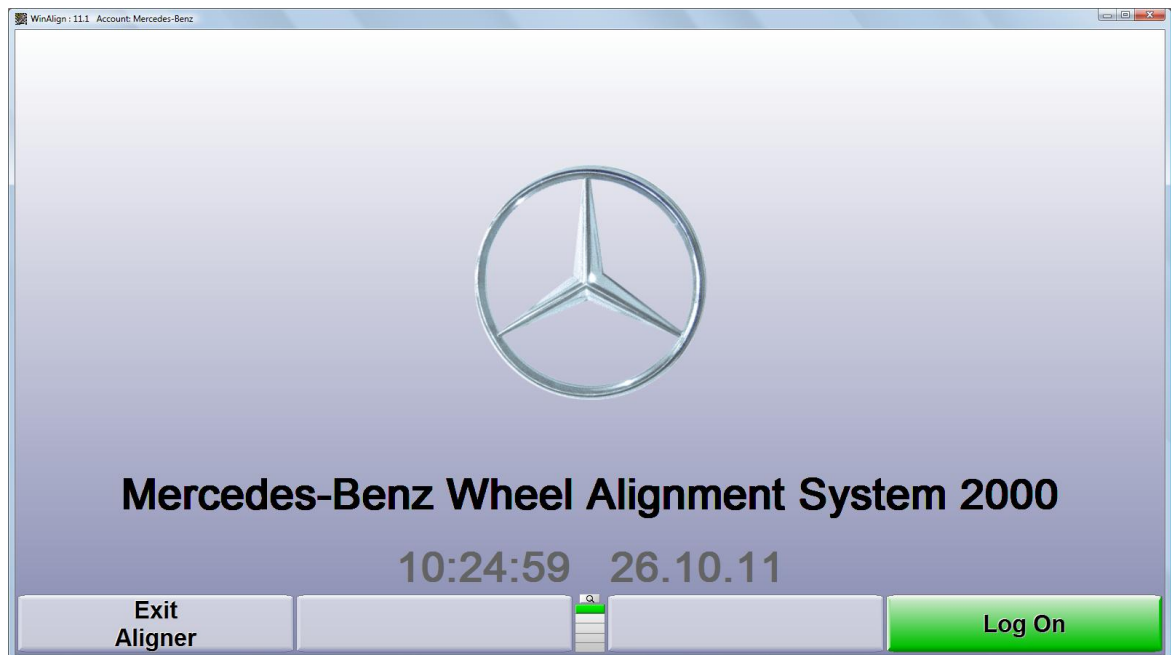


Mercedes-Benz Wheel Alignment System

WinAlign Program Version 12.x

Mercedes Program Version 2.0



Contents

CONTENTS	I
GETTING STARTED	1
1.1 INTRODUCTION.....	1
1.2 OPERATING THE CONSOLE.....	2
POSITION CONTROL SYSTEM (MKS)	5
2.1 MKS INTRODUCTION.....	5
2.2 SENSOR SETUP USING SPECIAL ADAPTORS OR MOUNTING.....	5
2.3 MKS OPERATION.....	6
PRE-ALIGNMENT OPERATION	8
3.1 PRE-ADJUSTMENT.....	8
3.2 LOGON.....	8
3.3 BEGIN ALIGNMENT.....	10
3.4 WORK ORDER.....	10
3.5 SELECTING VEHICLE ALIGNMENT SPECIFICATION.....	12
3.6 EDIT TIRE INFORMATION.....	13
3.7 VEHICLE SPECIFICATION DISPLAY.....	13
ALIGNMENT MEASUREMENTS	14
4.1 COMPENSATION CONTROL.....	14
4.2 CASTER AND S.A.I. MEASUREMENT.....	16
4.3 "BEFORE" MEASURE MAXIMUM STEERING ANGLE.....	16
4.4 "BEFORE" TOE MEASUREMENT WITH PRESSER BAR.....	17
4.5 "BEFORE" RIDE HEIGHT / BALL POINT MEASUREMENTS.....	18
4.6 ELECTRONIC DATA ENTRY WITH ELECTRONIC LEVEL GAGE.....	19
4.7 RIDE HEIGHT VS. SPECIFICATIONS.....	21
4.8 "BEFORE" MEASUREMENTS OVERVIEW.....	24
4.9 "AFTER" RIDE HEIGHT / BALL POINT MEASUREMENTS.....	24
ALIGNMENT ADJUSTMENTS	25
5.1 REAR CASTER ADJUSTMENT.....	25
5.2 ADJUST REAR CAMBER AND TOE.....	25
5.3 ADJUST FRONT CAMBER AND CASTER.....	26
5.4 MAKE ADDITIONAL ADJUSTMENTS.....	27
5.5 FRONT TOE PRESSED ADJUSTMENT.....	29
VERIFY AND DOCUMENT MEASUREMENTS	30
6.1 CASTER AND S.A.I MEASUREMENT (RE-MEASURE).....	30
6.2 MEASURE MAXIMUM STEER ANGLE (RE-MEASURE).....	30
6.3 "AFTER" MEASUREMENTS OVERVIEW.....	31
6.4 SAVE CURRENT WORK ORDER.....	31
6.5 PRINT ALIGNMENT.....	31
6.6 RESETTING THE ALIGNMENT SOFTWARE.....	31
PROGRAM DETAILS	33
7.1 SAVING CURRENT WORK ORDER.....	33
7.2 VIEWING A PREVIOUS WORK ORDER.....	33

7.3 EQUIPMENT PREPARATION FOR MKS TEST.....	34
7.4 SETTING MKS MEASUREMENTS TO ZERO.....	34
7.5 MKS TEST	34
7.6 REVERSE SENSOR TEST.....	35
7.7 TYPES OF LOGON	38
7.8 WHEEL OFF ADJUST.....	39
TOOLS AND ACCESSORIES	40
GLOSSARY	42

Getting Started

1.1 Introduction

This manual provides information and operation instructions required to operate the Mercedes-Benz Computerized Wheel Alignment System.

This manual assumes that you are already familiar with the basics of wheel alignment. *Italics* are used to refer to specific parts of this manual that provide additional information or explanation. For example, refer to *“Vehicle Specifications,” page 30*. These references should be read for additional information to the instructions being presented.

These Mercedes-Benz Operation Instructions are a supplement to the standard WinAlign Operation Manual supplied with this equipment.

Turning Power On

Turn the unit "ON" by pressing the power switch located on the left side panel, or on the back panel of the aligner cabinet. The "Logo" screen will appear and indicate that the unit is ready for use. This will take approximately 1.5 minutes.

Mercedes-Benz Account

The Mercedes-Benz logo screen is only displayed when the Mercedes account is activated. The "WinAlign" logo is shown when the standard account is activated.

The "Mercedes-Benz" account includes specific procedures required by Mercedes-Benz and is intended for use by authorized BMW dealers.

The selection process starts at the Mercedes-Benz logo screen. There are four possible selections on the first level of keys that are displayed on this screen:



K1 - Exit Aligner K2 – MKS K3 - Pre-Adjustment K4 - Begin Alignment

"Exit Aligner" is activated by selecting the K1 softkey. Always press "Exit Aligner" before turning the power off to shutdown the system.





"Begin Alignment" is activated by pressing the K4 softkey. The green highlight indicates this is the logical next step in the alignment process.

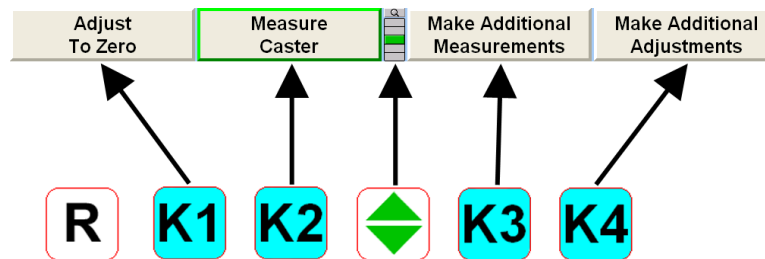
1.2 Operating the Console



Using “Softkeys”




The softkeys, located on the keyboard, provide operator control of the program. These keys are identified as:


	K1 key		Forward key
	K2 key		Backward key
	K3 key		Zoom key (keyboard)
	K4 key		Zoom softkey (screen display)
	Menu shift key		Forward key
	Reset key		

The four menu labels that appear at the bottom of each screen are referred to as the softkey labels. These labels indicate the action that the program will take when the corresponding , , , or  key is pressed.




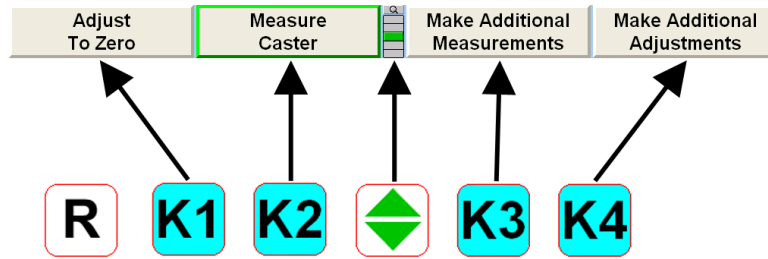
The vertically stacked squares between the  and  softkeys indicate how many levels of menu labels are available. Six levels of menus are possible. The highlighted box indicates the menu level that is currently displayed.

Pressing the menu shift softkey, , changes the menu level. When this key is pressed, the menu labels will change to the next level “down.” If the last menu level is currently displayed, the next step will be to the first menu level. To go to the next menu level “up,” press  and .

Pressing  and F6 will enlarge the current softkey menu level. The softkey associated with the label is shown on the left side of the labels and the menu level is indicated on the right side of the labels. Pressing F6 again will cause the menu to return to the normal softkey setting.

Pressing F6, or pressing and holding with a pointing device on the menu level indicator, will cause all of the menus available to appear. The dark green color, displayed behind the entire row of softkeys, indicates the active menu level. Pressing F6 again will cause the menu to return to the normal softkey setting.

Throughout this manual, the statement Press “nnnnnn” indicates the label of the softkey to press. If the required label is not on the current menu,  must be pressed to change menu levels until the desired label is displayed.







Some softkey labels have a green border as depicted around the K4 softkey shown above.

Generally, the softkey with the green border (usually **K4**) is the appropriate key to press to continue with the procedure being performed.

Using the Handheld Infrared Wireless Remote Control

The remote control provides operation of the WinAlign[®] program from a distance by duplicating the five softkeys.

The remote control has six softkeys: **K1**, **K2**, **K3**, **K4**, , and a zoom key . Pressing  will enlarge the current softkey menu level and is equal to pressing **Shift** and  on the main keyboard.

To use the remote control, point the front end of the transmitter toward the front of the wheel aligner console and press the appropriate softkey.

NOTE: The remote control transmitter is a “line-of-sight” device and will not transmit signals through solid objects.

Resetting the Program

The wheel alignment program may be reset **Error! Bookmark not defined.** at any time during the measurement process by pressing the **R** key, located at the upper left-hand corner of the keyboard.

A confirmation screen will appear to verify that the “Reset” button was pressed intentionally.

When this screen appears, press “YES” to reset the program or “NO” if the program should not be reset.

When the aligner is reset, the information collected for the measurements in progress will be erased and the display will return to the “BMW Logo” screen.

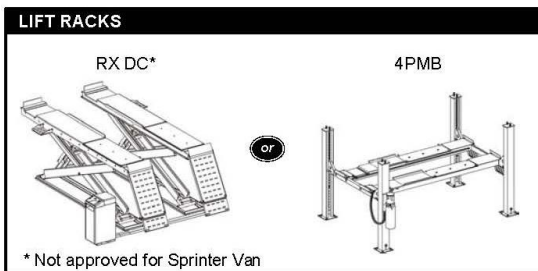
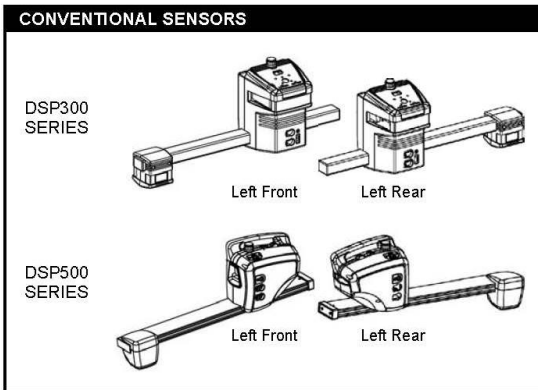
cedes-Benz Logo” screen.

NOTE: The following diagrams indicate the current Mercedes-Benz compliant Hunter Alignment Equipment as of this document's print date. Always check current sources for the latest information.

MERCEDES-BENZ OE COMPLIANCY QUICK REFERENCE GUIDE HTA-MB Required Equipment

03-10

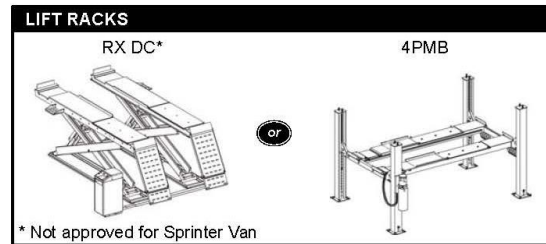
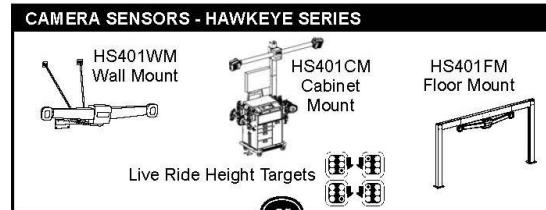
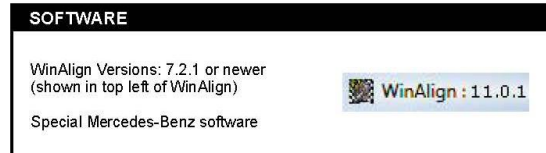
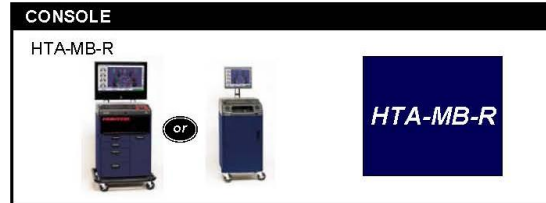
For use when verifying compliance of alignment equipment.



MERCEDES-BENZ OE COMPLIANCY QUICK REFERENCE GUIDE HTA-MB-R Required Equipment

03-10

For use when verifying compliance of alignment equipment.



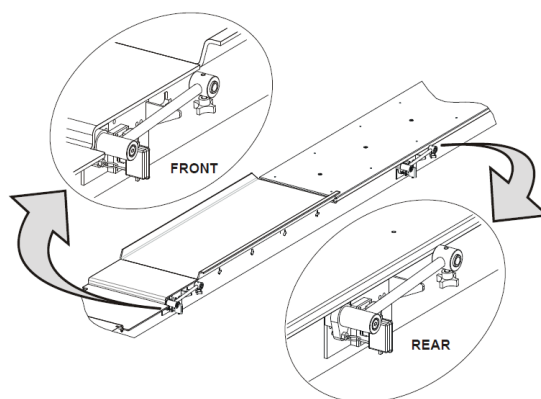
As of August 2011, the approved camera systems include Hunter Engineering's DSP600 sensors and HS401 sensors

Position Control System (MKS)

2.1 MKS Introduction

MKS is a Mercedes-Benz procedure that may be used to monitor the precision of the wheel alignment lift rack and sensors.

The lift rack must be equipped with MKS mounting brackets in order to make use of this procedure and to obtain valid MKS measurements.



MKS Bracket Installation, Left Runway

2.2 Sensor Setup Using Special Adaptors or Mounting

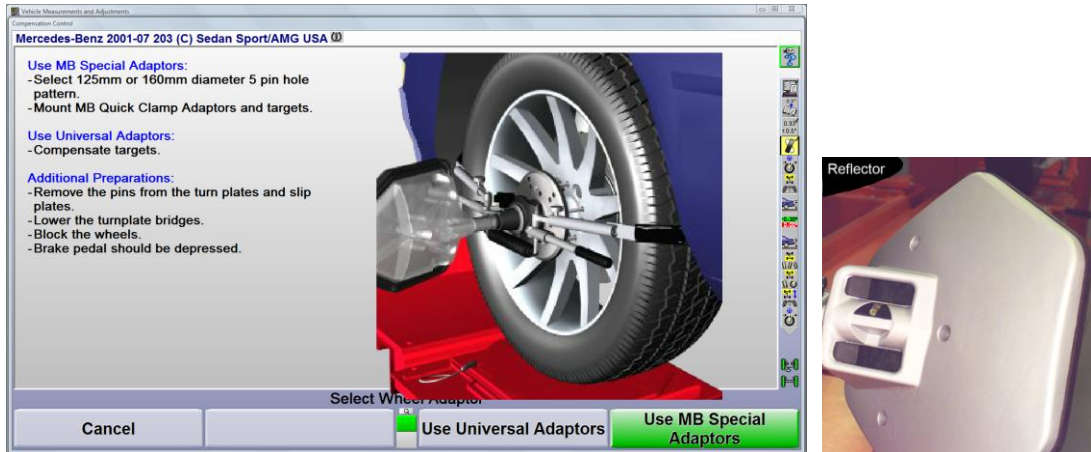
Indexing Electronic Sensors

Before mounting the sensors on the Mercedes-Benz special adaptors or MKS brackets, rotate the index mark on the sensor shaft to the 12 o'clock position with the sensor held vertical and lock it in place using the sensor lock knob. Do not loosen the sensor lock knobs.



When instructed to level the sensors, do so only by loosening the locking lever or lock knob on the adaptor, not the lock knob on the sensor. *Refer to “Leveling and Locking Sensors.”*

For sensors mounted to the Mercedes-Benz special adaptors, the sensors are secured at the “level” position by tightening the lock knob on the bracket or wheel adaptor, rather than the lock knob on the sensor. Verify that the index mark of the sensor shaft is at the 12:00 o’clock position.



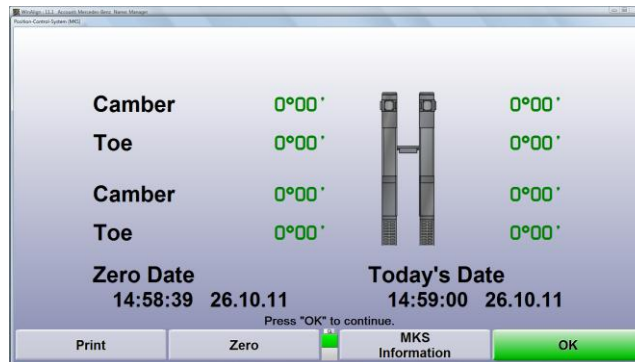
Vision System Reflectors

Install the reflectors on the special adaptors or in the MKS brackets. Level the sensor using the bubble level or align the arrows vertically depending on the style of reflector. Secure the reflector shaft using the adaptor lock mechanism.

2.3 MKS Operation

The level of the lift rack and wheel alignment sensors should be calibrated prior to setting the MKS measurements to zero. *Refer to “Setting MKS Measurements to Zero.”*

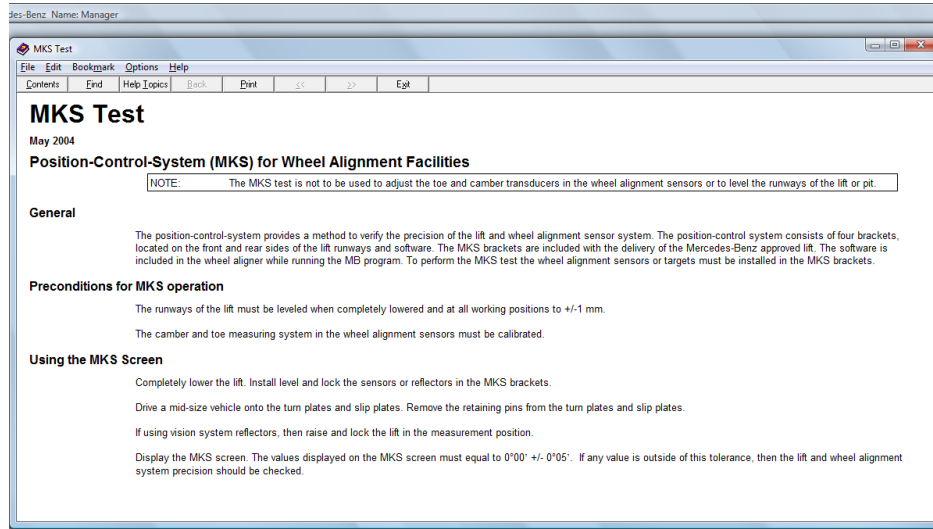
The “Position Control System (MKS)” screen is displayed automatically after the computer boots up when the power is turned on.



The MKS screen may also be displayed by pressing the “MKS” softkey located on the Mercedes-Benz logo screen after logging on.

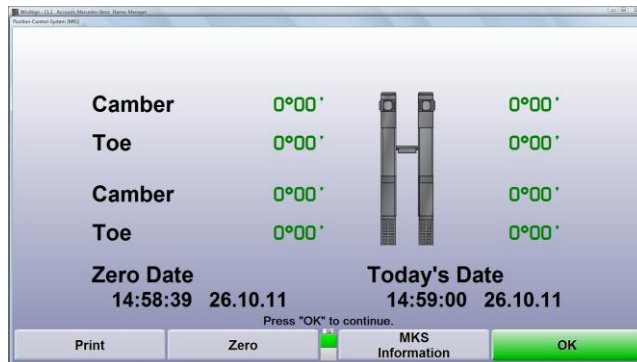


By pressing “MKS Information” from the MKS screen, the MKS Help screen will appear.



The measurements that appear on the MKS screen are valid only if the MKS measurements have been previously measured and set to zero. Refer to “Setting MKS Measurements to Zero,” page 7.

If the MKS measurements have been previously measured and set to zero, then all measurements should equal 0 degrees 00 minutes ± 0 degrees 05 minutes. Measurements that are within this tolerance will be green. Measurements that are outside of this tolerance will be red.



Green measurements are considered good and the lift rack and sensors are expected to provide accurate vehicle wheel alignment measuring results.

If red measurements are displayed, then the accuracy of the lift rack and/or sensors are suspect and it is recommended that the sensors first be checked for accuracy.

If the sensors are found to be accurate, then it is recommended that the lift rack be checked for accuracy.

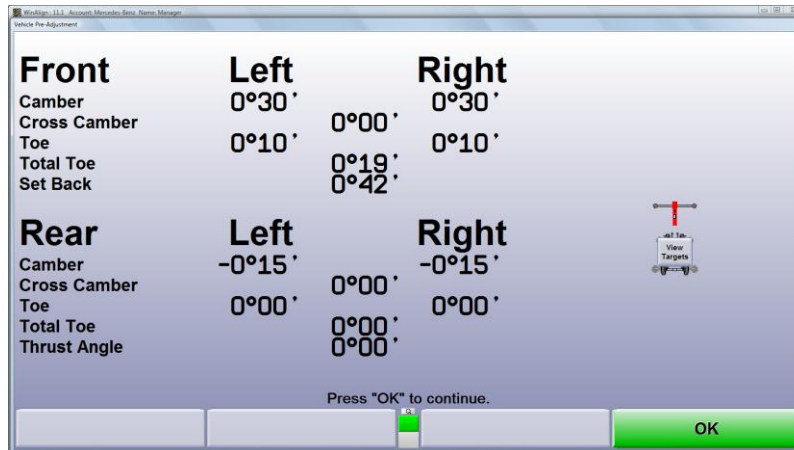
NOTE: The wheel alignment program will operate regardless of the MKS measuring results. Green or red measurements will not prohibit the use of the operating program.

Additional information on the MKS procedure is located on page 33.

Pre-Alignment Operation

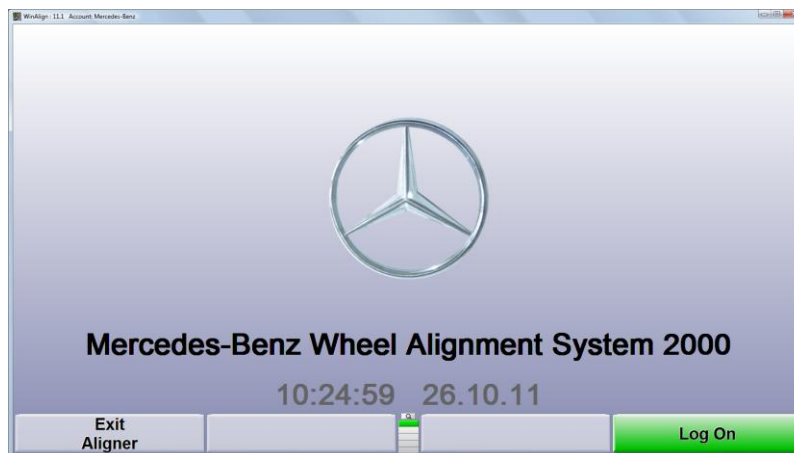
3.1 Pre-Adjustment

This screen allows the user to perform a quick check of primary alignment angles before beginning an actual alignment of the vehicle.



3.2 Logon

The logon default is "enabled" for the Mercedes-Benz wheel alignment system. The primary use of Log On option is to allow a user to customize alignment program settings according to his or her preferences in the setup program. The logon capability can be enabled or disabled in the setup program.

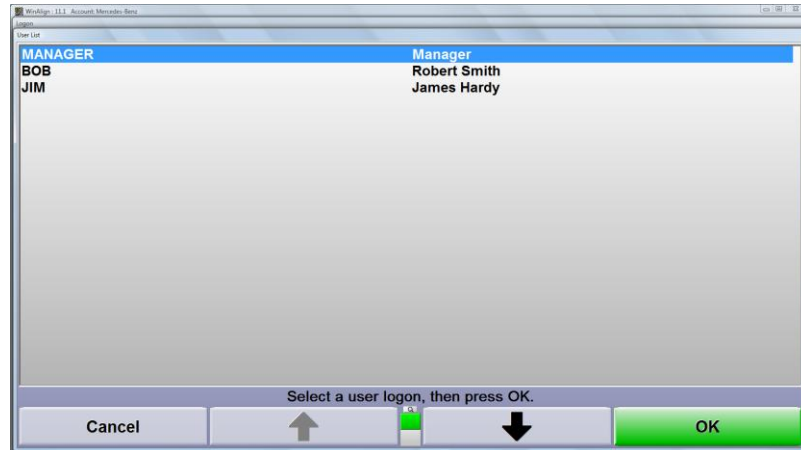


Additional information about the Logon function is located on page 37.

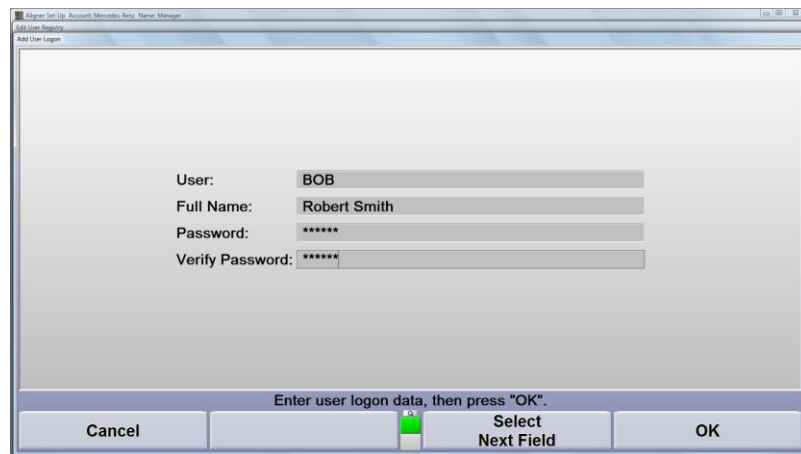
Logging On

With logon enabled, the “Begin Alignment” key is replaced with “Log On.” Press “Log On.” The “Logon User List” screen will appear. Select a user and enter the password.

Passwords are not case-sensitive. The logon feature does not distinguish between UPPER case and lower case letters for any logon names or passwords.



Press **Enter** or “Select Next Field” to move the cursor to the next field, “Password,” then enter the password. For each character entered in this field, an asterisk (*) will appear. This prevents anyone from reading the password off the screen after it has been typed.



If the password is not correct, an error message will appear. Press “OK,” then re-enter the password.

When a user has logged on successfully, the logo screen will appear with the “Begin Alignment” key.

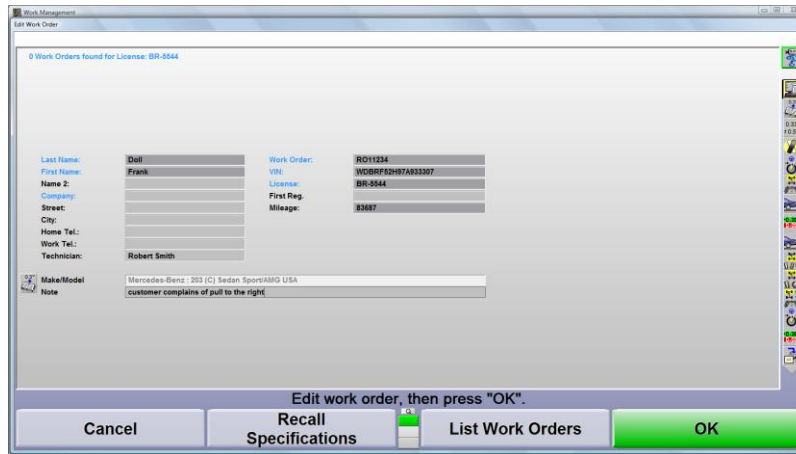
Logging Off

Resetting the aligner will not log off a user. Turning the alignment console off will log off a user. To log off, press “Log Off” on the logo screen.



3.3 Begin Alignment

Press “Begin Alignment” to begin the wheel alignment measurement process. The “Work Management” screen will appear. This screen shows the basic work order information.



3.4 Work Order

Work Management provides a database for storing work orders, customer identification, and vehicle identification.

A work order may contain the following information fields:

work order number	reference to customer identification
reference to vehicle identification	technician identification
vehicle mileage	note
alignment procedure	alignment specifications
alignment measurements	tire information

Work Management provides methods to store and recall customer and vehicle identification. This identification is then referenced by work orders.

Customer identification includes the following:

customer number	first and last name
company name	address
home phone	work phone

Vehicle identification includes the following:

Vehicle alignment specification	vehicle make and model description
VIN	license
first registration date	

NOTE: Mileage is stored in the work order and not in the vehicle identification.

Entering Customer Identification

Customer information is entered on the “Edit Work Order” screen.

The cursor indicates the position where a letter or number will appear. Enter the required information by using the keyboard.

Press **Enter** or **Tab** to advance to the next field. Press **Shift** and **Tab** to back up to the previous field. The mouse may also be used.

Recalling a Customer/Vehicle

Press “List Work Orders” in the “Work Management” screen to display the “Recall Customer/Vehicle” screen.

Scroll using the **↑** or **↓** to highlight the desired customer or use the search function located below the list of work orders.

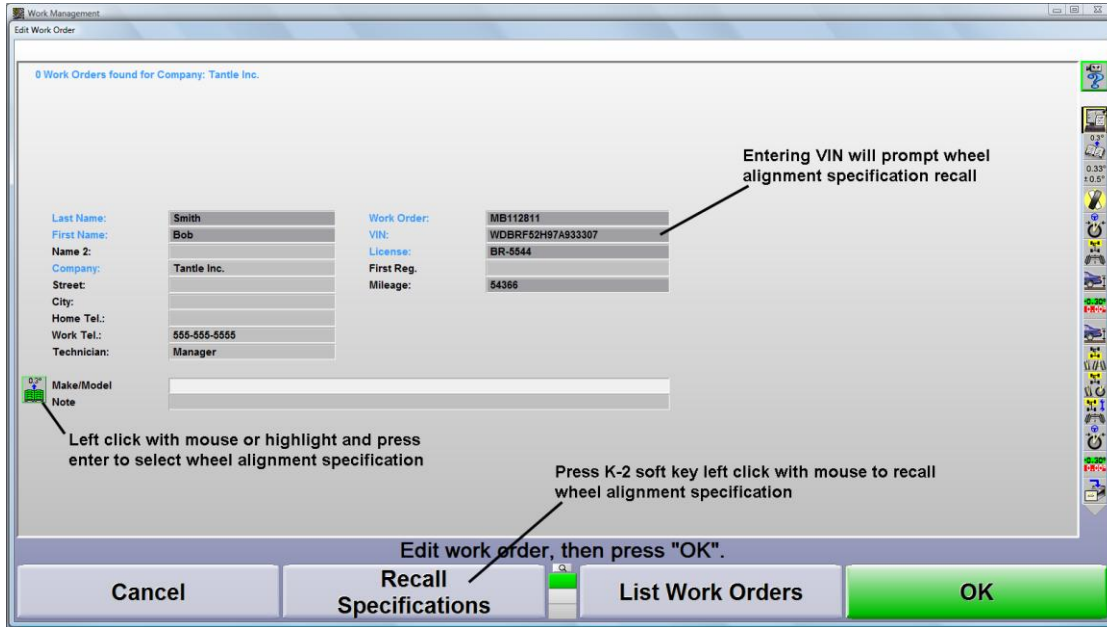
The search function will be faster in most cases.

Once the customer/vehicle is identified, press "Use Selected Item" and the customer/vehicle info is recalled and attached to the current work order.

Additional information about the Work Management function is located on page 32.

3.5 Selecting Vehicle Alignment Specification

The wheel alignment specifications for the vehicle are typically selected during the process of completing the work order. Three selection methods are available as illustrated below.

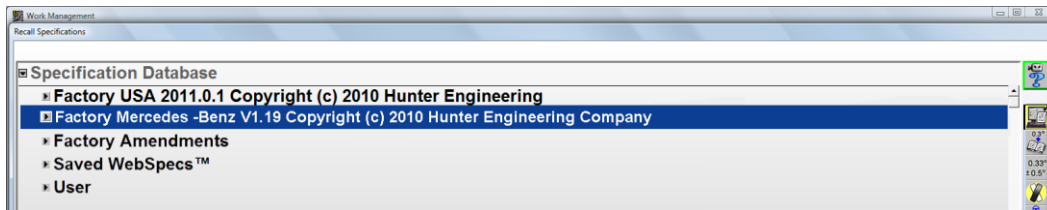


Mercedes Benz Alignment Specification Database

A dedicated Mercedes-Benz specification database is included with WinAlign's MB alignment software.

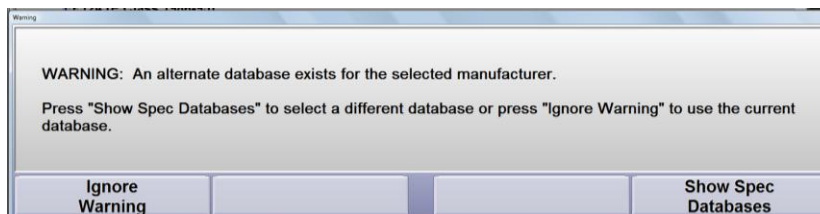
Always use the dedicated Mercedes-Benz specification database. This database includes information and procedures not offered in the standard "Factory USA" database.

The Mercedes Benz database is in addition to the "Factory USA" database shipped standard with the WinAlign program.



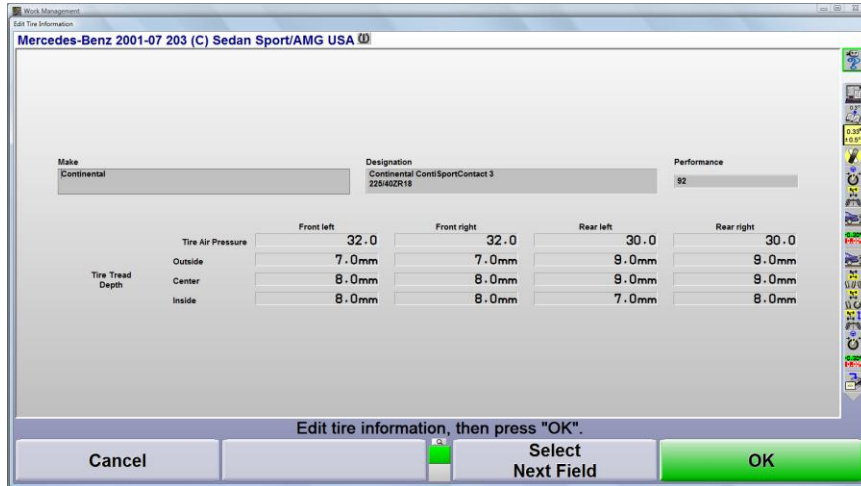
Press "Show Spec Databases" and a list of specification databases will appear. Select the "Factory Mercedes-Benz" database, press "OK," and then select the model.

If you recall Mercedes-Benz specifications from a database other than the "Factory Mercedes-Benz" database, the following warning message will appear.



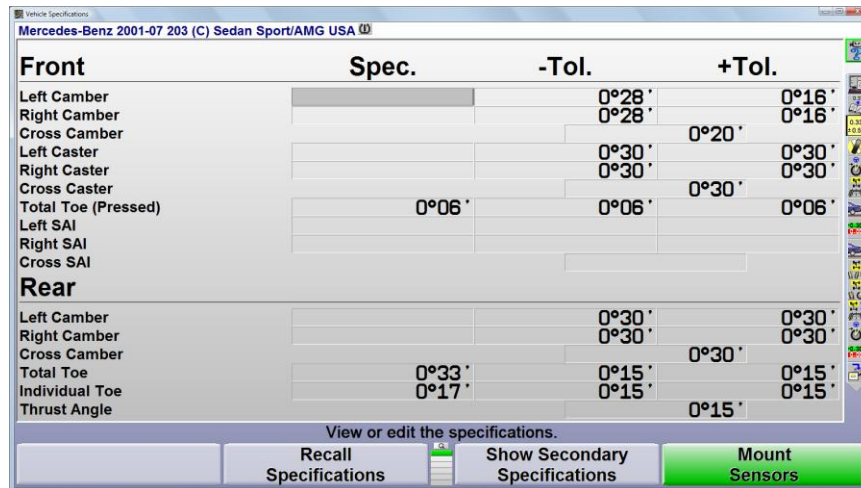
3.6 Edit Tire Information

Use the keyboard to enter the appropriate data into the “Edit Tire Information” screen. This information will appear on the printout summary. This data entry process is optional. Press “OK” to continue.



3.7 Vehicle Specification Display

The “Vehicle Specifications” primary screen allows the operator to view the vehicle specification data that has been recalled.



Some data fields are intentionally left blank for Mercedes-Benz models. The vehicle specification data for some of the blank fields will be recalled later during the wheel alignment measurement process.

Specifications may be manually entered on this screen. Any change to the vehicle specifications will cause the title of the specification to be changed with "(Modified Specification)" at the end of the title.

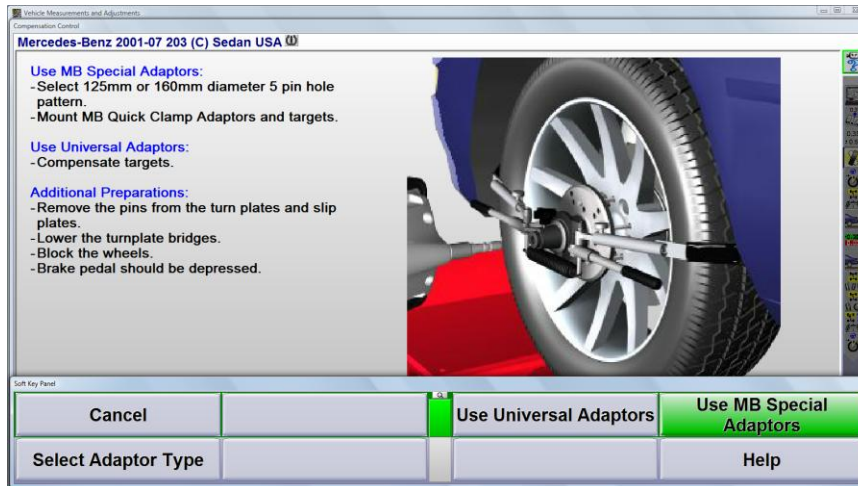
Mercedes-Benz 2001-07 203 (C) Sedan USA (Modified Specification)

Press "Mount Sensors" to continue.

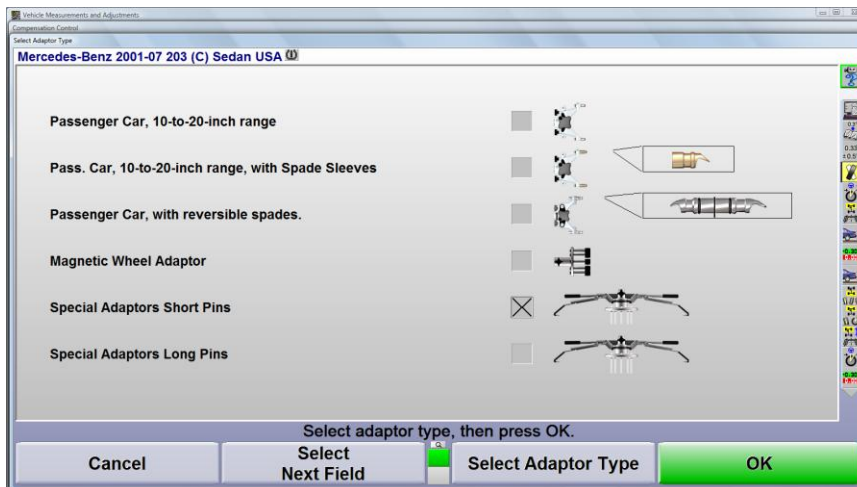
Alignment Measurements

4.1 Compensation Control

This screen provides special instructions for universal and Mercedes-Benz special adaptors. Choose a wheel adaptor type before proceeding with the alignment.



Additional adaptor type configurations are available through the second row of softkeys.



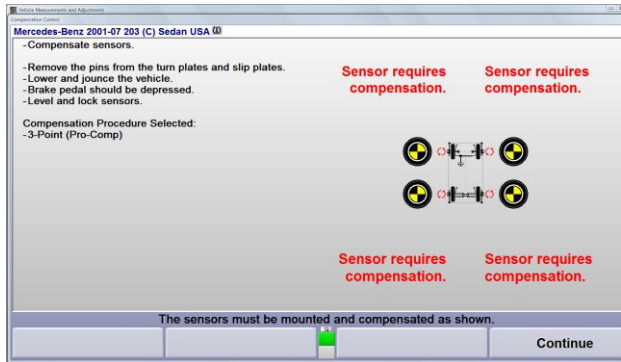
Some measurements require knowledge of the distance between the vehicle's wheel and the alignment sensor. Specifying the attachment method provides the distance value.

Universal Adaptors

Wheel run-out compensation must be performed when using universal adaptors

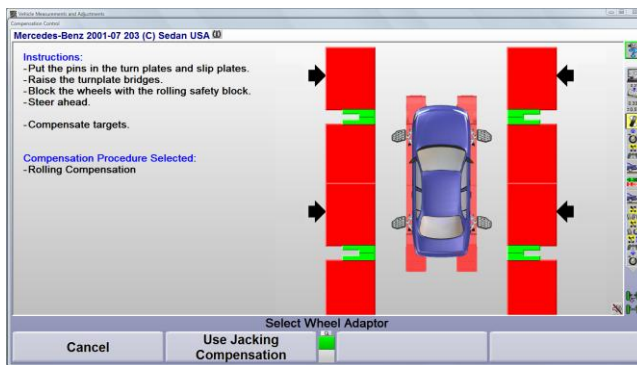
If the universal adaptor was selected, instructions pertaining to this adaptor are provided on the display screen. The compensation option is displayed along with the vehicle plan view showing the status of the sensors.

Follow the instructions on the display to assure the best compensation possible.



offset adaptors

One or more conventional electronic sensors may be compensated at the same time if multiple people are available. The center casting of the adapter should be centered on the adaptor rods. The offset adaptors shown above are available to lower the front sensors if communication between the front sensors is blocked.

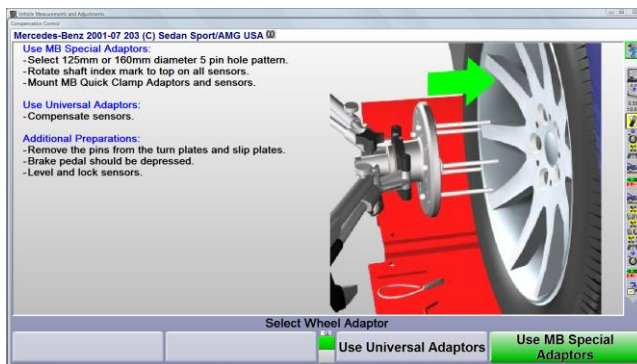


Follow these guidelines when performing rolling compensation with vision sensors.

1. Use a rear tire to roll the vehicle during compensation
 - a. Do not roll the vehicle by pushing or pulling on the front or rear bumper (suspension angles will change)
 - b. Do not roll the vehicle using either of the front tires (front wheels will steer during the roll)
2. The gap between the rear of the turnplate and the runway must be filled using the bridges provided
3. Never unlock the sensor shaft from the adaptor during the alignment process

Use Mercedes-Benz Special Adaptors

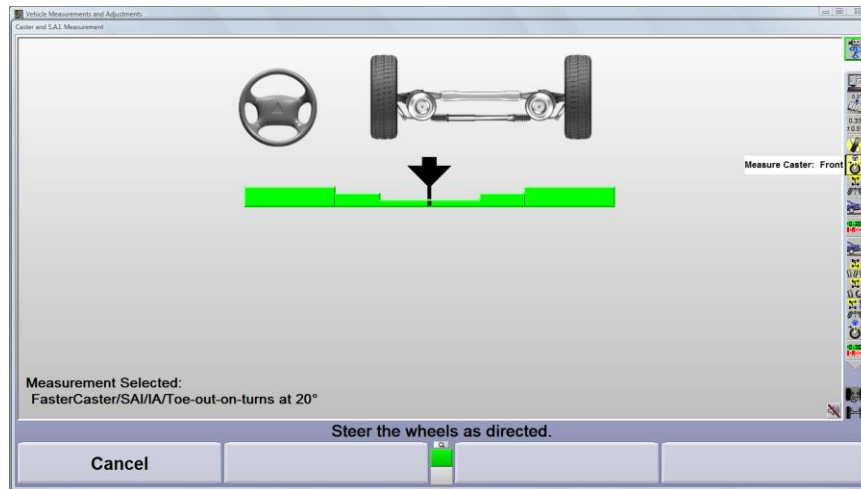
If Mercedes-Benz special adaptors are selected, the instructions change to show only those pertinent to these adaptors. The compensation option is displayed along with the vehicle plan view showing the status of the sensors. Press K-4 "Use MB Special Adaptors" to advance the procedure.



4.2 Caster and S.A.I. Measurement

The caster measurement sequence for the Mercedes-Benz system is set to measure FasterCaster/SAI/IA/Toe-out-on-turns at 20 degrees.

Follow the instructions given on the screen. The program will wait until all sensors are stable before automatically moving to the next screen. This is necessary because all live “Before” measurements for the sensors are saved at this time.



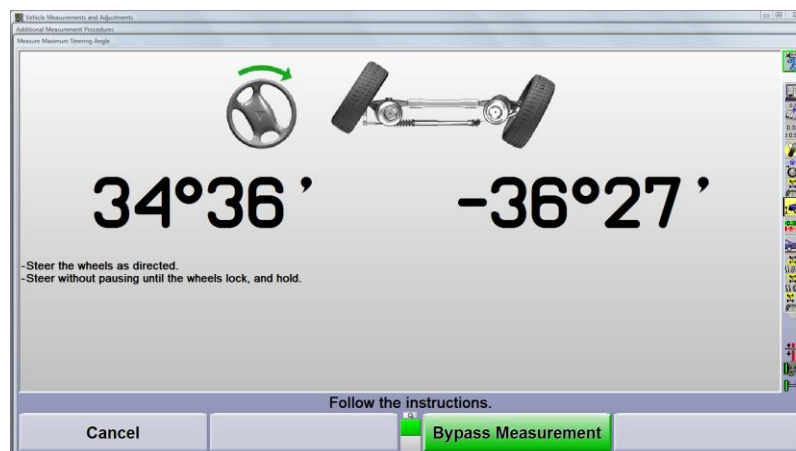
Steer the wheels as directed by the bar graphs.

NOTE: Steering past the intended steer angle will result in a bar graph directing the front wheels to be steered back to the side of original entry. This is designed to assure consistent measurements.

If any sensor is not level during the final steer ahead, a warning will appear at the end of the procedure and the steering sequence must be repeated.

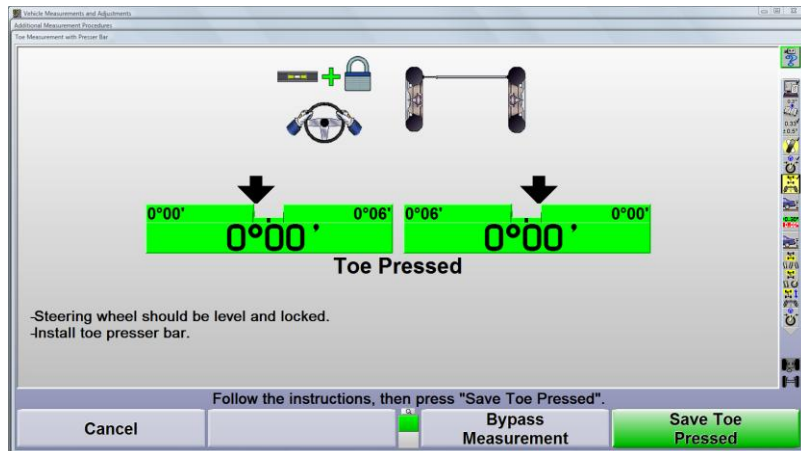
4.3 “Before” Measure Maximum Steering Angle

The “Measure Maximum Steering Angle” measurement screen will appear next, if the vehicle specification includes a maximum steer angle preferred specification and tolerance. WinAlign will bypass this measurement if the vehicle’s specification does not include a preferred specification and tolerance for maximum steering angle.



4.4 “Before” Toe Measurement with Presser Bar

Follow all of the instructions on the screen and then press “Save Toe Pressed.” The front toe pressed measurements are saved to “Before” measurements at this time.



The operator is instructed to remove the toe presser bar. Press “OK.” Normal front toe is measured and saved to “Before” measurements at this time.



4.5 “Before” Ride Height / Ball Point Measurements

Alignment angle specifications may be based on measurements entered on this display.

The screenshot shows a software window titled "Vehicle Measurements and Adjustments" with a sub-window "Ride Height / Ball Point Measurements" for a "Mercedes-Benz 2001-07 203 (C) Sedan USA". The interface is divided into "Left" and "Right" columns. Under the heading "Before" Measurements, there are input fields for "Front Ride Height", "Ball Point", "Rear Ride Height", and "Control Point". The "Ball Point" fields include a unit selector set to "mm". At the bottom, there are buttons for "Cancel", "Select Next Value", and "Save 'Before' Ride Height". A status bar at the bottom of the window reads "Enter data, then press 'Save 'Before' Ride Height'".

This screen allows the entry of vehicle Ride Height, Ball Point, Control Point, Rear Caster and/or Front Shock Tube Length measurements, depending on the vehicle that has been recalled from the specification database.

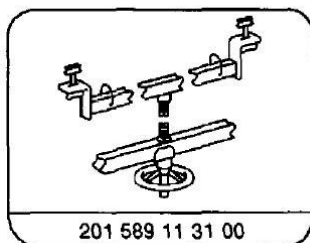
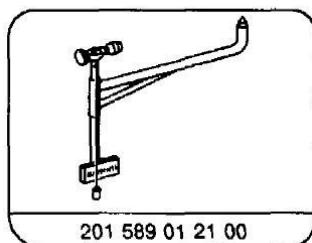
Linear vs. Angular measurements

Mechanical ride height measurement tools may be required to measure ride height, ball point and control point on older Mercedes-Benz models. Models manufactured since 1998 may utilize mechanical measurement tools or the Electronic Level Gage.

New models, such as the A class, do not utilize the mechanical measurement tools. Ride height on these newer models is measured only in decimal degrees using the Electronic Level Gage.

Appropriate measurement tools must be used to obtain these measurements.

Special tools



The data may be manually or electronically entered into the appropriate fields provided on this screen.

Press “Save ‘Before Ride Height” after all data entries have been entered.

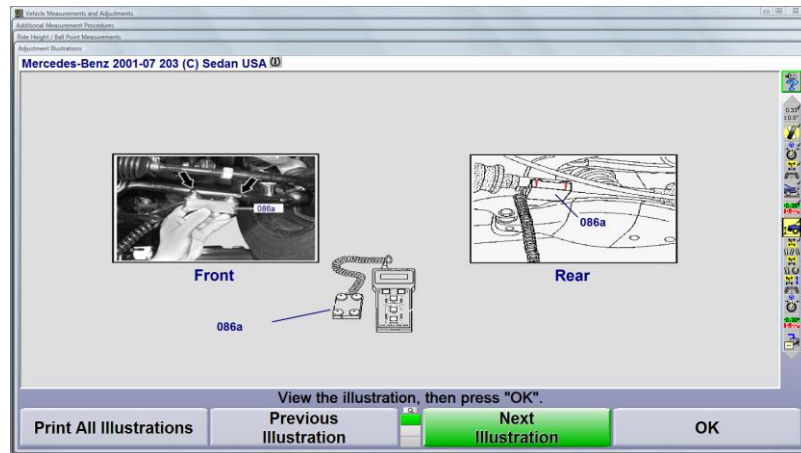
The remaining vehicle specs will be recalled from the specification database when this data is saved.

4.6 Electronic Data Entry with Electronic Level Gage

Front and rear ride height measurements, along with rear caster measurements obtained with the Electronic Level Gage may be electronically transmitted to the wheel aligner.

Rear Control Point may be measured with the Electronic Level Gage, however this measurement must be entered manually into the wheel aligner. Refer to the operation instructions provided with the Electronic Level Gage to obtain the angular measurements.

Illustrations of the ride height measurement point are made available for some models by pressing the "Illustrate Adjustments" softkey.



Measure and store the front and/or rear ride height measurements using the electronic level gage and adaptors.



Connect the Electronic Level Gage to the appropriate port on the wheel aligner using the cable or docking station provided with the wheel aligner.

After connecting the Electronic Level Gage to the wheel aligner,

Press the "Memory" key on the face of the Electronic Level Gage

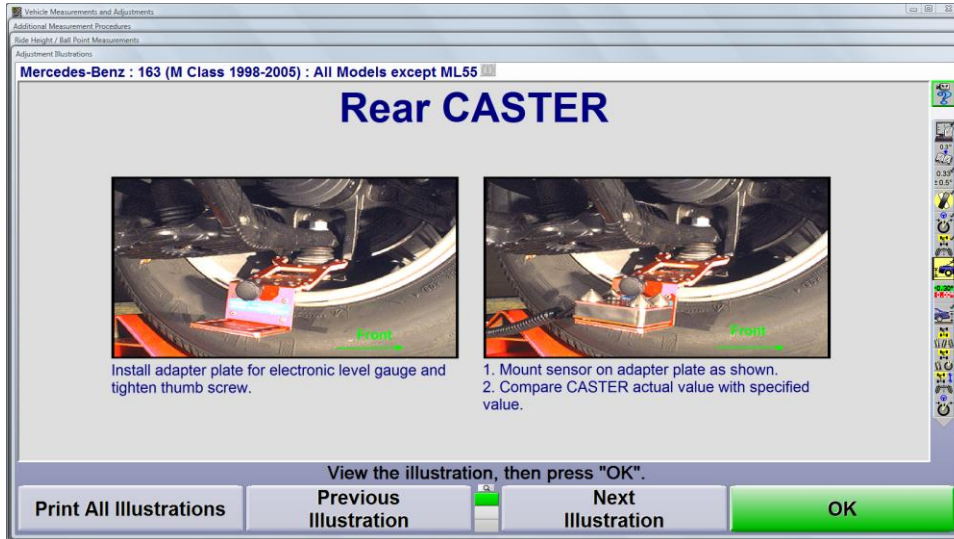
Press the "Transfer Ride Height" or "Transfer Rear Caster" softkey.

If the transmission is successful, the appropriate fields will display the data received from the Electronic Level Gage and the data will be erased from the Electronic Level Gage. The "Transfer" softkeys will not be displayed if the vehicle cannot be measured with the Electronic Level Gage.

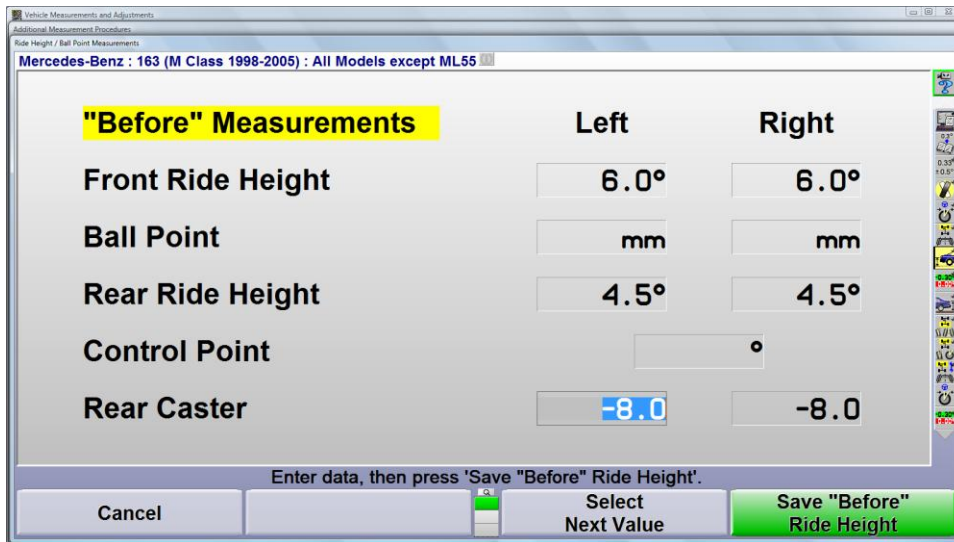
Rear Caster (Data Entry with Electronic Level Gage)

Rear caster is measured by attaching the rear caster adaptor bracket to the rear knuckle assembly and placing the angle gage on the adaptor. Measure and store the left and right rear caster measurements using the Romess tool.

After measuring the rear caster, connect the Electronic Level Gage to the aligner, the measurements may be transmitted to the aligner by pressing "Transfer Rear Caster."



NOTE: When transferring rear caster measurements from the Electronic Level Gage, make sure that the rear caster measurement data has been entered in the fields that are normally used to measure rear ride height on the Electronic Level Gage.



4.7 Ride Height vs. Specifications

Press the “Show Camber/Caster Specs” softkey to view the correlation between ride height and the camber or caster specifications. If desired, you may also view the camber/caster specs.

"Before" Measurements

	Left	Right
Front Ride Height	<input type="text"/>	<input type="text"/>
Ball Point	mm	mm
Rear Ride Height	<input type="text"/>	<input type="text"/>

Soft Key Panel:

Cancel	Select Next Value	Save "Before" Ride Height
Display In Millimeters	Illustrate Adjustments	
Show Camber/Caster Specs	Show Nominal Level Specs	Help

The caster tables utilize the front and rear ride height to determine the front caster specification. The Mercedes 204 is an example of a vehicle with ride height dependent front caster. An example is shown below:

Ride Height Specification Table
Front Caster (20 Degree Turn)

	-10.40°	14°58'	14°52'	14°46'	14°40'	14°34'	14°29'	14°24'	14°20'	14°16'	14°13'	14°10'
	-9.60°	14°47'	14°41'	14°34'	14°28'	14°22'	14°17'	14°11'	14°07'	14°02'	13°59'	13°55'
	-8.80°	14°36'	14°30'	14°23'	14°17'	14°11'	14°05'	13°59'	13°54'	13°50'	13°45'	13°41'
	-8.00°	14°25'	14°19'	14°13'	14°07'	14°01'	13°54'	13°48'	13°43'	13°38'	13°33'	13°29'
	-7.20°	14°15'	14°09'	14°03'	13°57'	13°51'	13°45'	13°38'	13°32'	13°27'	13°22'	13°17'
	-6.40°	14°04'	13°59'	13°54'	13°48'	13°42'	13°35'	13°29'	13°23'	13°17'	13°11'	13°06'
	-5.60°	13°54'	13°49'	13°44'	13°39'	13°33'	13°27'	13°20'	13°14'	13°08'	13°02'	12°56'
	-4.80°	13°44'	13°40'	13°35'	13°30'	13°24'	13°18'	13°12'	13°06'	13°00'	12°53'	12°47'
	-4.00°	13°34'	13°30'	13°26'	13°21'	13°16'	13°10'	13°04'	12°58'	12°52'	12°46'	12°39'
	-3.20°	13°24'	13°20'	13°17'	13°12'	13°08'	13°02'	12°57'	12°51'	12°45'	12°38'	12°32'
	-2.40°	13°14'	13°11'	13°08'	13°04'	12°59'	12°55'	12°49'	12°44'	12°38'	12°32'	12°25'
	-1.60°	13°05'	13°02'	12°59'	12°55'	12°51'	12°47'	12°42'	12°37'	12°31'	12°25'	12°19'
	-0.80°	12°55'	12°52'	12°50'	12°46'	12°43'	12°39'	12°35'	12°30'	12°25'	12°19'	12°13'
	0.00°	12°46'	12°43'	12°41'	12°38'	12°35'	12°31'	12°27'	12°23'	12°18'	12°13'	12°08'
	0.80°	12°37'	12°35'	12°32'	12°30'	12°27'	12°24'	12°20'	12°16'	12°12'	12°07'	12°02'
	1.60°	12°28'	12°26'	12°24'	12°22'	12°19'	12°16'	12°13'	12°10'	12°06'	12°01'	11°57'
	2.40°	12°19'	12°18'	12°16'	12°14'	12°11'	12°09'	12°06'	12°03'	11°59'	11°55'	11°51'
		-10.15°	-9.62°	-9.09°	-8.56°	-8.03°	-7.50°	-6.97°	-6.44°	-5.91°	-5.38°	-4.85°

Follow the instructions, then press "OK".

Soft Key Panel:

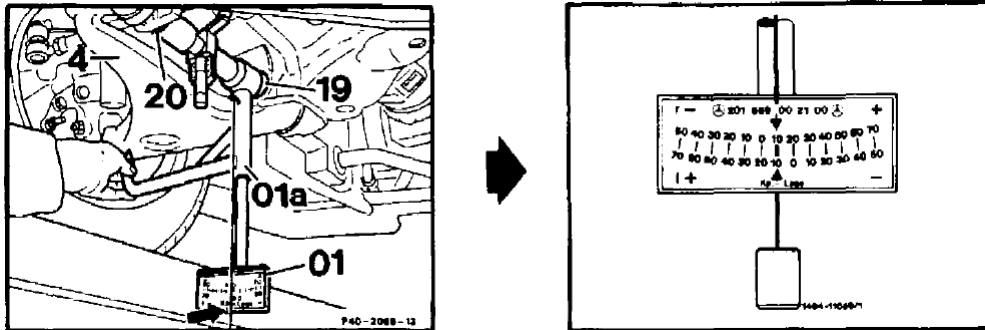
Show Previous Table	Show Next Table	OK
---------------------	-----------------	----

Using the table shown above, a front ride height of -4.28 degrees and a rear ride height of -7.99 degrees corresponds to a front caster specification of $+13$ degrees 07 minutes.

Manual Entry of Ride Height Data

Manual front ride height measurement

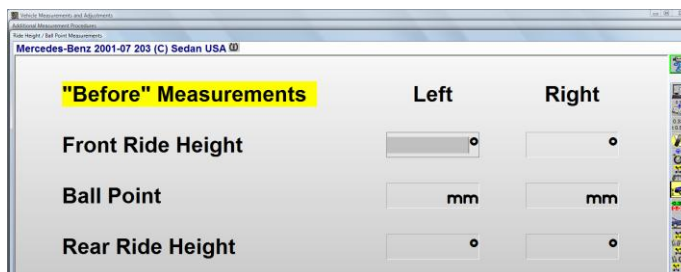
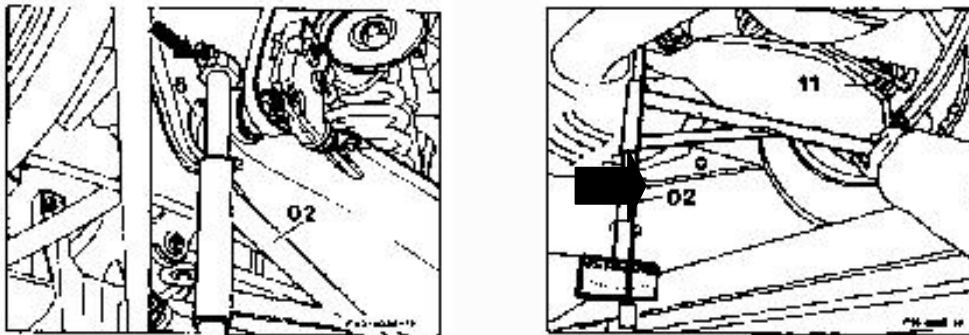
Check front ride height by placing the 201 589 00 21 00 tool between the two eccentrics on the lower control arm. Position the contact arm on the lower control arm. Enter the angle from the scale indicated by the weighted string in the appropriate portion of the screen.



Manual rear ride height measurement

Rear ride height is manually checked by placing the pivot arm of the measuring device on the spring link (control arm bushing) of the inner control arm mount.

Place the pointer on the rear axle shaft. Enter the angle from the scale indicated by the weighted string in the appropriate portion of the screen.



Adjustments to vehicle level may be made changing the spring's rubber mount. A change of the rubber mount by 5mm results in a vehicle level change of approximately 9mm.

On vehicles with level control, do not correct vehicle level by changing the connecting rod of the level controller (control point). Check level control for proper function. Inspect springs and rubber mounts

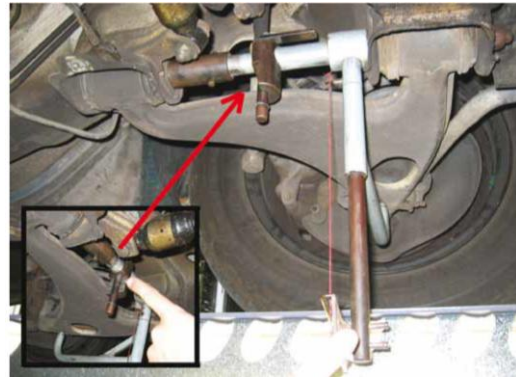
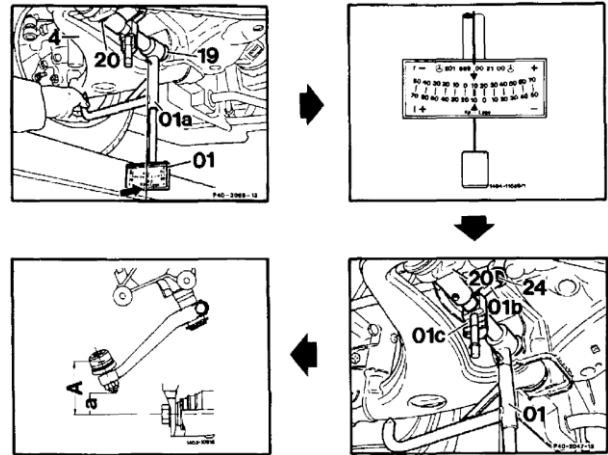
Manual Entry of Ball Point Data

Ball Point measurement may be obtained by utilizing the mechanical measurement tools and are always entered in millimeters.

Measure ball point position by placing Mercedes Benz tool 201 589 00 21 00 between the two eccentrics on the lower control arm. Position the contact arm on the lower control arm such that the plumb bob is at zero on the scale.

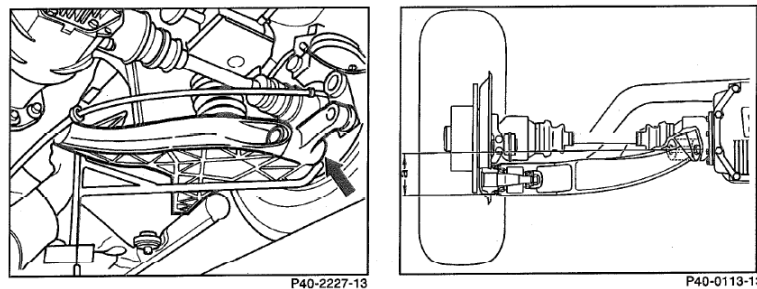
With the front wheels in the straight ahead position, slide part O1b to contact threaded portion of inner tie rod. Difference in height "A" = ball joint position. The ball joint position is not measured directly but via dimension "a".

Ball point position may be adjusted at the Idler arm by inserting an additional washer or by removing a washer. Enter the distance in millimeters for the left and right ball point measurement.



Manual Entry of "Control Point"

Control point is a manual ride height measurement of the rear suspension. A linear measurement may be entered in millimeters. The measurement records the height difference between the center of the lower control arm bolt and the bottom edge protective ring of the wheel carrier bearing of semi-trailing arm. .



This measurement may also be recorded as an angle using Mercedes tool 107 589 01 21 00 or with 107 589 02 21 00

4.8 “Before” Measurements Overview

“Before” adjustment measurements that have been saved are shown here. Front camber values are measured at “0 degree toe.” If an angle is not shown as compared to a specification, then it may not have a specification.

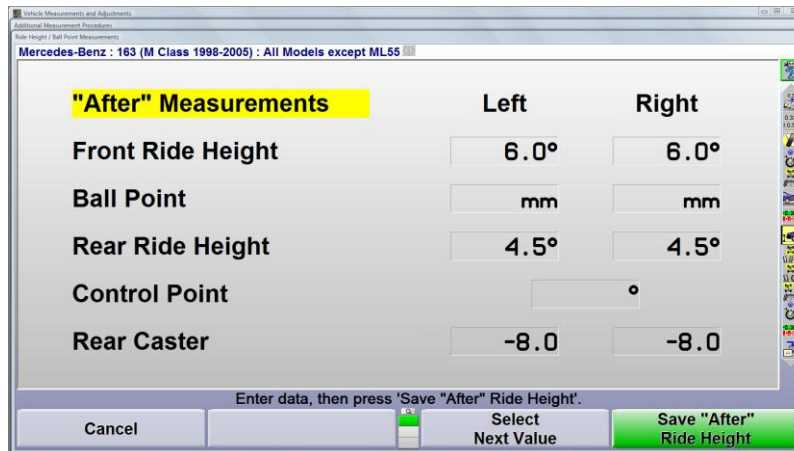
NOTE: Whenever the following Vehicle Measurements and Adjustments Screen is shown, the values are “frozen.”



Pressing “Show After Ride Height” begins the vehicle adjustment process.

4.9 “After” Ride Height / Ball Point Measurements

The initial measurements shown on this screen are the same as the measurements that appeared on the “Before” Ride Height / Ball Point / Control Point screen.



The data on the “After” measurement screen can be edited if any value was changed during the adjustment process.

Ride height measurements transferred from the Electronic Level Gage cannot be manually edited. New measurements must be made and transferred from the Electronic Level Gage.

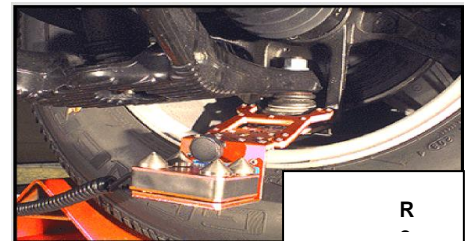
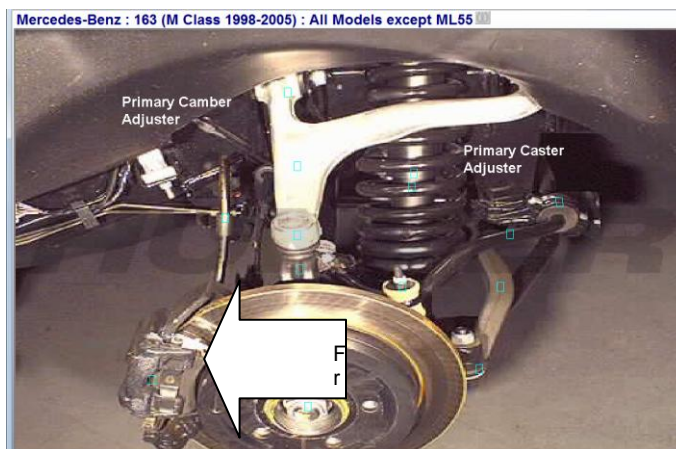
Pressing “Save After Ride Height” will re-calculate the ride height dependent specifications according to the “After” ride height values. Saved ride height data will appear in the “After correction” column on the printout summary.

Alignment Adjustments

5.1 Rear Caster Adjustment

Rear caster adjustments require the electronic level gage and caster bracket.

Rear caster adjustments on the M63 platform requires moving the rear upper control arm, which also controls rear camber. The rearmost adjuster is primarily responsible for tilting the top of the steering axis forward or rearward.

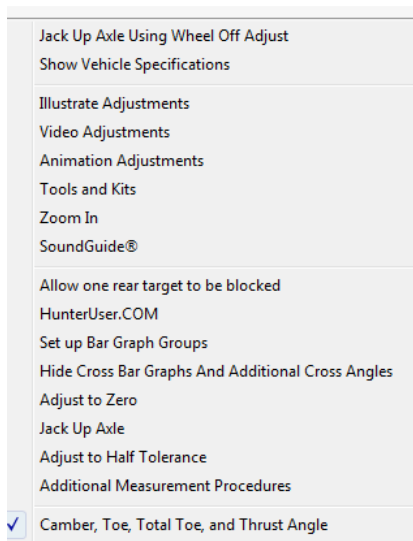
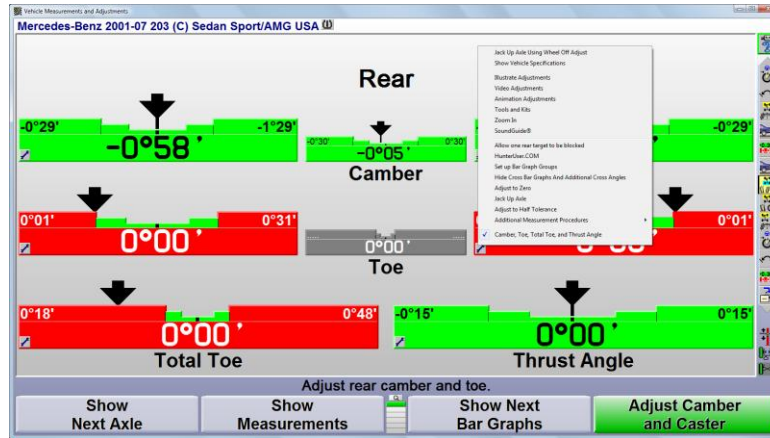


5.2 Adjust Rear Camber and Toe

Adjustments may be made to rear camber and toe at this screen. Rear camber should be adjusted before rear toe.



Place the mouse pointer on the symbol in the lower left corner of any bar graph and hold the left mouse button down for one second. A menu will appear offering helpful functions associated with the angle represented on the bar graph.



Jack Up Axle is used to make rear camber adjustments easier

Illustrate Adjustments and animation are helpful in identifying the adjustment type and location

Tools and Kits offers hand tools and aftermarket kits needed to make the adjustment

Set Up Bar Graph Groups offers additional rear bar graph designs

Adjust to Zero changes the values on the bar graphs to indicate how far away the angle is from preferred specification

Adjust to Half Tolerances changes the bar graph to yellow when the measurements is the outer portion of the tolerance area.

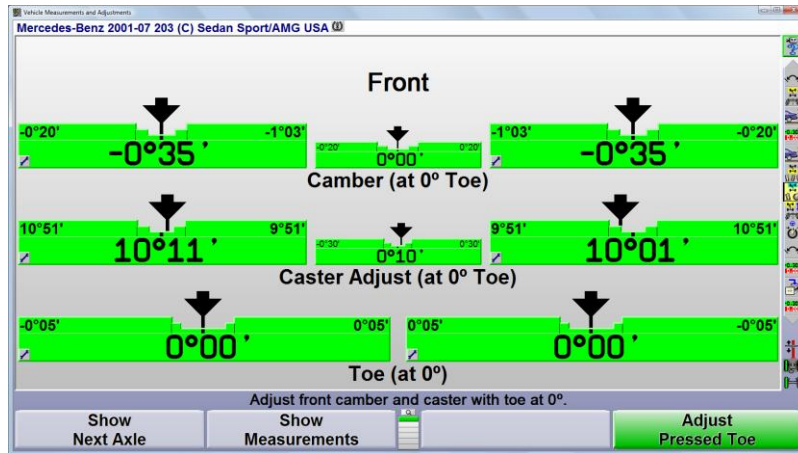
5.3 Adjust Front Camber and Caster

Do not re-level the front sensors before adjusting camber or caster.

The vehicle's service brakes must prevent the front wheels from rolling when adjusting caster.

The front caster adjustment values change as the front of the alignment sensor rotates upward or downward. With the front brakes applied, the front of the sensor rotates upward as the top of the steering axis is tilted rearward (caster increase).

If the front brakes are free, the front wheels may roll causing the sensor to rotate and change the value on the caster adjust bar graphs. To correct this problem, go to the third row of soft keys and select "Measure Caster." Measure the caster angle again to establish good adjustment values before adjusting front caster.



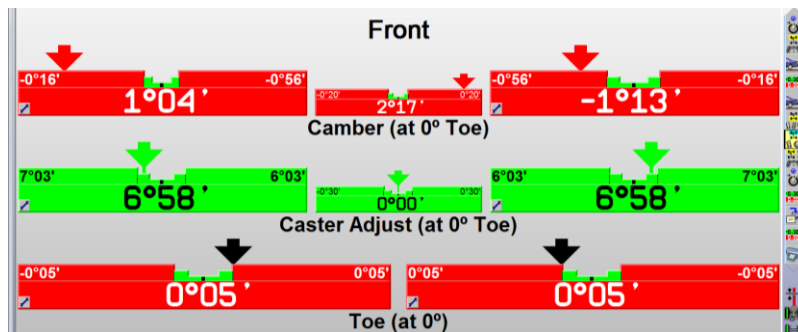
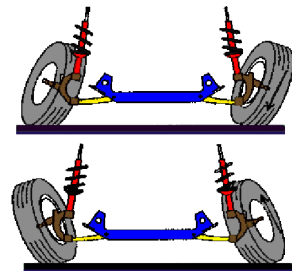
Front individual toe must be at zero when making adjustments to front camber and/or caster.

The high amount of positive caster specified on many Mercedes Benz vehicles causes extreme changes in front camber as the front wheels steer left or right of zero toe.

Maintaining front individual toe at zero when adjusting camber and/or caster will ensure the desired results after the adjustment to camber and/or caster is complete.

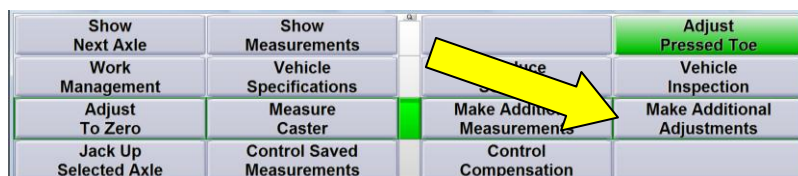
Red arrows on the camber bar graphs indicate toe has not been adjusted to zero and the camber adjustment bar graph will not function.

Setting individual toe to zero will "unlock" the camber bar graph.

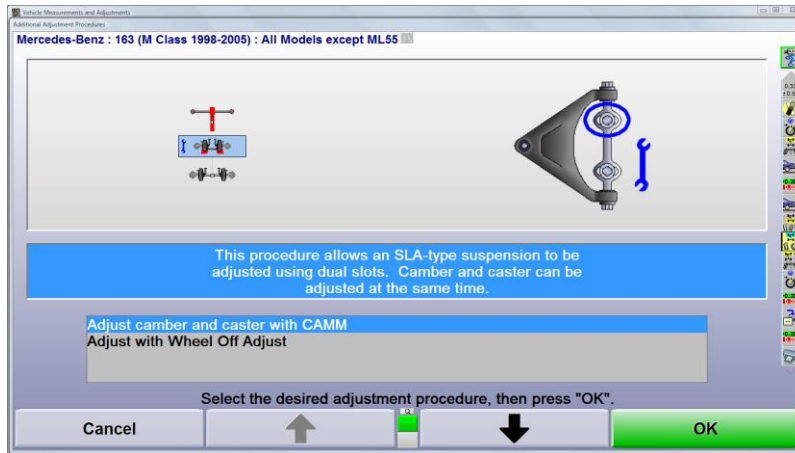


5.4 Make Additional Adjustments

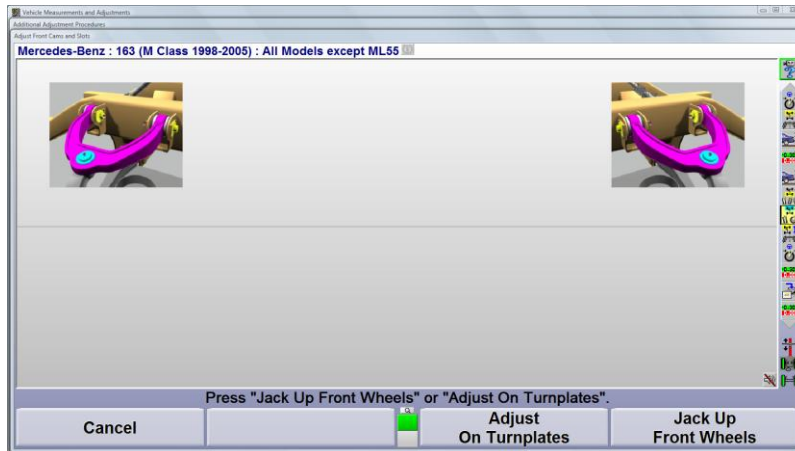
Additional adjustment help may be found by selecting "Make Additional Adjustments" from the soft key menu.



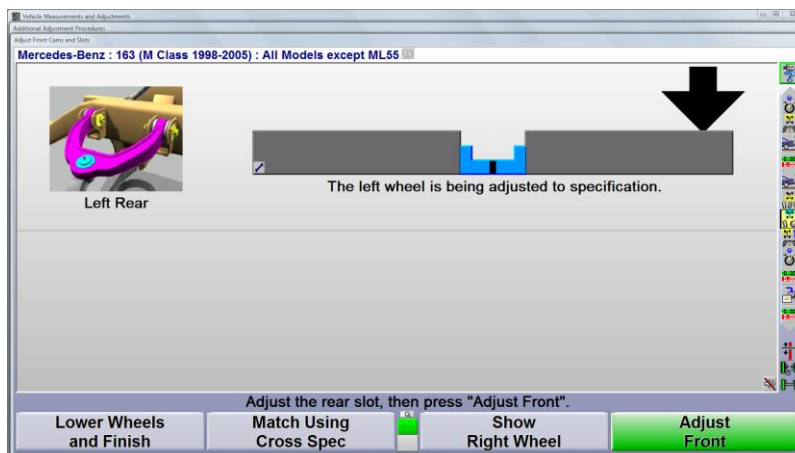
Helpful adjustment procedures for the vehicle selected will be displayed in a list.



The 163 M Class vehicle requires the upper control arm to be adjusted. The C.A.M.M. program will help make this adjustment easier. The option of adjusting the control arm with the front wheel removed is also available. An optional adaptor is available for "Wheel Off" adjustments.

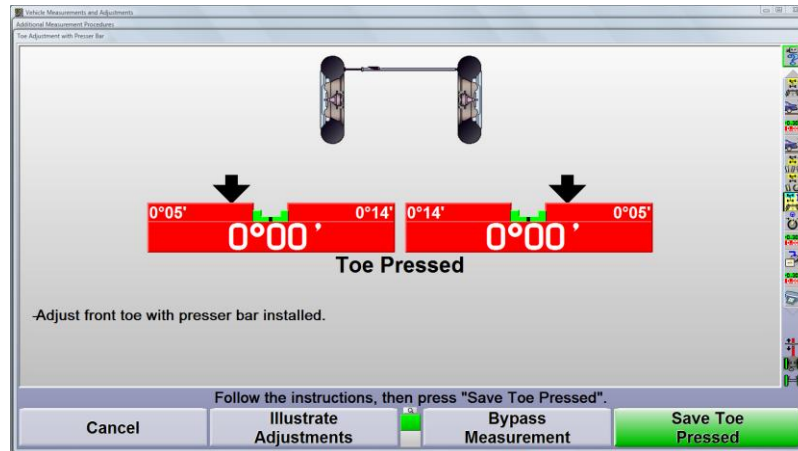


Select "Jack Up Front Wheels" when making adjustments to upper control arms.

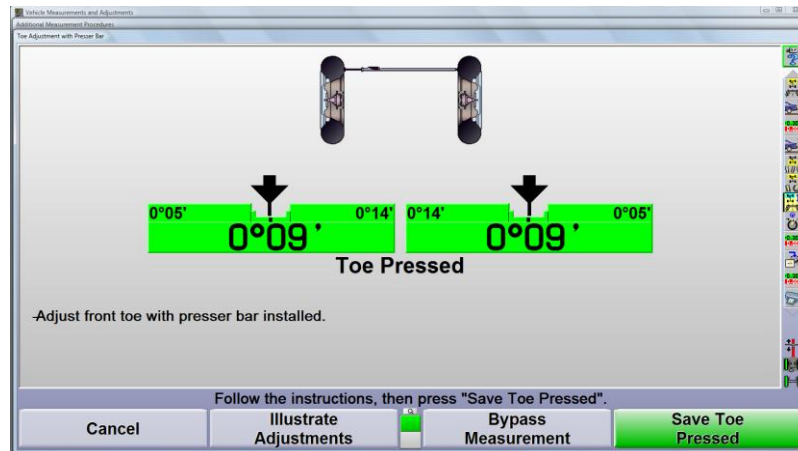


Follow the instructions on the display, Select "Lower Wheels and Finish" to complete the procedure.

5.5 Front Toe Pressed Adjustment



After installing the toe presser bar, adjust front toe while the steering wheel is locked in the straight-ahead position.



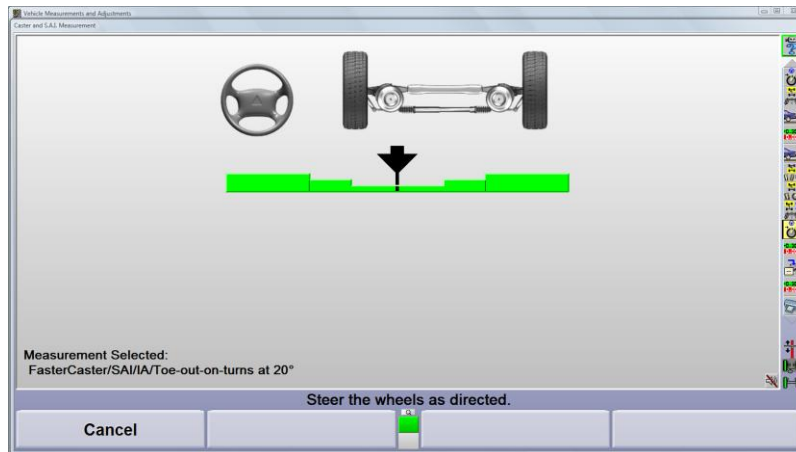
Remove the toe presser bar.



Verify and Document Measurements

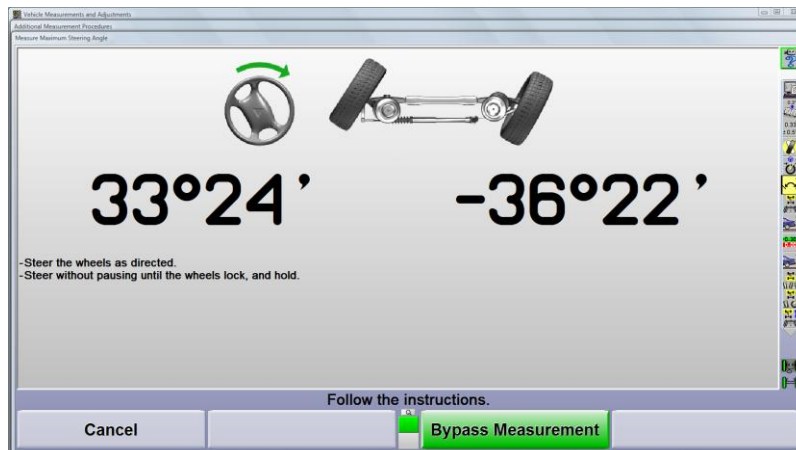
6.1 Caster and S.A.I Measurement (Re-measure)

This steering sequence is performed again to measure “After” caster, SAI, IA, toe-out-on-turns and camber at 0 degrees toe. The program will wait until all sensors are stable before saving all “After” measurements.



6.2 Measure Maximum Steer Angle (Re-measure)

The final maximum steer angle is measured at this time, if the vehicle's specification includes a preferred specification and tolerance.



6.3 “After” Measurements Overview

Final alignment measurements are displayed for review and will be recorded as the “After Correction” measurements on the final print summary. Front camber values are at zero degrees toe.

	Left	Right
Front		
Ride Height	6.0°	6.0°
Cross Ride Height	0.0°	0.0°
Camber	-0°35'	-0°33'
Cross Camber	-0°02'	-0°02'
Caster	6°58'	6°58'
Cross Caster	0°00'	0°00'
SAI	0°00'	0°00'
Cross SAI	0°00'	0°00'
Toe Pressed	0°09'	0°09'
Total Toe	0°18'	0°18'
Rear		
Ride Height	4.5°	4.5°
Cross Ride Height	0.0°	0.0°
Camber	-0°37'	-0°53'
Cross Camber	0°17'	0°17'
Caster	-8°00'	-8°00'
Cross Caster	0°00'	0°00'
Toe	0°16'	0°16'
Total Toe	0°31'	0°31'
Thrust Angle	0°00'	0°00'

6.4 Save Current Work Order

Press “Save Current Work Order” to memorize all data pertaining to this job.

6.5 Print Alignment

Select “Print Summary” to print “Before” and “After” measurements using the MB printout format.

	Print Left	Print Right	New Left	New Right
Front				
Ride Height	6.0°	6.0°		
Cross Ride Height	0.0°	0.0°		
Camber	-0°35'	-0°33'		
Cross Camber	-0°02'	-0°02'		
Caster	6°58'	6°58'		
Cross Caster	0°00'	0°00'		
SAI	0°00'	0°00'		
Cross SAI	0°00'	0°00'		
Toe Pressed	0°09'	0°09'		
Total Toe	0°18'	0°18'		
Rear				
Ride Height	4.5°	4.5°		
Cross Ride Height	0.0°	0.0°		
Camber	-0°37'	-0°53'		
Cross Camber	0°17'	0°17'		
Caster	-8°00'	-8°00'		
Cross Caster	0°00'	0°00'		
Toe	0°16'	0°16'		
Total Toe	0°31'	0°31'		
Thrust Angle	0°00'	0°00'		

6.6 Resetting the Alignment Software

Select the K-4 “Reset” softkey to return to the initial alignment test procedure screen. All information not saved through the work order will be erased in preparation for the next alignment process.

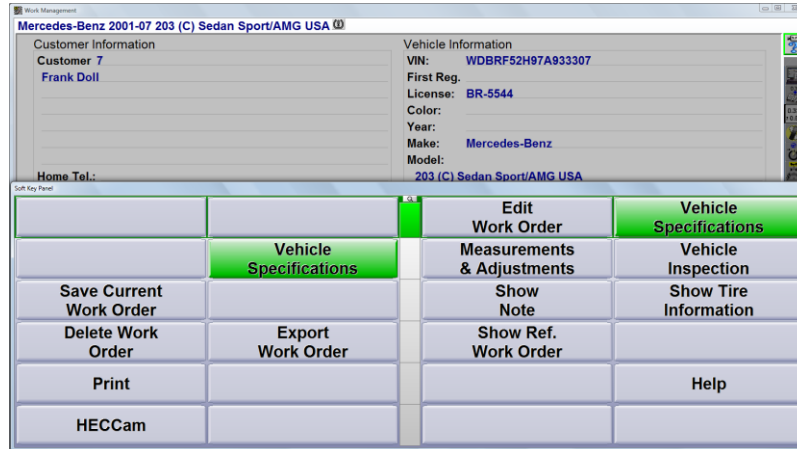
Mercedes-Benz 2001-07 203 (C) Sedan Sport/AMG USA (Modified Specification)			
Showing the "after" measurements.			
Front	Left	Right	
Ride Height	6.0°	6.0°	
Cross Ride Height	0.0°	0.0°	
Camber	-0°28'	-0°25'	
Cross Camber	-0°02'	-0°02'	
Caster	10°46'	10°46'	
Cross Caster	0°00'	0°00'	
SAI	0°00'	0°00'	
Cross SAI	0°00'	0°00'	
Toe Pressed	0°02'	0°02'	
Total Toe Pressed	0°05'	0°05'	
Total Toe	0°05'	0°05'	
Rear	Left	Right	
Ride Height	2.0°	2.0°	
Cross Ride Height	0.0°	0.0°	
Camber	-1°10'	-1°15'	
Cross Camber	0°05'	0°05'	
Toe	0°16'	0°17'	
Total Toe	0°32'	0°32'	
Thrust Angle	-0°01'	-0°01'	

Saved measurements are shown; adjustments cannot be made.

Program Details

7.1 Saving Current Work Order

Find and press “Work Management” softkey. Search the available softkeys to find and select the “Save Current Work Order” softkey. Press this softkey to save the work order and store it on the hard drive.



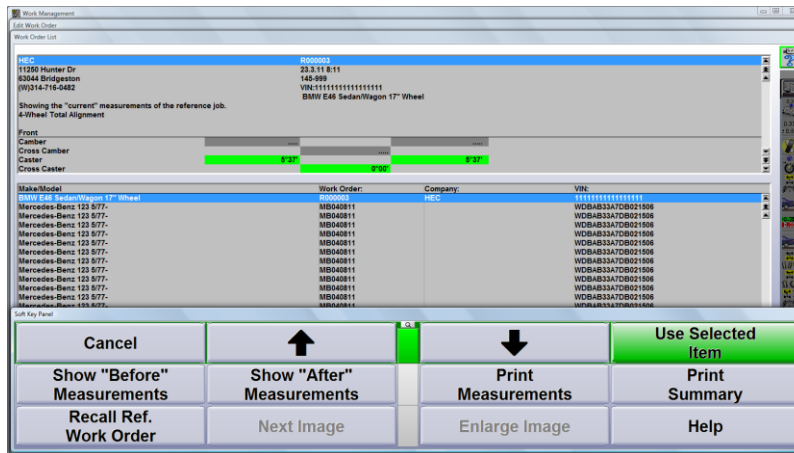
If the current work order customer/vehicle identification was not recalled from the database, new customer/vehicle identification is created and attached to the current work order.

If the current work order customer/vehicle identification was recalled from the database, any customer/vehicle identification changes (for example a new address or phone number) would replace the customer/vehicle identification. All work orders for this customer/vehicle will be updated.

The “Save Current Work Order” softkey will also appear at the end of the alignment measurement procedure and on the “Print” screen.

7.2 Viewing a Previous Work Order

From the Work Management display, find and press “List Work Orders” softkey. Highlight the desired work order to be viewed.



Display all of the softkeys available and select to show the "Before" or "After" alignment measurements for the work order selected.

Print the measurements, if desired.

7.3 Equipment Preparation for MKS Test

1. Set the lift rack to the fully lowered, drive-on position.
2. Drive a vehicle onto the lift rack.
3. The runways of the lift must be leveled, when completely lowered and at all working positions, to less than or equal to 1 mm.
4. Install the wheel alignment sensors onto the appropriate MKS brackets located on the side of the lift rack runways.
5. Connect all sensor cables (if required) and turn all sensor power switches on.
6. Level and lock the sensors. *Refer to "Leveling and Locking Sensors," page 3.*
7. Turn the system "ON" by pressing the power switch located on the back of the console where the AC power cord is connected to the cabinet.

7.4 Setting MKS Measurements to Zero

- MKS measurements may be set to zero only after the "Manager" has logged on
- MKS measurements may not be set to zero if a "User" is logged on, or if the "Logon Enable" feature is disabled.
- The Mercedes-Benz logo screen will be displayed after logging on to the system using the "Manager" name and password.
- Press "MKS" to display the "Position Control System (MKS)" screen.
- Press "Zero" to set all of the measurements to 0 degrees 00 minutes. The Zero Date will be set to the current time and date.

7.5 MKS Test

Position Control System (MKS) for wheel alignment facilities

NOTE: The MKS test is not to be used to adjust the toe and camber transducers in the wheel alignment sensors or to level the runways of the lift or pit.

Set the lift rack to the fully lowered, drive-on position.

Drive a vehicle onto the lift rack.

Install the wheel alignment sensors onto the appropriate MKS brackets located on the side of the lift rack runways. *Refer to "Sensor Indexing," page 3.*

Connect all sensor cables (if required) and turn all sensor power switches on.

Level and lock the sensors. *Refer to "Leveling and Locking Sensors," page 3.*

Turn the system "ON" by pressing the power switch located on the back of the console where the AC power cord is connected to the cabinet.

Thereafter, before performing wheel alignment measurements, the values displayed on the MKS screen must not be greater than or equal to 5 minutes while the sensors are installed in the MKS brackets as described above.

If any value is out of tolerance, then the lift and wheel alignment system must be checked.

Checking procedure

1. Checking the level of the lift:

Drive a vehicle onto the turn plates and slip plates. Install the brake-pedal depressor. Remove the safety pins from the turn plates and slip plates. Install wheel adaptors and sensors on the wheels. Compare camber and toe measurements with the lift completely lowered and in the raised working position (*refer to Quality report Q40.2 / 9.1*). Permitted differences less than or equal to 2 minutes. In cases where the tolerance has been exceeded, the level of the lift must be adjusted by the lift manufacturer or by the manufacturer's service representative.

2. Checking the wheel alignment sensors:

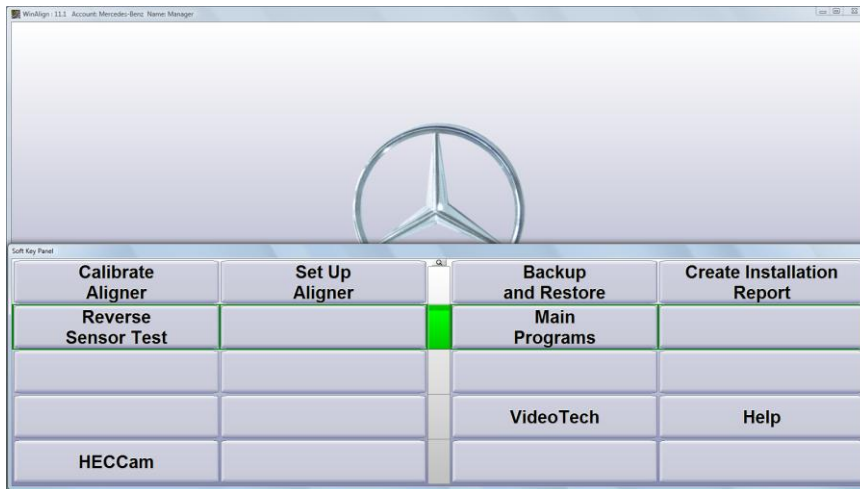
Perform a reverse sensor test to determine if the wheel alignment sensors are measuring accurately. *Refer to "Reverse Sensor Test," page 8.* Differences must be less than 5 minutes (*refer to Quality Report Q40.2 / 7.6*). If differences exceed this tolerance, then the wheel alignment sensors must be calibrated.

7.6 Reverse Sensor Test

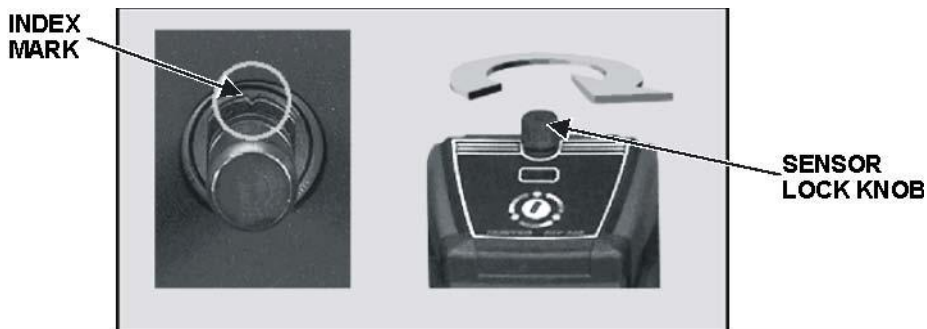
The Reverse Sensor Test is a quick check of the calibration of a set of sensors. This test is applicable to all versions of DSP306, DSP308, DSP506 and DSP508 sensors that have been calibrated using the long calibration bar.

The Reverse Sensor test is also applicable to DSP400, DSP600 and HS401 Hawkeye vision sensors.

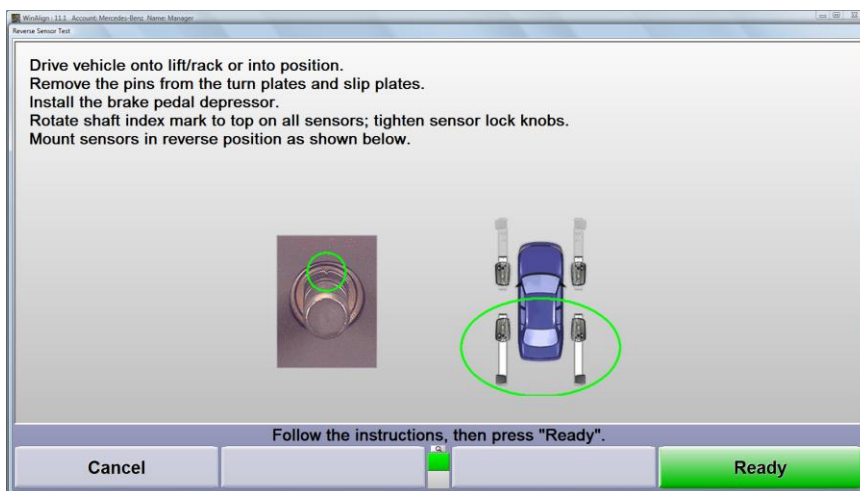
Begin the test by turning on the sensors and selecting the "Reverse Sensor Test" softkey from the Service Programs screen. The Reverse Sensor Test will be available only if applicable sensors are in use. Follow the on-screen instructions to carry out the test.



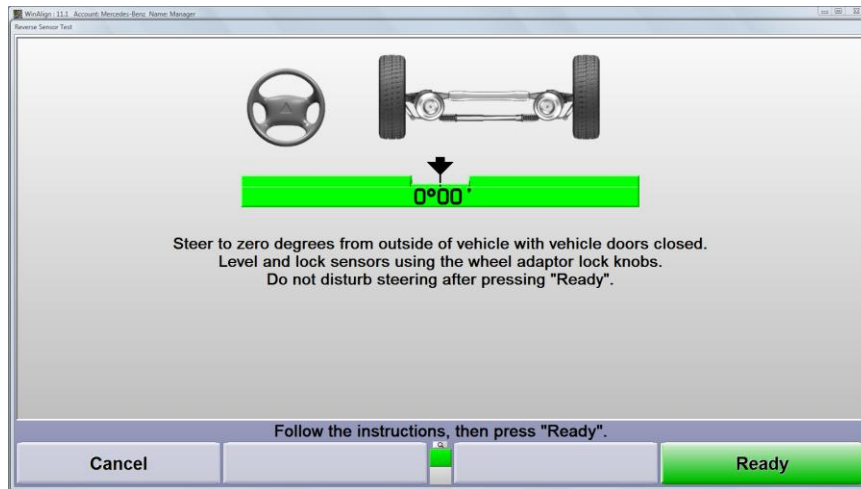
Before mounting the sensors on the Mercedes-Benz special adaptors, rotate the index mark on the sensor shaft to the 12 o'clock position with the sensor held vertical and lock it in place using the sensor lock knob. Do not loosen the sensor lock knobs for the remainder of the test. When instructed to level the sensors, do so only by loosening the locking lever or lock knob on the adaptor, not the lock knob on the sensor. *Refer to "Leveling and Locking Sensors," page 3.*



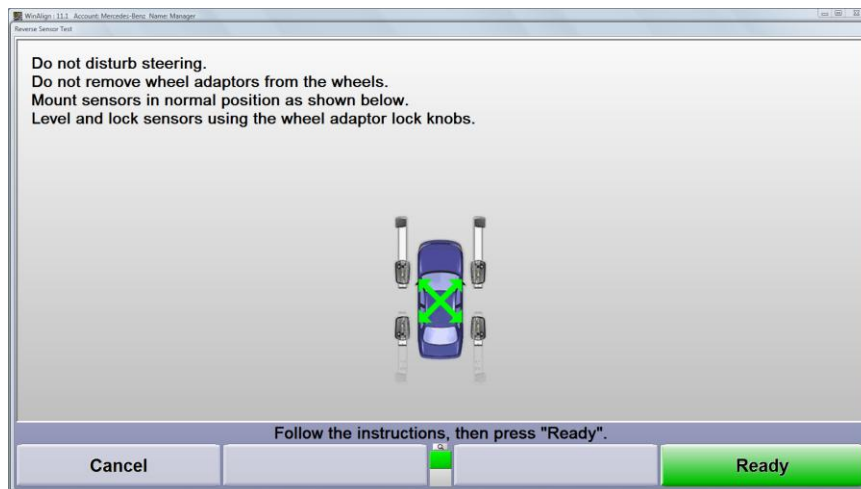
Follow the on-screen instructions, then press "Ready."



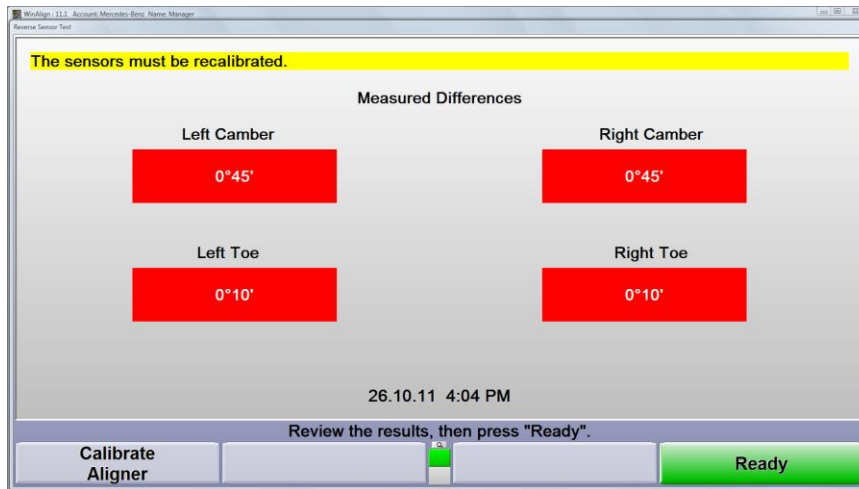
When instructed to steer the vehicle, steer as precisely as possible to zero degrees, then use care to not disturb the steering for the remainder of the test. Level and lock the sensors using the wheel adaptor lock knobs, after the wheels have been steered to zero degrees. Follow the on-screen instructions, then press "Ready." *Refer to "Leveling and Locking Sensors."*



This test assumes that the vehicle or wheel adaptors do not move during the test procedure. When moving sensors to the opposite axle, detach the sensors from the wheel adaptors, leaving the wheel adaptors mounted to the wheels on which they were originally mounted. Carefully insert the sensors into the wheel adaptors, being careful to not disturb the vehicle or the wheel adaptor.



When the test has been completed, four values will be displayed showing toe and camber differences. Measurements of 0 degrees 00 minutes \pm 0 degrees 05 minutes will be green. Measurements outside of this tolerance will be red.



If any of the values are shown in red, the sensors need to be calibrated. Failing to carry out the proper procedures described above and in the on-screen instructions may cause incorrect readings and produce a false indication that calibration is needed.

NOTE: Measurements from the Reverse Sensor Test are saved to the hard drive and may be imported into the Mercedes-Benz Quality Report Database Software (Version 3.1 or higher).

7.7 Types of Logon

The logon feature supports two different types of logons - manager and user. The person designated to be the administrator for the system typically uses the MANAGER logon.

Manager Logon

There is only one logon name called "MANAGER." The "MANAGER" logon cannot be deleted or renamed and is typically assigned to the owner, service manager, or supervisor.

The manager logon has more setup items than the user logons and is the only logon that can enable or disable the logon feature or add, change, or delete other user logons.

NOTE: The password for the MANAGER is MANAGER. After logon is enabled, the password for the "MANAGER" logon should be changed. Please record the new password for future use.

User Logon

A user is anyone who performs alignments using the WinAlign program. A logon may be created for each user. Typically, each alignment technician would be assigned and use their own user logon.

Setup Items

When a user is logged on and changes a setup item, the change affects only the program structure for that specific user. However, when a setup item is changed using the manager logon, the change affects all users with logons that have not set up the item selected by the manager.

Logon Registry

When logon is enabled, only the users that appear in the logon registry may log on to WinAlign. Users may be added to or deleted from the logon registry by using the "Set Up Aligner" function. Only the MANAGER can add or delete from the logon registry.

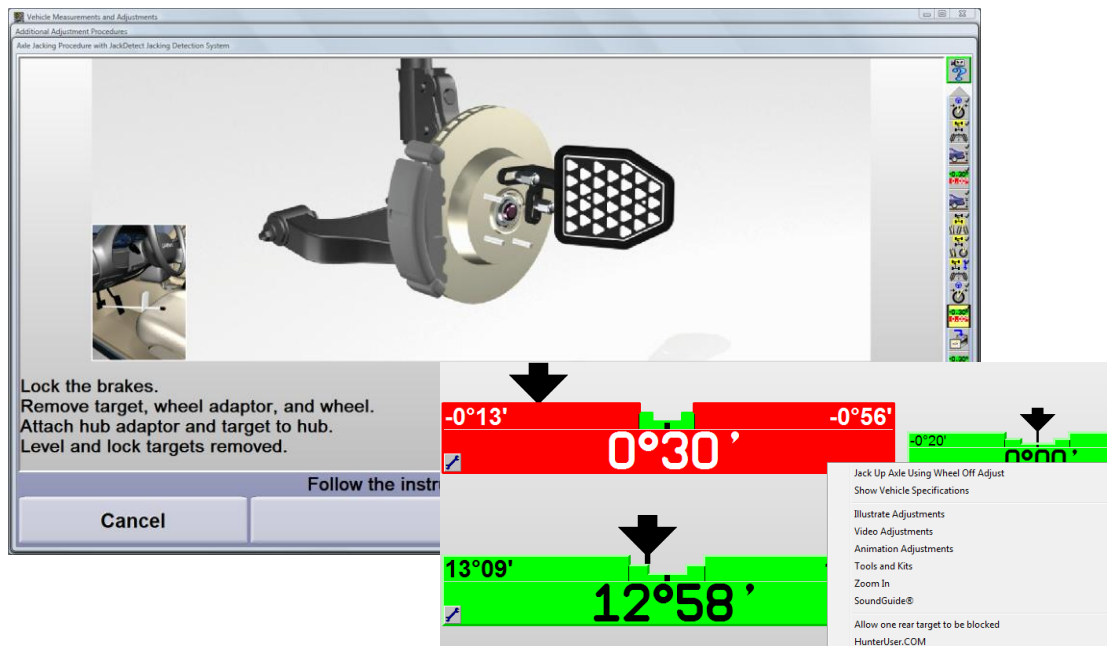
The registry contains the following information for each user that has been assigned a logon name:

Logon Name	A short name used to identify the user. This name is what the user types into the "Logon" popup screen.
Full Name	The user's full name. This name will appear on the Customer ID screen as the Technician and on the reset screen as the current user.
Password	A password to protect the user from having his identity misrepresented. Passwords are never displayed and can be left blank.
User Number	A number representing each user in the database.

NOTE: A user may change his or her password. Only the manager logon may add, change, or delete user logons from the registry.




7.8 Wheel Off Adjust









Front camber, front caster and rear camber may be adjusted with the vehicle's tire lifted off the runway and the wheel removed.



This function may be accessed through a softkey called "Make Additional Adjustments" or from the camber or caster context sensitive drop menu.

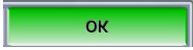
Tools and Accessories

Mandatory Tools for all Mercedes-Benz USA Consoles <i>These tools must be ordered from MBUSA</i>		
124 589 01 31 00	MB Quick Clamp Adaptor x 4- (or Hunter MB approved quick clamp alternative listed under Mercedes Specific Options)	
199 589 00 31 00	SLR (199) Pin Set for fastening the M-B Quick Clamp Adapter to the rear axle (10 pcs)	
211 589 00 31 00	Adapter, Brake Pedal Winch (211, 230)	
000 589 18 31 00	Brake Pedal Depressor	
129 589 01 21 00	Steering Wheel Holder	
900 589 01 27 00	Toe Rod (spreader bar)	
900 589 03 21 00	M Class Adaptor Front (accessory for Mercedes Electronic Level Gauge)	
900 589 04 21 00	M Class Adaptor Rear (accessory for Mercedes Electronic Level Gauge)	
900 589 01 21 00	Mercedes Electronic Level Gauge (Electronic Ride Height Tool)	
230 589 01 09 00	Lug Socket for assembling and disassembling AMG multispoke wheel	
230 589 03 31 00	AMG Pin Set for fastening the MB Quick Clamp Adaptor to the rear axle (10 pieces)	
900 589 17 21 00	Support for Data Transfer and Charging Station Tool (DTCS)	
900 589 16 21 00	Maybach Front Adapter (Maybach Dealers Only)	
Optional Tools for all Mercedes-Benz USA Consoles <i>These tools must be ordered from MBUSA</i>		
900 589 02 21 00	Data Transfer Station (docking station for Mercedes Electronic Level Gauge)	
Standard Accessories with MB DSP500 Sensors		
20-1786-1	Pair of electronic turnplates with protective covers	
20-1899-1	DSP500 Quick Clamp Adaptor Support Kit	
20-1913-1	Offset Adaptor used to clear spoilers	

Standard Accessories with MB HS421 Sensors		
20-1963-1	50 mm Turnplates Bridges	
20-1899-1	DSP500 Quick Clamp Adaptor Support Kit	
<u>Optional accessories DSP600 and HS4X1 Camera Based Sensor systems</u>		
 30-419-1	Icon Remote Indicator	New style remote indicator
 30-421-1	Icon Cordless Remote Indicator	New style cordless remote indicator
 30-418-1	Plus Cordless Remote Indicator	New style cordless remote indicator. Records tire pressure, tread depth, ride height and measures tire temperature and frame angle. Includes Tire Temperature Probe.
 20-2072-1	XF2 Pod Kit	XF communication for use with Plus Cordless Remote Indicator, 30-418-1-1 and Icon Cordless Remote Indicator, 30-421-1.
 20-1978-1	Wheel-Off Adaptor	Wheel-Off adaptor may be used to make adjustments to camber and caster with wheel removed. Magnetic version also 20-1979-1
The following accessories are available for older wheel adaptor configurations		
 20-1789-1	External tire clamp adaptor	Compatible only DSP600 and HS4X1 self-centering adaptors 175-321-1 or 175-325-1.

Glossary

Alignment	The process of measuring and positioning all wheels attached to a common chassis
Angle	Two intersecting lines
Camber:	The inward or outward tilt of the top of the wheel as viewed from the front
Camber roll:	The change in front camber in a turn due to caster
Caster:	The forward or rearward tilt of the steering axis as viewed from the side
<i>Degree:</i>	A unit of measurement used to describe an angle.
Directional stability:	The tendency for a vehicle to maintain a directed path.
Dog tracking:	The appearance given when the thrustline is not parallel with the centerline of the vehicle.
Drift (lead):	The tendency of a vehicle to steer away from a directed course. Less severe than a pull, constant pressure at the steering wheel is not needed to maintain straight ahead.
Geometric centerline:	A line drawn through the midpoint of both front wheels and both rear wheels.
Included angle:	S.A.I. plus camber
Individual toe:	The angle formed by the intersection of an individual line drawn through the plane of one wheel and the centerline.
Max Steer Angle	The maximum steer angle left and right of center for both front wheels
"Measurement" Specification	An alignment specification intended to assess the wheel alignment condition of a vehicle manufactured by BMW
MKS Procedure	Processed used to used to monitor the precision of the wheel alignment lift rack and sensors.
O.E.M.	An acronym used instead of Original Equipment Manufacturer.
Pivot point:	A component used to permit the steering knuckle to turn i.e. ball joint, strut bearing, king pin
Pull:	The tendency of a vehicle to steer away from a directed course. A constant pressure is maintained by the driver at the steering wheel to travel straight ahead.
Pre-Adjustment	A function which displays current camber, toe and setback values. Values may be used to evaluate the need for wheel alignment.

Returnability:	The tendency of the front wheels to return to the straight ahead position from a steered position.
Road isolation	The ability of the vehicle to absorb or dissipate road vibrations.
Sensor compensation	A process which measures lateral and axial runout to determine the location of the center of the hub/axle
Setback	The angle formed by the geometric centerline and a line drawn perpendicular to the front axle.
Softkey	A graphic menu icon used to operate WinAlign® software 
Steering Angle Sensor	An electro-mechanical device designed to measure steering wheel angle and rate of turn
Steering axis	A line drawn between the upper and lower pivot points of the spindle.
Steering arm	A steering component that connects the outer tie rod to the spindle. The angle of the steering arm to the wheel's axis determines turning angle.
Steering Axis Inclination	An angle formed by a line drawn through the upper and lower pivot points of the steering knuckle and a vertical
S.A.I.	An angle formed by a line drawn through the upper and lower pivot points of the steering knuckle and a vertical line drawn through the lower pivot point, as viewed from the front.
Slip plates	A free floating surface designed to allow a rear suspension to relax
Suspension:	An assembly used to support weight, dampen shock, and maintain tire contact and proper wheel to chassis position.
Thrust angle:	The angle formed between thrustline and geometric centerline.
Thrust line:	The bisector of rear toe, also described as a line drawn in the direction the rear wheels are pointed.
Total toe (angular):	The angle formed by the intersection of lines drawn through both wheels of a given axle.
Total toe (linear):	The difference in measurements taken across the front of the tires versus a measurement taken across the rear of the same tires.
Tracking:	The interrelated paths taken by the front and rear wheels.
Turn plate	A free floating surface designed to allow front wheels to remain free of binding during a wheel alignment
Turning angle:	The angle of a wheel during a turn when the opposing front wheel is steered to a specific reference angle
Wander:	The tendency of a vehicle to drift to either side of a directed course.

