODUCTS FOR PURPOSES OF RESALE OR USE IN THE ORDINARY COURSE OF THE BUYER'S BUSINESS.

LAUNCH electronic product is warranted against defects in materials and workmanship for 1 year from date of delivery from Launch to the user. This warranty does not cover any part that has been abused, altered, used for a purpose other than for which it was intended, or used in a manner inconsistent with instructions regarding use. The exclusive remedy for any automotive meter found to be defective is repair or replacement, and LAUNCH shall not be liable for any consequential or incidental damages. Final determination of defects shall be made by LAUNCH in accordance with procedures established by LAUNCH. No agent, employee, or representative of LAUNCH has any authority to bind LAUNCH to any affirmation, representation, or warranty concerning LAUNCH automotive meters, except as stated herein.

Disclaimer

THE ABOVE WARRANTY IS IN LIEU OF ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Order Information

Replaceable and optional parts can be ordered directly from your LAUNCH authorized tool supplier. Your order should include the following information:

1. Quantity
2. Part number
3. Item description

Customer Service

If you have any questions on the operation of the unit, please call: +86-0755-84528767 or 4000666666.

If your unit requires repair service, return it to the manufacturer with a copy of the sales receipt and a note describing the problem. If the unit is determined to be in warranty, it will be repaired or replaced at no charge. If the unit is determined to be out of warranty, it will be repaired for a nominal service charge plus return freight. Send the unit pre-paid to:

Attn: Customer Service Center
Shenzhen Launch Tech. Co., Ltd.
LAUNCH Industrial Park,
North of Wuhe Rd.,