



BEAR ROBOTICS OPERATION MANUAL

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1 Description

1.1 General Information

The measuring robots move from the front to the rear axle for automatic measurement of the symmetry axle of the vehicle.

The preceding wheel run-out compensation is manually done with standard measuring systems. The rear axle initial measurement is stored. Now any necessary adjustments of the rear axle can be carried out.

The measuring robots move to the front axle once the rear axle measurement and adjustment are completed. The same procedure is followed for wheel run-out compensation, measuring and storing of toe-in and camber values and finally, any necessary adjustment to the front axle. The next step, if required, measures castor, king-pin inclination, toe difference angle and steering angle.

The measurement time can be reduced to approx. two minutes (without adjustment) when four robots are used with fully automatic wheel run-out compensation. The wheel alignment system can be used in combination with a scissors lift or four post CARTEK or a garage pit.

1.2 Specifications

Measuring variables

♦ Toe (single/total)	front/rear
♦ Camber (single/difference)	front/rear
♦ Castor (indirect measurement at 20°)	front
♦ Wheel base (in mm)	front
♦ King pin (indirect meas. at 20°)	front
♦ Toe difference (measurement at 20°)	front
♦ Max. steering angle (inside/outside)	left/right
♦ Wheel-base difference (in mm)	front/rear

Measuring range

♦ Toe (single)	+/- 5°
♦ Camber	+/- 5°
♦ Max. steering angle	+/- 50°

Measuring accuracy

♦ Toe (single), measured on caliber	+/- 1'
♦ Camber, measured on caliber	+/- 1'
♦ Castor	+/- 5'
♦ King pin	+/- 10'
♦ Toe difference	+/- 10'
♦ Max. steering angle	+/- 15'

Computer

- ♦ Windows XP operating system

Power supply

♦ Standard measuring system: (incl. computer, printer, screen, robots etc.)	230 VAC / 6 A total
♦ With automatic wheel run-out compensation: (incl. computer, printer, screen, robots etc.)	3 x 400 VAC / 10 A total

Measuring robot

♦ Dimensions	700 x 410 x 420 mm
♦ Weight	approx. 40 kg
♦ Sliding speed in longitudinal direction	300 mm/s

Dimensions of alignment system

♦ Installed to DUO scissors lift	4400 or 4800 x 3500 mm
♦ Installed to garage pit	5000 x 3500 mm

2 Safety

2.1 Introduction

Thoroughly read the operation manual before operating the lift and comply with the instructions. Always display the manual in a conspicuous location.

Personal injury and property damage incurred due to non-compliance with these instructions are not covered by the product liability regulations.



Failure to comply with instructions could result in personal injury.



Failure to comply with instructions could result in property damage.



Important information.

- ♦ Carefully observe all safety instructions. They are provided to warn of dangers and help prevent personal injury and property damage.
- ♦ It is the operator's responsibility to comply with all safety instructions pertaining to his work station and to bring them up to date continually.

2.2 Safety Instructions for Commissioning

- ♦ The lift may only be commissioned by authorized service personnel.
- ♦ Protect all parts of the electrical equipment from humidity and moisture.
- ♦ The lift shall not be used in rooms liable to contain explosives or in car washing installations.

2.3 Safety Instructions for Operation

- ♦ Use the equipment for its intended purpose only.
- ♦ Use the equipment within its rated performance range only.
- ♦ Do not allow unauthorized persons to operate the equipment.
- ♦ Protect all parts of the electrical equipment from humidity and moisture.
- ♦ Always keep the equipment and the working area clean.
- ♦ Shut down the system when it is not in use.
- ♦ Do not allow anyone to stay in the danger zone of the system. Risk of injury by rotating components!

2.4 Safety Instructions for Service Work

- ◆ Service work may be carried out by authorized service personnel only.
- ◆ Shut down the system before doing any repair, maintenance, or setup work.
- ◆ Work on the electrical equipment by qualified electricians only.

2.5 Further Information

- ◆ Periodically clean and check the equipment:
 - Daily clean the runways.
 - Once a week calibrate the system.
 - Periodically clean the wheel plates.
 - Every two weeks clean the longitudinal guides using a compressed-air gun.
 - Once a month check the calibration device.

See also section "Cleaning".

- ◆ Use a grounded power socket.
- ◆ Make sure the power cable does not contact any rotating components.
- ◆ When using an extension cable, make sure the wire size is greater than or equal to that of the power cable. Check that the cables are not pinched or overstretched.
- ◆ Shut down the system when it is not in use. Do not pull on the cable, only disconnect the power plug.
- ◆ Do not use the equipment near open containers of flammable liquids.
- ◆ Do not expose the equipment to the rain and do not operate it on wet floors.
- ◆ Keep hair, loose clothing, fingers, and all parts of body away from moving parts.
- ◆ Make sure the power socket has an adequate fuse protection as recommended by the equipment manufacturer.
- ◆ Observe all instruction and warning decals attached to the equipment.

2.6 Accessories

Only use accessories offered or approved by CARTEK.

2.7 Replacement Parts

Only use genuine CARTEK spare parts to ensure continued safe operation of the equipment.

2.8 Safety Features

Periodically have the safety devices inspected by authorized service personnel.
Recommended interval: 12 months.

Do not operate the system with all or any of the safety devices disabled!

3 Operation

3.1 Short Measurement

- 1 Robots are in initial position.
- 2 Drive vehicle onto runways.
- 3 Select vehicle model.
- 4 Place and lock the steering wheel in straight-ahead position.
- 5 Select measuring menu, enter outside diameter if required.
- 6 Select measuring program *Toe/Camber* or *All Measurements*.
- 7 Robots move to front axle first, then to rear axle. The rear axle can now be adjusted. When using *Toe/Camber* measurement, switch over to *2nd Measurement* before carrying out adjustment.
- 8 To continue with the front axle click on *Change to Front Axle* (with *Toe/Camber* measurement) or *Continue* (with *All Measurements*). When using *Toe/Camber* measurement switch to *1st Measurement*, then to *2nd Measurement*. The front axle can be adjusted.
- 9 In program *Toe/Camber* click on *Back to Measuring Menu*, in program *All Measurements* click on *Continue*.
- 10 At completion of measurement click on *Back to Main Menu*.
- 11 To print out the test results click on *Print*.
- 12 Print out the test results using the print menu.
- 13 Take out the test certificate.
- 14 Check that robots are back in initial position. Remove vehicle.
- 15 Place wheel plates back in initial position.

3.2 Start Menu

All important functions can be selected in the start menu. For details see description below.

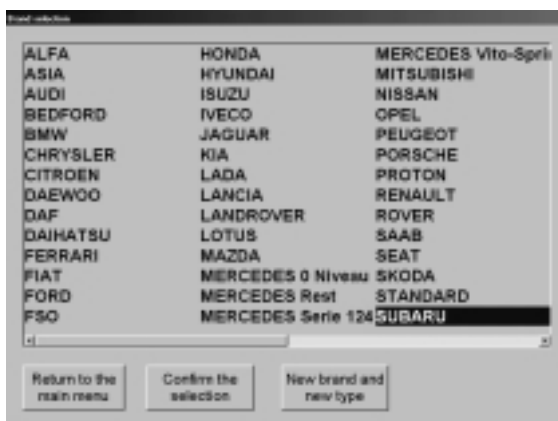


3.3 Info Box



Activate the Info box to get information on program and service support (hotline).

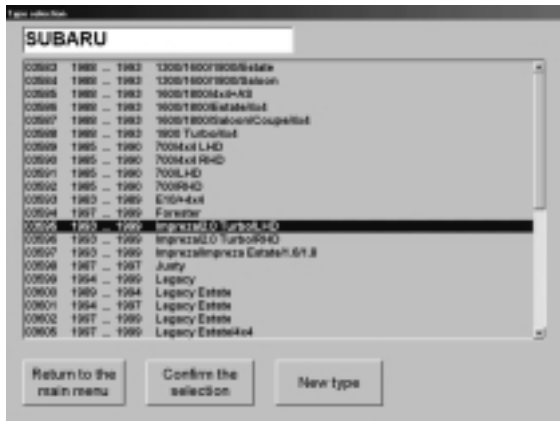
3.4 Vehicle Selection



In two consecutive menus vehicle make and model can be selected. More than 1500 vehicles including all target values are stored in the database. Other vehicles can be added without limitation.

Start with selecting the vehicle manufacture. Navigate in the list using a light pen, the tab key or the arrow keys. Confirm your selection using the *Confirm* button, the Enter key or a double click.

Correspondingly select the vehicle model.



It is possible at any time to go back to the main menu, to confirm your selection or to enter new makes and models.

An empty data mask is used for data entry.

3.5 Data Mask



The current vehicle data can be viewed, changed or deleted in a special data mask.

New vehicles can also be added.



The data mask consists of three main items:

- ◆ General
- ◆ Front axle set points
- ◆ Rear axle set points



Data entry is possible in (degrees/minutes), (degrees, decimal) or (mm). The computer will automatically calculate the other display formats.

3.6 Customer File



The program contains an extensive customer database. All customer-specific data are stored and allocated to the tested vehicles. This ensures that all vehicle tests can be easily viewed and printed out at any time.

3.7 Measuring Menu



Preparation:

The correct positioning of the vehicle is demonstrated in four pictures. Enter the outer diameter if required and correctly position the arms of the measuring device.

3.8 Selection of Measuring Menu



Select between programs *Toe/Camber* and *All Measurements*.

3.9 Toe/Camber

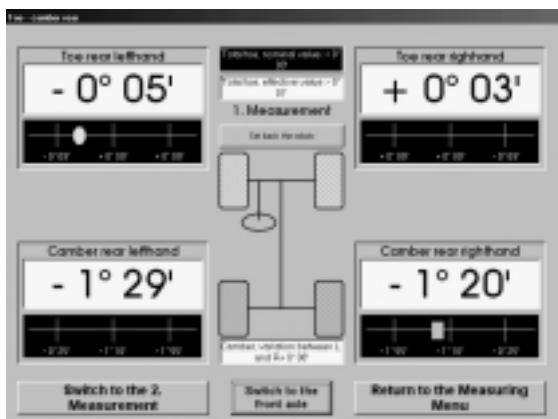


First the front axle is measured to calculate the inclination of the vehicle on the runways. Then the robots are automatically positioned at the rear axle. The toe and camber values are displayed on the screen.

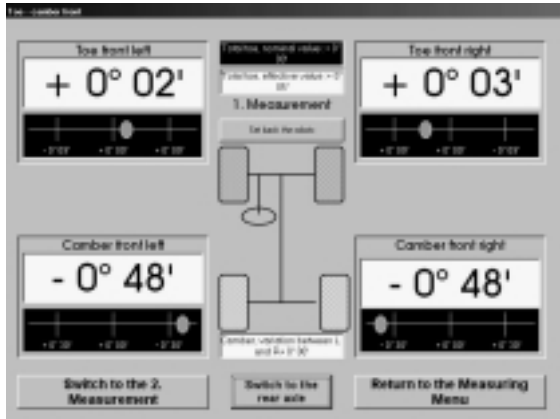


The number of switchovers between front and rear axle and between first and second measurement is unlimited.

The robots automatically scan the wheels and are positioned at the wheels. The wheel base is determined and compared with the corresponding target value from the database. If the values are matching within a certain tolerance range, the robots are positioned at the rear axle.



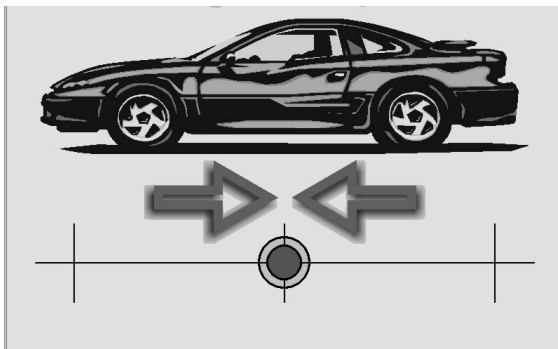
Display of rear axle values on the screen.



Display of front axle values on the screen.

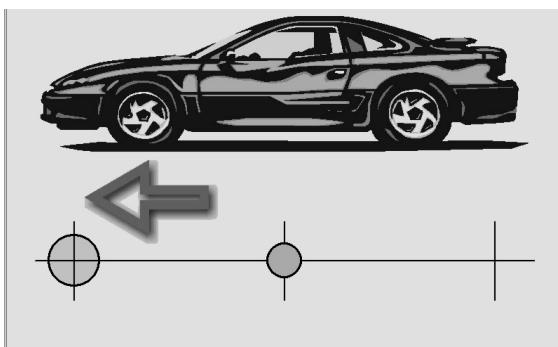
The robots can be reset to their initial position by using button *Reset Robot*.

3.10 Wheel Run-Out Compensation



Use button *Wheel Run-Out Compensation* to perform the manual compensation.

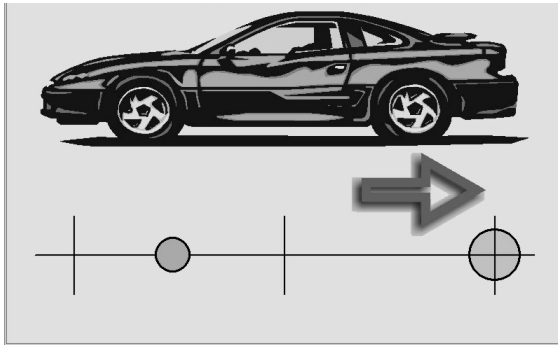
The vehicle is centered on the wheel plates. The user prompting is displayed step-by-step on the screen.



First step:

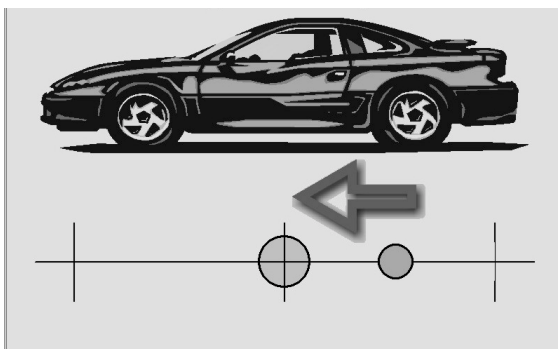
Slowly turn the wheel in forward direction. The cursor must reach the crosshair and change from red to green.

Do not move the vehicle for a few seconds.



Second step:

Slowly turn the wheel in reverse direction. The cursor must reach the crosshair and change from red to green. Do not move the vehicle for a few seconds.



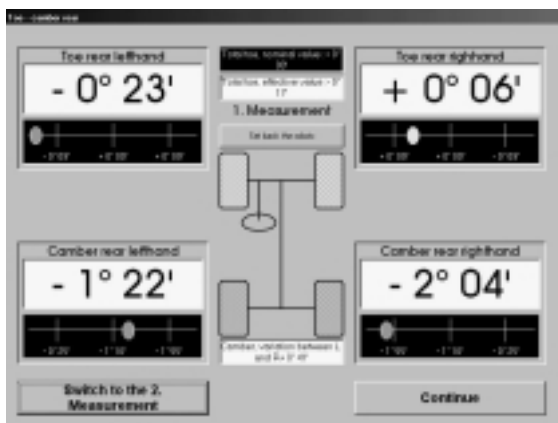
Third step:

Slowly turn the wheel in such a way that the vehicle moves in forward direction. The cursor must reach the crosshair and change from red to green. Do not move the vehicle for a few seconds.

3.11 All Measurements

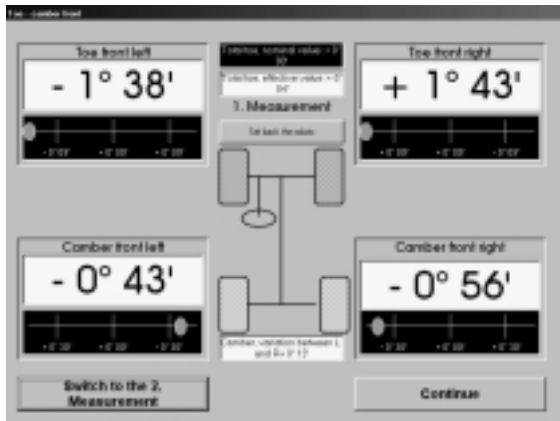


Use this program to measure and display all data in one cycle.

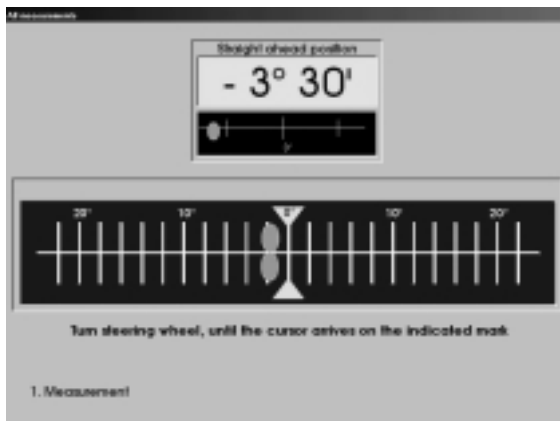


The rear axle values are displayed in two steps:

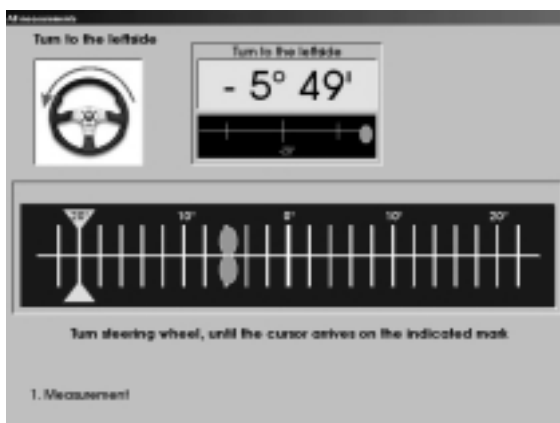
- 1 Measurement of front symmetry.
- 2 Measurement of rear axle and display of values.



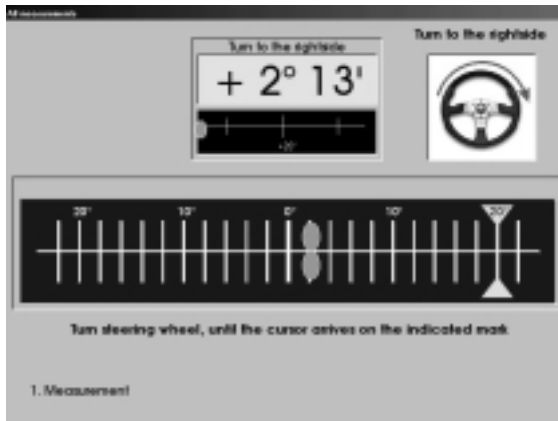
3 Measurement of front axle and display of values.



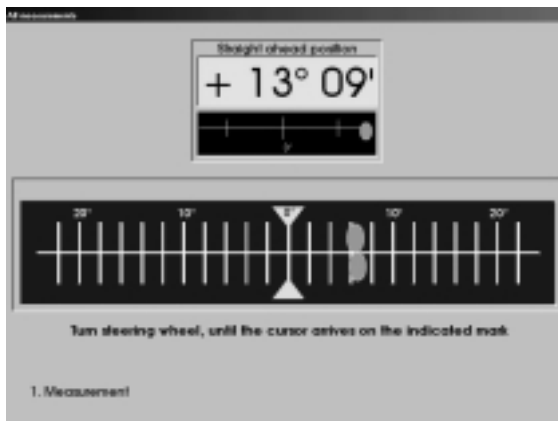
4 Straight-ahead position of front wheels.



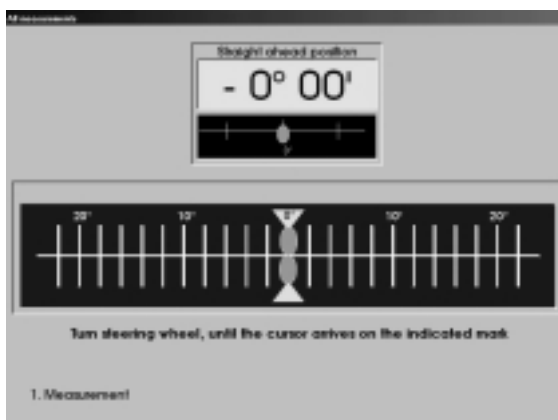
5 Slowly and continuously turn the steering wheel 20° to the left side. Do not exceed the 20° limit.



- 6 Slowly and continuously turn the steering wheel 20° to the right side. Do not exceed the 20° limit.



- 7 Straight-ahead position of front wheels.



- 8 Once straight-ahead position is reached, the robots move back into initial position.

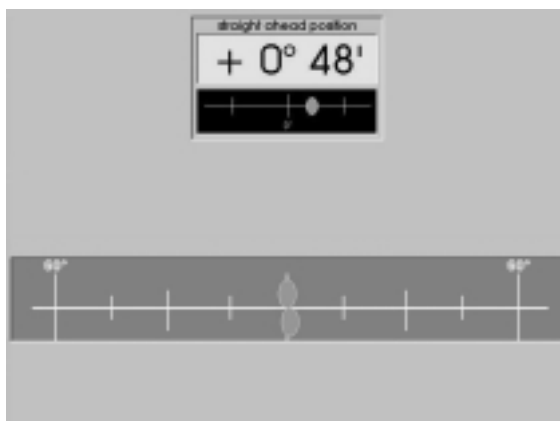


9 Display of measured values.

The measurement can be repeated.

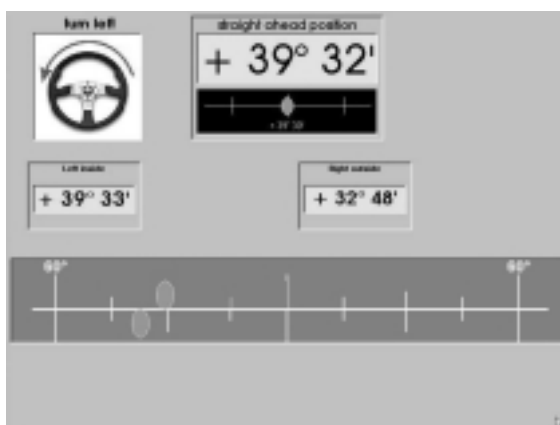
3.12 Maximum Steering Angle

Use button *Maximum Steering Angle*.



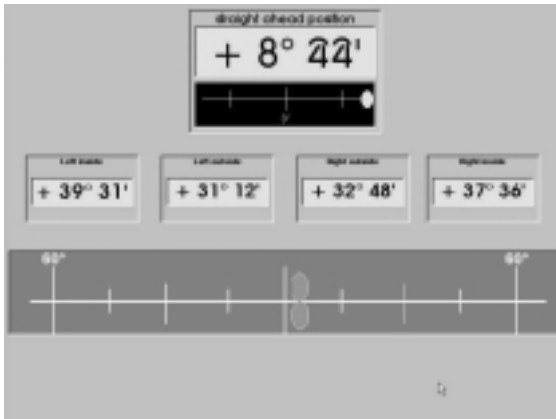
First step:

Following the user prompting on the screen, turn the steering wheel until the front wheels are in straight-ahead position.



Second step:

Slowly and continuously turn the steering wheel to the left side.



Third step:

Slowly and continuously turn the steering wheel to the right side. Then place back steering-wheel in straight-ahead position.

The values of the inside and outside steering lock are displayed on the screen.

3.13 Printing Menu



At completion of the measurement the test results can be printed out.


It is possible to include customer- and vehicle-specific data (serial number, mileage etc.).

Click on *Start Research*. The customer datasets appear in the white text field. Mark the desired customer dataset to include it in the current test printout.



In the menu the printing form can be selected.

3.14 Sample Printout



Alignment Results

Date: 20.08.2003	Hour: 10:42	Customer information: Maschinenbau Haldenwang
Vehicle registration :		MAHA
Mileage:		Hoyen 20
Serial N°:		8749 Haldenwang
Reference:		Tel: 08374-585-0
Operator:		Fax: 08374-585-497
Mark and Model:	PEUGEOT 406 Estate Family H1=148mm H2=140mm	Comment:
Year of construction	1995	

Front Axle

Measure:	Initial Values:			1. Measure:		2. Measure:	
	min	Value	max.	left	right	left	right
Toe per wheel:	- 0° 05'	+ 0° 00'	+ 0° 05'	+ 0° 51'	- 0° 17'		
Total Toe:		+ 0° 00'			+ 0° 34'		
Camber:	- 0° 30'	+ 0° 00'	+ 0° 30'	- 0° 01'	+ 0° 01'		
Camber variation:					+ 0° 02'		
Caster:	+ 3° 00'	+ 3° 30'	+ 4° 00'	+ 3° 01'	+ 2° 32'		
KPI:	+ 2° 00'	+ 12° 00'	+ 22° 00'	+ 10° 25'	+ 10° 11'		
Toe-Out-On-Turns:	- 4° 00'	- 2° 00'	+ 0° 00'	- 1° 28'	- 1° 17'		

Rear Axle

Measure:	Initial Values:			1. Measure:		2. Measure:	
	min	Value	max.	left	right	left	right
Toe per wheel:	+ 0° 08'	+ 0° 13'	+ 0° 18'	- 0° 34'	+ 0° 48'		
Total Toe:		+ 0° 25'			+ 0° 14'		
Camber:	- 2° 20'	- 1° 50'	- 1° 20'	- 1° 43'	- 1° 16'		
Camber variation:					+ 0° 27'		
Trajectory angle:					+ 0° 41'		

PROMOTIONAL OFFER:

3.15 Adjustments

Printer Initialization:

Install the printer see the user manual included

Number of Printouts:

Enter the number of copies required.

Cancel the Measuring Values at Return in Basic Position:

With activated option (setting = 1) the vehicle selection is cancelled (no vehicle selected), if the robots are manually reset to basic position.

Automatic Scan of the Vehicle Wheels:

Automatic recognition of wheel base is enabled or disabled by the built-in sensor. For lowered vehicles temporary deactivation of this function may be necessary.



Deactivate this function, if the robots move to the limit stop without having recognized any wheel.

After deactivation of *Automatic Scan* function the robots may require manual positioning. Manually disengage the positioning unit, move the robot to the desired position and finally release the positioning unit.

Control of Measurement of Travelling Distance:

Once the robot has recognized the rear axle, the measured wheel base is compared with the wheel base value from the vehicle database. If the values do not match, the measuring procedure will be automatically interrupted.

Deactivation of the control function is effective for the rear axle only. Before disabling the control function consult your service representative.

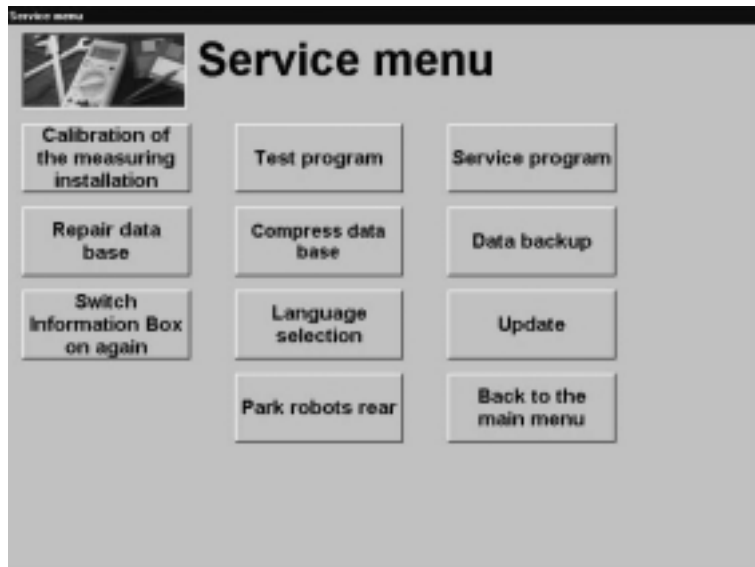
Publicity Text:

Use this field to enter promotion texts that will appear on the printout. Click on button *Updating* to store the new text in the database.

3.16 End of Cycle

Click on button *End-of-Cycle of Machine* in the start menu (see section 3.2) to move the robots back to their initial position and to reset the internal calculation variables.

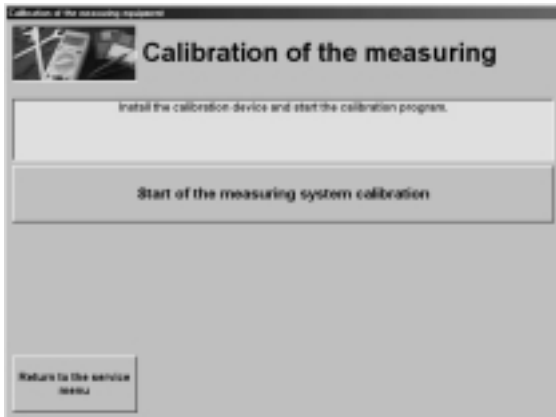
4 Service Menu



4.1 Calibration of the Measuring Installation

Carefully place the calibration device on the edge of the runway. Make sure the recess matches with the pin at the front wheel plate (see arrow).

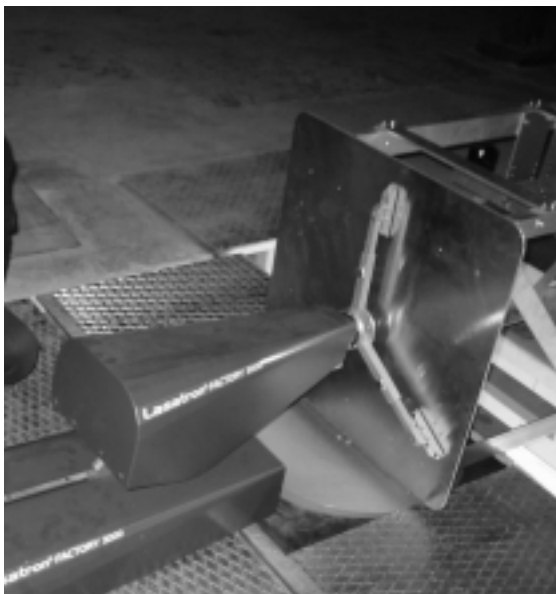




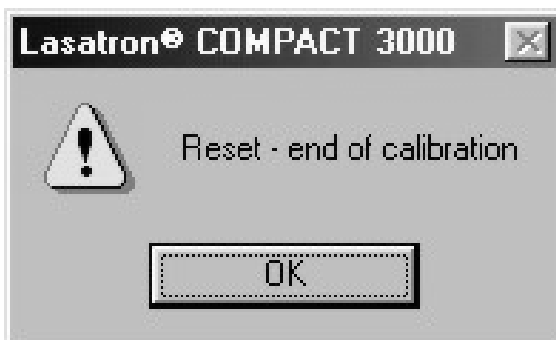
Click on button *Start of Measuring System Calibration*.



Calibration is fully automatic.



Ensure that the contact points of the robots are positioned exactly on the measuring surface of the calibration device.



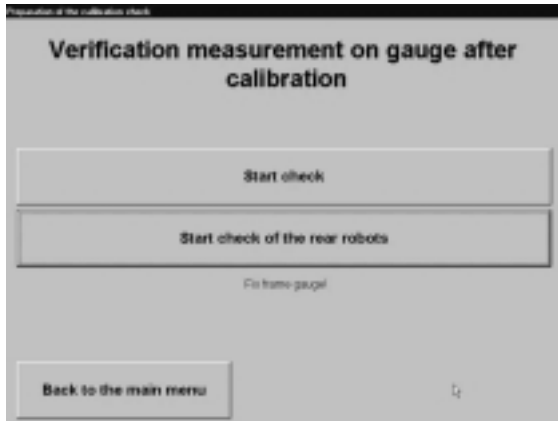
At completion of calibration the robots move back to their initial position. This message appears on the screen.



Once a week calibrate the system.

Switch on the system at least 30 minutes before calibration.

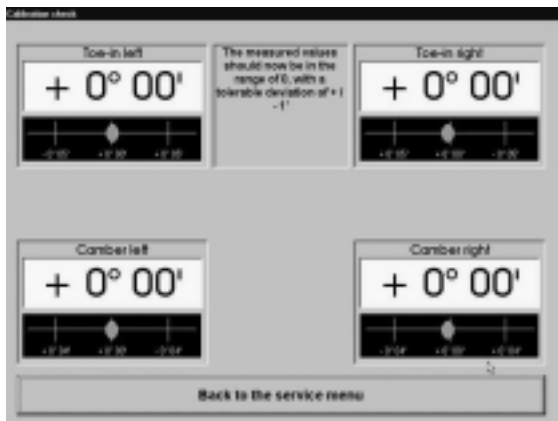
4.2 Test Program



Click on *Start Check*.

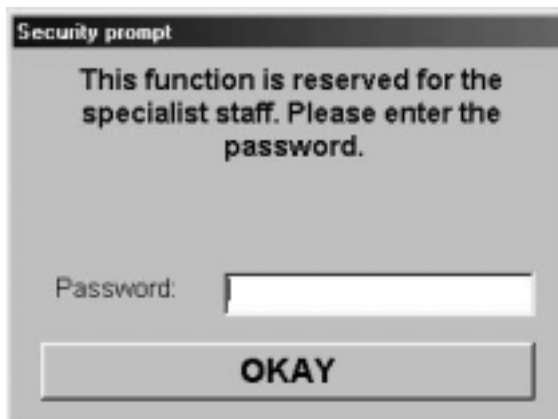


Make sure the calibration device remains installed to the runways.



Once the robots are in position, this screen will appear. If all values show 0° 00' (tolerance +/- 1'), the calibration is OK. In case of larger deviations repeat the calibration procedure.

4.3 Service Program



This part of the program has password protection. Access is restricted to authorized service personnel.

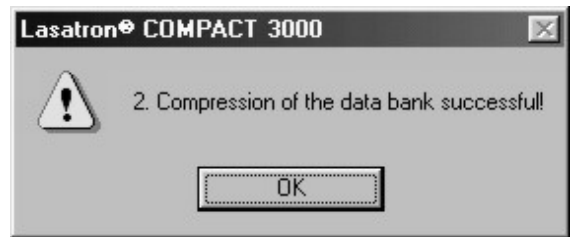
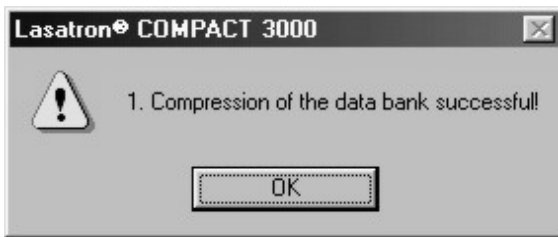
4.4 Repair Database



If the databases cannot be opened use this menu item to recover them.

4.5 Compress Database

After deleting many vehicle or customer data, use this function to compress the databases.

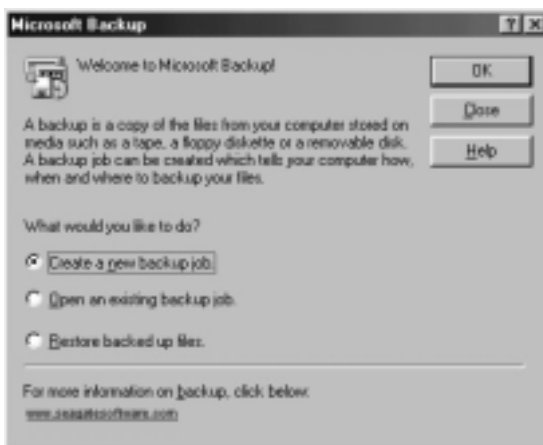


4.6 Data Backup

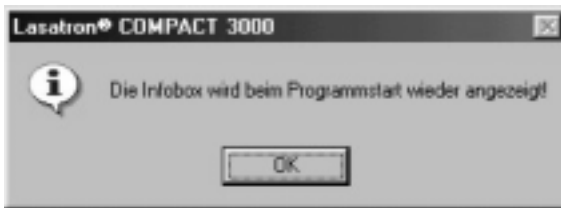
Qualified personnel only!



Use this function to start the WIN98 Microsoft Backup program. The relevant directory has the following path: C:\Lasatron3000\Daten



4.7 Reactivate Info box



Use this function to display the Info box again.

4.8 Language Selection

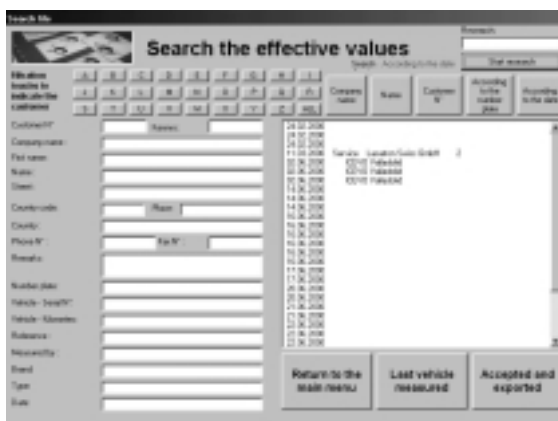


Select the desired language.

4.9 Update

If your alignment system is not equipped with a modem, you will receive update disks by mail. For installation use this button and follow the instructions supplied with the update disk.

4.10 Effective Values



Use button *Effective Values* in the start menu to search, display and print all vehicle data measured so far.

The database can be searched with five different criteria.



Use search words or filter keys to speed up the search.



Select a dataset.

Click on *Accepted and Exported* to display the vehicle data.

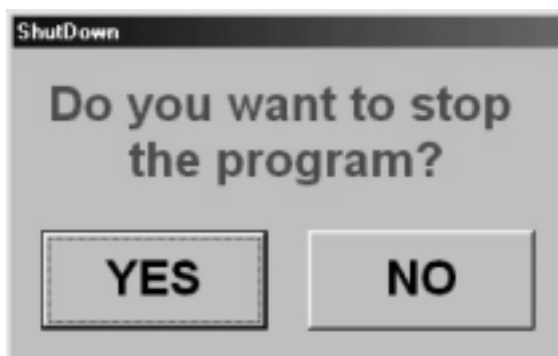
If you want to print out the *Last Vehicle Measured* only, use the respective button.



All set points and effective values of the selected vehicle are displayed on the screen.

You may now *Return to the Main Menu* or *Print* out the data.

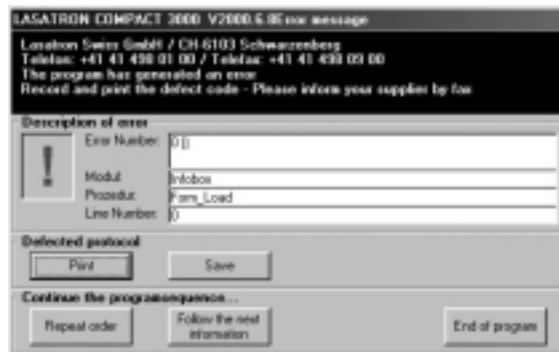
4.11 End of Program



In the main menu click on *End of Program* to terminate the program and shut down the computer.

5 Troubleshooting

5.1 Program Crash



In case of a program crash proceed as follows:

- ◆ Save the error message, print it and fax it to the service support.
- ◆ Try to repeat the command.
- ◆ Try to continue with the next command.
- ◆ If necessary: Terminate the program.
- ◆ Shut down the system and restart it after five seconds.

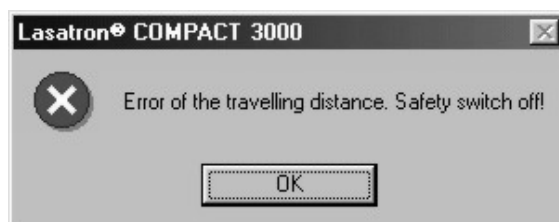
5.2 Safety Functions

The program is provided with various safety functions. If necessary the measuring procedure is stopped to avoid damage to the vehicle.

5.3 Automatic Reset of Robots

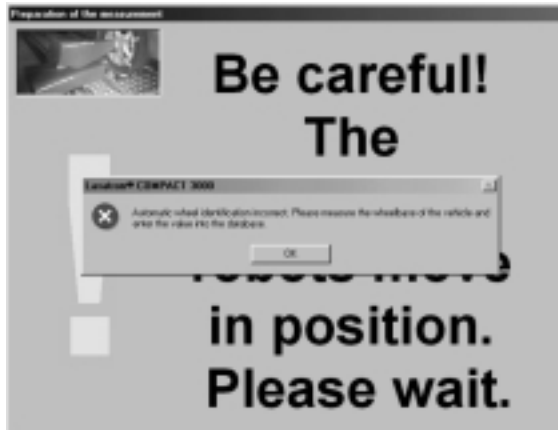
If the robots are inadvertently displaced during the measuring process, they will automatically move back to their initial position. The program is interrupted and reloaded.

5.4 Incorrect Positioning of Front Wheels



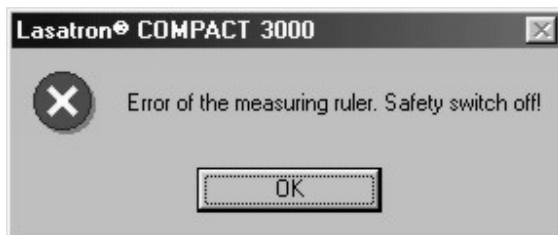
If the front wheels are positioned incorrectly on the front wheel plates, the robots will not operate. Instead, an error message appears. After confirmation the entire program is restarted.

5.5 Incorrect Wheel Base Measurement



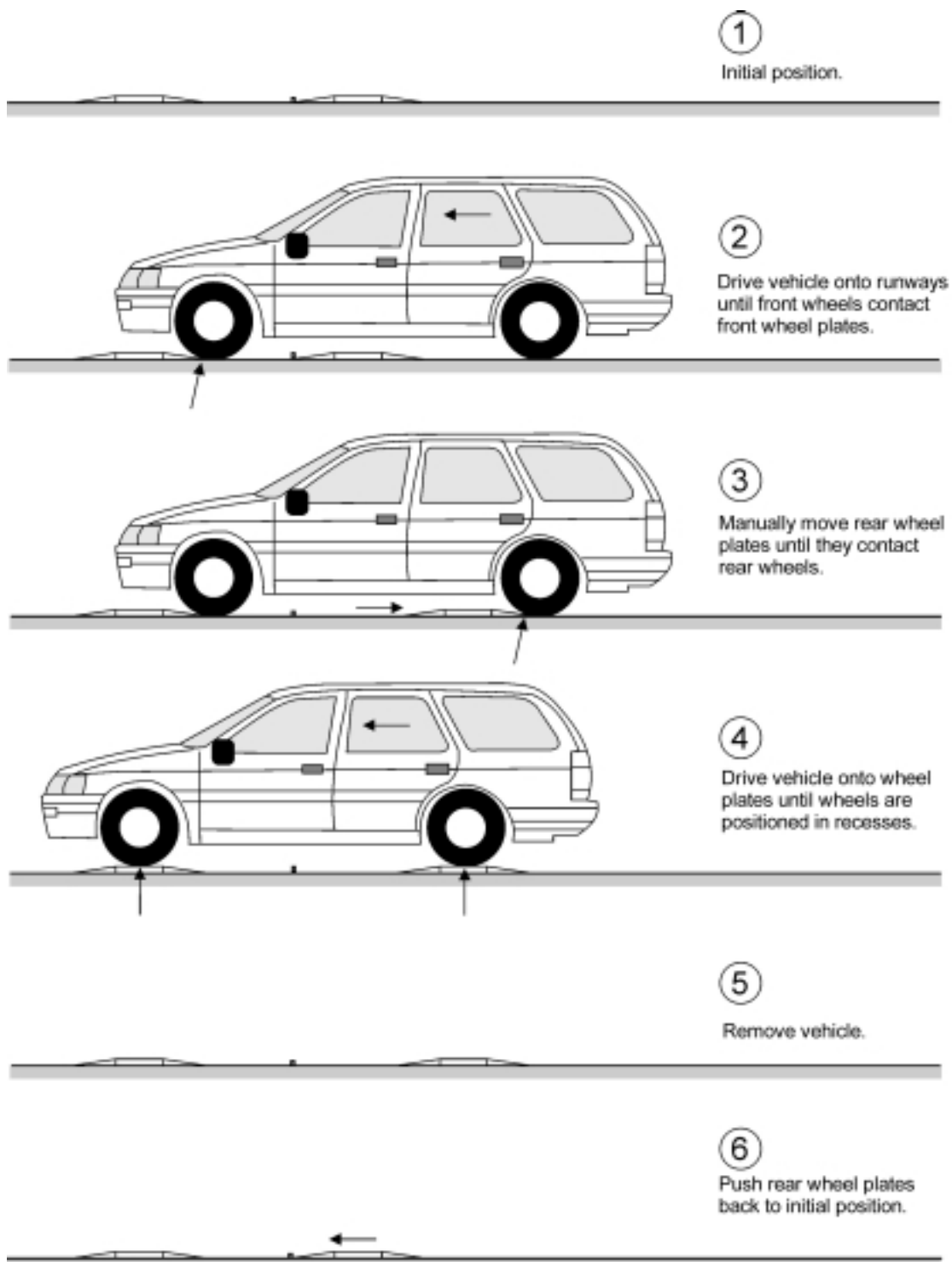
The program compares the measured wheel base with the database value. If the values do not match, an error message appears. After confirmation the entire program is restarted.

5.6 Slippage of Measuring Ruler



If the measuring ruler slips away from the wheel, an error message appears. After confirmation the entire program is restarted.

6 Vehicle Positioning



7 Cleaning

7.1 Wheel Plates



Clean the wheel plates using a cloth.



Ensure that the plates are completely free of sand and grit.



The ball cage is located below the wheel plate. Make sure the balls are free of dirt and grease. Slight discolorations of the balls are normal and not safety-relevant.



To clean the balls and the chromium steel plate proceed as follows:

Remove the ball cage and clean it using a cloth..



Remove the balls and store them safely. Carefully clean the surface of the chromium steel plate using a cloth.



Clean the balls one by one. If the balls are very dirty use penetrating oil as required.



Penetrating oil WD-40 (spray) is recommended.



Place back the ball cage and then the balls. Lubricate the balls using commercial machine oil.



Also lubricate the guide pin of the chromium steel plate.

7.2 Runways

Periodically clean the runways using a broom. Tenacious dirt may be removed with a moist cloth. Avoid splash water!

7.3 Robots, Longitudinal Guides

Blow out the longitudinal guides using a compressed-air gun. Do not use water!



NEVER aim the air stream at the robots. Drive and electronics can be severely damaged!

7.4 Cleaning Intervals

Clean the runways daily, the wheel plates once a week and the longitudinal guides once every two weeks.

7.5 Duty of Care

Lasatron® measuring systems are high-precision instruments and require careful handling to avoid equipment damage and measuring errors. Please note:

- ◆ The robots may not be manually moved unless there are compelling reasons.
- ◆ The robots must not be subject to shock load.
- ◆ Always keep the robots free of tools, parts etc.
- ◆ Protect the robots from splash water.





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