BMW KDS Wheel Alignment System

WinAlign[®] Program Version 14.1





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Getting Started

1.1 Introduction

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

"References"

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 "Recall Specifications."* These references should be read for additional information to the instructions being presented.

These BMW Operation Instructions are a supplement to the standard WinAlign Operation Manual, Form 3850-T, supplied with this equipment.

Turning Power On

The main power switch is located on the back of the console where the AC power cord is connected to the cabinet. Some cabinet designs will have an additional power switch on the left side of the cabinet. This switch is used to power On/Off the systems computer but leaves power on to the charging stations available for DSP500 sensors and remote indicators.

BMW Account

The BMW logo screen is only displayed when the BMW account is activated. The "WinAlign" logo is shown when the standard account is activated.

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



K1 - Exit Aligner K2 (Blank) K3 (Blank) K4 - Begin Alignment

There are two possible selections on the first level of keys that are displayed on this screen:

"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.

Other softkey selections will appear if multiple account keys are available.

1.2 Operating the Console

Using "Softkeys"

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



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



The vertically stacked squares between the $\boxed{122}$ and $\boxed{132}$ 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 **Shift** and **•**.

Pressing Shift 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, is 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) 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: $\mathbf{K1}$, $\mathbf{K2}$, $\mathbf{K3}$, $\mathbf{K4}$, \mathbf{c} , and a zoom key \mathbf{k} .

Pressing $\stackrel{\frown}{\searrow}$ will enlarge the current softkey menu level and is equal to pressing $\stackrel{\frown}{\boxtimes}$ and $\stackrel{\frown}{\searrow}$ 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 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.

1.3 Conventional Sensor Setup (DSP508)

Before mounting the sensors on the BMW 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.

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.



When instructed to level and lock sensors during the BMW software program, the method in which the sensors are leveled and locked when the sensors are mounted to brackets or when mounted to BMW special adaptors is different than the method used when mounting sensors to universal adaptors.

For sensors mounted to the BMW 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.

1.4 Camera Sensor Setup (DSP600 or HS4X1 Sensors)

The shaft is not able to rotate on the sensors used with the camera system. Install the sensor to the adaptor. Level and lock the sensor once the adaptor is installed on the vehicle's wheel.

Construction of the second		
BMW : 1 Series - E81 (2007 - 2012) : without AFS (Active Front St	eering) : Series : 16" Wheel 🕮	
Use Special Adaptors: -Clean the holes in the wheel for the locator pins. -Select 4 or 5 pins to suit hole pattern in wheels. -Mount adaptors. -Level and lock targets. -Remove handles from adaptors. -Remove the pins from the turn plates and slip plates. Use Universal Adaptors: -Compensate targets. -NOTE: All BMW Group vehicles should not be raised and should be measured with Special Adaptors.		
Select 1	Wheel Adaptor	
	Use Universal Adaptors	Use Special Adaptors
		100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

Operation

2.1 Work Order Information

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

Enter the information. Dark shaded fields must be filled in to continue.

	W	ork Order:	R000001	1
6	Li Li	cense:		
g.	Te	chnician:		
rder Position:	Vi	hicle Key no:		
ime:	. Li	st Name:		
ny:	St	reet:		
	SI	ate:		
	н	ome Tel.:		
el.:	0	ustomer Number:	1	
	eft Front Right Fron	t Left Rear	Right Rear	
ssure	BAR E	BAR BAI	R BAR	
ad Depth	mm	mm mr	n mm	
Tires (star): (for Yes)				
	Edit work order, the	n press "OK".		
Cancel	Recall Specifications	List Work Orde	rs C	ж
Cancel	Recall	np	the second second second second	North March March 1997

Detailed information regarding this display is available in a later section. Use the TAB key on the keyboard or the mouse to move from field to field on the display.

Optional Tire Information

Use the keyboard to enter the appropriate data into the optional "Edit Work Order" screen. This information will appear on the printout summary. Press "OK" to continue.

An "X" should be entered in the Factory Tires (star) field if the tires are Original Equipment Manufacturer (OEM) tires. Factory tires will have a star design imprinted on the tire.



Factory star signifying OEM tires.

When all information is entered select "OK."

IN: lileage:	LKJASD3566887225AS	G Work O		R000001	
irst Reg.	04090	Technic			
ork Order Position:			Key no:		
irst Name:		Last Na	ime:		
ompany:		Street:			
ity:		State:			
IP:		Home 1	Tel.:		
lork Tel.:		Custon	ner Number:	1	
	Left Front	Right Front	Left Rear	Right Rear	
ire Pressure	BAR	BAR	BAR	BAR	£.
ire Tread Depth	mm	mm	mm	mm	i.
actory Tires (star): Enter X for Yes)					
	Edit wor	k order, then pre	ss "OK".		
Cancel	Recall	L	ist Work Orden		OK

2.2 Specifications

Use the K2 and K3 softkeys or the mouse to select the desired model from the Factory BMW Specification database. It is crucial to select the exact vehicle with the exact options, such as wheel diameter, sport suspension, etc..

pecification Database		g) : Series : 16" Wheel ^{III}	
Factory BMW 2012.0.3.7 BMW	Copyright (c) 2012 Hunte	r Engineering	
-MINI			
Rolls Royce			
	Select an item, th	hen press *OK*.	

Select the Series.

Select with or without Active Front Steering (AFS) Steering system.

	the second s
SMW : 1 Series - E01 (2007 - 2012) : without AFS (Active Front Steering) : Series : 16" Wheel ID	
Specification Database	室
+Factory BMW 2012.0.3.7 Copyright (c) 2012 Hunter Engineering	100
*BMW	6
#1 Series - E81 (2007 - 2012)	
without AFS (Active Front Steering)	0
+-with AFS (Active Front Steering)	8
and an a frente trait atenting)	
	10
	ē
	22
	10
	2
	-
Select an item, then press "OK".	-
WebSpecs **	OK
2 () ()	111111

Select the next suspension related option.

BMW : 1 Series - E81 (2007 - 2012) : w • Specification Database	Ser line (Strang 2002)		8
 Factory BMW 2012.0.3.7 BMW 	sopyright (c) 2012 Hunt	or Engineering	2
**1 Series - E81 (2007	- 2012)		
+without AFS (Actin	ve Front Steering)		
10 Series	ata transformation and		10
	on (with lower ride-heig	ht) ower ride-height) SZP5A	
** Performance Sy	ort suspension (with id	wer noe-neight) 52P5A	-
			-
			5
			9
			ā
			9
5	Select an item,	then press "OK".	- 11
WebSpecs**	+	• •	OK.
Contract of the local division of the local		11	-

Select the wheel size.

W (1 Series - E81 (2007 - 2012) w	ithout AFS (Active Fr	ont Steering) : Serie	a : 16" Wheel	
pecification Database				
Factory BMW 2012.0.3.7	Copyright (c) 201	2 Hunter Engin	neering	
+BMW				
=+1 Series - E81 (2007	- 2012)			
 without AFS (Act) 	ve Front Steering	a)		
**Series				
16" Wheel				
17" Wheel				
18" Wheel				
	Select	an item, then pres	ss "OK".	
WebSpecs TM	-			OK
AACDODCC0				

This completes the vehicle specification selection. Additional Information screens may be presented throughout the procedure. These screens are specific to the vehicle selected from the specification database and designed to remind the technician of procedures or processes required for the vehicle selected. The following example contains information pertaining to vehicles without AFS.

and which is a state of the sta		
MW : 1 Series - E81 (2007 - 2012)	without AFS (Active Front Steering) : Series : 16" Wheel	
Check Requirements for Wheel Alignment (rex to starting the alignment:	
Vehicles with AFS. Start the trabatization of	te ATS with the SMW diagnostic trater	
Note: The standing angle of the standing out	ner is displayed during the initialization process and is required for the flord a	die bes adjustment.
 Check that the time, are inflated to the c Check that all surgeraphic and steering Check that the vehicle springs and shore 	and a set material the legal local. This brand displit balances free of a parentee and ridy but offse rend pressure. Refer to fire worked for parentees state: worken component are in content working dollar worken terminate are in content and damagest data with an ride suggestion. The DAW eggst manual refrections	r by Hone Bain 1 Steen
	Colore the sector to a sector 20 and 2	
T	Follow the instructions, then press "Ready".	
		Ready
1 + + + + + + + + + + + + + + + + + + +	and the second division of	Sec. 1

2.3 Supplemental Information on Specifications and Tolerances

After the BMW specification data has been recalled, "measurement" tolerances are applied and displayed everywhere in the software flow and on the printout except on the adjustment bar graphs. "Adjustment" tolerances are applied to adjustment bar graphs. "Adjustment" tolerances are tighter than "Measurement" tolerances.

The "Measurement" tolerances are presented everywhere accept the adjustment bar graph. "Adjustment" tolerances are tighter and applied to the adjustment bar graphs only.

The following is an example of a 2007-2012 BMW 1 Series (E81) with AFS: 16" Wheel.

BMW - Kinematics Dia Loading measurement Date: 28.12.12 9:57					
WinAlign Version 14.0 Beta 1		ation Version Iniv 112.0.3.7		Version Hx421 0.0	Cal Date ????
Customer: Vehicle Key no: Customer number:1 License:			Work Ord Mileage: First Reg. Technicia		
/ehicle E	BMW : 1 Series	- E81 (2007 - 2012) : with AF	S (Active Front Steering)	: Series : 16" Wheel	
Tire Inspection		Front left	Front right	Rear left	Rear right
l'ire Air Pressure					
Fire Tread Depth					
Fire Marking	Star				
Rear Axle		Initial Measureme	ent Ta	rget Data	Final Measurement
Ride Height	left right		-20mm[[557mm]+40mm	
Front Axle	ngin	Initial Measureme	nt Ta	rget Data	Final Measurement
Ride Height	left right	IIIUdi medaditine	destruction of the second s	[579mm]+40mm	That measurement
Rear Axle		Initial Measurement	Target Data	Final Measurement	Target Data
Camber	left right		-0°25'[-1°30']+0°25'		-0°25'[-1°30']+0°25'
	left				
foe	right				CONTRACTOR (DATE)
	total		-0°12'[0°18']+0°12'		-0°12'[0°18']+0°12'
'hrust Angle	total		-0°02'[0°09']+0°02'		-0°02'[0°09']+0°02'
Front Axle		Initial Measurement	Target Data	Final Measurement	Target Data
	left		-0°30'[-0°12']+0°30'		-0°30'[-0°12']+0°30'
Camber	right cross		-0°30'[0°00']+0°30'		-0°30'[0°00']+0°30'
	left		-0 50 [0 00].0 50		-0 30 [0 00] 10 30
	right				
loe -	cross		-0°12'[0°16']+0°12'		-0°12'[0°16']+0°12'
	total		-0°12'[0°16']+0°12'		-0°12'[0°16']+0°12'
rack differential ngle	left right				
lax steering lock on	left		[-41°22']		[-41°22']
urve inside wheel	right		[33°29']	- 23 - 23 	[33°29']
Caster	left right				
AI	left right				
Contraction of the second s	total		-0°15'[0°00']+0°15'		

NOTE: If a BMW specification is recalled from a database other than the "Factory BMW" database, the following warning message will appear.

Re	
the section of the section of the section of the	
BMW 1999-2006 E46 Cabrio 17* Wheel Ø	14 March 19
 Specification Database 	3
Factory USA 2011.0.1 Copyright (c) 2010 Hunter Er	gineering
*BMW	
All 1976 and Earlier Models	
1+1 Series - E81 (2007 -)	
#+1 Series - E82 (2008 -)	
1+1 Series - E87 (2004 -)	
1 1 Series - E88 (2008 -)	
**X1 + EB4 (2011 +)	
i • 3 Series - E21 (1977 - 9/83)	
1. 3 Series - E30 (1984 - 1993)	
. 3. Cories . E12 (1003 1000)	
WARNING: An alternate database exists for the sel Press "Show Spec Databases" to select a different of database.	cted manufacturer. atabase or press "Ignore Warning" to use the current
Ignore	Show Spec
Warning	Databases

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

ma private					
al united and and the second state of the second state					
BMW 1969-2006 E48 Cabrio 17" Wheel @					-
Specification Database		an Antoni IV as as fast as as as fa			
- Factory USA 2011.0.1 Copyrig					100
 Factory USA 2011.0.0.7 Copy 					100
 Factory International 2010.0.2 					5
Factory BMW 2010.0 Copyrig	ne (c) 2010 Hun	tter Engineeron			18
 Factory Amendments 					1
saved WebSpecs™					1502
+User					10
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Quick List					ž.
Acura : CL : 2001-03 : exce	ent Type S				10
Audi : A8/S8 : 2011 : Sport		MA/2MB)			
Plant Planter - Sector Spect	ouspension le	and chick			
			No. Provine Lo		
	Select ar	n item, then pre	SS OK".	1141	
					1000
WebSpecs TH	-			OK	-

2.4 Measurements

Special and Universal Adaptors Screen

All BMW Group vehicles should be measured with the Special Adaptors. Compensation is not needed when using the special adaptor designed for BMW. Information on using the Universal Adaptors can be found in Appendix A section 5.1.



Live Ride Height

If ride height measurements are required, WinAlign[®] will display a ride height measurement screen. This screen provides an initial unladen ride height measurement compared against a tolerance of +40 / -20mm. The specification and tolerance information is listed at the top of the screen for easy reference. Passing measurements are displayed in green and failing measurements are displayed in red.



If the vehicle is within tolerances, the screen will advance to the Caster, S.A.I. included angle and turning angle measurements screen when "Continue" is pressed and you may proceed with the alignment.

If the vehicle is out of specification the operator is presented with two options to bring the vehicle ride height into acceptable tolerances. Both options are listed at the bottom of the screen presented in tabs.



The preferred method for obtaining acceptable ride height measurements is through use of the Loading Mode.

- This mode continues to measure the ride height against the +40 / -20mm tolerance used in the initial unladen measurement.
- Load or unload the vehicle as needed and select Loading Mode to view the actual Ride Height Measurement.
- Continue the procedure until the vehicle ride height is within tolerance. Once the program records measurements that are within tolerance, the program will advance to the Caster, S.A.I. included angle and toe-out-on-turns measurements screen.

The Construction Mode is a method of setting Ride Height to an **EXACT** factory specification. This method is primarily used when a vehicle has had major service that will affect its alignment and or ride height.

- The Construction Mode uses a two tiered tolerance threshold for ride height.
- The first tier has a specification tolerance of +/- 10mm.
- Load or unload the vehicle as needed to obtain another Ride Height Measurement.
- Once that tolerance has been met, weight must be added or removed until the measured ride height is within +/- 2mm tolerance.
- Some sport tuned suspensions will require a second tier tolerance of +/-1mm.

Complete instructions on the Construction Mode are found in Appendix A section 5.2.

NOTE The Manual Ride Height data entry screen can be reached by using a second row softkey.

Caster, S.A.I., Included Angle and Toe-out-on-turns Measurements

BMW's process requires Caster, SAI/IA and toe-out-on-turns at 20 degrees to be measured using a single 20 degree steering sequence.

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



Steer to the left as directed until the arrow is in the lower valley of the graph. Hold the wheels still until the bar graph changes to the screen shown below.



Steer to the right as directed until the arrow is in the lower valley of the graph. Hold the wheels still until the bar graph changes to the screen shown below.

an of 111 May some		3
	Ó m	8
	*	0
		No.
		24345
		ő
Anasurement Selected		3
FasterCaster/SAI/A/Too-		10
	Steer the wheels as directed.	2.4
Cancel	Bypass Measurement	

Steer back to the left until the arrow is centered in the bar graph. Hold steady until the screen changes to the next step of the operation.

Steering Wheel Status

A steering wheel status indicator may be used during the alignment if the option is turned on through the "Common Files" portion of WinAlign[®]'s setup program.

	"before" measurements are saved, you will t the steering wheel is level.		
Work Management Shop Shop Manage Use ASANETWORK	Manager	4	
Display of Vehicle S Vehicle Inspection Tire Information Ride Height Measur CodeLink® DTC che	The steering whee "The steering whee	I was level before the alignm	
Show Measurement - Show Measurement - Print symptom print	Display The steering whee	was steered to the left befo was steered to the right bef	
Advanced Vehicle H Display Compensati	on Instructions	was steered to the right ber	ore alignine
- Verify Caster Adjust	evel Status when Measurements are Soved nent		
	Select optional procedure steps.		
Enable	🔶 📕 🛨	OK	

Initial steering wheel position may be recorded when the initial primary angles have been measured.

Not Appendication			
Steering Wheel Level St	a signant' n he signant'		
		Ready".	
Cancel	Set Steering Wheel Status	Bypass Measurement	Ready

"Before" Measure Maximum Steering Angle

Maximum Steering Angle will be measured if the specification for the vehicle selected contains maximum steer angle value. The program will automatically bypass this procedure if the vehicle's specification does not contain a maximum steer angle value. Follow the instructions and then steer the wheels as directed.

Conventional sensors should be unlocked for this measurement.



Steer the wheels as directed with a steady motion until maximum steer angle is achieved to the left. Hold the wheels until the display indicates to steer right.



Repeat this process when steering to the right.

Anna Anna an Anna Anna Anna Anna Anna A		
-Shore the wheelin straight alread.		A Party of the second
1	Follow the instructions.	
Cancel	Bypass Measurement	5

Return the wheels to the straight ahead position.

Vehicles without AFS will display the screen with the steering wheel level pictured to demonstrate how to set the steering wheel to level position.

AFS equipped vehicles will display a screen that shows the BMW diagnostic computer. The BMW diagnostic computer must be used to view steering angle sensor value. The steering wheel must be steered until the BMW diagnostic computer displays 0 degrees +/- 0.2 degrees.



Alignment Measurements Printout

The 'Before" measurements screen will appear after all measurements are obtained. Screen scroll up or down, zoom in or out to see all the alignment data. Numbers shown in red are out of specifications, number in green are within acceptable limits. Click on "Print" to create a printout of what is displayed on the screen.

	-					
			E	-		
Section 1		-	here	-	to an	
Sector 1	4	10		(Transformer)		
Annual Annual Annual	#	12		and the second second	And	
-	11 MAR	-				and the second se
and a second		121	Section of	-	terio -	
	1813	THE .				0
the second secon	-	11 11	-			
-	1	12 12				192
-						
Zoo					Zoom Out	Continue

The next screen asks the operator if adjustments are needed. If the answer is "Yes" the program will proceed to the initial alignment screen. If the answer is "No" the system will skip directly to the end.

Wells Measurements and Adjustments						
wasted Mean representation						
	And Andrew Street	-		al las		1
	San Barrier Barrier Barrier	Manual Prints	54	34		
	The second secon	1000 10 100 100 - 1	a di Astri Luci bang 1	And Prices	-	
	The Total Spect	_	_	_	-	
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		100.5	Augram.	And Des	Augusta -	
		.#.		8		
	and a second		and the second	-	rantes	
menda Newsland I						
Are adjustments needed adjustments. If you ans						inue so that you can make rint the measurements.
Cancel	[No	Yes
				-		

2.5 Adjustments

Bar graphs quickly indicate the position of the angle compared to specification.



Rear Camber and Toe Adjustment

The Rear Camber screen indicates the current measurement of Camber, Toe and Total Toe. BMW vehicle specification data, which is displayed at the top of each bar graph, may change if the measured ride height changes while camber or toe adjustments are performed if ride height is being measured with live ride height targets.



Note: If ride height was brought into specification via "Loading Mode", then the spec value shown on the bar graphs may change as any adjustments affect the ride height. It is required for the ride height targets to still be unobstructed to perform this procedure. This does not apply to the "Construction Mode" procedure.

Steering Wheel Adjustment

Once Rear Camber adjustments have been completed the program will return to the "Level Steering Wheel" screen.



Front Camber Adjustment

Adjustments may be made to front camber at this screen. Do not re-level conventional front sensors before adjusting front camber.



Note: If ride height was brought into specification via "Loading Mode", then the spec value shown on the bar graphs may change as any adjustments affect the ride height. It is required for the ride height targets to still be unobstructed to perform this procedure. This does not apply to the "Construction Mode" procedure.

2.6 Completing the Alignment Process

Verify Caster Measurement



Measure caster/SAI/IA/Toe-out-on-turns at °20 again. This step should not be bypassed. Adjustments made to front camber and toe influence the SAI/IA and Toe-out-on-turn values.

Steering Wheel Status

Select the steering wheel status now that all adjustments have been finished.



A note will be added to the printout the position the steering wheel was in before and after the alignment adjustments were made. Select K4 "Ready" to continue with the procedure.

Measure Maximum Steer Angle (Re-measure)

The maximum steer angle measurement is also affected by adjustments to front toe angles. If a maximum steering angle specification is available, the program will automatically offer a maximum steer angle measurement. Proceed as instructed on the screen.



The final maximum steer measurement is made at this screen.

Does the vehicle have ESC (if unsure, press "Yes")?

ng the information unitate, press "		below	
unaure, press "			
	Yes:)?		
mentifying 'publicate Mills P	Inchasts Balling	Laded #20	
	the second second		
17			
-	- · ·		
un i	departing 1		
	100	strate halfs, face	
44	100	Networkson Delta	
ant-firms 1	181		
	100		
		Charlos Parketer Trapes	
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-		Marinet Manhater Magniti	
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da i	185	there had an interiore	
	And And And And And And And And	신유, 전유 소리 전 전유 가 전 전유 가 전 전유 가 전 전유 가 전 전유 가 전유	Strand Difference Strand Stran

Selecting "Yes" will instruct the WinAlign[®] system to use Hunter's CodeLink tool.



It is vital to follow the sequence of events exactly as the display indicates.

The "Click here for more information" hyperlink will help you find the connector.



Final Measurements Overview

Measurements that have been saved as "After" measurements are shown here. This detailed page illustrates all the measurements and adjustments required, plus any customer and vehicle information entered on the work order.



Saving Final Work Order

Press "Save Current Work Order" to store all data pertaining to this job.

Alignment Printouts

Press "Print " to generate an alignment summary using the BMW printout format.



BMW-Kinematics Diagnosis System Printout

WinAlign Version		ation Version		Version Hx421		
14.0 Beta 1	BMW/L	Jniv 112.0.3.7		0.0	2222	
Customer: Vehicle Key no: Customer number:1 License:			Work Ord Mileage: First Reg. Technicia			
Vehicle E	BMW : 1 Series	5 - E81 (2007 - 2012) : with	AFS (Active Front Steering)	: Series : 16" Wheel		
Tire Inspection		Front left	Front right	Rear left	Rear right	
Tire Air Pressure						
Tire Tread Depth						
Tire Marking	Star					
Rear Axle		Initial Measure	ment Ta	rget Data	Final Measurement	
Ride Height	left	557mm	-20mm[557mm]+40mm	557mm	
inde molgin	right	557mm	-2011111		557mm	
Front Axle	1100	Initial Measure	ment Ta	rget Data	Final Measurement	
Ride Height	left 579mm right 579mm		-20mm[579mm]+40mm	579mm 579mm	
Rear Axle	0.1.00	Initial Measurement	Target Data	Final Measurement	Target Data	
Camber	left right	< 0.00, >	-0°25'[-1°30']+0°25'	-1°31' -1°34'	-0°25'[-1°30']+0°25'	
	left	0°00'		0°11'		
Тое	right	-0°05'		0°07'		
	total	< -0°05' >	-0°12'[0°18']+0°12'	0°18'	-0°12'[0°18']+0°12'	
Thrust Angle	total	< -0°05' >	-0°02'[0°09']+0°02'	0°07'	-0°02'[0°09']+0°02'	
Front Axle		Initial Measurement	Target Data	Final Measurement	Target Data	
11 N	left	-0°01'	-0°30'[-0°12']+0°30'	-0°01'	-0°30'[-0°12']+0°30'	
Camber	right cross	0.00,	-0°30'[0°00']+0°30'	0°00' -0°01'	-0°30'[0°00']+0°30'	
	110017001001		-0 30 [0 00]+0 30		-0 30 [0 00]+0 30	
	left right	-0°03' 0°01'		-0°02' -0°01'		
Тое	cross	< -0°02' >	-0°12'[0°16']+0°12'	< -0°03' >	-0°12'[0°16']+0°12'	
	total	< -0°02' >	-0°12'[0°16']+0°12'	< -0°03' >	-0°12'[0°16']+0°12'	
Track differential	left	-10°02'	121 - 125	-10°02'		
angle	right	-20°03'		-20°03'		
Max steering lock on	left	-37°30'	[-41°22']	-37°30'	[-41°22']	
curve inside wheel	right	39°13'	[33°29']	39°13'	[33°29']	
Caster	left	0°00'		0°00'		
vaster	right	0°00'		0°00'		
CA1	left	0°00'		0°00'		
SAI	right	0°01'		0°00'		
Setback	total		-0°15'[0°00']+0°15'			
<> = Measured value is	s outside of to	lerance				

Print Vehicle Printout

Select "Print Vehicle" to print specific measurements shown in the WinAlign[®] format. The following example shows both "before" and "after" results.



Conclude the alignment process by selecting the "Reset" softkey.

Additional Alignment Steps

During Recall Specifications the info icon is will appear next to vehicles requiring special procedures. Click on the icon to display a detailed illustration or description.

3.1 Adaptive Cruise Control

Vehicles with ACC (Active Cruise Control), AFS (Active Front Steering), and DSC (Dynamic Stability Control) may require additional measurements, adjustments, and/or special tools to make the adjustments.

BMW 1999-2006 E46 Cabrio 17" W	eet Ø	NECC- MA
<u>^</u>	Important! After a wheel alignment, the following tasks must be performed: Carry out adjustment of the steering angle sensor. Vehicles with ACC (Active Cruise Control): the ACC system must be fine-adjusted with the BMW diagnosis system. Vehicles with Reversing Camera: the system must be calibrated with special BMW tools and procedures.	To HE HE HE
	View the illustration, then press "OK".	
Print All Illustrations	ок	

¹"Radar sensors at the front of the vehicle permanently scan the road ahead. As your BMW approaches a slower vehicle, Active Cruise Control automatically reduces power output from the engine and gently applies the brakes, holding your BMW at a pre-defined distance to the vehicle ahead. This distance is set as a number of seconds, not of meters, so that a safe reaction time is always available, relative to the current speed. When the lane ahead becomes clear, Active Cruise Control automatically increases your vehicle's speed to your preferred cruising speed. Up to four different cruising speeds can be pre-programmed. A touch on the accelerator or brake pedal deactivates the system."



Alignment of the BMW ACC System requires a vehicle specific BMW scan too and special ACC adjustment tool (BMW part# 81-10-0-021-292).

¹ "BMW Insights," BMW website

http://www.bmw.com/com/en/insights/technology/technology_guide/articles/active_cruise_cont rol.html

BMW TIS - 66 31 001 Adjusting ACC sensor

66 31 001	Adjusting ACC sensor
5-5	Special tools required: · 36 1 100 · 36 1 130
	Lever out cap ①. Carry out adjustment of ACC sensor ② with special tool 36 1 130 by means of adjusting screws ③.
2 3 4 5 W05 00 002	 Special tool required: Active Cruise Control ACC adjusting device, complete. Order number: 81 10 0 021 292 Consisting of: Mirror, complete Wheel laser Slotted diaphragm Control bracket (for initial installation of rail) Rail Setup and operating instructions (not shown) Note: A holder which is not included in the scope of delivery is required to support the wheel laser. Use either the quick-action clamp from the existing KDS or ACC wheel holder (36 1 100).
i	Note: Follow instructions for ACC adjusting device .
	Note: To adjust the ACC sensor, connect the BMW diagnosis system and fit the ACC adjusting device. Select ACC system in diagnosis. Start test module "ACC adjustment" (service functions) and proceed in accordance with instructions. Handle ACC adjusting device in accordance with mounting and operating instructions provided with device.
i	Note: Further information on the ACC adjusting device can be found in the BMW Workshop Equipment and Planning Documentation

3.2 Active Front Steering

²"When driving at lower speeds - such as in city traffic, when parking or on winding mountain roads, Active Steering increases the size of the steering angle. The front wheels respond immediately to small movements of the steering wheel, enabling the driver to maneuver through tight spaces without needing to make multiple turns of the steering wheel. Parking is easier and agility enhanced.

At medium speeds, steering is also easier. And to ensure smoothness at higher speeds, as of around 120 to 140 km/h (depending on the model) Active Steering becomes more indirect.

Active Steering therefore reduces the amount of change in the steering angle for every movement of the steering wheel. This gives the driver the advantage of more precise steering at higher speeds, and ensures great stability and more comfort.

If the vehicle is threatened with instability, such as by over steering or braking on a changeable surface, DSC identifies the problem and can use Active Steering to help overcome it. For example, in order to reduce unsafe yaw, Active Steering can increase the angle of steering wheels faster than even the most expert driver.

Active Steering does not interrupt the direct connection between steering wheel and front wheels, so that even in the unlikely event of a complete failure of the electronic systems, the BMW remains completely controllable at all times. This is because at the first sign of any problems, an adaptation mechanism blocks the Active Steering immediately using a pivot so that the driver is permanently in control of the situation."



The markings on the steering shaft cap and housing must be aligned before front toe adjustments are performed.

² "BMW Insights," BMW website

http://www.bmw.com/com/en/insights/technology/technology_guide/articles/mm_active_steering.html (May 8, 2013)



These marks must stay aligned during the toe adjustment process.

(32.4.163)		(usting toe-in/toe-differential angle (ve need: vehicle to diagnosis tester, lect item "AFS start-op / adjustment" fit t steering gear to zero point (total stee ero")) Ck steering gear with special tool 32.4 Secure special tool 32.4 152 to steering Secure special tool 32.4 152 to steering Secure special tool 32.4 151 to front as Lock tool 32.4 153 by turning at knob (Checking total steering angle portant! a absolutily essential to ensure that th mains set to "zero" on the diagnosis te s been mechanically locked.	rom Service Functions. ring angle must be 150. g spindle. le support. 1). e total ateering angle
	View the illustrat	ion, then press "OK".	

A special tool assembly (32-4-150) is used to hold the marks together.

"IMPORTANT: It is absolutely essential to ensure that the total steering angle remains set to zero on the diagnostic tester after the steering has been mechanically locked".

Proceed with the alignment process. The alignment procedure will inform the technician when the tool should be removed.

If further instructions are required, such as resetting the steering gear, these instructions will also be displayed at the appropriate point in the procedure.

AW : 6 Series - EGU (2002 - 2010	Important!	th AFS (Active Front Steering) : Series	17 Wheel W
	On vehicles with AFS (Active Front Steering), the AFS system must be adjusted after work is carried out on the steering system.		
	Connect vehicle to diag	nosis tester.	
	In "Service Functions / select the item "AFS St	Chassis / Steering / Active art-up / Adjustment".	Front Steering"
	Set total steering angle	on steering gear to "zero".	s
	Work through test mod	ule.	
	1. Reset motor position		
	2. Steering angle senso 3. Adjustment of total s		
	Minus then illustration	n, then press "OK".	
essenten sossa	Previous	Next	127.0
Print All Illustrations	Illustration	Illustration	OK

Final measurements will display after all special procedures are completed.

3.3 Dynamic Stability Control (DSC)

BMW's Dynamic Stability Control is a system designed to help keep the vehicle in control. The system gathers information from sensors monitoring wheel rotation, steering angle, lateral forces, pressure and yaw (spin).

Wheel alignment may affect the calibration of the steering angle sensor. The only way to know that the DSC system is working with properly calibrated sensors is to connect the vehicle's computer system and check.

WinAlign[®] will display a message screen indicating that the vehicle may be equipped with DSC and in need of a verification procedure at the end of the alignment process.

	trol (ESC) is optio	nal on this vet	nicle.	
Check the vehicle for E	SC using the info	mation provid-	ed below	
Does the vehicle have 8	ESC of unnulle, pro	988-1Y88-)71-		
				1
		Will Pretrans Babl		
	and the second second	4231020		
	ALC: NOT	with the	with both half	
	22	-		
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The icon for Hunter's CodeLink device will appear in the procedure bar if CodeLink is part of the alignment system.

The following display will appear at the correct place in the alignment procedure if CodeLink is available.

	the second se
vertible : Series : 17" Wheel Ø	
n the vehicle	5
ion.	
cie's diagnostic connector.	
WW 20-pin diagnostic connector located under	r the hood.
present it NUST be the connector used for o	ommunications with CodeLink®
	4
	r the hood. onenunications with CodeLine®
Press "Continue" to procee	
	Continue
	vertible : Series : 17" Wheel 0 In the which masen into Park, see into Neutral and chock the rear wheels. tion Which diagnostic corrector. NAV 20-pin diagnostic corrector located under is present if MUST de the corrector located under is present if MUST de the corrector located under Press "Continue" to procee

Follow the instructions line-by-line and the procedure will be complete in a short period of time.
Program Details

4.1 Work Management

Using the Work Management program provides the following advantages:

- 1. Storage of customer information for later recall
- 2. Storage of customer's vehicle information for later recall
- 3. The ability to store more than one vehicle per customer
- 4. Storage of "Before" and "After" wheel alignment measurements
- 5. Record of customers tire pressure and tread depth
- 6. Record of factory or non-factory tire
- 7. Ability to recall work orders electronically

VIN:	jhud66gsdk587756zsdg	III		R000001	
Mileage:	51000	Licens	10000		
First Reg.		Technic	cian:		
Work Order Position:		Vehicle	Key no:		_
First Name:		Last Na	ame:		
Company:		Street:			
City:		State:			
ZIP:		Home	Tel.:		
Work Tel.:		Custon	ner Number:	17	
	Left Front	Right Front	Left Rear	Right Rear	
Tire Pressure	BAR	BAR	BAR	BAR	
Tire Tread Depth	mm	mm	mm	mm	
Factory Tires (star): Enter X for Yes)					
	Edit wo	rk order, then pre	ss "OK".		
Cancel	Recall	. 1	ist Work Orders	ок	

Vehicle identification includes the following:

VIN:	Jhud66gsdk587756zsdg	Work Order:	R000001
Mileage:	51000	License:	
First Reg.		Technician:	
Work Order Position:		Vehicle Key no:	

The Edit Work Order screen also contains tire pressure, tread depth, and whether or not the tires are factory equipment.

	Left Front	Right Front	Left Rear	Right Rear
Tire Pressure	BAR	BAR	BAR	BAR
Tire Tread Depth	mm	mm	mm	mm
Factory Tires (star): (Enter X for Yes)				

The dark grey areas indicate mandatory information. This usually includes:

VIN #, Work order number, Mileage

VIN:		Work C	Inder:	R000001	
Mileage:		Licens	et i		
First Reg.		Technik	cian:		
Work Order Position:		Vehicle	Key no:		_
First Name:		Last Na	ame:		
Company:		Street:			
City:		State:			
ZIP:		Home	Contract of the second s		
Work Tel.:		Custon	ner Number:	1	
	Left Front	Right Front	Left Rear	Right Rear	
Tire Pressure	BAR	BAR	BAR	BAR	
Tire Tread Depth	mm	mm	mm	mm	
Factory Tires (star): [Enter X for Yes)					
	Edit wor	k order, then pre	ss "OK".		1
Cancel	Recall Specifications	- 1	ist Work Orders	OK	8

The cursor indicates the position where a letter or number will appear.

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

Press the **Backspace** key to delete the last character entered.

Press the right or left cursor arrow key to move the cursor.

Press **Del** to remove the character to the right of the cursor.

To insert a character in the middle of a word, move the cursor to the character before the position and press the character to be inserted.

The following error will appear, if a mandatory field is left blank.



Saving Current Work Order

Press "Work Management" on any primary screen to display the "Work Management" primary screen.

Press "Save Current Work Order." The work order with its associated customer and vehicle identification will be stored on the hard drive.

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

Recalling a Work Order for Review or Print

Start on the Edit Work Order screen.

1. Select the "List Work Orders" softkey

/IN:		Work O	eder:	R000001	
Alleage:		License	8:		
irst Reg.		Technic	clan:		
Vork Order Position:		Vehicle	Key no:		
irst Name:		Last N	ime:		_
Company:		Street:			
lity:		State:			
IP:		Home	Tel.:		
Vork Tel.:		Custon	ner Number:	1	
	Left Front	Right Front	Left Rear	Right Rear	
ire Pressure	BAR	BAR	BAR	BAR	
Ire Tread Depth	mm	mm	mm	mm	
actory Tires (star): Enter X for Yes)					
		R order, then pre	ss "OK".		
Cancel	Recall Specifications	- L	ist Work Orders	e Henry	ОК

- 2. Use the search function to find the correct work order / customer
- 3. Highlight the correct work order / customer
- 4. Expose all the softkeys by clicking on the magnifying glass between the K2 and K3 keys
- 5. Select "Show "Before" Measurements", "Show "After" Measurements", "Print Measurements" or Print Summary".

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Show "Before"	Show "After"	Print	Print
Measurements	Measurements	Measurements	Summary
Recall Ref.	1		02005
needal Net.	Next Image	Enlarge Image	Help
Work Order			

4.2 Raise Selected Axle

Front camber, front caster and rear camber may be adjusted with the tires lifted off the runway using the "Jack Up Selected Axle" softkey available on the fourth row.

+	Rear Cambo	er A	djustment	+
-00	-1°51'	-1	-004	-1°2
Show Next Axle	Show Measurements	ľ	Show Next Bar Graphs	Adjust Toe
Work Management	Vehicle Specifications		Reduce Soft Keys	Vehicle Inspection
Adjust To Zero	Measure Caster		Make Additional Measurements	Make Additiona Adjustments
Jack Up Selected Axle	Control Saved Measurements		Control Compensation	
Print	Illustrate Adjustments		Show Ref. Work Order	Help
HECCam	1		1	filmen and the second s

Jack up the vehicle as indicated and press K4 "Ready".



Adjust the camber or caster angle as needed.



Press K1 "Lower Selected Axle" when adjustment is finished.

4.3 WinToe[®]

WinAlign[®]'s patented WinToe[®] program has been enhanced with the addition of WayUp and WayOut Wintoe[®], which were introduced with WinAlign[®] 10.0.

WayUp WinToe[®] is a seamless software program which extends the vertical range of the cameras. This allows the alignment lift to be raised higher without moving the cameras or losing front toe measurements.

WayOut WinToe[®] allows the front wheels to be turned during a front toe adjustment while maintaining accurate toe values.

Disk is Based and Married		(1) 月上市。
ner i Hanne (hanne		
		10 · · · · · · · · · · · · · · · · · · ·
Step 1: Start the engine and level the ster Install the brake pedal depressor. Turn off the engine.	aring wheel.	4 6
Fal	low the instructions, then press "Ready".	3.0
Cancel	Show Toe Bar Graphs	Ready

Enter WinToe[®] from the "Make Additional Adjustment" softkey or through the context sensitive drop-menu obtained by clicking on the steering wheel icon on the front toe bar graphs.

NOTE: Vehicles requiring the steering gear to be centered during the front toe adjustment should not use the WayOut WinToe[®] feature.



Select K2 "Steer Before Adjusting" to use the WayOut WinToe® program.



Follow the instructions on the display. Securely lock the front wheels in place after steering to the desired position. This may require using the ignition lock.



Press K4 "Ready" when the front wheels are secure.



The toe adjustment display is shown with the same required change displayed before the front wheels were steered. Adjust toe and follow the instructions. Press K4 "Ready" when ready to adjust the left tie rod.



Steer the wheels to the position desired to access the left tie rod adjuster.

1 m	6
-	Y
22°24'	-22°24'
Steer the vehicle to the preferred adjustme	
Sider one vehicle to the preferred adjustition	

Lock the front wheels in place and press K4 "Ready".

Constanting of the second seco			1.8.3
0°	04 [.]		
Step 3: Adjust the left tie rod (Jounce the front asle. Equalize rotational mo Lock the left tie rod.	1		0
	Follow the instruction	ins, then press "Ready".	
Cancel	Steer Before Adjusting	Restart WinToe	Ready

Adjust the left tie rod and follow the instructions displayed on the screen.

Chard Liderman Talansa			
	-	SF-	
2 O °	00' +		and a second sec
Step 3: Adjust the left tie rod (Jource the front asie, Equalize rotational mo Lock the left tie rod	1		6
	Follow the instruction	ins, then press "Ready".	
Cancel	Steer Before Adjusting	Restart WinToe	Ready

Press K4 "Ready" when the adjustment is complete and the instructions on the screen have been followed.

Construction of the second sec		
Ć) • • • • • •	
Step 4: With the engine running, steer a	thead.	Solid C. ▲ 45 B
Restart WinToe if steering whee Turn off the engine.	el is not level,	N PI
Cancel	ollow the instructions, then press "Ready", Restart WinToe	Ready

Verify the steering wheel is centered when the arrow is in the center of the bar graph.

Construction of the second sec		24.1
-Steer the wheels straight alread		and Subconnections
	Follow the instructions.	
Cancel	Bypass Measurement	

Camera Based BMW KDS II and KDS II Plus Aligners			
Standard accessories for	DSP600 and HS4X1 Camera I	Based Sensor systems	
175-348-1	BMW Adaptor w/120mm pins and large tire hooks.	BMW special adaptors with large tire hooks (with 120mm pins). For use with all DSP and HS4x1 sensors	
8 - 8 8 - 8 20-2050-1	HS4X1 and DSP600 Live Ride Height Targets <u>Intended for ride height</u> <u>measurements from center</u> of wheel to wheel opening <u>lower edge.</u>	For use with all HS4X1 and DSP600 sensors. Includes 4 Live Ride Height Targets and 20 adhesive strips. Included with new KDS II-Plus systems. (Requires WinAlign® 9.0 or greater)	
20-1885-1	Ride Height Handheld Wireless Remote Control	Ride Height Handheld Wireless Remote Control Kit 20-1885-1, ships standard with BMW DSP600 and HS4X1 Series Sensors and DSP508XF-B Sensors.	
Optional accesso	ries DSP600 and HS4X1 Camera	a Based Sensor systems	
30-419-1-X	Icon Remote Indicator	New style remote indicator	
30-421-1-X-XF	Icon Cordless Remote Indicator	New style cordless remote indicator	
30-418-1-X-XF	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
20-2389-1	Storage Tray for Bar Code Reader	Bar Code Reader must be purchased from outside vendor. Recommended scanner is the Symbol LS4278
The following acce	essories are available for older w	vheel adaptor configurations
20-1222-1	Pin 135-302-1 BMW 100mm Pins One kit required per adaptor.	Use with older BMW special adaptors (175-214-1) for some specialty wheels with deeper offsets. The current BMW special adaptor performs well without the 100mm pins
175-214-1	(Older design) BMW Special Adaptor with 100mm pins	Available to replace broken or damaged BMW Special adaptors purchased prior to the availability of BMW Special Adaptor 175-348-1 (April 2004)
20-1789-1	External tire clamp adaptor	Compatible only DSP600 and HS4X1 self-centering adaptors 175-321-1 or 175- 325-1.
20-1792-1	Extensions for self- centering 175-321-1 or 175-325-1 adaptor	Compatible only with DSP600 self- centering adaptors 175-321-1 or 175-325- 1. (set of sixteen, covers 4 wheel adaptors)

Glossary

	1
"Adjustment" Tolerance	An alignment specification intended for use when a BMW vehicle has one or more alignment angles that are not with the "Measurement" specification
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
Degree:	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
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.
Rack and pinion steering:	A steering system design that utilizes a pinion gear meshed with a rack gear to transmit steering forces to the spindle.

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:	ssembly used to support weight, dampen shock, and maintain ontact and proper wheel to chassis position.		
Thrust angle:	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.		
WinToe®	A procedure used to adjust front toe patented by Hunter Engineering Co.		

Appendix A:

5.1 Universal Adaptors

Sensor Operation

Place the vehicle in position for compensation by following the instructions.

Prot Presented	10.5.1
BMW : 3 Series - E46 (1998 - 2006) : Convertible : Series : 17" Wheel GI	
Position vehicle on slip plates and turn plates. Check for equal fire tread. Check tire pressure. Verity that the correct tires and wheels are installed. Install brake pedal depressor.	Sustoren Regeneration (Southern Street
Press *OK* to continue.	
	OK

The operator must choose a wheel adaptor type before proceeding with the alignment.



Universal Adaptors

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

Run-out compensation must be performed when using universal adaptors. Press "Continue" to proceed with the measurement process.

The lift rack should be level on the leveling legs or locks during the compensation process. The lock pins must be in place on the turnplates and rear slip plates.

Place the vehicle's transmission in neutral with the engine off.



Roll the vehicle rearward using the left rear tire until the bar graphs are green and the arrows are well within the green area of the bar graph. Hold the vehicle until the bar graphs change.

Roll the vehicle forward until the bar graphs are green and the front tires are centered on the front turnplates. Chock the rear wheels.

Install the brake pedal depressor.

Remove the pins from the front turnplate and rear slip plates.

The vehicle's transmission may be placed in Park at this time.

Do not disturb the level condition of the sensors. The sensors will remain locked the remainder of the alignment process or until unlock instructions are displayed

5.2 Construction Mode

The Construction Mode is a method of setting Ride Height to an EXACT factory specification. This method is primarily used when a vehicle has had major service that will affect its alignment and or ride height. The Construction Mode uses a two tiered tolerance threshold for ride height. The first tier has a specification tolerance of +/- 10mm and once that tolerance has been met, weight must be added or removed until the measured ride height is within +/- 2mm tolerance. Some sport tuned suspensions will require a second tier tolerance of +/-1mm.



Once the Construction Mode is selected two informational screens are presented. The first screen is the Loading screen. This screen provides a guide for adding weight to the correct areas of the vehicle. Once the "OK" tab is clicked you advance to the Specifications screen.



This screen provides the desired ride height specification for both axels. A table also provides an "X" and a "Y" tolerance. Once the "x" tolerance is achieved it will be necessary to continue adding and removing weight until the "Y" tolerance is met. The "X" tolerance is a fixed value with a +/- 10mm range. The "Y" tolerance is +/- 2mm



Once the vehicle has had weight added or removed as needed, the Ride Height entry screen will appear again. The specifications and tolerances to be me are listed at the top of the screen.



Ride height measurements that are obtained by using live ride height targets will continuously be measured and displayed as changes in ride height occur. Ride height dependent BMW vehicle specification data will be recalled and will change as the ride height measurement changes.

5.3 Manually Entered Ride Height

Ride height measurements can also be entered manually. Ride height measurements that are measured and entered manually will be used to recall ride height dependent BMW vehicle specification data but specification data will not change if ride height changes occur.

Values may be manually entered via the keyboard or electronically entered using Hunter's Electronic ride height tool.

Enter the ride height values and press K4 "OK" to continue the alignment process.



The next screen is the loading diagram screen.



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		557	+1.10	+1-2	
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	If the heights are not within tolera				
	If the heights are within tolerance NOTE: Deactivate the air supply				
	nstructions.	CERTIFICATION CONTRACTORIO			
	View the dlu	istration, then pre	ISS "OK".		
	Contract of the second s	1.41	Next		
rint All Illustration	Previous				OK

Add weight to the vehicle as illustrated and enter measured ride height.



If the ride height is within the limits of Tolerance "X", Add or remove weight to get within the Tolerance "Y" value.



If the ride height is not with the limits of Tolerance "X", repair the vehicle.

Press K4 "OK" to continue