

# WINALIGN<sup>®</sup> HD

## Industry Standard Alignment Software

# OPERATIONS MANUAL



WinAlign HD Ops Manual

Form: 4543-T  
06/19/2024  
Supersedes 09-23



Hunter Learning Channel

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# 1. Getting Started

## 1.1. General Information

This manual provides operation instructions and information required to operate the WA Series aligner with WinAlign® HD software. WinAlign HD software version 15.x is a 64-bit program and is compatible only with Windows® Windows® 7 or higher. The owner of the WT Series aligner is solely responsible for arranging technical training. Only a qualified trained technician should operate the WT Series aligner. Maintaining records of personnel trained on this equipment is solely the responsibility of the owner and management.

This manual assumes that you are already familiar with the basics of heavy-duty wheel alignment. “Italics” are used to refer to specific parts of this manual that provide additional information or explanation. These references should be read for additional information to the instructions being presented.

## 1.2. System Requirements

WinAlign® software version 18.x is a 64-bit program that is compatible with only HW3 Series PCs or higher, with 4GB of RAM or higher running Windows® 10 or higher.

## 1.3. Important Safety Instructions

### 1.3.1. Hazard Definitions

Watch for these symbols:



#### **CAUTION**

Hazards or unsafe practices, which could result in minor personal injury or product or property damage.



#### **WARNING**

Hazards or unsafe practices, which could result in severe personal injury or death.



#### **DANGER**

Immediate hazards, which will result in severe personal injury or death.

These symbols identify situations that could be detrimental to your safety and or cause equipment damage.

Read all instructions.

Read and follow all caution and warning labels affixed to your equipment and tools. Misuse of this equipment can cause personal injury and shorten the life of the aligner. Always use wheel chocks in front of and behind the left rear wheel after positioning a vehicle on the rack. Use caution when jacking the vehicle.

**ALWAYS WEAR OSHA APPROVED SAFETY GLASSES.** Eyeglasses that only have impact resistant lenses are NOT safety glasses. Wear non-slip safety footwear when performing an alignment.

Never stand on the aligner.

Do not wear jewelry or loose clothing when performing an alignment.

Wear proper back support when lifting or removing wheels.

Do not operate equipment with a damaged cord, or equipment that has been dropped or damaged, until a Hunter Service Representative has examined it. Never use the cord to pull the plug from the outlet. Grasp plug and pull to disconnect. If an extension cord is necessary, a cord with a current rating equal to or more than that of the equipment should be used. Cords rated for less current than the equipment may overheat. Care should be taken to arrange the cord so that it will not be tripped over or pulled.

Verify that the electrical supply circuit and the receptacle are properly grounded. To reduce the risk of electrical shock, do not use on wet surfaces or expose to rain.

Verify that the appropriate electrical supply circuit is the same voltage and amperage ratings as marked on the aligner before operating.

To reduce the risk of fire, do not operate equipment in the vicinity of open containers of flammable liquids (gasoline).

Keep all instructions permanently with the unit. Keep all decals, labels, and notices clean and visible.

To prevent accidents and/or damage to the aligner, use only Hunter recommended accessories. Use only as described in this manual. Adequate ventilation should be provided when working on operating internal combustion engines.



**DANGER**

NOT FOR USE IN A COMPUTER ROOM AS DEFINED IN THE STANDARD FOR PROTECTION OF ELECTRONIC COMPUTER/DATA PROCESSING EQUIPMENT, ANSI/NFPA 75.



**DANGER**

This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instruction manual, it may cause interference with electronic devices. Operation of this equipment in a residential area may cause interference in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference.



**DANGER**

Do not turn the power off when the disk drive is operating. The disk can be damaged.



**DANGER**

DO NOT ALTER THE ELECTRICAL PLUG. Plugging the electrical plug into an unsuitable supply circuit will damage the equipment and may result in personal injury.

**SAVE THESE INSTRUCTIONS**

**1.3.2. Precautions for Systems Equipped with XF and XF2 Cordless Sensors**

The following precautions apply to the XF and XF2 transceivers installed in the aligner console and the alignment sensors as part of the XF and XF2 cordless sensor option.



## **DANGER**

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.



## **DANGER**

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.



## **CAUTION**

RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE. DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS.



## **CAUTION**

Tread DepthTool: 221-731-1

Contains FCC ID: LS3-45-1443

IC: 2938A-451443

Model: 45-1443

OR

Contains FCC ID: LS3-45-1637

IC: 2938A-451637

Model 45-1637

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. this device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

This device complies with Industry Canada license exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

### 1.3.3. North America

The PC aligner is intended to operate from a power source that will apply 120 VAC (nominal) 50/60 Hz between the supply conductors of the power cord set.

### 1.3.4. Other Regions

The PC aligner is intended to operate from a power source that will apply 230 VAC (nominal) 50/60 Hz between the supply conductors of the power cordset. The power supply cord set, supplied with this equipment, may need modification to allow connection to the power supply mains. Your Hunter service representative will install the proper plug for your location.



#### CAUTION

A protective ground connection, through the grounding conductor in the power cord, is essential for safe operation. Use only a power cord that is in good condition.

### 1.3.5. FUSING

To avoid fire hazard, use only the fuse specified for your product.

### 1.3.6. EQUIPMENT SERVICE

This equipment contains no user serviceable parts. All repairs must be referred to a qualified Hunter Service Representative.

### 1.3.7. PROVISIONS FOR LIFTING and CARRYING

No provision has been made for lifting or carrying this equipment. The unit must be moved by rolling it on its casters.

### 1.3.8. Electrical



|           |                         |
|-----------|-------------------------|
| Voltage:  | 120/230 volts (nominal) |
| Amperage: | 6/3 amps                |
| Wattage:  | 720 watts               |

### 1.3.9. Atmospherics


|                    |                                |
|--------------------|--------------------------------|
| Temperature:       | +32°F to +122°F (0°C to +50°C) |
| Relative Humidity: | Up to 95% Non-condensing       |
| Altitude:          | Up to 10,000 ft. (3048 m)      |

### Explanation of Symbols

|  |                               |
|--|-------------------------------|
|  | Alternating Current           |
|  | Earth ground terminal         |
|  | Protective conductor terminal |
|  | ON / OFF (Supply) condition   |
|  | Risk of electrical shock      |

|   |   |
|---|---|
|  | Stand-by Switch                               |
|  | Not intended for connection to public network |

## 1.4. Inside Help Tips

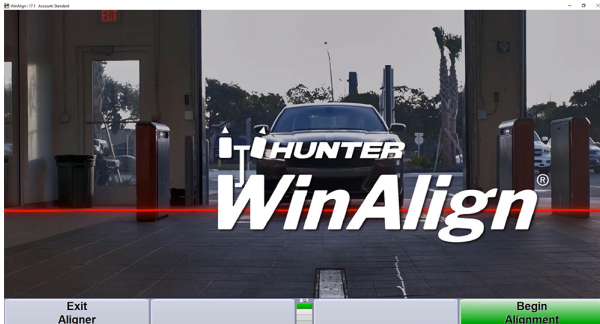
The “HELP” key accesses an on-line, context-sensitive copy of this manual. The “HELP” soft key label is available on all screens, usually located in the **K4** key of the lowest menu level. If the “HELP” soft key is not present, press  until it appears. When **K4** is pressed, a pop-up screen appears with the question “What kind of help would you like?” The choices are:

- “Cancel” will close the pop-up and return the screen where “HELP” was pressed.
- “Table of Contents” will open a pop-up screen with the table of contents of the “Help Manual.”
- The soft key label for **K4** will be “About nnnnnn,” and will refer to the topic or procedure of the screen from where “HELP” was pressed. Pressing **K4** will open the Help Manual directly to the reference section for that topic.

## 1.5. Operating the Console

Individual consoles will vary due to specific model number and production date. Detailed console-specific instructions will be included with the aligner console.

**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.



**To turn off the aligner power, do the following:**

Turn off cordless sensors. (Each sensor has a power switch.)

Reset the console.

Press “Exit Aligner”. A “Confirmation” pop-up screen will ask if you are sure you want to exit the aligner. Press “Yes”.

Wait for the aligner program to end. The aligner will shut down automatically. Turn off console power.








### CAUTION

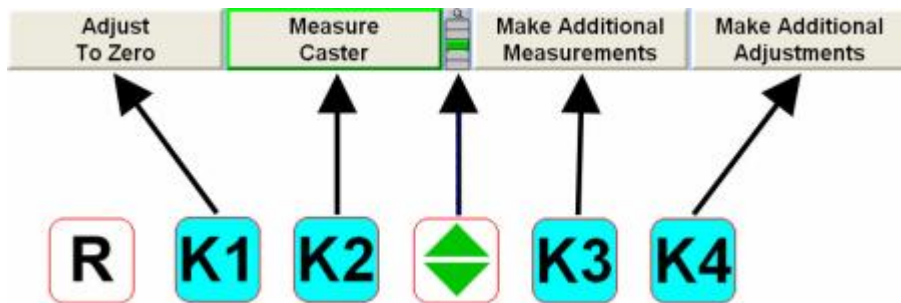
Do not turn off the power while information is being written to the disk drive. This occurs during console setup and when specifications are being stored. This can result in corrupt disk drive files.

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 |   |                               |
|  | Reset key      |   |                               |

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



The vertically stacked squares between the “K2” and “K3” labels indicate how many levels of soft keys are available. The highlighted box indicates the menu level that is currently displayed.

The soft key level is changed by pressing the menu shift softkey, . When this key is pressed, the softkey labels will change to the next level down. If the last menu level is currently displayed, the softkey level will be the first softkey level. To go to the next softkey level up, press  and .

### 1.5.1. Alignment Procedure Bar





Whether ExpressAlign® is enabled or disabled, a vertical procedure bar appears along the right side of the screen. The Alignment Procedure toolbar displays an icon for each alignment or WinAlign® procedure available or performed.

The icons are arranged in order from the first step that you must complete to the last step that you must complete. After each alignment procedure has been completed, a check mark will appear in the upper right corner of the corresponding icon.

If there are more icons available than space on the screen, the toolbar can be scrolled up or down. If the triangular area at the top or bottom is gray there are more choices available and can be selected to scroll up or down. If the triangle is blue, no more choices are available in that direction.



When the cursor is placed over an icon, a message appears describing the icon's function, such as ExpressAlign.

Selecting an icon from the Alignment Procedure bar will take you to the procedure that the icon represents. Selecting  Backward key, or the  Forward key, will move the screen backward or forward in the alignment procedure as outlined on the procedure bar.

A Plan View Indicator, located along the right side of the screen, under the procedure bar, shows which axle is being adjusted when a gray background is present.

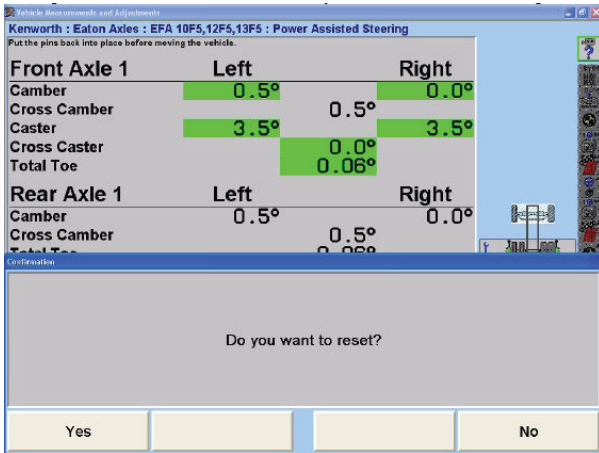
### 1.5.2. SoundGuide® Tone Feedback System

SoundGuide® Tone Feedback System is an audio recognition system that offers audible alignment feedback when performing certain functions within the alignment program.

Turn the SoundGuide® on or off by single-clicking on the icon . When SoundGuide® is off the icon appears with a red line through it . SoundGuide® can be selected from bar graphs or icons next to individual angles to

### 1.5.3. Resetting the Program

The alignment program may be reset at anytime during an alignment by pressing the **R** key, located at the upper left-hand corner of the keyboard. A confirmation screen will appear to verify that the **R** button was pressed intentionally.



When this screen appears, press "YES" to reset the program or "NO" to continue working. When the aligner is reset, the information collected for the alignment in progress will be erased and the display will return to the "Logo" screen.

### 1.5.4. Using the Screen Saver

If the monitor displays the same image for a long period of time, the image may become "burned in", and will be visible even when the display is turned off. This is a characteristic of ALL computer monitor displays. When screen saver is on and any key (even a remote control key) is pressed, the program will reappear on the display. This single keystroke is recognized only by the screen saver program and will not affect the aligner program. After the screen is on, additional key presses will operate the program normally.



#### NOTE

When screen saver is activated, the system is STILL RUNNING.

### 1.5.5. Using the Standard Remote Control

The standard aligner console remote control provides operation of the WinAlign® HD program from a distance by duplicating the five softkeys. Some remote controls have six softkeys **K1**, **K2**, **K3**, **K4**, **↕**, and a zoom key **+**. Pressing **+** will zoom screens that support the zoom feature.

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



#### NOTE

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

## 2. Basic Operation

### 2.1. Sensors and Wheel Adaptors

#### 2.1.1. Mounting Sensors onto Wheel Adaptors

Sensors may be mounted on the wheel adaptors before mounting the wheel adaptors on the vehicle. In some cases, it may be easier to mount the wheel adaptor first and then mount the sensor onto the adaptor. Either method may be used.

Center the wheel adaptor center casting between the upper and lower castings. When the center casting is properly centered, a plunger ball will fall into the detent position on the adaptor rod.

Tighten both center casting lock knobs firmly. This will prevent the center casting from slipping down when the sensor is attached.



#### CAUTION

Hand tighten center casting lock knobs as tight as possible (DO NOT USE TOOLS TO TIGHTEN).

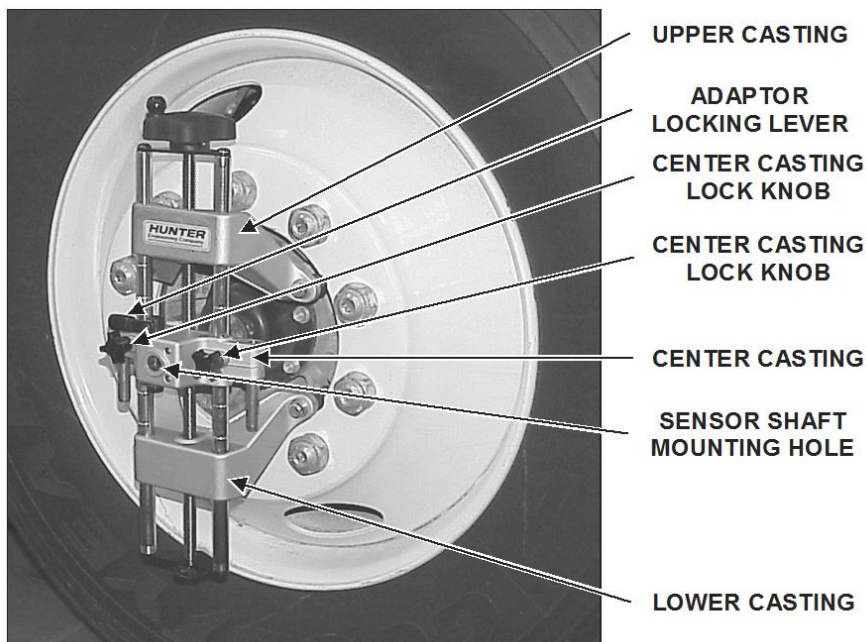


#### CAUTION

If the center casting lock knobs are not firmly tightened, runout compensation and alignment accuracy will be adversely affected.

#### 2.1.2. Mounting Wheel Adaptors onto Wheels

The mini self-centering truck wheel adaptors may be mounted in the center opening of the truck wheel (steel or alloy).



Standard self-centering truck wheel adaptors must be mounted to the outside of the rim on alloy wheels.

## 2.2. Self-Centering Adaptors and targets

Sensors may be mounted on the wheel adaptors before mounting the wheel adaptors on the vehicle. In some cases, it may be easier to mount the wheel adaptor first and then mount the sensor onto the adaptor.

### 2.2.1. Mounting Sensors or Targets onto Wheel Adaptors

Center the wheel adaptor center casting between the upper and lower castings. When the center casting is properly centered, a plunger ball will fall into the detent position on the adaptor rod. Tighten both center casting lock knobs firmly. This will prevent the center casting from slipping down when the sensor is attached.



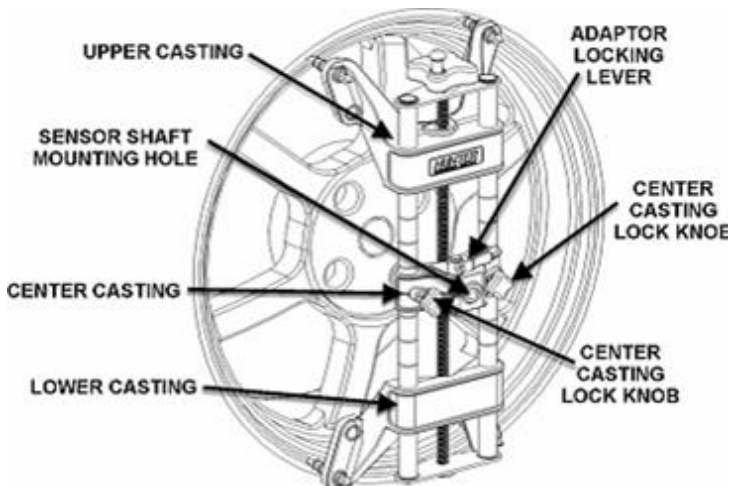
#### CAUTION

Hand tighten center casting lock knobs as tight as possible (DO NOT USE TOOLS TO TIGHTEN).



#### CAUTION

If the center casting lock knobs are not firmly tightened, runout compensation and alignment accuracy will be adversely affected.



If detached, attach the sensor to the wheel adaptor by inserting the sensor mounting shaft (at the rear of the sensor) into the sensor mounting hole in the middle of the center casting.



#### NOTE

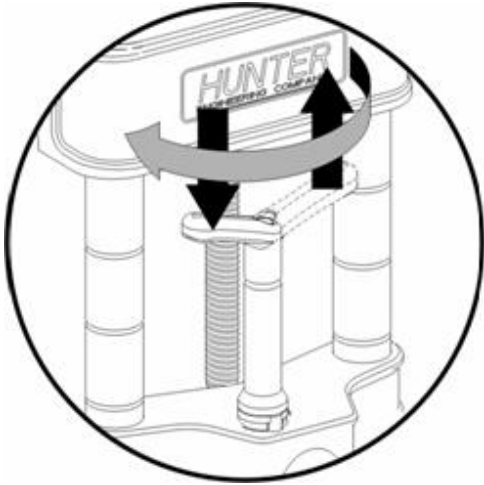
The sensor shaft must be fully inserted into the sensor shaft mounting hole.

### Wheel Adaptor 175-321-1 with Ratchet Adaptor Locking Lever

Rotate locking lever clockwise to tighten. If upper casting prevents rotation of lever, either expand adaptor to move upper casting or re-position the lever by lifting lever up to disengage, rotating counter-clockwise, and lowering to re-engage.

Proceed until the shaft is locked tight to adaptor.

With shaft fully locked, re-position the lever to the 9 o'clock position by lifting lever up to disengage, rotating to 9 o'clock, and lowering to re-engage.



The lever in the 9 o'clock position eliminates possible contact with upper casting or sensor during alignments.

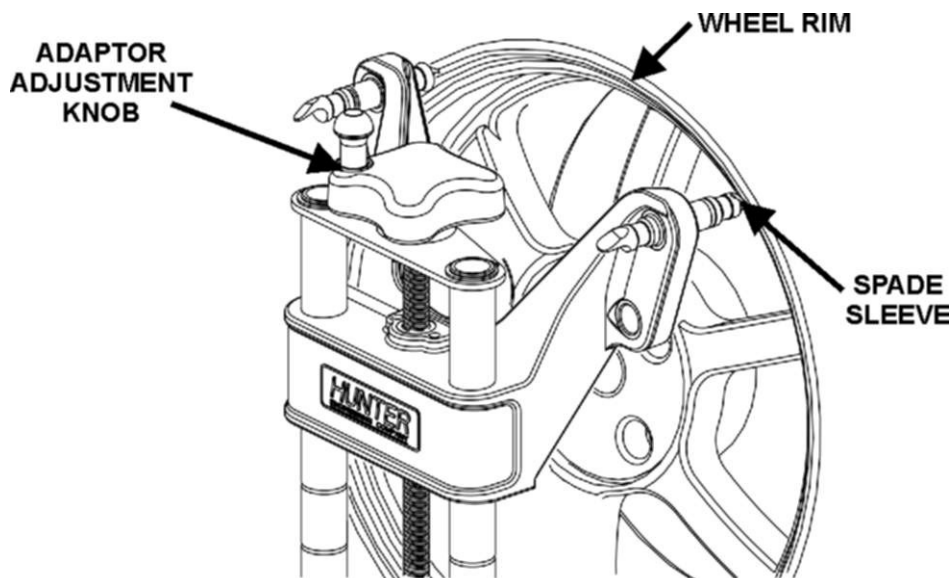
### 2.2.2. Mounting Wheel Adaptor onto Wheels

#### Wheels without Rim Lip (Attaching to Outer Rim Lip)

Position the wheel adaptor with the two upper external rim studs on the outside of the wheel rim.

Align the two lower external rim studs on the out side of the wheel rim and check that all four rim studs will engage the outside of the wheel rim.

Turn the adaptor adjustment knob to firmly attach the adaptor to the wheel.



Test the security of the installation by lightly tugging on the wheel adaptor.



#### **WARNING**

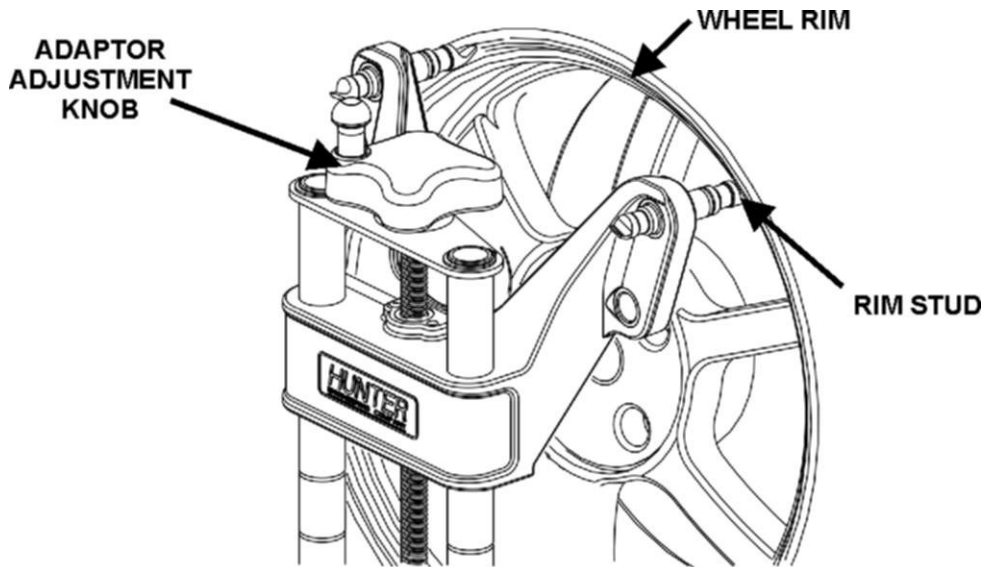
Do not allow the rim studs to slip on the wheel. Runout compensation and alignment accuracy will be adversely affected if the wheel adaptor is allowed to slip on the wheel.

#### Wheels with Rim Lip (Attaching To Inner Rim Lip)

Position the wheel adaptor with the two lower rim studs engaging the lower wheel rim lip.

Align the two upper rim studs with the upper wheel rim lip and check that all four studs will engage the inner portion of the rim lip.

Turn the adaptor adjustment knob to firmly attach the adaptor to the wheel.



Test the security of the installation by tugging on the wheel adaptor.



#### **WARNING**

Do not use rim studs on alloy or clear coat wheels. Rim studs can damage these wheels.



#### **WARNING**

Do not allow the rim studs to slip on the wheel. Runout compensation and alignment accuracy will be adversely affected if the wheel adaptor is allowed to slip on the wheel.

### **2.2.3. Compensating DSP700T Sensors**

#### **Rolling Compensation**

DSP700 series sensors may be compensated using a rolling procedure as follows.



#### **DANGER**

Always make sure wheel chocks are in place before starting rolling compensation. Serious injury or death can result if chocks are not used to limit the movement of the truck.

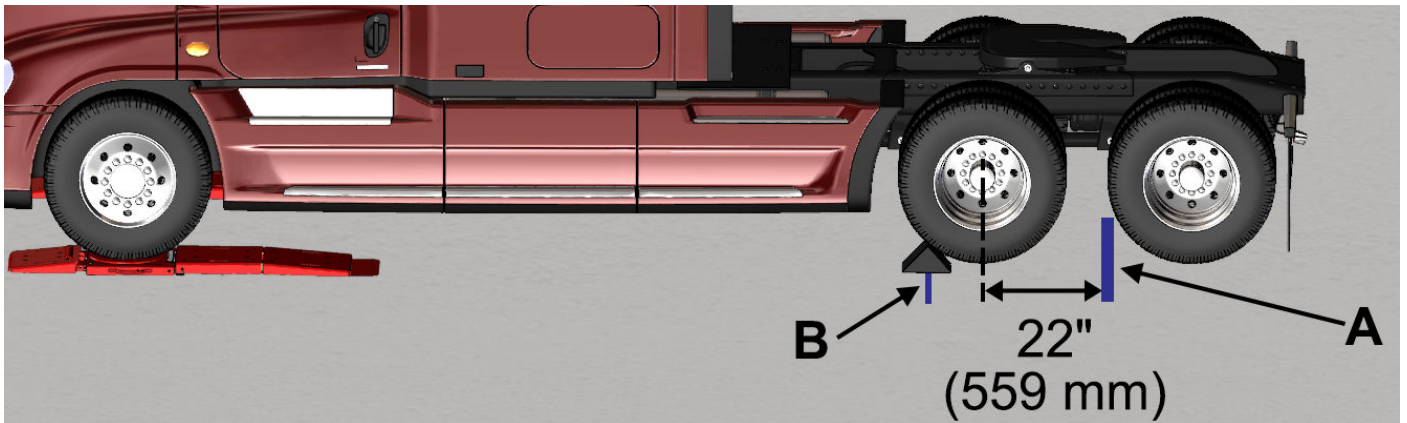
1. Position the truck with the front tires centered on the turnplates.
2. Chock the front side of the first drive axle.



#### **NOTE**

Chock the side of the truck that allows viewing of the console screen.

3. Measure 22 ( $\pm 1$ ) inches rearward from the center of the first drive axle and mark the location on the floor or rack (position "A" shown below).
4. Mark the position of the wheel chock (position "B" shown below).

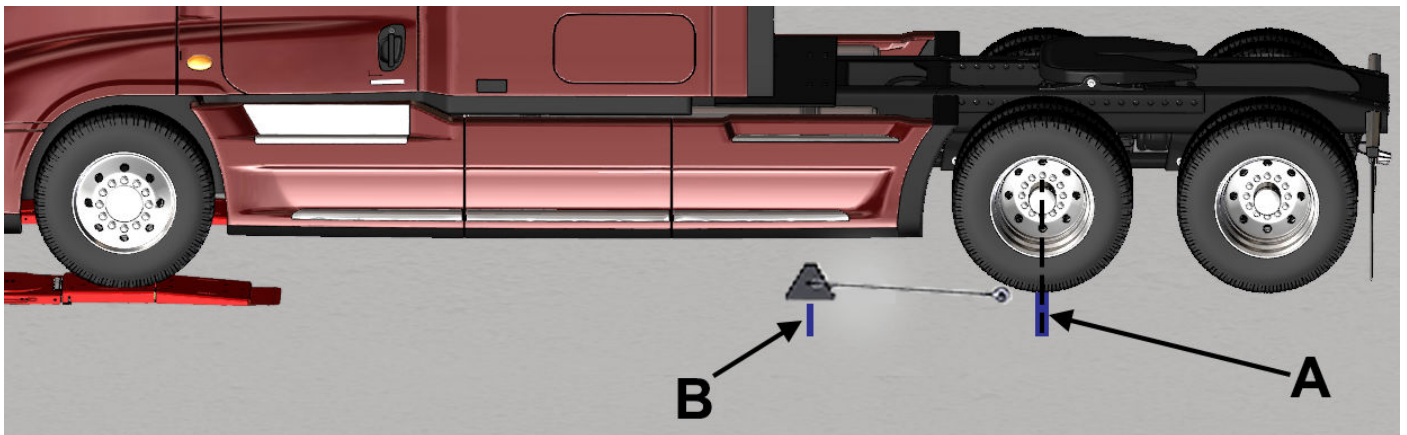


5. Position the truck such that the center of the first drive axle lines up with the mark.



#### NOTICE

If using floor turnplates, ensure the front tires are on the flat portion of the plates.



6. Proceed to the Rolling Compensation screen in the aligner.
7. Put the lock pins in the turning angle gauges and rear slip plates. Raise the turn plate bridges.
8. All sensors must be mounted before starting compensation.
9. Turn sensors on. The starting position of the wheel adaptor does not matter. The middle LED will be on.
10. Unlock the sensor lock knob on each sensor.
11. Steer the vehicle ahead.





## DANGER

Always make sure wheel chocks are in place before starting rolling compensation.



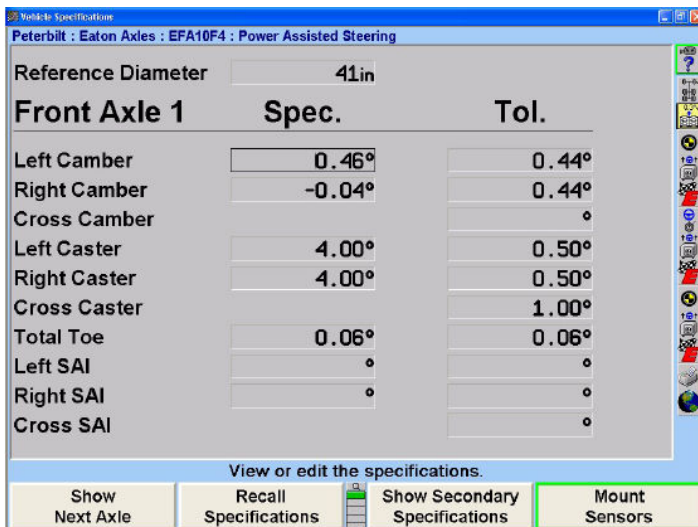
12. Ensure the wheel chock has not moved. When directed by the aligner, manually roll (do not drive) the vehicle forward into the wheel chock to center all bar graphs in the green. Do not disturb the sensors. Wait for the aligner to save the measurements, which is indicated by the bar graphs disappearing.

### 3-Point (Pro-Comp) Compensation

Follow on-screen procedures to perform the 3 point compensation procedure.

## 2.3. Vehicle Specifications

The "Vehicle Specifications" primary screen shows the vehicle identification and its alignment specifications.



The "Vehicle Specifications" primary screen is used for the following purposes:

- Viewing the identification of the vehicle.
- Viewing the specifications of the vehicle.
- Manually entering the specifications of the vehicle.

The "Vehicle Specifications" primary screen is also used for:

- Recalling vehicle specifications from the specification memory.
- Storing vehicle specifications into the specification memory.

- Reading and writing notes which are attached to the specifications of a vehicle.
- Setting the display units and formats for specifications and measurements.

### 2.3.1. Primary and Secondary Specification Groups

The specifications and tolerances are shown in two different groups:

**Primary Specifications** are camber, caster, total toe, and thrust angle specifications and tolerances.

**Secondary Specifications** are SAI, toe-out-on turns and maximum steering angle specifications and tolerances.

### 2.3.2. Vehicle Specification Memory

The “Recall Specifications” pop-up screen allows vehicle specifications to be recalled and stored in the specification memory.

The “Recall Specifications” pop-up screen is displayed by pressing “Recall Specifications” on the “Vehicle Specifications” primary screen.



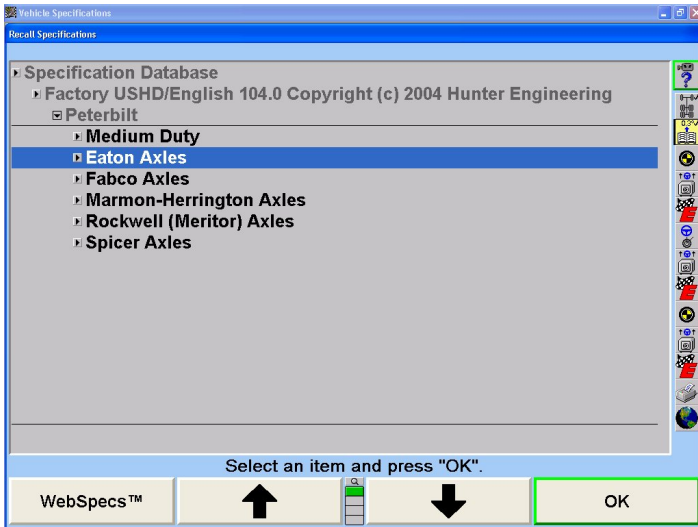
Specifications may be recalled from “Factory Specifications”, based on original equipment manufacturer specifications, “Factory Amendments”, or “User Specifications”. “Factory Amendments”, and “User Specifications” are created and stored into the computer’s memory by the equipment operator.

Although the specification database is extensive, some vehicle manufacturers and/or specific models may not be included in the factory specifications memory. Locate the alignment data in the alignment specification book or vehicle manufacturers’ service manual and manually enter the specifications on the “Vehicle Specifications” display.

The manually entered specifications may be stored in computer memory to be recalled at a later time. Refer to “2.3.5 Selecting User Specifications.”

### 2.3.3. Vehicle Recall Specifications Selection

To recall the specifications from the specification database, begin by pressing ↑ or ↓ to highlight the manufacturer of the vehicle being aligned. Press “OK” to select the highlighted manufacturer. The screen will change to show the models available for the selected manufacturer.



Press ↑ or ↓ to highlight the vehicle model. Press “OK”. Continue in this manner until the vehicle is completely identified. When the vehicle is identified, the specifications will be recalled and the screen will change to the “Vehicle Specifications” primary screen.

At any point in the selection sequence, you can type in the desired selection using the keyboard. For example, when selecting the vehicle manufacturer, you can select “Freightliner” as follows:

- Type “F”; the selection changes to “Flexible Vehicles.”
- Type “R”; the selection changes to “Freightliner.”

The “Optimal” sequence is intended to be the easiest way to choose the vehicle. The sequence is generally as follows:

- Manufacturer
- Model
- Other Choices

For example, an “Optimal” selection sequence might be:

- Chevrolet
- C and T Series
- Kodiak C5H, C6H, C7H - 1996

OR

- Kenworth
- Mid-range
- EFA 10F5, 12F5 w/Radial Tires

### 2.3.4. Selecting from the Vehicle Lists

The factory specifications stored in the system are based on industry data available at the time of entry. Because specifications are subject to change, refer to vehicle manufacturer’s service manual and service bulletins if a question arises.

### 2.3.5. Selecting User Specifications

The system can store user entered specifications in addition to those contained in the factory specification memory. These specifications may be for older vehicles no longer in the factory specification memory, or a user may modify factory specifications for a specific vehicle. These specifications may be recalled and used during an alignment.

To recall specifications from the “User” specification memory, the “Recall Specifications” pop-up screen must be currently displayed:

Press  $\uparrow$  or  $\downarrow$  to highlight Specification Database.

Press “OK”. The screen will change to a list of possible database selections.

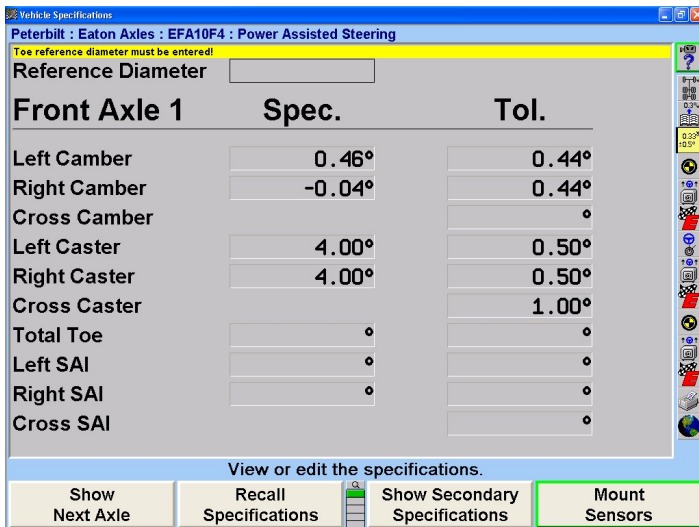
Press  $\uparrow$  or  $\downarrow$  to select “User” and press “OK”. The screen will change to list user entered specifications.

Press  $\uparrow$  or  $\downarrow$  to highlight the desired item and press “OK”. The vehicle specifications will be retrieved from the “User” specification memory. When the specifications have been retrieved, the screen will change to display those specifications.

### 2.3.6. Entering and Editing Specifications

If specifications for a vehicle are not included in the factory specifications memory, the alignment information must be found in the alignment specification book and entered manually. It may be necessary to change the specification or tolerance of an existing specification.

To change or enter a value on the Vehicle Specifications display, press “Select Next Value” or “Enter” to advance to the desired field. Enter the new specification and press “Select Next Value” or “Enter” to replace the existing specification.



Tolerances must not be 0.

Specifications may be entered as whole numbers (1), whole numbers and fractions (1 1/2), fractions (1/2), decimals (0.5), degrees (1.01°), or degrees and minutes (1°30). Use the following methods to enter alignment specifications using the current display units.



#### NOTICE

Display units (i.e. degrees to inches, degrees to degrees and minutes, etc.) can be changed from the Vehicle Specifications primary screen. Refer to [“Selecting Display Units. \[26\]”](#)

Use the Space key to separate whole numbers and fractions.

For example, 2 1/2° would be entered as,

Press **2**, **Spacebar**, **1** / **2**, and “Select Next Value”.

Use the Space key to separate degrees and minutes.

For example, 2° 15' would be entered as,

Press **2**, **Spacebar**, **1**, **5**, and "Select Next Value".

If the degrees and minutes specification is less than 1°, enter a 0 for degrees.

For example, 6' would be entered as,

Press **0**, **Spacebar**, **6**, and "Select Next Value".



### NOTICE

Specifications are assumed to be positive unless the negative (-) sign is positioned before the specification value.

When "Select Next Value" or "Enter" is pressed, the value is entered and the cursor advances to the next entry field.



### WARNING

Values are not entered until "Select Next Value" or "Enter" is pressed.

Specifications and tolerances may be changed at any time during the alignment by pressing Vehicle Specifications and advancing the cursor to the position for the new value to be entered.

### 2.3.7. Selecting Specification Formats

Specifications may be displayed in a symmetrical or nonsymmetrical manner. Specifications that use an equal tolerance range for an angle such as:

| -           | Specification | Tolerance |
|-------------|---------------|-----------|
| Left camber | 0.50°         | ± 0.25°   |

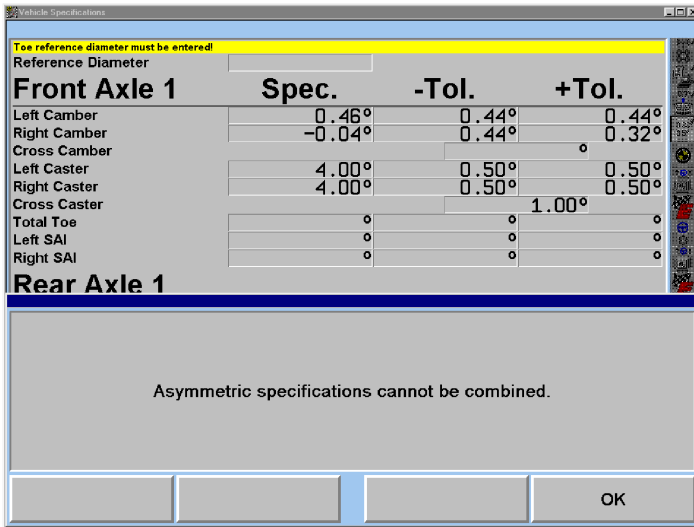
These are called symmetrical specifications because the tolerance range extremes are equal distance from the preferred specification. This permits a ± value to be used as a tolerance and does not require two place holders for tolerances. Symmetrical specifications are most common. Non-symmetrical specifications use an unequal ± tolerance such as:

| -           | Specification | + Tolerance | - Tolerance |
|-------------|---------------|-------------|-------------|
| Left camber | 0.50°         | 0.50°       | 0.30°       |

The tolerance values require two placeholders on the specification screen because the tolerance extremes are unequal distances from the preferred specification.

Press "Set Spec Format", if individual + and - tolerance values are to be entered. The screen will change to display a positive and negative tolerance position for each specified angle.

If the format is asymmetric and the "+ tolerance" is not equal to the "- tolerance" for at least one tolerance pair, then the screen cannot be changed to symmetric format. Attempting to do so will generate an error message.



Press "OK" to clear this error message.

### 2.3.8. Reducing Tolerances

Tolerances that are too large may allow a less than desirable alignment while tolerances that are too small may make adjustments difficult.

Pressing "Reduce Tolerances" will reduce the specification tolerances to the following:

Front and rear camber tolerance to  $\pm 0.25^\circ$  ( $1/4^\circ$ ),

Front caster tolerance to  $\pm 0.50^\circ$  ( $1/2^\circ$ ),

Front and rear total toe tolerance to  $\pm 0.06''$  ( $1/16''$ ,  $0.13^\circ$  or 1.5 mm depending upon toe units selected).

The actual angle specification will not be altered and only tolerances greater than these will be reduced.

### 2.3.9. Specification Notes

A "specification note" is a block of text that may be attached to a vehicle specification and stored with the specifications in the specification memory. The note may be stored with factory specifications, factory amended specifications, or with user specifications.



#### NOTICE

Some factory specifications may already have a note attached. This might be a technical service bulletin, or some tip that may aid you in selecting the vehicle or adjusting its alignment.

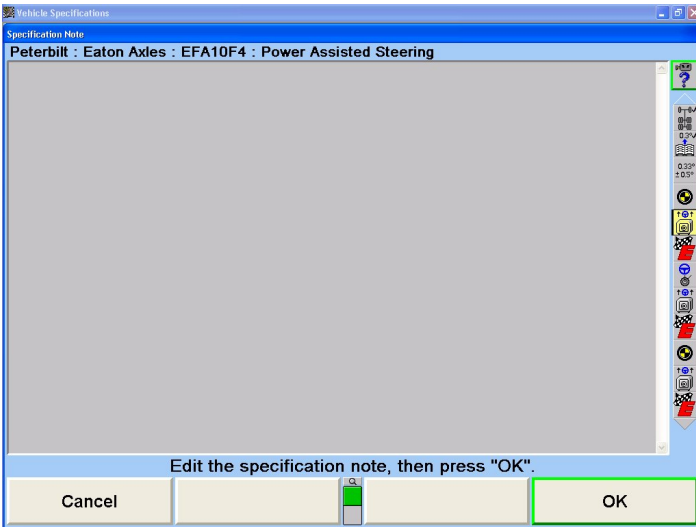
To enter and store a specification note, do either of the following:

Recall the specifications in the usual manner. On the "Vehicle Measurements and Adjustments" primary screen, press "Show Spec Note".

**OR**

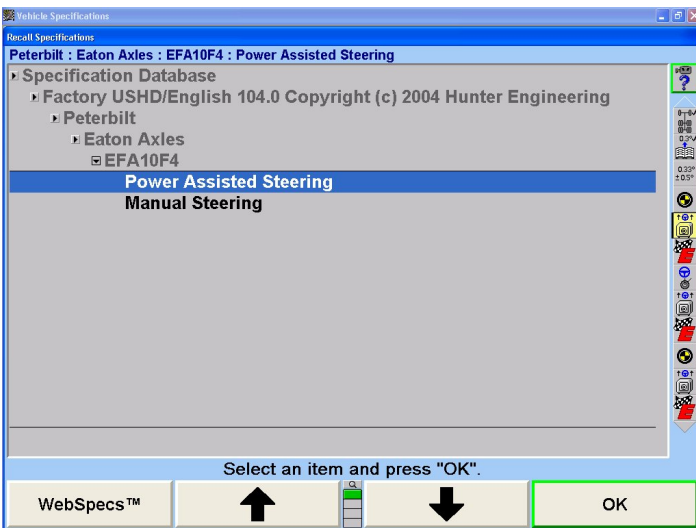
Open the "Recall Specifications" pop-up screen. Select the vehicle, press "OK" for the final selection. The "Show Spec Note" softkey will be available on the screen at this point. Press "Show Spec Note". This allows you to view the note without recalling the specifications.

The "Specification Note" pop-up screen will appear.



Use the keyboard to type and/or edit the note as desired. Pressing “Cancel” will close the pop-up screen without altering the note. Pressing “OK” will store the note in the specification memory with the vehicle.

If a vehicle in the specification memory has a note attached, it will have a small image of a note with a paperclip next to it in the “Recall Specifications” pop-up screen.



### 2.3.10. Storing User Specifications

The program can store vehicle specifications that you enter and identify directly.

These specifications can either be manually entered onto a blank specification screen or derived from a factory specification by recalling and then editing the specifications for a vehicle.

#### The specifications can then be stored in two locations:

If they were manually entered onto a blank specifications screen, they can be stored in “User” specification memory.

If they were derived from a factory specification, they can be stored in “User” specification memory or they can be stored in the “Factory” specification memory as an “Attachment” to the factory specification.

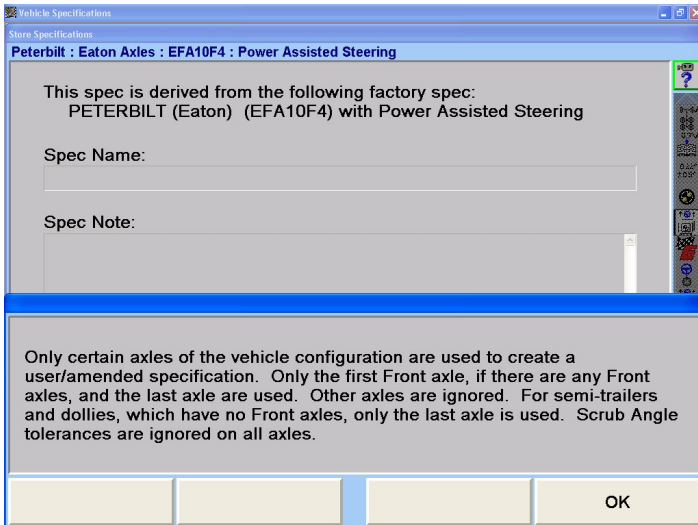
#### To store a specification:

On the “Vehicle Specifications” primary screen, press “Clear All Specifications”. Then manually enter the specifications in the usual manner.

OR

Recall the vehicle specifications from the specification memory. Then manually edit the specifications as needed. This derives the specifications from the factory specifications.

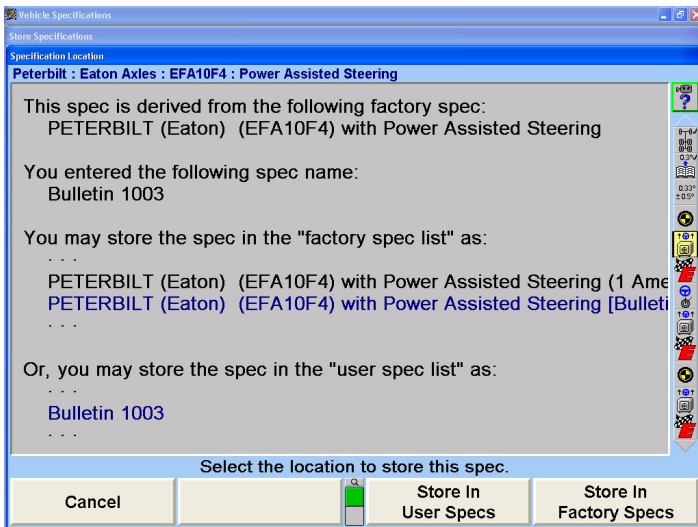
When the specifications are ready to store, press "Store Specifications". The "Store Specification" pop-up screen will appear.



Type in the identification of the vehicle. This is the name of the vehicle that will appear on the "Specification Recall" pop-up screen, and at the top of the "Vehicle Specifications" primary screen.

Press "Next Field" or "Tab", and the cursor will move to the "Spec Note" field. Type in any desired notes concerning the vehicle, such as Technical Service Bulletin information.

Press "OK". If the specifications were not derived from a factory specification, they will be immediately stored in the user specification memory. If they were derived from a factory specification, the "Specification Location" popup screen will appear. Now you must decide where to store the specification.



Press "Store In User Specs" or "Store In Factory Specs" to specify the memory where the new specification will be stored.

When saving to User specifications, if the specification ID is already used in the memory, a screen will appear stating "A specification with this ID is already in the database. Do you want to replace it?" Pressing "OK" or "Enter" will replace the specification.



When saving to “Factory” specifications, if the specification ID is already used in the database, the specification will be saved as an AMENDMENT to the factory specification already in memory. For recalling User Specifications, refer to [“Selecting User Specifications. \[19\]”](#)

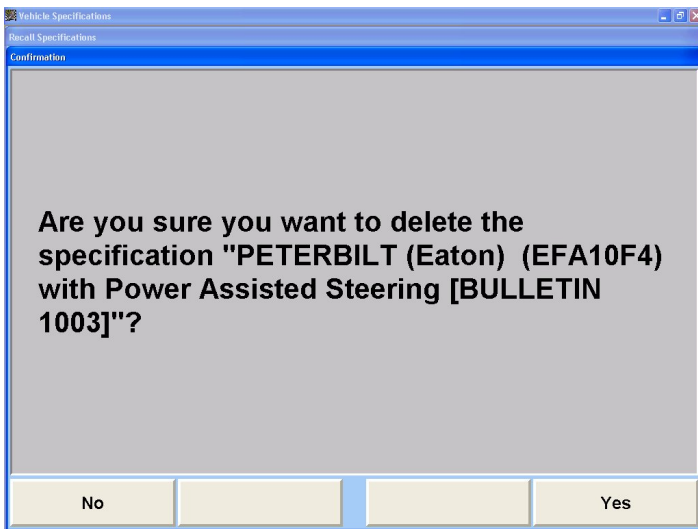
### 2.3.11. Deleting User Specifications

On the “Recall Specifications” screen:

Press ↑ or ↓ to select “Specification Database” and press “OK”. The screen will change to a list of possible screen sequences.

Press ↑ or ↓ to select “User” and press “OK”. The screen will change to list user entered specifications.

Press ↑ or ↓ to move the cursor to the desired item and press “Delete Specification”. The screen will ask for verification.

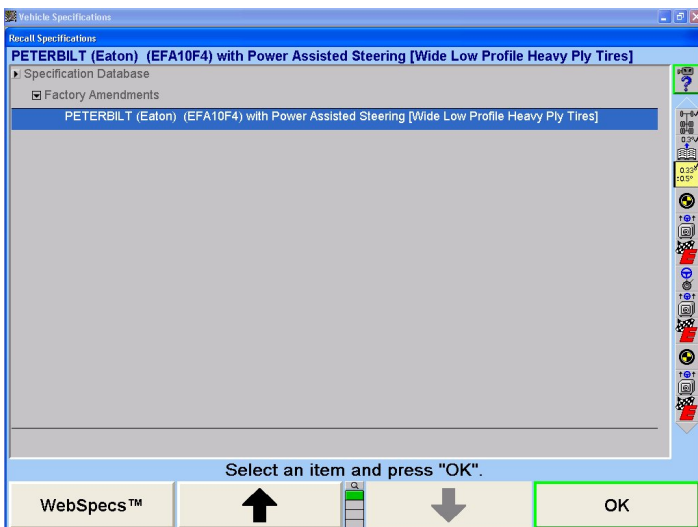


Press “Yes” or “No”.

### 2.3.12. Factory Amended Specifications

“Factory Amended Specifications” are specifications that are derived from and stored with a factory specification. The procedure for doing this is discussed in, “Storing User Specifications.”

Select “Show Spec Databases”. Then select “Factory Amendments”. This displays all vehicles that have a Factory Amended Specification.



The most likely use of a factory-amended specification is that the manufacturer has issued a Technical Service Bulletin that does one or more of the following:

- It alters the factory specification.
- It details a special service procedure.
- It warns of alignment problems.
- It warns of warranty procedures.

By having a “Factory Amended Specification” in the specification memory, these items are brought to your attention, as you recall the specifications. This way, you do not have to remember the Technical Service Bulletins.

On the “Recall Specification” pop-up screen, when there is an amended specification that is derived from the factory specification of the vehicle being aligned, highlight that specification and view its “Specification Note”. This note is intended to explain the use of this specification instead of the factory specification.

If there is a Technical Service Bulletin, store a “Factory Amended Specification” as detailed in “Storing User Specifications.” The “Specification Note” should contain the contents of the Technical Service Bulletin.

### 2.3.13. Selecting Display Units

Do not underestimate the importance of selecting the display units. Although the ability to change display units can be beneficial, the factory specifications are displayed in the format designated by the manufacturer.



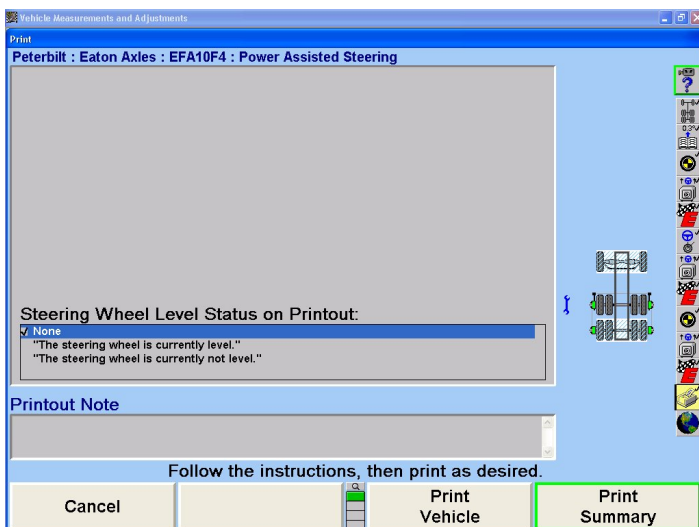
#### NOTICE

The “Alignment Measurement Units and Formats Setup” popup screen may also be accessed by selecting “Alignment Measurement Units and Formats” from “Aligner Setup.” Refer to [“Aligner Setup. \[44\]”](#)

### 2.3.14. Printing Specifications

The vehicle specifications can be printed from the “Vehicle Specifications” primary screen and the “Vehicle Measurements and Adjustments” primary screen.

To print the vehicle specifications, press “Print” on the “Vehicle Specifications” primary screen or the “Vehicle Measurements and Adjustments” primary screen. The “Print” popup screen will appear.



If you wish, type in a note to appear on the printout. Press “Print Summary” to print the vehicle specifications.

## 2.4. Alignment Log Analyzer

The alignment log analyzer will store basic information about each alignment that can be used to generate an alignment summary.

The log analyzer can be reached from the third level of the logo screen.

## 2.5. Vehicle Measurements and Adjustments

### 2.5.1. Vehicle Plan View Status Indicator

The purpose of the vehicle plan view status indicator is to illustrate:

- The geometry of the vehicle under alignment.
- Where and how the sensors should be mounted.
- Which axle of the vehicle is currently displayed.
- The current status of the sensors, transducers, and sensor communications.

The purpose of the vehicle plan view status indicator is to illustrate:

- The axle configuration of the vehicle under alignment.
- Where and how the sensors should be mounted.
- Which axle of the vehicle is currently displayed.
- The current status of the sensors, transducers, and sensor communications.

The indicator appears on the display when:

- The primary or popup screen actively uses the sensors to measure or adjust the alignment.
- Specifications are being shown.
- An alignment procedure is being selected, where one or more instances of the plan view are used to illustrate the steps of the procedure.



















The indicator shows:

- The vehicle axle configuration.
- The currently required sensor mounting locations and orientations.
- Which axle the measurements and adjustments currently apply.
- Which axle is currently selected (which applies to jacking up the axle, etc.).
- The highest priority problem with the set of sensors.
- The highest priority problem with each individual sensor.
- Any detectable blockage of a line of sight between sensors.



To change the displayed axle measurements, click on a wheel of the indicator with a pointing device, or press the softkey for "Select Next Axle."

### 2.5.2. Sensor Troubleshooting

If a sensor has a problem, the "Sensor Status" popup screen will display, and an icon appears next to the affected sensor to indicate the problem. If the sensor has multiple problems, the icon representing the highest priority problem appears. Two icons may appear at times, thereby showing two separate problems. The icons that may be found next to the sensors in the sensor status pop-up screen:

|   |  |
|---|--|
|    | Sensor is not connected.   |
|    | Sensor has communication problem   |
|    | Sensor is unknown type   |
|    | Sensor has self-test error   |
|    | Sensor is mismatched with others   |
|    | Sensor is not calibrated (Cal-Check®)                                    |
|    | Sensor has calibration errors.   |
|    | Sensor requires compensation   |
|    | Caster adjust transducer has problems                                    |
|    | Camber transducer has problems   |
|   | Transverse toe transducer has problems                                   |
|  | Longitudinal toe transducer has problems.                                |
|  | Sensor has excessive runout.   |
|  | Sensor is not level. (Level Reminder®)                                   |
|  | Toe transducers may require re-calibration.                              |
|  | Battery requires recharging.   |
|  | Target not found. Targets need to be cleaned.                            |
|  | Target is found by camera, but not measured. Targets need to be cleaned. |

The following icons can appear overlaying the line of sight from one sensor to another:

|   |                                   |
|---|-----------------------------------|
|  | Transverse toe beam is blocked.   |
|  | Longitudinal toe beam is blocked. |

### 2.5.3. Showing Measurements

For “Geometric Centerline” the measurements for alignment, front camber, toe, and total toe will be shown.

For “Thrust Line” or “Total 4-Wheel” alignment, camber, toe, and total toe for the front will be displayed as well as rear camber, toe, total toe, and thrust angle.



#### NOTICE

These measurements should not be used to diagnose or adjust the vehicle until the vehicle is lowered, jounced, and the wheels are in a straight ahead position.



#### NOTICE

A red “X” next to the sensor having difficulty indicates a blocked optical path or other communication problem.



#### NOTICE

A negative sign (-) is used to indicate the following:

A negative value for a specified angle or tolerance. A SET BACK condition to the left (indicating the left front wheel is trailing the right front wheel). A THRUST ANGLE condition to the left (indicating a thrust line toward the left of centerline). Positive values for SET BACK and THRUST ANGLE indicate conditions to the right.

Pre-alignment measurements can be saved to be printed on the summary after the alignment is complete. Pressing “Save Before Measurements” will store these measurements.

### 2.5.4. Bar Graph Adjustments

Bar graphs indicate the difference between the actual measurements of the vehicle and the recalled specifications.

Softkeys labeled “Show Next Axle,” “Show Bar Graphs,” and “Show Next Bar Graphs” are available to access adjustment displays. The system utilizes both bar graph and digital adjustment displays.

As the vehicle is adjusted, the wheel position indicator moves in the direction of the adjustment. As the adjustment approaches the acceptable tolerance range, the center area of the bar graph grows. When the adjustment is within tolerance, the bar graph changes to green.



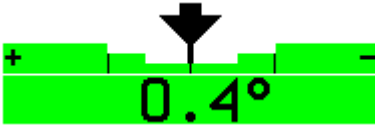
Out Of Tolerance - beyond range of the bar graph



Out Of Tolerance



## Acceptable Adjustment (within tolerance)



## Preferred Adjustment

If the bar graph color is gray:

No specification, a “zero tolerance,” or no tolerance is entered for that angle.

**OR**

The sensors are experiencing some problem that prevents measurements, such as: the sensor is unplugged, uncompensated, or the toe beam is blocked.

## 2.5.5. Bar Graph Groups

The bar graphs can be displayed in various groups. Select the appropriate softkey to view an alternative group or single bar graph.

## 2.5.6. Context Sensitive Menu

A context sensitive menu is available on the bar graph adjustment screen.

To view the menu, move the arrow cursor to the desired bar graph then press and hold. Pressing the tab key will also cycle through each context sensitive menu.

The items listed in the menu will depend upon which bargraph is selected. The menu may contain some of the following items:

- Zoom In
- Zoom Out
- Illustrate Adjustments
- Video Adjustments
- Animation Adjustments
- Adjust with Eccentric Cams
- Adjust with Shims
- Adjust Toe with WinToe
- Measure Caster
- Measure SAI/IA
- Set Units and Formats
- Select Bar Graphs Groups
- Show Specs
- Hide Specs
- Show Cross Bar Graphs and Additional Cross Angles

## 2.5.7. Zero Adjustments

The “Zero Adjust” screen shows the amount and direction( $\pm$ ) the actual measurement is from the preferred specification. Adjusting an angle to zero on this display will cause the actual angle measurement to be exactly equal to the preferred specifications as established by the alignment specifications.

If the bar graph is gray, no specification, zero tolerance, no tolerance, or the conditions make the bar graph invalid for that angle.

### 2.5.8. Showing and Selecting Axles

The axle measurements can be viewed at any time from the “Vehicle Measurements and Adjustments” primary screen.

When the measurements for an axle are shown, press “Select Next Axle” to see the next axle measurements.

### 2.5.9. Adjusting with Axles Raised

Adjustment Order

The vehicle should be adjusted in the following order:

- Rear Camber (if adjustable)
- Thrust Angle (if adjustable)
- Front Camber/Caster (if adjustable)
- Front Toe
- Scrub Angle



#### NOTICE

If a sensor is removed from the wheel during vehicle adjustment, that sensor must be re-compensated when it is re-mounted.

If a measurement displays in gray with no value shown and an error message is on the vehicle graphic, something is wrong with the sensor at the wheel indicated. The sensor may be disconnected, or an optical “line of sight” to another sensor may be blocked. When the error is corrected, the error message will disappear and the bar graph will return to normal.

### Selecting the Procedure

From Setup Aligner > Alignment Procedure > Use the arrows keys to choose the desired alignment procedure > OK.

### 2.5.10. Controlling Sensor Compensation

The sensors can be compensated by the 2-Point method or the 3-Point (Pro-Comp) method. This is controlled by WinAlign® HD. To select the compensation method:

- Press “Mount Sensors” on the “Vehicle Inspection” primary screen or “Control Compensation” on the “Vehicle Measurements and Adjustments” primary screen. The screen will change to the “Compensation Control” popup screen.
- Press “Use 3-Point (Pro-Comp®) Procedure” or “Use 2-Point Procedure.”
- Press “Set As Default” to have the selected procedure become the default.
- Press “Revert to Default” if the selection was temporary and the alignment procedure for that method has been completed.

### 2.5.11. Measuring Caster, S.A.I., and Included Angle

The “Measure Caster” display provides guidance through the procedure to measure Caster or Steering Axis Inclination (S.A.I.) and Included Angle (I.A.). At times, measuring S.A.I. or I.A. may help determine front suspension problems.

Follow the on-screen instructions to perform the measurements. For complete information, reference the “HELP” file, available in the lowest row of k-keys.

### Twin Steer Caster Measurement

For vehicles with two front steering axles, caster measurements can be taken at the same time.

Follow the on-screen instructions to perform the measurements. For complete information, reference the "HELP" file, available in the lowest row of k-keys.

### 2.5.12. Measuring Additional Angles

Selecting "Make Additional Measurements" from the "Vehicle Measurements and Adjustments" primary screen provides a choice of additional measurement procedures:

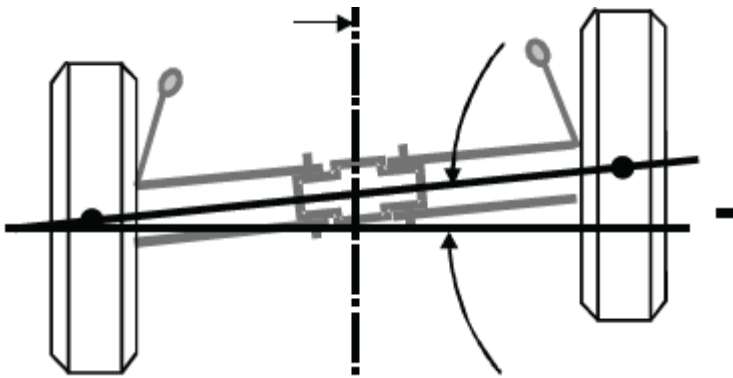
- Frame Offset
- Frame Angle
- Axle Offset
- Toe-Out-On-Turns
- Maximum Steering Angle and Toe-Out-On-Turns
- Live Set Back

Follow the on-screen instructions to perform the measurements. For complete information, reference the "HELP" file, available in the lowest row of k-keys.

### 2.5.13. Symmetry Angle/Set Back Definitions

#### Front Set Back

Front Set Back is an angle formed by a line drawn perpendicular to the geometric centerline and a line connecting the centers of the front wheels. Front Set Back is positive when the right front wheel is behind the left front wheel. Front Set Back is negative when the right front wheel is ahead of the left front wheel. Front Set Back is measured as an angle but can be displayed in inches or millimeters if front tread width is available in the vehicle specification data.



### 2.5.14. Control Saved Measurements

#### Showing "Current" Measurements

Press "Control Saved Measurements" on the "Vehicle Measurements and Adjustments" primary screen. The "Control Saved Measurements" popup screen will appear.

Use the arrow keys to select "Show 'Current' Measurements." and display them.

#### Showing "Before" Measurements



#### NOTICE

If the "before" measurements are not saved, the bar graphs will become gray.



Press "Control Saved Measurements" on the "Vehicle Measurements and Adjustments" primary screen. Use the arrow keys to select "Show 'Before' Measurements." and display them.

A yellow bar across the top of the screen denotes "Save Before Measurements." When the before measurements are on the screen, adjustments cannot be made.

### Saving "Current" Measurements as "Before" Measurements

This option is available on the "Control Saved Measurements."

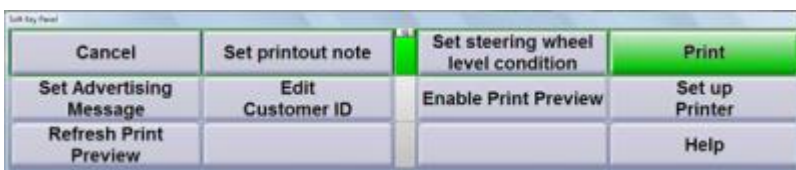
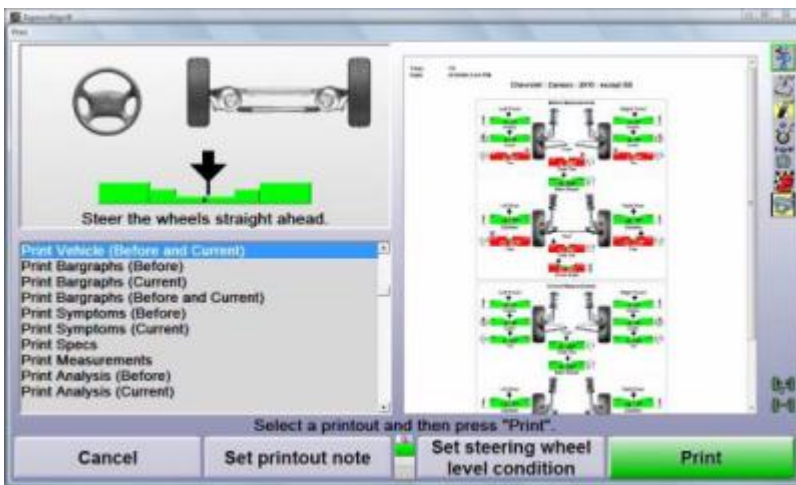
Use the arrow keys to select "Save 'Current' Measurements as 'Before'."

Steer the wheels straight ahead as indicated by the bargraph on the screen.

Press "Ready." The program will save the before measurements and the screen will return to the "Vehicle Measurements and Adjustments" primary screen.

### 2.5.15. Printing the Measurements

Access the print selections from the "Vehicle Specifications" or the "Vehicle Measurements and Adjustments" primary screens. This screen will also be available at the end of the alignment process.

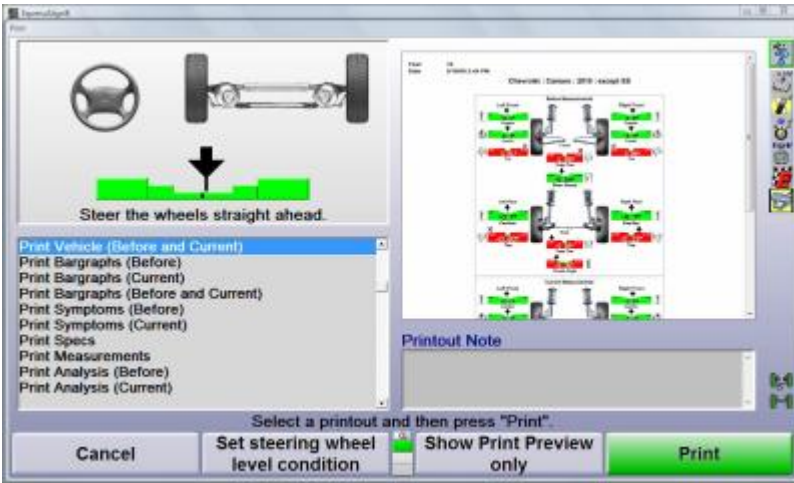


WinAlign will remember the printout selected on the last alignment and automatically select the same printout for future alignments.

Selecting a printout in the selection box on the lower left portion of the screen will show a preview of that print out on the screen. When "Print" is selected WinAlign will send the printout to the printer.

### 2.5.16. Set Printout Note

A note can be added to the printout by pressing "Set Printout Note" and typing in the text box provided below the print preview.



## 2.6. ExpressAlign®

ExpressAlign® is a feature that analyzes an alignment job and directs the technician through the alignment and adjustment procedures needed for a specific vehicle. ExpressAlign® reduces the alignment procedures to the minimum number of steps required to completely align the vehicle.

ExpressAlign® considers the following for each specified vehicle aligned:

- The alignment adjustments that are necessary.
- The alignment sequence and specifications for the adjustment(s).
- The tools and kits required.
- The applicable adjustment illustrations and videos.

Then ExpressAlign® creates a custom alignment procedure that allows the technician to perform only the procedures needed for the selected vehicle.



### NOTICE

ExpressAlign® may display bar graphs and prompt you to adjust an angle that is out of specification that the vehicle manufacturer states is non-adjustable. The reason ExpressAlign® displays these bar graphs is because this could indicate a problem within the suspension or steering components that needs to be diagnosed and repaired for proper vehicle alignment. This is why the manufacturer publishes a specification for that angle, even if it is not adjustable. There may also be an aftermarket kit available to make the necessary adjustment for this angle.

Three levels of ExpressAlign® can be selected from the ExpressAlign® Setup, or a custom setup can be chosen.

- Level I is designed to provide the technician with the maximum amount of help and support to complete the alignment.
- Level II is designed to present the optimal alignment procedure, while still showing the user what tools and kits are necessary to complete the job.
- Level III provides the optimal alignment procedure for the experienced technician.

Follow the on-screen instructions. For complete information, reference the “HELP” file, available in the lowest row of k-keys.

## 2.7. Frame Reference Alignment

To perform an alignment using the frame as a reference, follow the steps below. The procedure requires two frame gauges and frame plugs (if necessary for mounting the gauges).

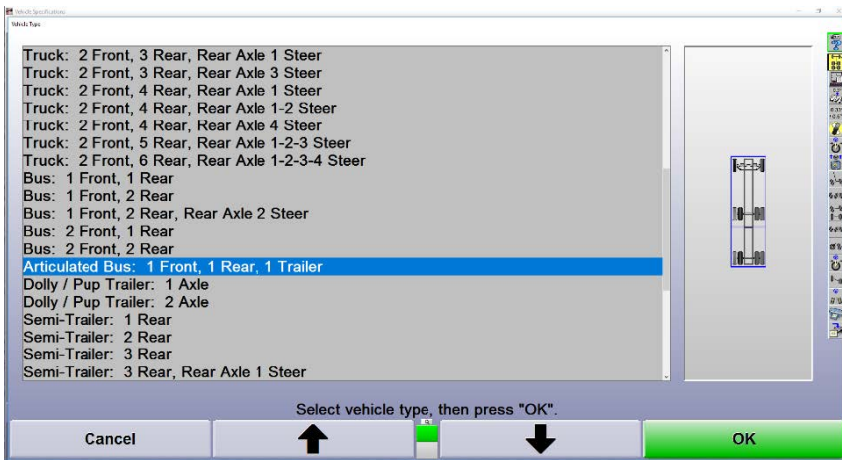
Choose configuration (vehicle year, make, model, axles,etc).

Select "Alignment Procedure", then choose "Total Alignment with Frame Reference".

Follow the on-screen instructions to perform the measurements. For complete information, reference the "HELP" file, available in the lowest row of k-keys.

## 2.8. Articulated Bus Procedure

An articulated bus is a two-section bus with a joint between sections to increase maneuverability. WinAlign®HD version 16.1 and later includes a procedure for articulated busses.

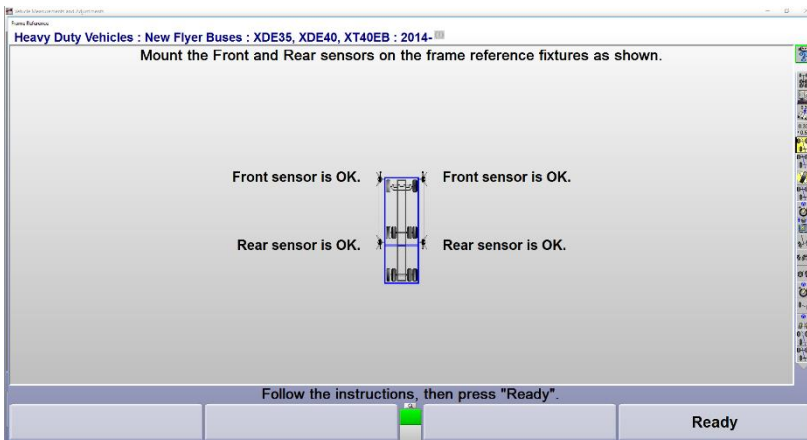


Bus body reference stands (20-3246-1, set of 4) are required.

Bus body reference stands (20-3246-1, set of 4) are required.



This procedure requires the bus to be pulled straightforward into the alignment bay. Driving straight ahead will allow the articulated hitch to self-center.



Bus stands are positioned as near to the corners of the front section as possible. It is advisable to avoid doorpanels. Notice the front bus stand is forward of the small access door. The concept is to find the centerline of the bus body.

Continue to follow on screen instructions.

## 2.9. HawkEye XL Sensors

### 2.9.1. Setting up Aligner

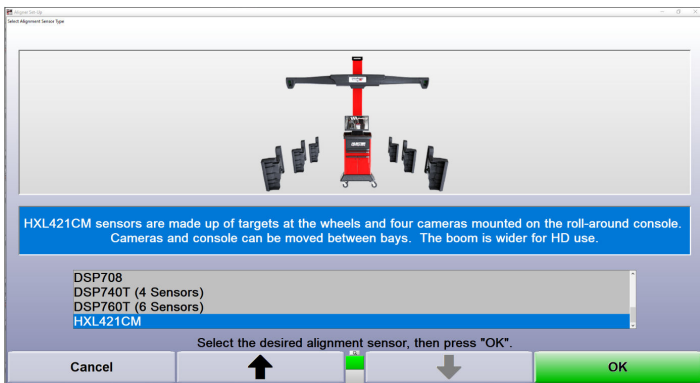


1. From the WinAlign® Start Screen click the 2nd button down.

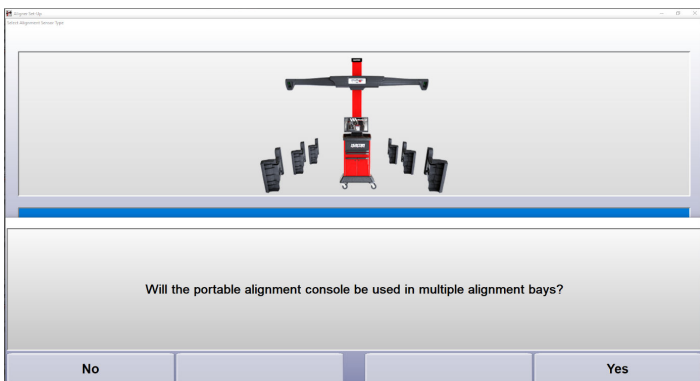


Then click on  
Service Programs > Setup Aligner

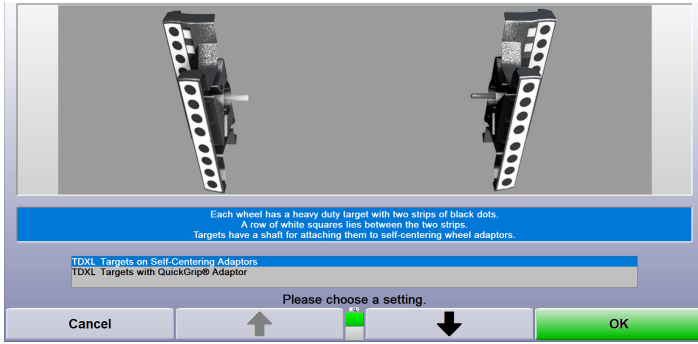
2. Scroll down to Heavy Duty Sensor Type and select: **HXL421CM**



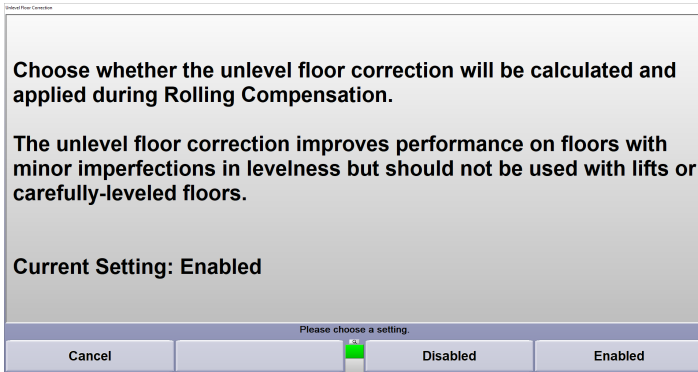
3. Select YES or NO for multiple bay use.



4. Select your target type  
**TDXL Targets on Self-Centering Adaptors:**



5. Choose whether the unlevel floor correction will be calculated and added during Rolling Compensation



### 2.9.2. Mounting Targets

The TD-XL Target™ alignment reflectors attach to wheels with adaptors for the purpose of indicating individual wheel position and orientation as measured by digital camera alignment sensors to perform vehicle alignment service.

TDXL Target™ alignment reflectors and QuickGrip® adaptors alignment wheel adaptors can only be used with Hunter HawkEye® XL alignment sensors.

TDXL Target™ alignment reflectors are capable of QuickComp™ roll-forward compensation.

#### Self-Centering Clamps with TDXL Target

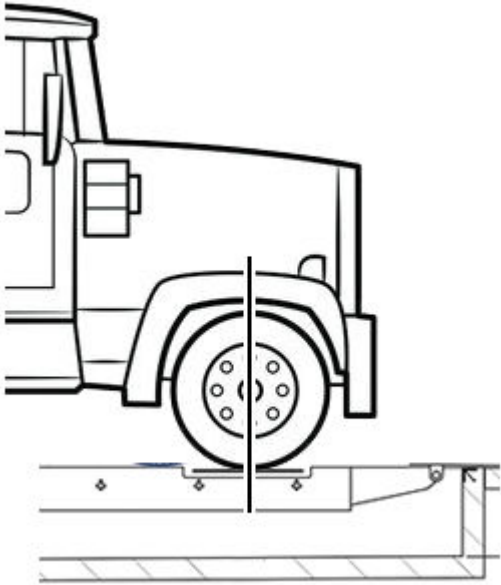


### **Jacking Compensation**

When using Jacking Compensation, targets may be compensated in any order; however, these precautions must be followed:

- If a target is removed from a wheel, that target must be re-compensated when re-installed. The other targets do not need re-compensation.
- When compensating targets that are mounted to drive wheels, place the transmission in neutral and release the brakes.

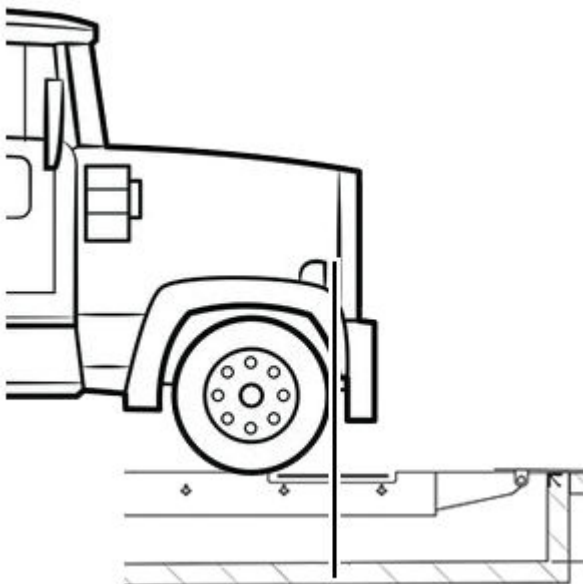
#### **Center of wheel on center of turnplate**



### **QuickComp™ Roll-Forward Compensation**

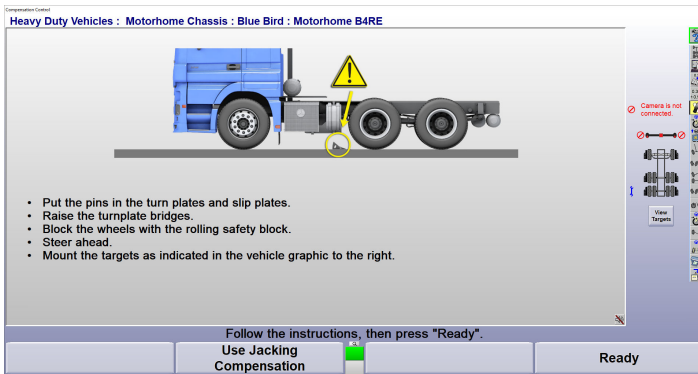
QuickComp™ Roll-forward compensation is performed by stopping the leading edge of the front tires on the centerline of the front turnplates and then rolling the vehicle forward onto the front turnplates when performing the compensation procedure.

#### **Leading edge of tire at center of turnplate**

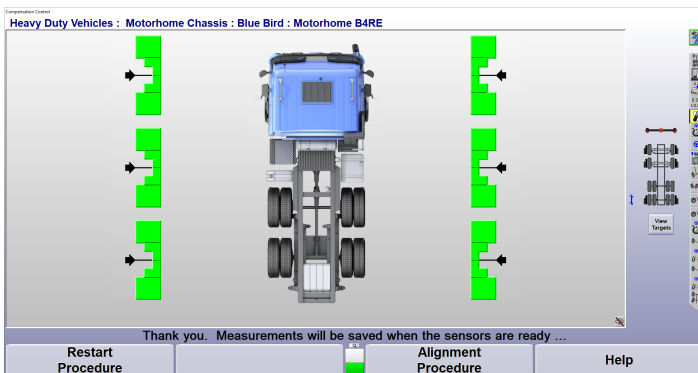
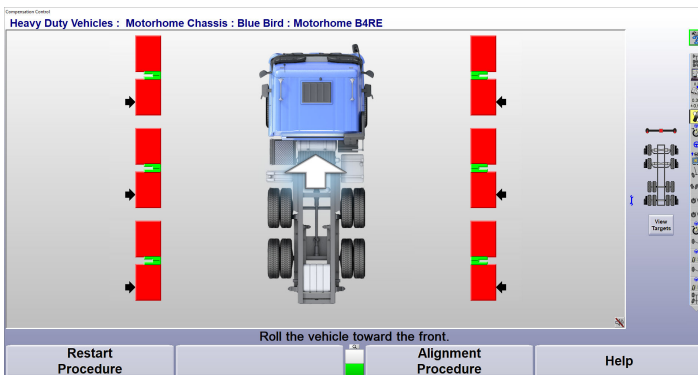


## 2.9.3. Alignment Procedures

- From the WinAlign Start Screen click "Begin Alignment"  
Follow the on-screen instructions. Press "Ready"



- Roll the vehicle toward the front  
Once within the green bars measurements will be saved automatically.



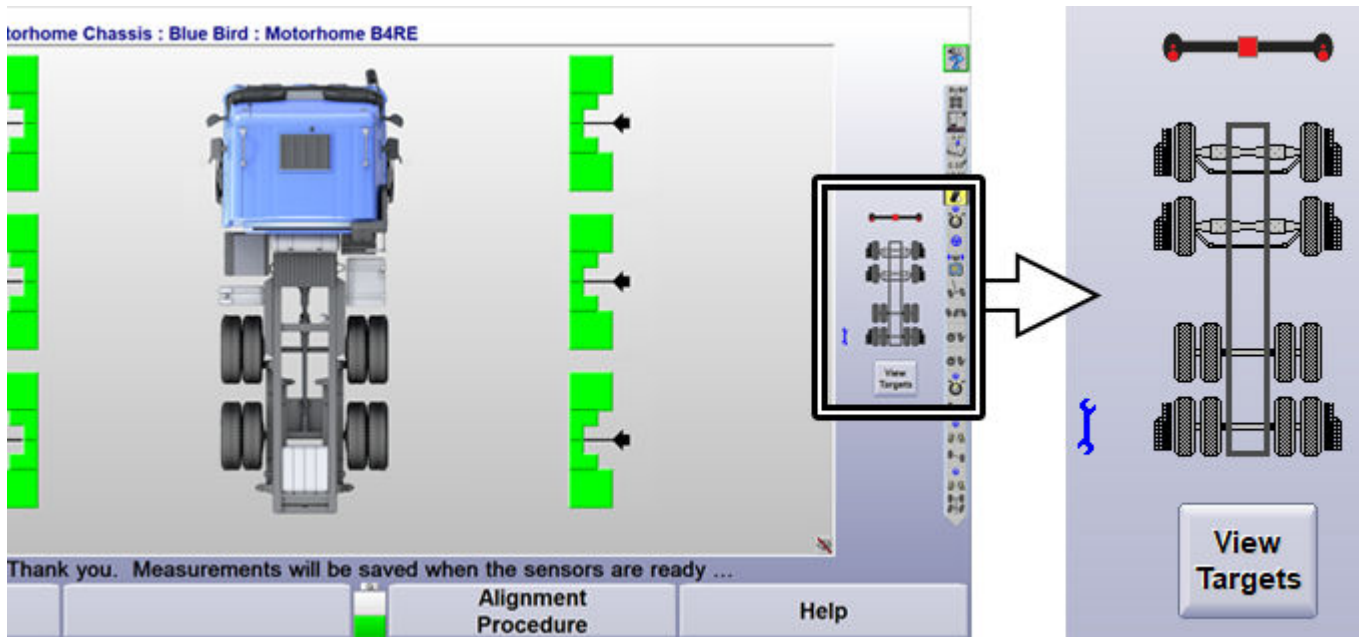
## 2.9.4. Truck Plan View

The **Plan View** graphic on the right will show you whereto mount the targets.

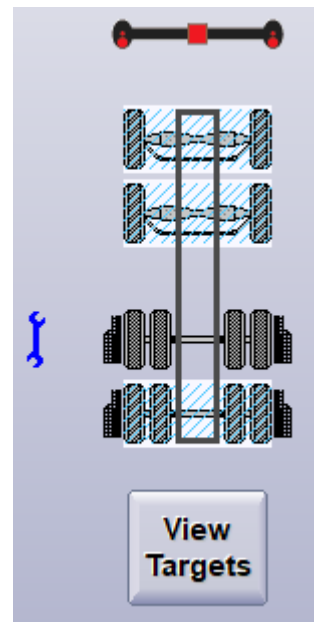
The **Wrench icon** indicates which axle is to be adjusted in the alignment procedure.

3-axles have live measurements at a time.



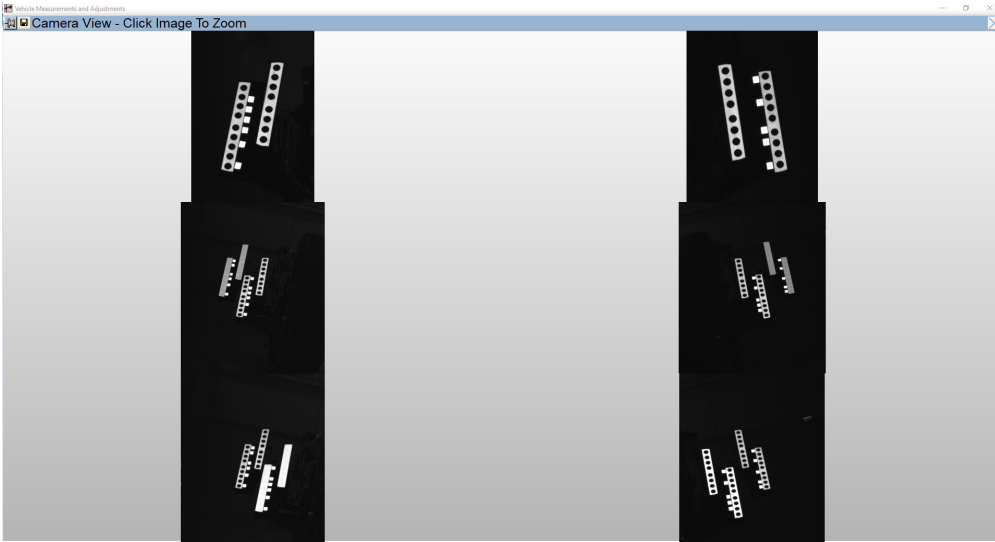


The Plan View shows which axle should have adapters and targets mounted for live measurements and adjustments.



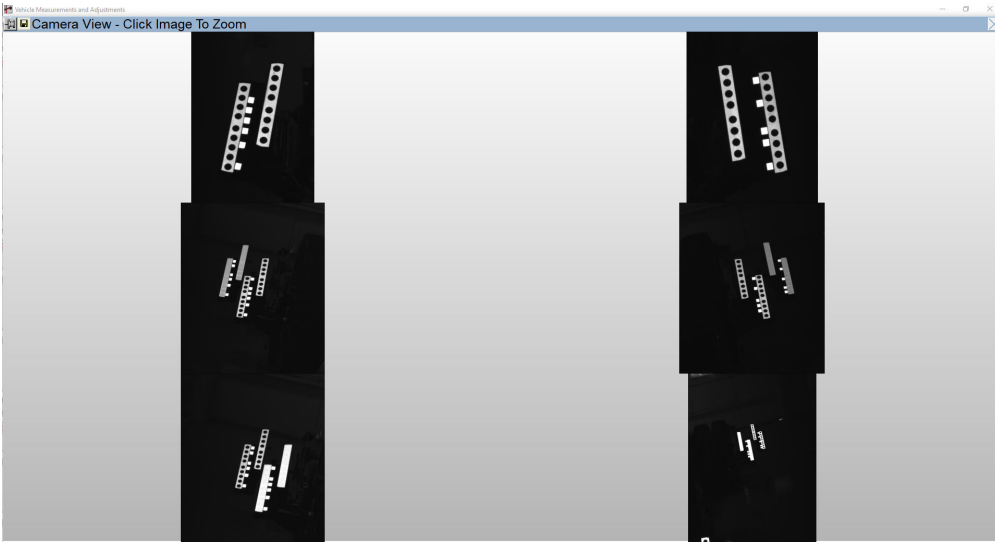
The "View Targets" button will show targets from the camera's point of view.

Example of 6 targets shown.



Example of 1 target blocked (back passenger side).

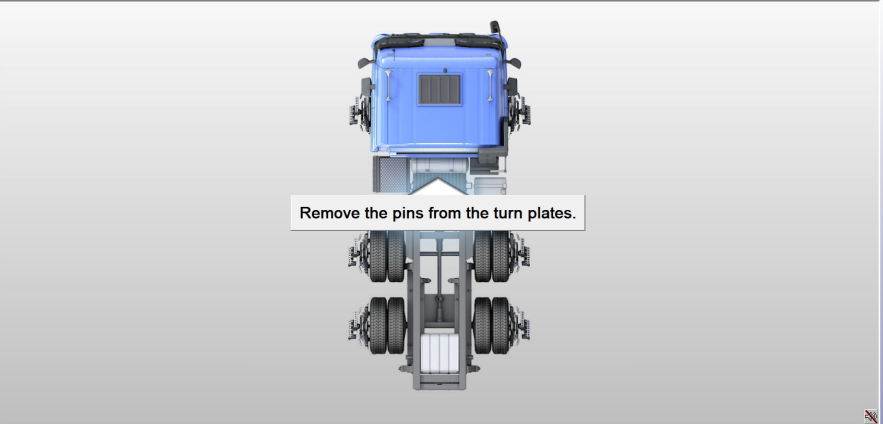
**Note:** middle and rear target below show the same image



8. After compensation, remove the pins from the turnplates.

Vehicle Measurements and Adjustments  
Compensation Control

Heavy Duty Vehicles : Motorhome Chassis : Blue Bird : Motorhome B4RE



Remove the pins from the turn plates.

Roll the vehicle toward the front.

Use Jacking Compensation

View Targets

The image shows a software interface for vehicle compensation. At the top, it identifies the vehicle as a 'Blue Bird Motorhome B4RE'. The main area displays a top-down view of the motorhome chassis. A white text box is overlaid on the chassis, instructing the user to 'Remove the pins from the turn plates.' Below the chassis view, another instruction reads 'Roll the vehicle toward the front.' At the bottom of the interface, there is a control panel with a button labeled 'Use Jacking Compensation' and a 'View Targets' button. A vertical toolbar on the right side contains various icons for navigation and adjustment.

## 3. Aligner Setup

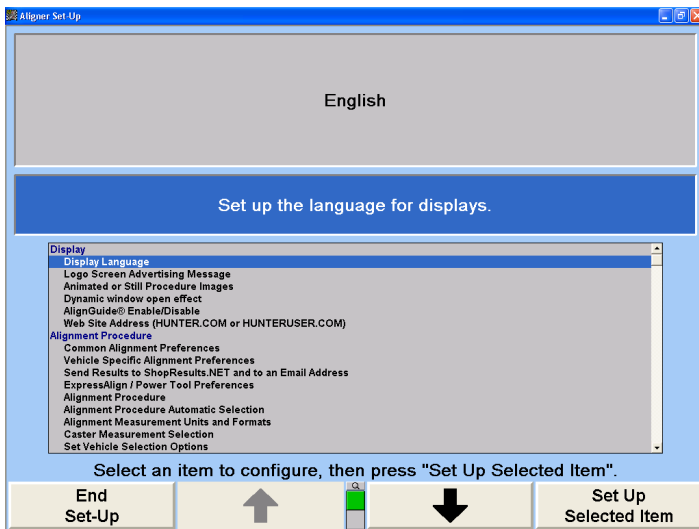
### 3.1. Setup

The aligner can be configured to meet many different operating needs. Selections such as the default alignment procedure can be set.

The setup selections are stored on the hard drive and recalled each time the program needs them.

To modify setup, press “Service Programs” on the logo screen. The menu labels will change.

Press “Set Up Aligner” and the “Aligner Setup” primary screen will appear.



Make the desired changes to settings and Press “End Setup” to exit setup and save changes.

### 3.2. Work Management

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

Two work orders may be available, the work order of the current alignment job, and the reference work order. Only one of these work orders is active at any time. Softkeys allow the user to quickly switch between viewing the current work order and the reference work order.

The reference work order recalls a previous alignment job for viewing, but cannot be modified. For repeat customers, the reference work order may be used to view or print the results of a previous alignment.

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

### 3.3. Equipment Information

#### 3.3.1. Conventional Sensors (Care & Cleaning)

When cleaning the sensors, use a mild window cleaning solution to wipe off the sensors and adaptors.



#### **WARNING**

Do not hose down or submerge the sensors. Do not spray cleaner on sensor. This could cause damage to the electrical system and optical components.

Keep wheel adaptor rods cleaned and lubricated. Lubricate as needed with a coating of light lubricant such as WD-40.



#### **WARNING**

Do not lubricate center screw shaft.

### **3.3.2. Charging Conventional Sensor Batteries (XF Sensors Only)**

Each sensor contains a 12VDC sealed lead acid rechargeable battery. To get the maximum life out of the batteries in the sensors, follow these three rules:

1. If the sensors are not in use, charge them.
2. Switch sensors "OFF" during charging if you are using cables.
3. Charge for eleven to thirteen hours, and/or provide an extended charge time (24 hours or longer) at least once a week.



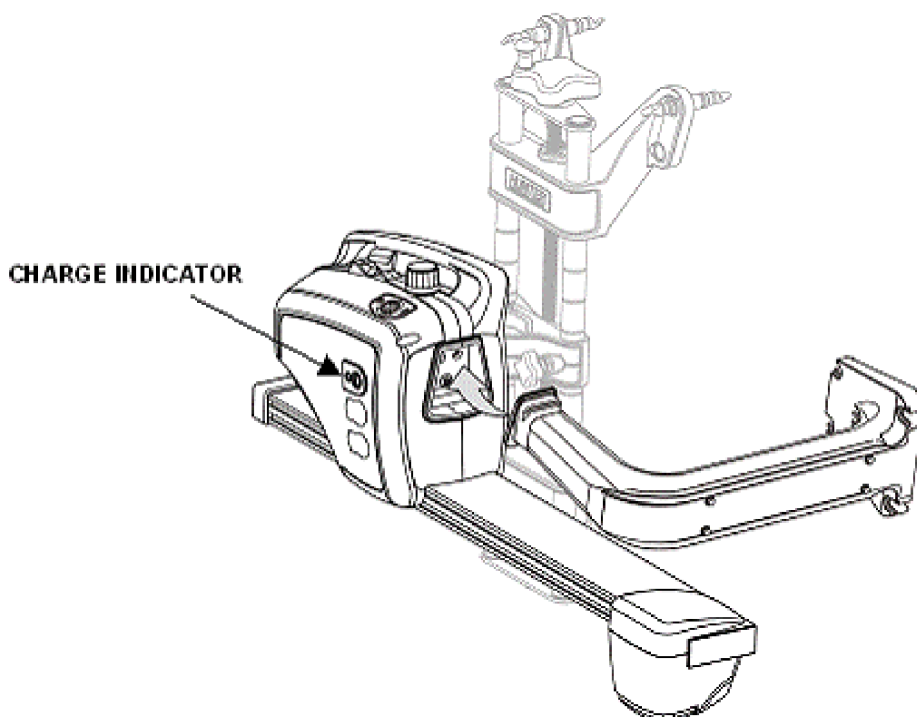
#### **NOTICE**

Make sure the main power switch at the rear of the console is left "ON" and the outlet that supplies power to the aligner is on.

To prevent premature degradation of battery performance, the charger has to replace 125% of the energy that was removed from the battery. It is not necessary to fully discharge the batteries before charging. However, it is important they be charged fully.

#### **CHARGING INFORMATION**

To recharge the batteries when the sensors are not in use, place the wheel adaptor sensor assemblies on the cabinet storage hanger and leave the main aligner power on. The "shoe" on which the sensor hangs acts as the - (neg) terminal, and the insulated contact is the + (pos) terminal.



Any time batteries are being charged the charge indicator light on the sensor will be illuminated.

The charge indicator light turning from red to yellow is an indication that the charging mode has switched from a fast charge mode into a “trickle” charge mode. It does not mean that the battery is 100% charged. A fully discharged battery should be allowed to “trickle” charge a minimum of five hours to ensure a full charge. The charge indicator light turns green after approximately 6-8 hours of trickle, indicating the charger has entered “float” mode, which maintains the battery at full charge indefinitely.

You should expect at least 8 hours of continuous use from a fully charged battery. If you are not getting this amount of usage time, the most likely cause is inadequate charging time.

Batteries that are consistently subjected to partial charging rather than full charge cycles will permanently lose capacity.

Charging time for a fully discharged battery with the sensor power switch turned “OFF” is 11 to 13 hours. Three or four times this interval would be required if the sensors were left “ON” during the charge cycle. It is very important that the sensors be turned “OFF” during charging. The sensor’s power switch is located on the front of the sensor above the two cable connectors. When the sensor is placed on the storage hanger, it will automatically turn off.

Charging overnight with the sensors’ power switches set to “OFF” will provide a proper charge.

Our charging system cannot over-charge the batteries. If you’re not using the sensors, charge them!

The sensor batteries are rated for 200 full charge/discharge cycles, making their life expectancy about one year for the customer that consistently discharges them 100%. Life expectancy for batteries with lower usage can be significantly longer.

|                |             |
|----------------|-------------|
| 100% Discharge | 200 Cycles  |
| 50% Discharge  | 450 Cycles  |
| 30% Discharge  | 1000 Cycles |

### **In a shop with extended service hours, there are some things you can do to prolong battery life:**

When the sensors are not being used to perform alignments, they should be stored on the charging hangers with sensor power switched off. At a minimum, turn the sensors “OFF” between alignments. Any charging accomplished throughout the day helps maintain the batteries at peak performance, and helps extend their life.

If you have one day out of the week when alignments are not performed, you can let the sensors charge continuously for 24 hours or longer. This should “undo” the effects of any undercharging that occurred during the previous week. This sort of prolonged charging will only be effective at restoring full capacity to the batteries if performed regularly. Once a week is the recommended minimum.

### **When is it time to replace the batteries?**

If after a full charge the battery does not last for the expected 8 hours, you should put it through one or two sessions of extended charge time (24 hours or longer). If the battery does not recover and start giving satisfactory cycle time, then it should be replaced. The sooner you catch the batteries losing capacity, the more likely an extended charge time will restore the battery to normal capacity. If the battery discharge time is only three or four hours, it is unlikely that extended charge time will help significantly.

### **Additional information:**

Any sensor that is powered up after being off for a while will initially indicate 100% capacity on the aligner screen. This is not an accurate indication of the charge state of the battery. The battery has a “surface charge” which dissipates quickly. Within 5 minutes of operation the on screen battery level indicator will settle at its true value. The individual wheels on the screen indicate the actual battery condition and are color-coded. The following is an indication of battery charging condition:

- **Green** = fully charged or partially charged
- **Yellow** = approximately 20% charge left

### 3.4. Quick Check Drive HD



#### NOTICE

Quick Check Drive HD™ requires an active HunterNet® account to be enabled in setup.



#### NOTICE

ShopResultst must be enabled in quiet mode(with or without printout images) in order for the system to return VIN numbers.

WinAlignHD® 17.0 and above supports the use of Quick Check Drive HD™ sensors in the Quick Check® procedure (WU series consoles only).

Quick Check Drive HD™ is a completely unmanned inspection system. 32 lasers shoot onto the vehicle's tires. 8 camera sensors "see" the reflection of the laser and compute 16 total toe and four camber measurements. Outlying measurements are discarded, other measurements are averaged.

Cameras capture images of the license plate, determine the characters, then send those characters to a third party which then sends back the VIN number associated with that license plate.

Brand new plates, temporary plates, recently transferred plates and dealer plates will not return a valid VIN if they are not in this database.

Vehicle year, make and model are then determined locally by the WinAlign® software according to the VIN number that is returned. This information is used to determine the specifications of the vehicle. WinAlign® compares measurements to specs. The results are calculated and displayed.

In the event the VIN cannot resolve the specs, gray bargraphs will be displayed. "Missing" results may be edited manually in HunterNet.

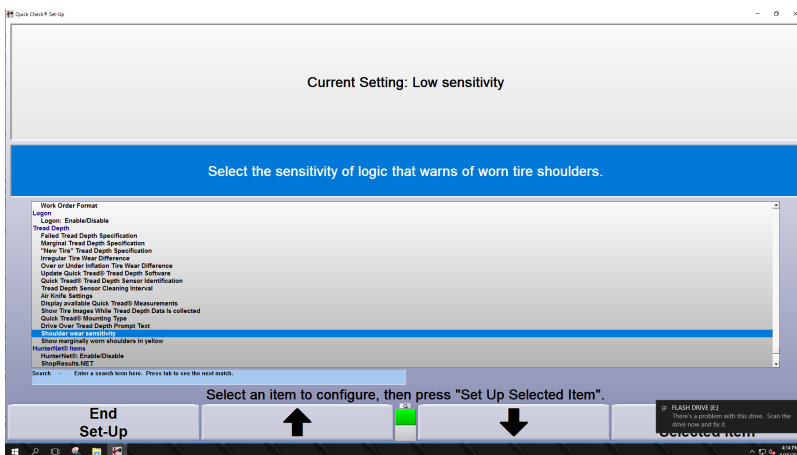
### 3.5. Quick Tread Heavy

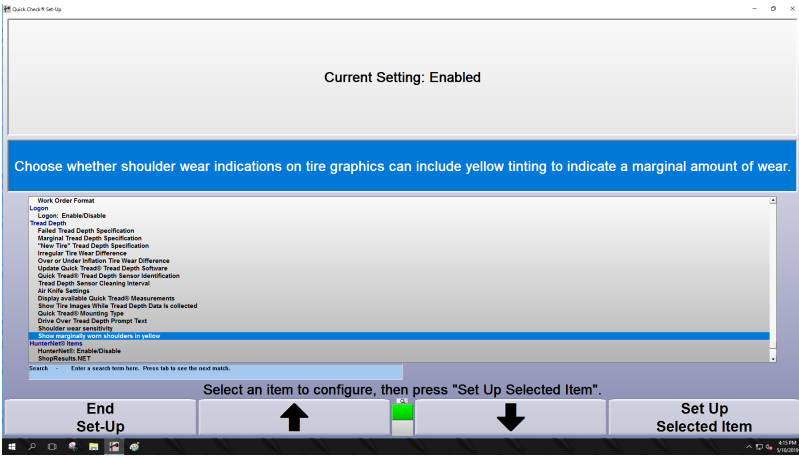
WinAlign® 17.0 and above supports the use of QuickTread Heavy™ sensors in the Quick Check® procedure (WU series consoles only).

Quick Tread Heavy® can detect shoulder wear, in addition to the same measurement capable of the first generation machines.

#### Unique Setup Items

Quick Tread Heavy™ has two unique setup items to adjust the shoulder wear detection sensitivity and display options.





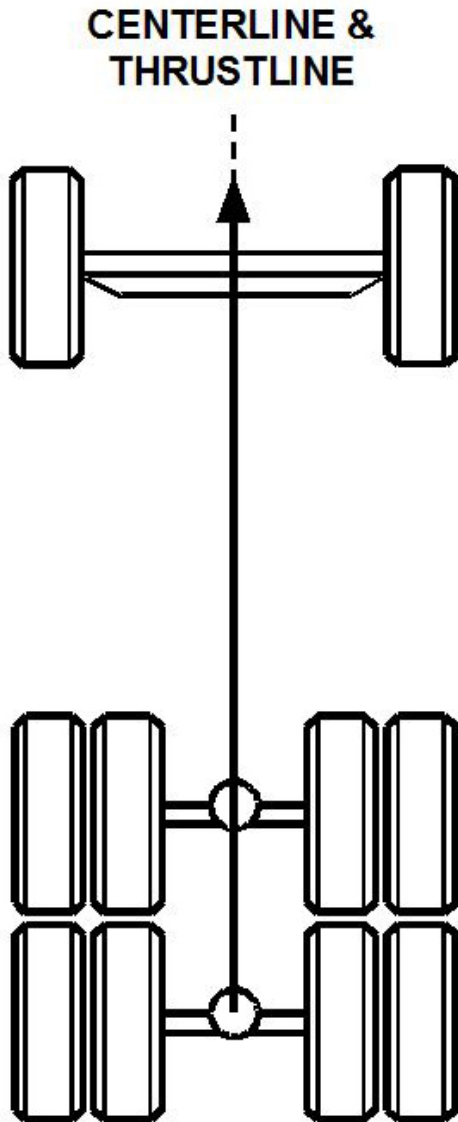


## 4. Glossary

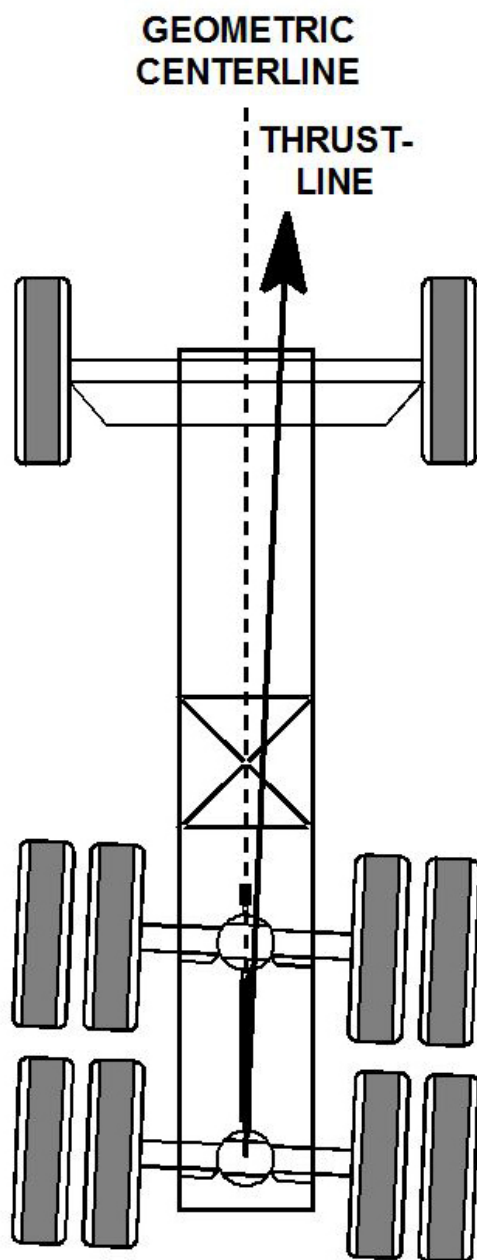
### 4.1. Alignment Types

#### 4.1.1. Front Centerline Alignment

Toe on each front wheel is measured and adjusted using the geometric centerline of the vehicle as a reference. Geometric centerline alignment has been used for many years and may provide a satisfactory alignment if the rear wheels are positioned squarely with the geometric centerline of the vehicle.



However, if the vehicle's rear wheels (either solid axle or independent suspension) create a thrust line that is not parallel to the geometric centerline, the front end steering geometry will be off center as the vehicle moves in a straight direction.



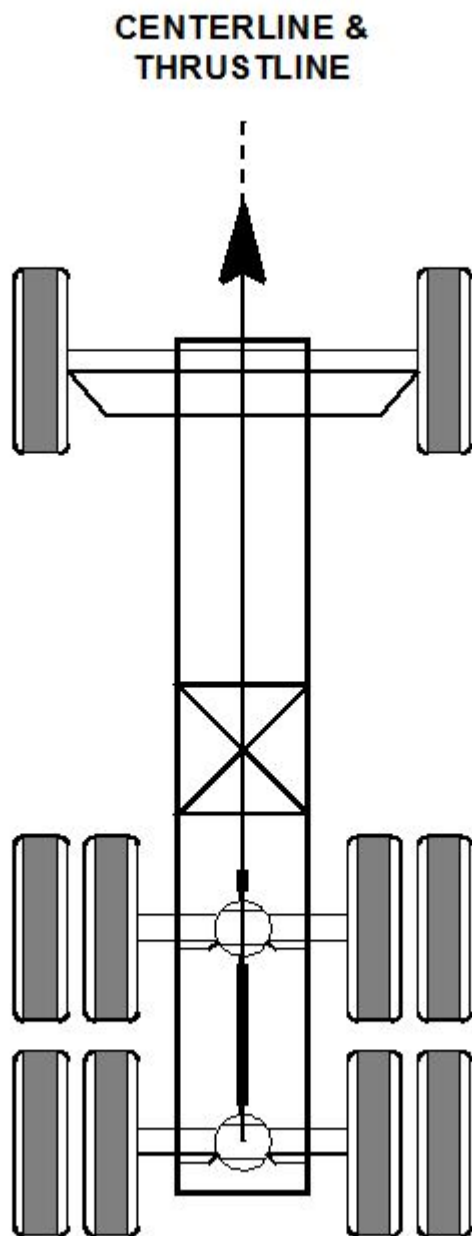
#### 4.1.2. Total (All Wheel) Alignment

Total all wheel alignment is the ultimate wheel alignment service. The reference axle thrust angle is measured, then adjusted. This adjustment brings the thrust line of the reference axle parallel to the geometric centerline.

The front wheels are then aligned to the reference axle thrust line.

If applicable, the remaining rear axles are then measured and adjusted.

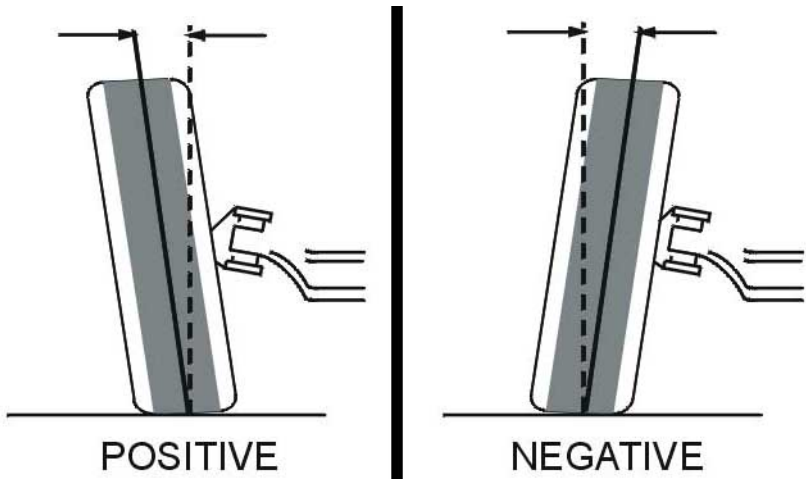
Total all wheel alignment results in all wheels being parallel and the steering geometry being centered as the vehicle moves in a straight line.



### **4.1.3. Alignment Angles and Measurements**

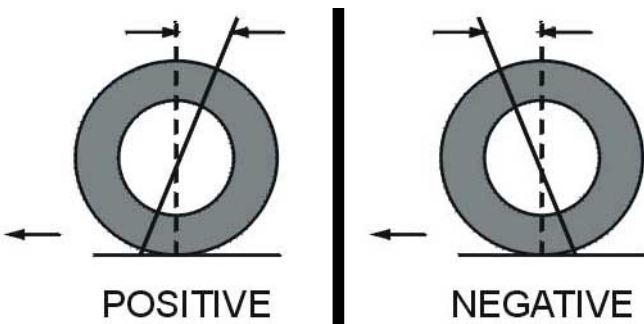
This section describes vehicle alignment angles for reference when making adjustments.

## Camber



The angle formed by the inward or outward tilt of the top of the wheel referenced to a vertical line as viewed from the front. This angle is measured and displayed in degrees. Camber is positive when the wheel is tilted outward at the top and is negative when the wheel is tilted inward at the top.

## Caster



The forward or rearward tilt of the steering axis in reference to a vertical line as viewed from the side. This angle is measured and displayed in degrees. Caster is positive when the top of the steering axis is tilted rearward and is negative when the top of the steering axis is tilted forward.

## Frame Angle



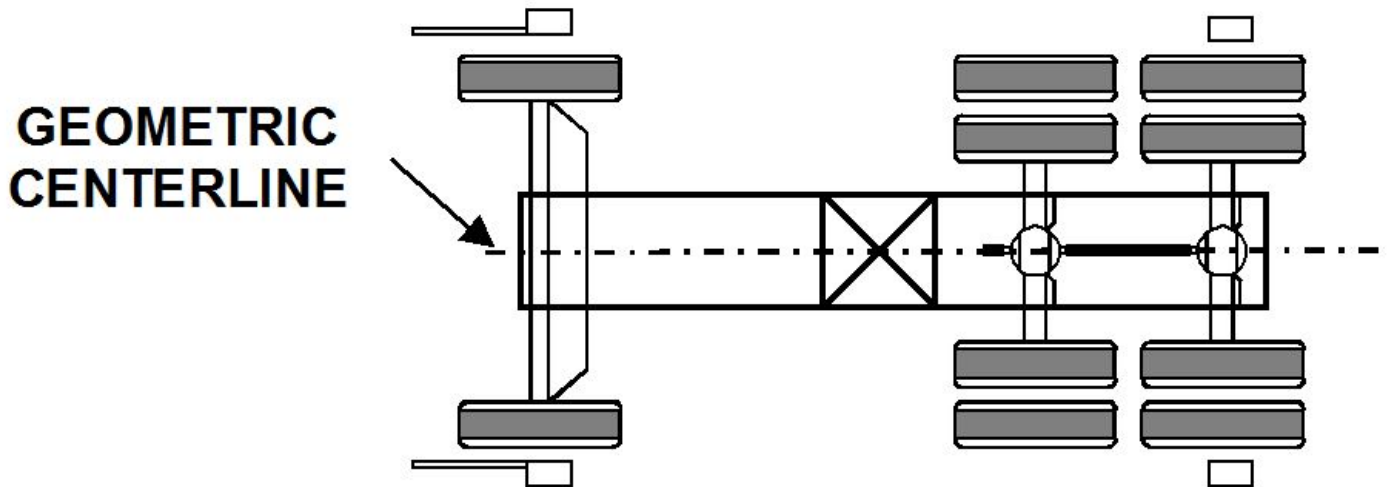
Positive



Negative

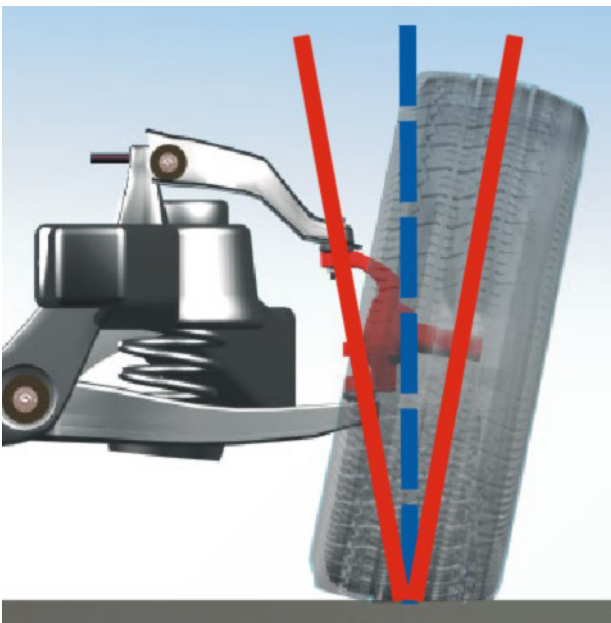
The angle (from a side view) formed by a horizontal line and a line drawn parallel to the frame. Frame angle is positive when the frame is higher at the rear and is negative when the frame is lower at the rear. The aligner does NOT calculate frame angle.

### Geometric Centerline



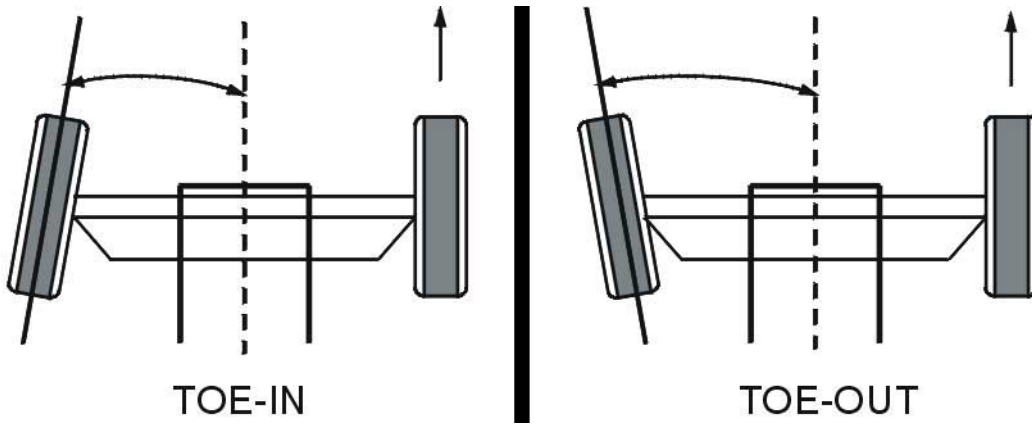
This is a line drawn through the midpoint of the front and rear axle.

### Included Angle (I.A.)



The sum of S.A.I. and camber.

## Individual Toe



The angle formed by a horizontal line drawn through a plane of one wheel referenced to the reference line of the vehicle. Individual toe is measured in degrees but maybe displayed in degrees, inches or millimeters.

Toe-in is when the horizontal lines intersect in front of the wheel.

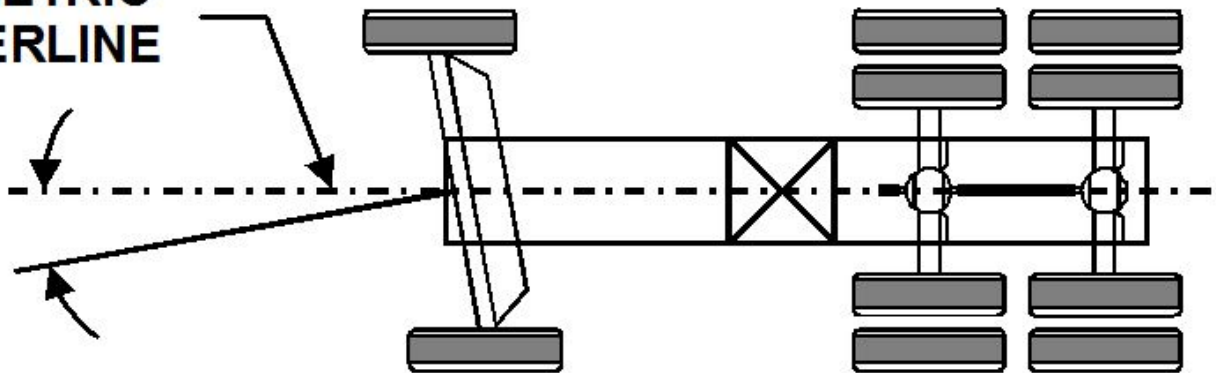
Toe-out is when the horizontal lines intersect behind the wheel.

## Ride Height

The height of the vehicle to a point specified by the manufacturer within specific tolerances.

## Set Back

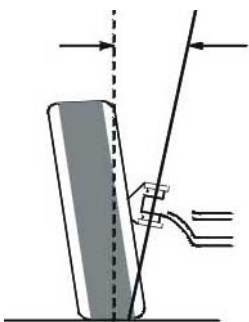
### GEOMETRIC CENTERLINE



The angle formed by the geometric centerline and a line drawn perpendicular to the front axle. Set back is positive when the right wheel is behind the left wheel. Set back is negative when the left wheel is behind the right wheel.

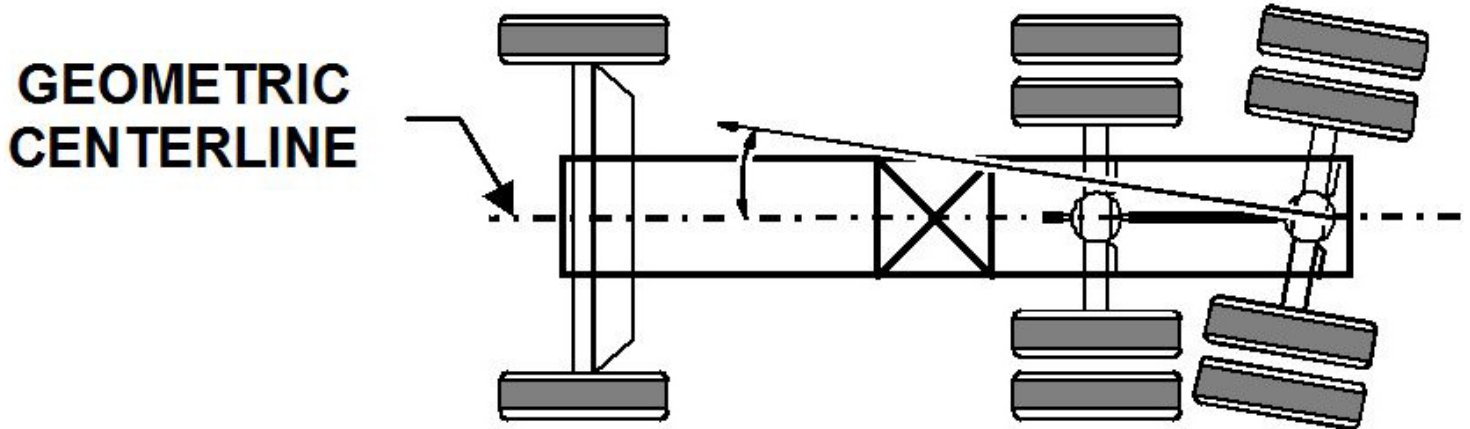
A set back condition will not affect the accuracy of the system.

## Steering Axis Inclination (S.A.I.)



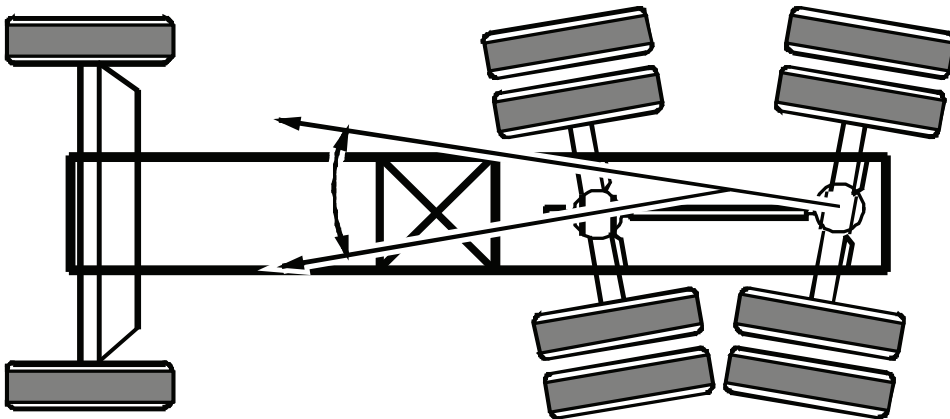
The angle formed by a line drawn through the upper and lower pivot points of the steering axis and a vertical line as viewed from the front. S.A.I. is measured and displayed in degrees.

### Thrust Angle



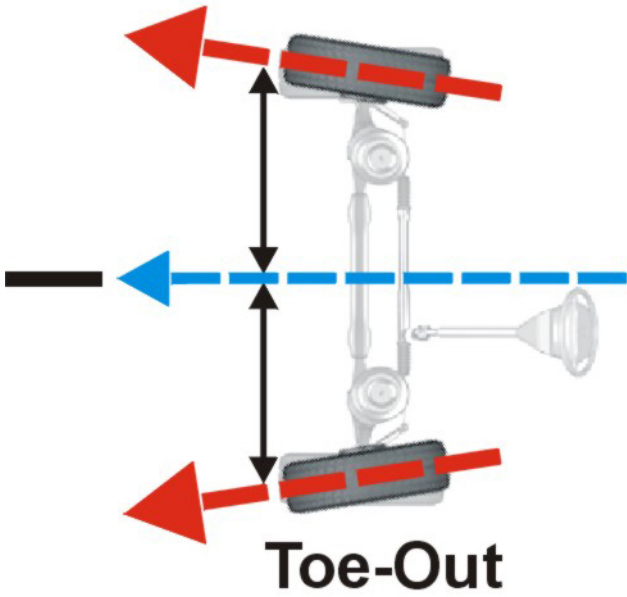
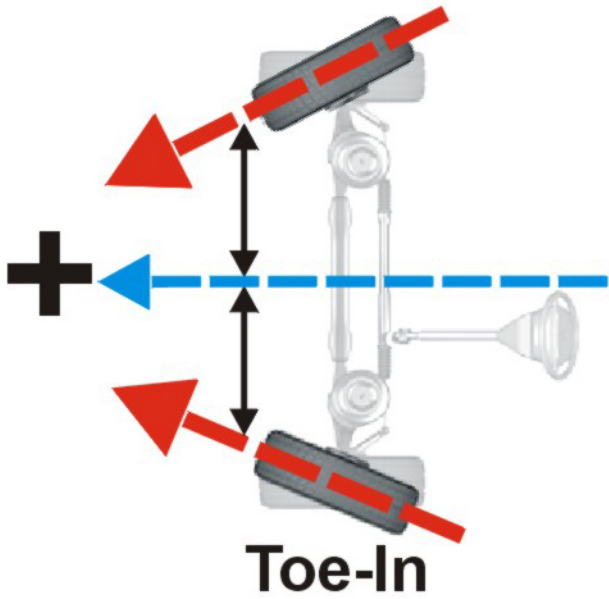
The angle formed by the geometric centerline and the thrust line of an axle. This angle is measured and displayed in degrees.

### Thrust Line and Tandem Scrub Angle



Thrust Line is the bisector of total toe angle of the axle. Tandem Scrub Angle is the angle formed by the two thrust lines of a tandem.

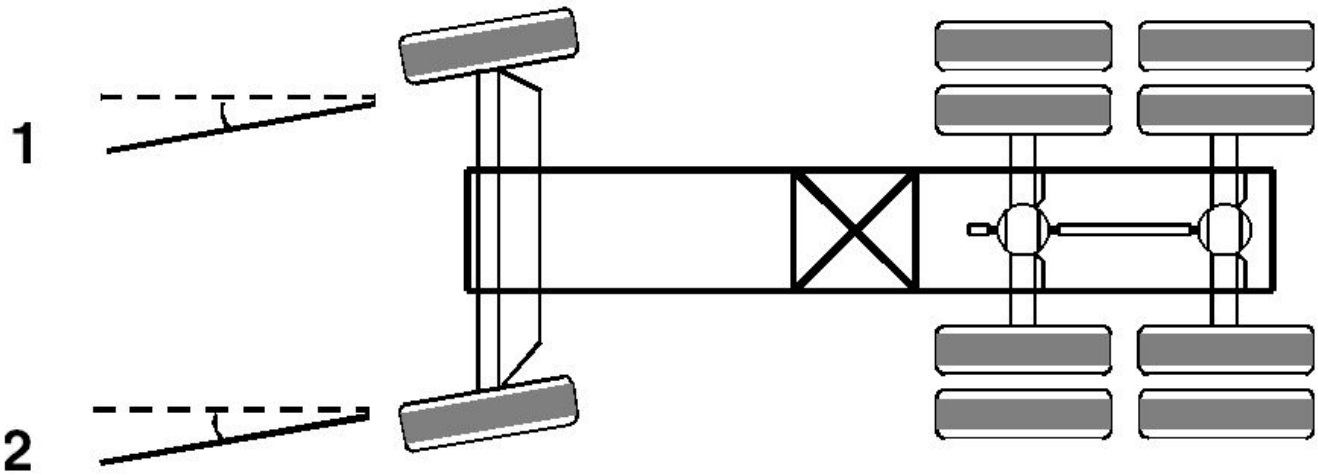
## Total Toe



The angle formed by two horizontal lines drawn through the planes of two wheels on the same axle. Total toe is measured in degrees but may be displayed in degrees, inches or millimeters. Toe-in is when the horizontal lines intersect in front of the wheels. Toe-out is when the horizontal lines intersect behind the wheels.

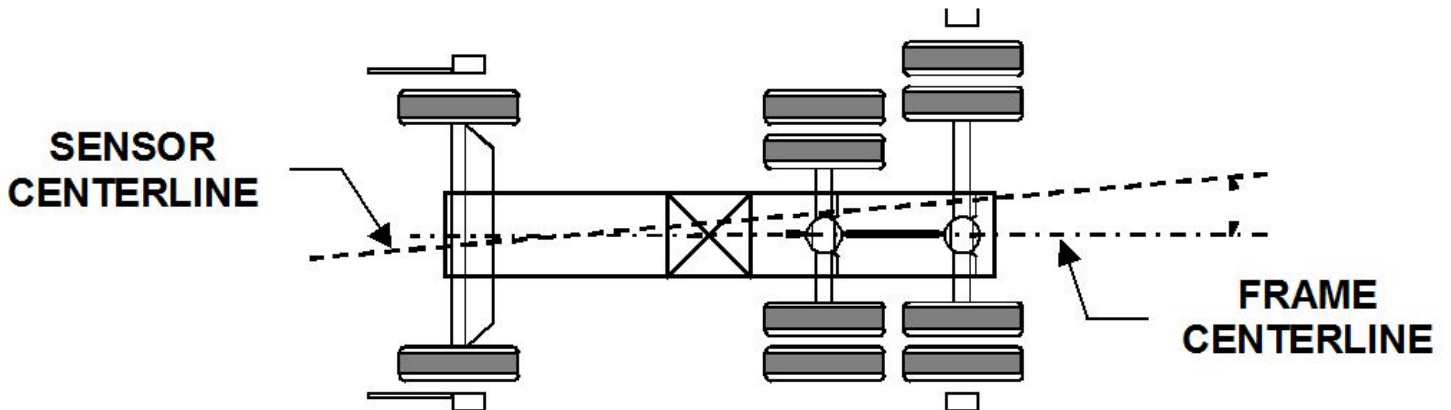


## Turning Angle



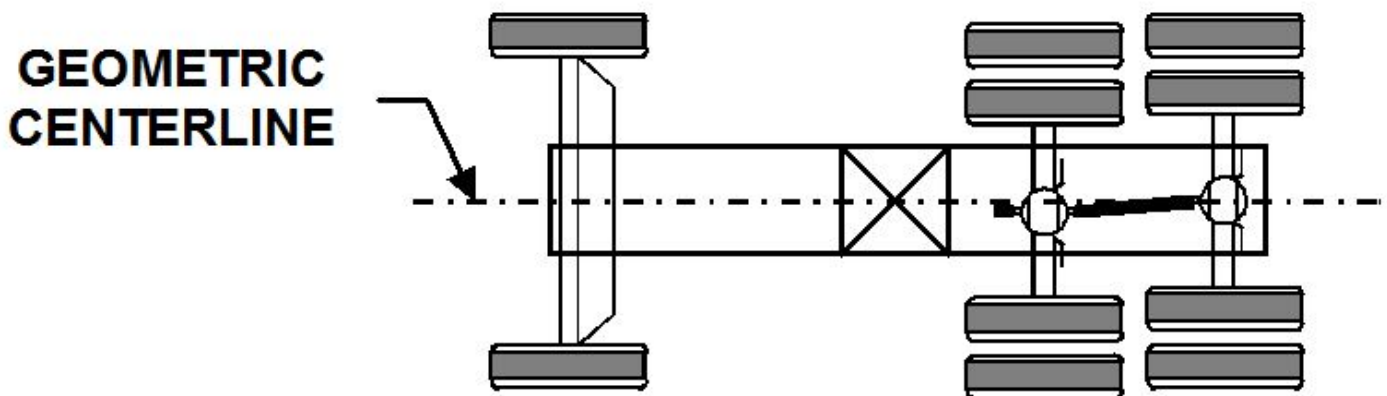
The difference in the angles of the front wheels in a turn.

## Frame Offset Angle



The angle of the frame referenced to the sensor centerline. Frame offset angle is calculated by the aligner when the requested measurements, as shown on the display, are entered into the aligner.

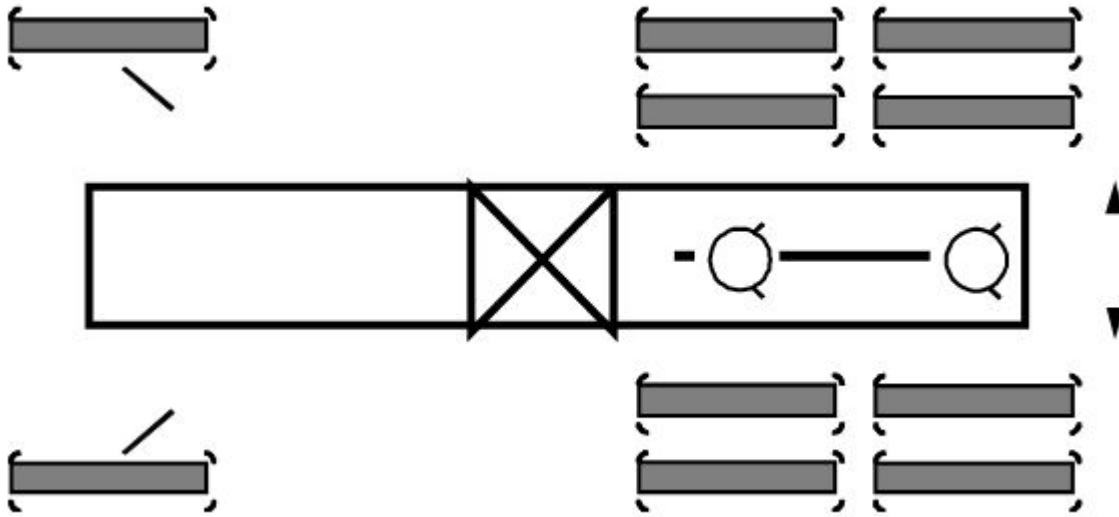
## Tandem Lateral Offset



When the geometric centerline does not cross the midpoint of all axles. Negative Tandem Lateral Offset is when the geometric centerline is to the right of the axle midpoint. Positive Tandem Lateral Offset is when the geometric centerline is

to the left of the axle midpoint. A tandem lateral offset condition or tread width variation will not affect the accuracy of the system.

### Separation



The distance between the reference axle adjustment points. This distance may be measured and entered into the aligner before adjusting thrust angle to allow the aligner to calculate how much the axle must be moved at the adjustment point.

### Maximum Steering Angle

The amount that the front wheels can be turned in either direction due to mechanical limitations.

### Advanced Vehicle Handling Values

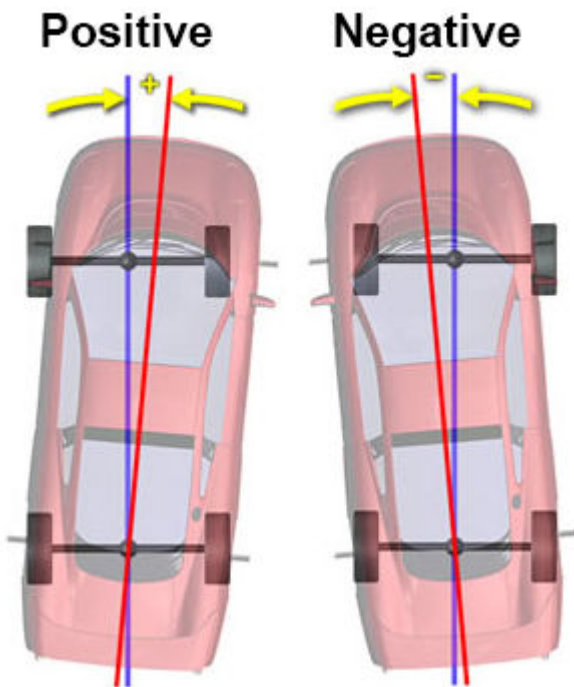
Advanced alignment values represent forces, angles and dimensions which may affect vehicle handling. Modifications to a vehicle's suspension, tires and/or wheels often affect these values, which may result in unwanted changes to vehicle handling or ride quality.

Although most of these values cannot be adjusted directly, knowing the amount and direction of change can be very useful when diagnosing problems.

These changes may indicate potential problems or improvements in vehicle ride, handling, stability, steering response, tire wear, and fuel efficiency. These values should be measured before and after any modifications to record the changes of both adjustable and non-adjustable readings.

There are no specifications for advanced alignment values.

## Body Center Line Angle



### NOTICE

Body Center Line Angle measurements require Live Ride Height Targets.

### Description:

Body Center Line is the center of the vehicle's body and measured using ride height targets affixed to the body of the vehicle. The alignment sensors are also used to find the geometric or chassis centerline of the vehicle.

Ideally, the body center line and the chassis centerline are aligned with each other and to the thrust line of the vehicle. A substantial difference between body and chassis center line may be the result of collision or intentional modification.

The difference between body and chassis center line is shown as Body Center Line Angle. A positive number indicates the thrust line is to the right of body center line. Negative numbers indicate the thrust line is to the left of body center line.

Both Body Center Line Angle and Body Center Line Offset may be useful tools when diagnosing the cause of an excessive thrust angle.

### What can change it:

A horizontal shift of the rear axle may be caused by broken leaf spring centering pins, loose or broken U-bolts, bent trailing arms or damaged frame rails.

A horizontal shift of the front axle may be caused by cradle position (damaged or shifted), frame rail damage, loose or broken U-bolts or broken leaf spring centering pins.

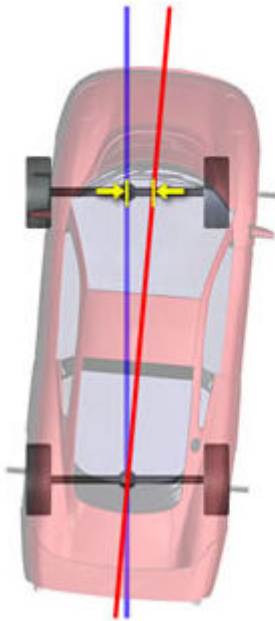
Collision, body repair, etc, may also cause these lines to be divergent.

### Vehicle characteristics it effects:

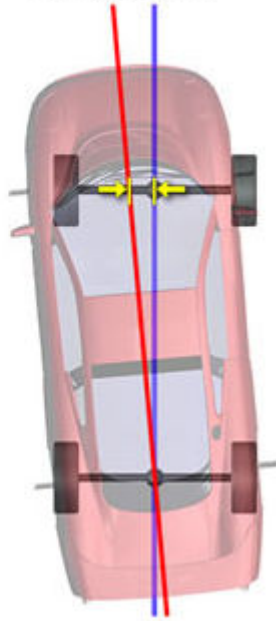
Any Body Center Line Angle measurement other than "0" will cause dog tracking.

## Body Center Line Offset

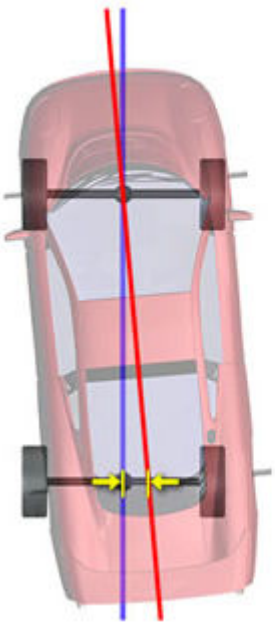
**Positive**



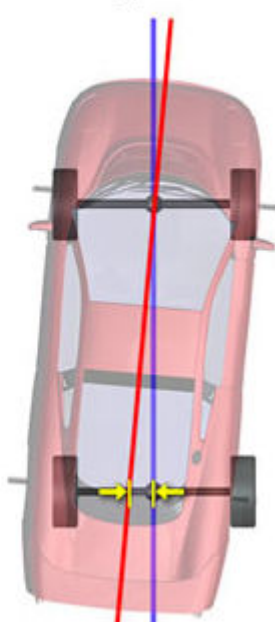
**Negative**



**Positive**



**Negative**



### **NOTICE**

Body Centerline Offset measurements require Live Ride Height Targets.

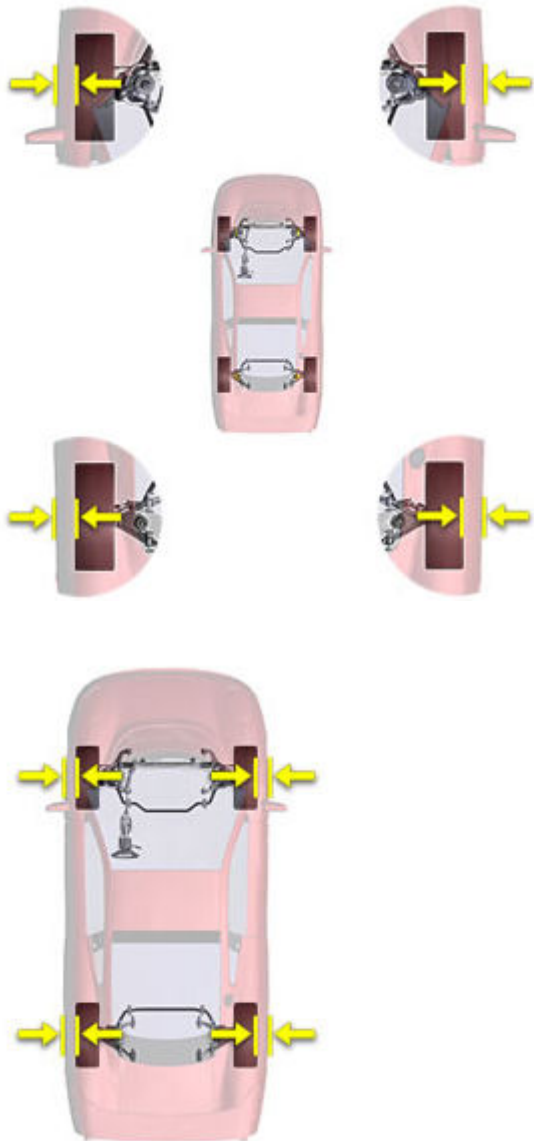
### **Description:**

Body Center Line Offset is the lateral distance between body center line and chassis center line at the front or rear axle. Both Body Center Line Angle and Body CenterLine Offset may be useful tools when diagnosing the cause of an excessive thrust angle.

**What can change it:**

Collision, body repair, etc, may cause these lines to be divergent. Vehicle characteristics it effects: Any front to rear difference in body centerline offset will produce a non-zero Body Center Line Angle measurement, which will cause dog tracking.

**Body Overhang**



**NOTICE**

Body Overhang measurements require Live Ride Height Targets.

**Description:**

Body Overhang is the distance, positive or negative, the wheel well overhangs the tire. This measurement should be similar on either side of the same axle.

**What can change it:**

Collision, body repair, etc, may cause these lines to be divergent.

**Vehicle characteristics it effects:**

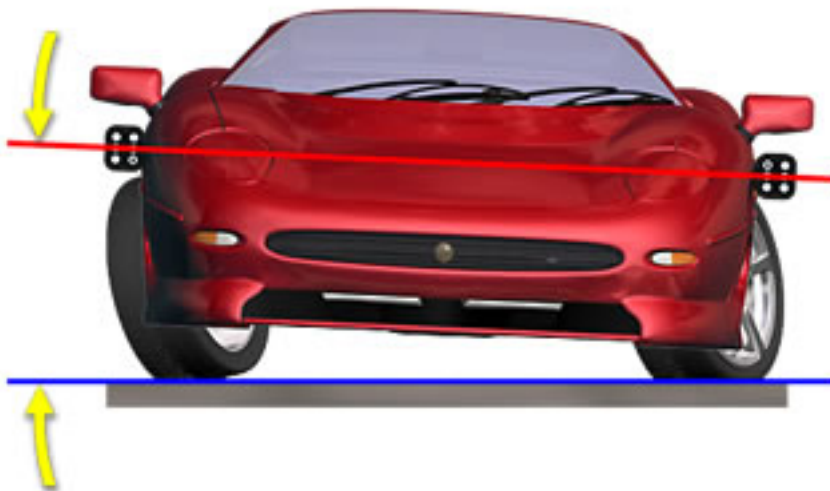
Wheels with greater offset or width can produce a negative Body Overhang, which means that a collision may occur between tire and wheel well when the springs are compressed.

**Body Roll Angle**

**Positive Body Roll Angle**



**Negative Body Roll Angle**



**NOTICE**

Body Roll Angle measurements require Live Ride Height Targets.

**Description:**

Body Roll Angle is the vehicle body tilt from side to side that occurs when the wheels are turned from steer ahead to the maximum steering angle in either direction.

When the vehicle is steered from side to side, the body of the vehicle rolls due to a height change induced by the steering axis inclination (SAI) and caster. The side of the vehicle on the inside of the turn is usually lifted higher than the side of the vehicle on the outside of the turn.

Steering system and suspension symmetry can be evaluated by comparing the Body Roll Angles at predetermined steering angles. The Body Roll Angle should be equal and opposite for left hand and right hand turns. If there is a difference then a symmetry problem exists.

**What can change it:**

Factors that influence Body Roll Angle are:

- Front caster
- Steering Axis inclination
- Spring rate
- Anti-sway bar configuration
- Wheel offset, diameter, and width

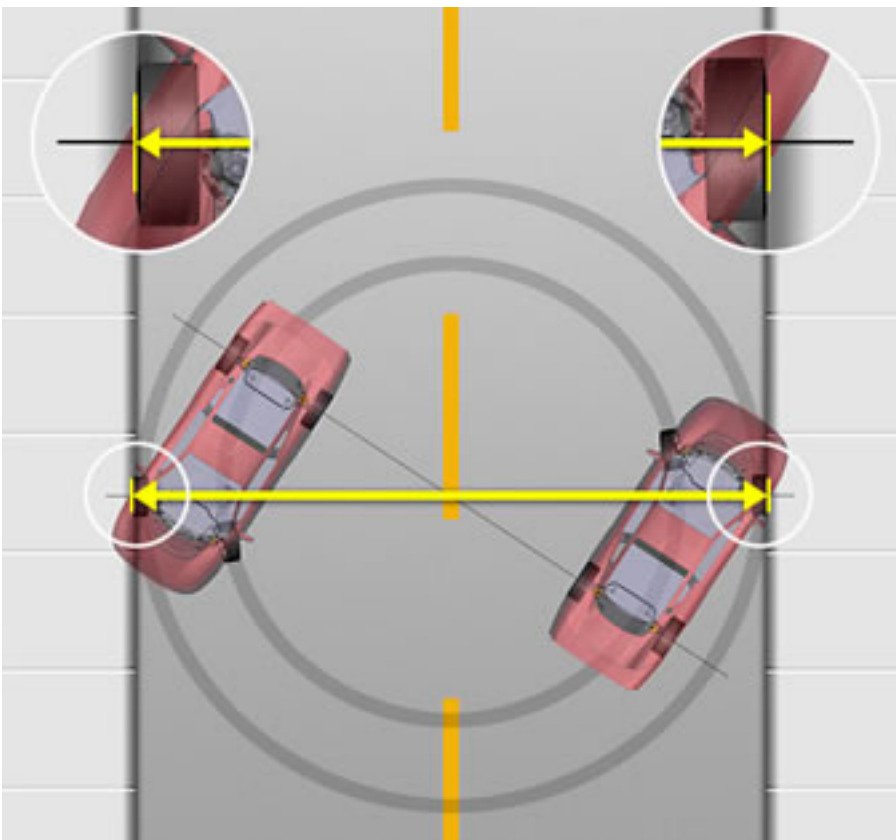
**The following conditions may contribute to excessive differences in Body Roll Angles:**

- Excessive cross caster and/or S.A.I.
- Sagged or broken springs
- Broken sway bar links

**Vehicle characteristics it effects:**

Minimizing Body Roll Angle will help the vehicle maintain better traction in turns.

**Curb-to-Curb Distance**



**Description:**

Curb-to-Curb Distance is the minimum diameter of a circle, as measured from the outside of the tire, needed to turn a vehicle 360°. This measurement is determined by the wheel base, tire width, and the vehicle's maximum turning angle.

**What can change it:**

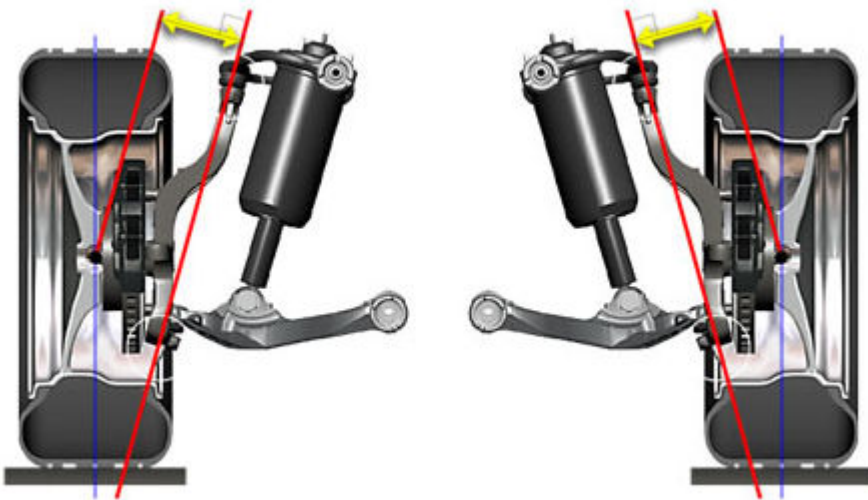
The following components can effect Turning Radius measurements:

- Loose or missing steering box mounting bolts.
- Bent or damaged steering arm.
- Loose or damaged idler arm.
- Loose or damaged pitman arm.

Incorrect total toe and modifications to the wheel base will also affect Turning Radius.

**Vehicle characteristics it effects:**

The larger the Curb-to-Curb Distance, the more room a vehicle needs to turn around.

**Rolling Force Lever**

Positive Rolling Force Lever - Left Side

Positive Rolling Force Lever - Right Side

**Description:**

Viewed from the front of the vehicle, the Rolling Force Lever can be illustrated by a line drawn perpendicular from the steering axis to where the wheel centerline intersects the spindle centerline.

This measurement should be similar on either side of the same axle.

**What can change it:**

Any modification or condition that can alter the position of the steering axis, or where the center of the wheel intersects the spindle, will cause the length of the Rolling Force Lever to change.

Using a wheel with a larger negative offset will cause the value to change towards the positive. Wheels with a smaller negative offset will change the value towards negative.

Changes in camber will affect Rolling Force Lever by tilting the spindle.



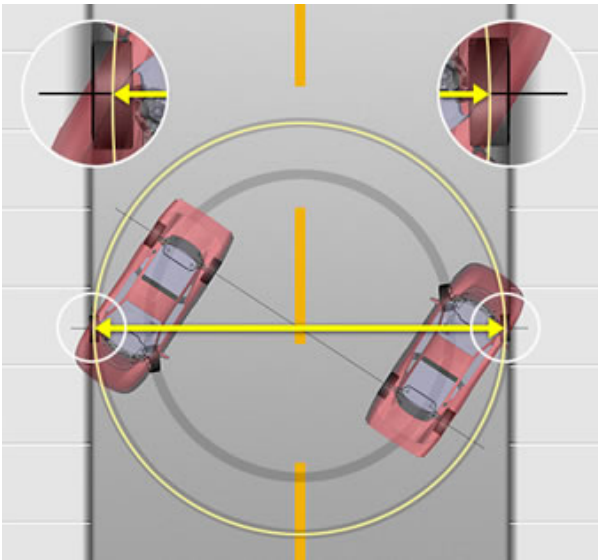
Damaged suspension components will also cause a change in Rolling Force Lever.

**Vehicle characteristics it effects:**

As the Rolling Force Lever gets longer, it becomes easier for road forces to disturb and sometimes steer the wheels. Because of this, additional road shock can be transmitted to the steering wheel.

If the Rolling Force Levers are unequal side-to-side, the vehicle may pull. Road force and rolling resistance will action the longer lever and try to steer the vehicle away from straight ahead. An under inflated tire will cause more steering pull when the Rolling Force Lever is longer.

**Turning Circle**



**Description:**

Turning Circle is the minimum diameter of a circle, as measured from the center of the tire, needed to turn a vehicle 360°. This measurement is determined by the wheel base and the vehicle's maximum turning angle.

**What can change it:**

The following components can effect Turning Radius measurements:

- Loose or missing steering box mounting bolts.
- Bent or damaged steering arm.
- Loose or damaged idler arm.
- Loose or damaged pitman arm.

Incorrect total toe and modifications to the wheel base will also affect Turning Radius.

**Vehicle characteristics it effects:**

The larger the Turning Circle, the more room a vehicle needs to turn around.

## 5. Warranty Information

Hunter Engineering Company warrants new equipment to be free from defects in material and workmanship under normal conditions of use for a period of three (3) years from the date of installation. Exceptions to this warranty are listed below:

- Field labor is covered under this warranty for a period of six (6) months.
- ADASLink™ units carry a one (1) year warranty and remain under warranty as long as a subscription is maintained there after.
- DAS 3000 units, including electronic circuit boards, carry a one (1) year warranty.
- Printers carry a one (1) year warranty.
- Normal consumables and wear items are not covered. Exception is batteries, which are warranted for a period of six (6) months.
- Product that has been subject to abuse, misuse, alterations, accident, exposure to the elements, tampering, unreasonable use, or not maintained in a reasonable or necessary manner.
- Replacement parts purchased through the Hunter Service Center and no longer covered by machine warranty are warranted for a period of six (6) months.

In case of any warranty claim, it will be necessary to contact your local authorized Hunter Service Representative. To have an item considered for warranty, it must be returned to Hunter Engineering Company for inspection and evaluation. This must be done on a freight prepaid basis. If after our inspection the product proves to be defective, and is within the time frame specified, we will repair or replace the item at no additional cost.

This is Hunter Engineering Company's only warranty with respect to new equipment. Hunter Engineering Company disclaims all other warranties to the extent permitted by law. This express warranty and any implied warranties of merchantability and fitness for a particular purpose shall not extend beyond the warranty period. Hunter Engineering Company is not responsible for any incidental or consequential damages, including, but not limited to, loss of business.

We do not authorize any person to assume for us any other liabilities with our products. Any remaining warranty may be transferred to subsequent purchasers by forwarding the purchaser's name, address, phone number and equipment serial number to:

See our document library at [www.Hunter.com](http://www.Hunter.com) for additional details.

**Hunter Engineering Company | Customer Service Department**

**11250 Hunter Drive, Bridgeton, MO 63044**

**(800) 448-6848**

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