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WinAlignâ Quick Reference

Version 7.x

HUNTER Engineering Company

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1. Getting Started

General Introduction

This manual provides operation instructions and information required to operate the 611/811 aligner with WinAlign® software. WinAlign® software version 7.0 is a 32-bit program and is compatible only with Windows 98® or above.

The owner of the Series 611/811 aligner is solely responsible for arranging technical training. Only a qualified trained technician should operate the Series 611/811 aligner. Maintaining records of personnel trained on this equipment is solely the responsibility of the owner and management.

References

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

System Requirements

WinAlign® software version 7.0 is a 32-bit program and therefore is compatible with only Series 611/811 Aligners.

Required Software that will be installed by the WinAlign® software 7.0 Installer:

Microsoft Internet Explorer 5.5 SP2

Windows® Media Player 7.1

NOTE:	Systems which originally shipped with WinAlign 4.X or 5.0 will need to install TCP/IP Protocol, in addition to a Digital Video key, in order to access AlignGuide™ training videos.

For Your Safety

Hazard Definitions

These symbols identify situations that could be detrimental to your safety and/or cause equipment damage. 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 that will result in severe personal injury or death.

IMPORTANT SAFETY 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 equipment only as described in this manual.

SAVE THESE INSTRUCTIONS

> ⚠ **WARNING:** **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.**

> ⚠ **CAUTION:** Do not turn the power off when the disk drive is operating. The disk can be damaged.

> ⚠ **WARNING:** **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.**

Precautions for Systems Equipped with HFSS Cordless Sensors

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

> ⚠ **WARNING:** **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 his own expense.**

> ⚠ **WARNING:** **Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.**

Specific Precautions/Power Source

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 cordset.

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 cordset, 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.

FUSING:

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

EQUIPMENT SERVICE:

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

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.

Equipment Specifications

Electrical

VOLTAGE:	120/230 volts (nominal)
AMPERAGE:	6/3 amps
WATTAGE:	720 watts

Atmospherics

TEMPERATURE:	+32°F to +122°F (0°C to +50°C)
RELATIVE HUMIDITY:	Up to 95% Non-condensing
ALTITUDE:	Up to 6000 ft. (1829 m)

Safety Summary

Explanation of Symbols

These symbols appear on the equipment.

Alternating current.


Earth ground terminal.


Protective conductor terminal.

ON (supply) condition.


OFF (supply) condition.


RISK of electrical shock.


Stand-by switch.


Not intended for connection to public telecommunications network.

Operating the Console

Turning Power On

Turn the unit “ON” by pressing the power switch located on the left side panel, or on the back panel of the aligner cabinet.

The “Logo” screen will appear and indicate that the unit is ready for use. This will take approximately 1.5 minutes.

Using the “Softkeys”

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

K1 key

K2 key

K3 key

K4 key


Menu shift key

Reset key

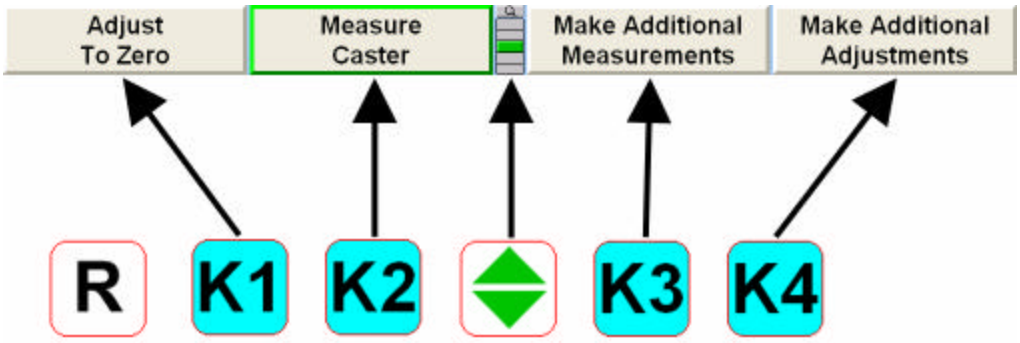

Forward key


Backward key

Zoom key (keyboard)

Zoom softkey (screen display)

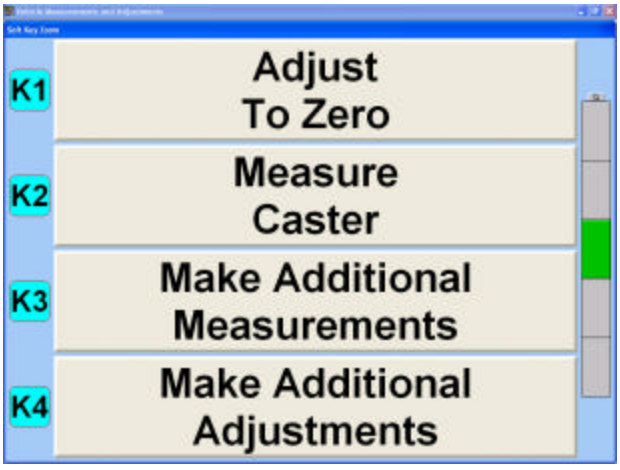
The four labels that appear at the bottom of each screen are referred to as the softkey labels. These labels indicate the action that the program will take when the corresponding K1, K2, K3, or K4 key is pressed.



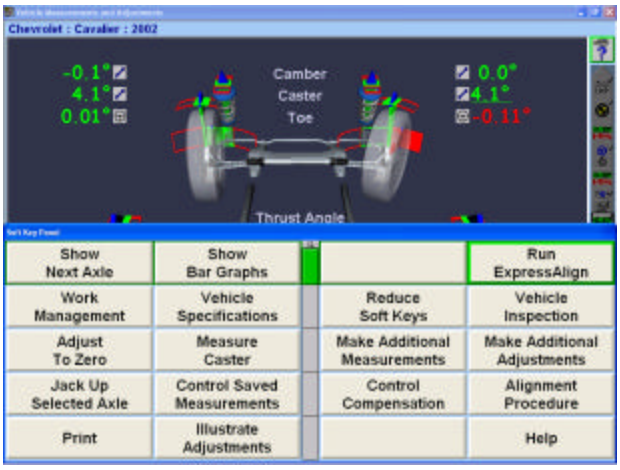
The vertically stacked squares between the “K2” and “K3” labels indicate how many levels of softkeys are available. The highlighted box indicates the menu level that is currently displayed.

The softkey 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 “Shift” and .

Pressing “Shift” and will zoom the current softkey level to a full screen version as seen below. The softkeys associated with the softkey label are shown on the left side of the labels and the softkey level is indicated on the right side of the labels. Pressing again will cause the softkey level to return to the original view.



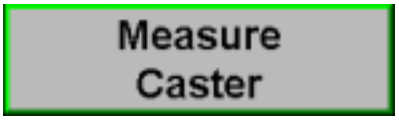
Pressing , selecting above the softkey levels, or pressing and holding with a pointing device on the menu level indicator will cause all of the menus available to appear, as seen below. The green background indicates the active menu level. Pressing again will cause the menu to return to the original perspective.



The number of softkeys displayed may be reduced to only the number of softkeys needed for a typical alignment by enabling “Reduce Number of Softkeys” in “Aligner Setup.” *Refer to “Aligner Setup”.*

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

Some softkey labels have a green border highlight around the softkey. Generally, the softkey with the green border (usually “K4”) is the appropriate key to press to continue with the procedure being performed, as seen below.



Alignment Procedure Bar

Whether ExpressAlign is enabled or disabled, a vertical procedure bar appears along the right side of the screen.

The “Alignment Procedure” bar is a toolbar that displays on the right side of the screen with an icon for each alignment or WinAlign procedure available or performed.

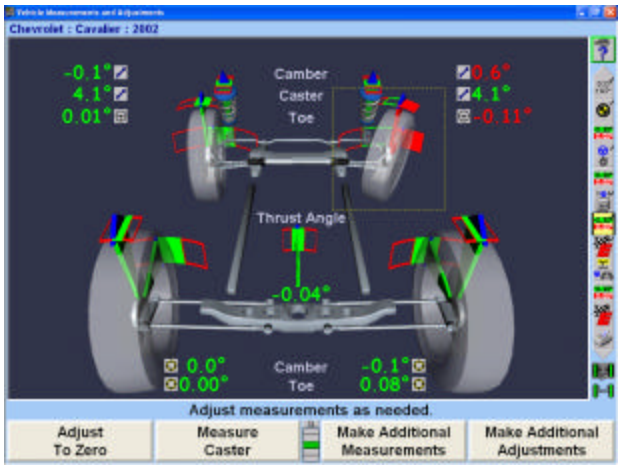
The icons are arranged in order from the first step that you must complete to the last step that you must complete. After each alignment procedure has been completed, a “✓” will appear in the upper right corner of the corresponding icon.

If there are more icons available than space on the screen, the toolbar can be scrolled up or down. The toolbar on the right shows the triangular area at the bottom indicating more choices.

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  , Forward key, or  , Backward key, will move the screen forward or backward in the alignment procedure as outlined on the procedure bar.

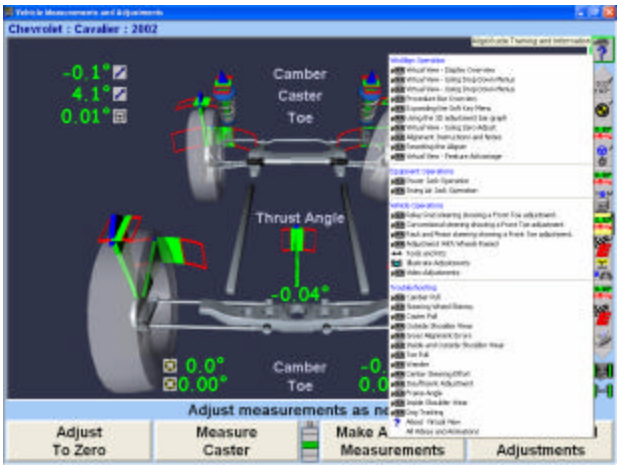


AlignGuide ä Training and Information Guide

AlignGuide is an information center on WinAlign® software. It contains training videos and information on using WinAlign® software, wheel sensor operations, vehicle operations, vehicle troubleshooting, and alignment adjustment methods.

AlignGuide is available only with the Digital Video option.

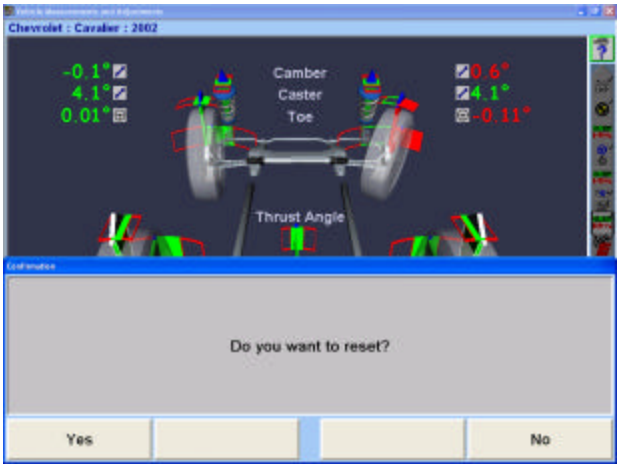
To access the AlignGuide training feature, select the  icon above the Procedure Bar. A drop-down menu will list all the choices available including access to WinAlign® Help, *Tools and Kits, Illustrate Adjustments*, (these choices are context-sensitive based on the current WinAlign® screen), and a selection for *All Videos and Animations*.



Select the appropriate choice and the video, animation, illustration, or Help item will display.

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 “Reset” button was pressed intentionally.



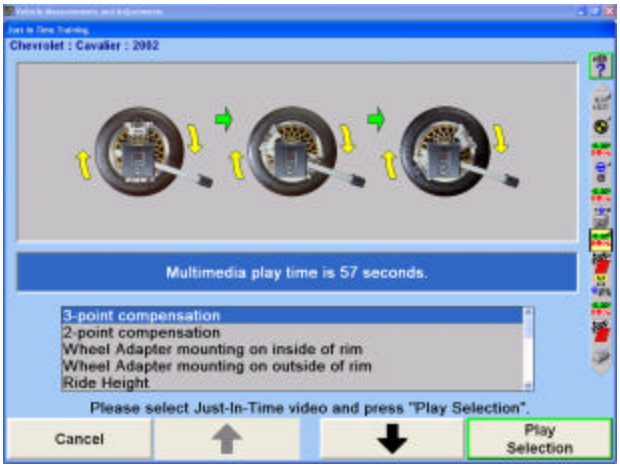
When this screen appears, press “YES” to reset the program or “NO” if the program should not be reset.

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

Just-In-Time Training

Optional multimedia video instructions provide a live audio-visual demonstration of procedures. To view video instructions:

Press “Help,” then press “Just-In-Time Training” to view a list of available videos.



Press ⬆ or ⬇ to highlight the desired video, and then press “Play Selection.” The video will start.

Pressing ⏸ will pause the video, and ▶ will restart the video after it has been paused. Pressing ■ will stop the video and return you to the Just-In-Time Training menu screen. After the video ends, you will be returned to the Just-In-Time Training menu screen.

Turning Power Off

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” popup 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 shutdown 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.

An Example Alignment Job with the ExpressAlignâ Adjustment Feature and DSP400/DSP600 Sensors

This example alignment job assumes that the system is configured as follows:

ENABLED
ExpressAlign Level III

Your system may be configured differently.

> NOTE: This section is an overview of an alignment job using the ExpressAlign® feature. For details about any procedure, *refer to the appropriate section of the manual or press "HELP" in the WinAlign® program.*

From aligner setup, "DSP400 Sensors or DSP600 Sensors" must be selected as the default sensor. *Refer to "Aligner Setup".*

Prepare the vehicle for alignment as follows:

Drive the vehicle onto the alignment rack, centering the front wheels on the turnplates.

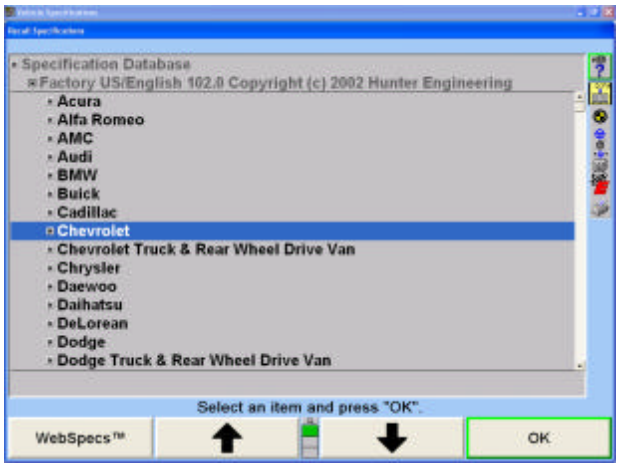
Apply the vehicle parking brake and place the transmission in park, if applicable. On standard transmission vehicles, the transmission should be placed in neutral.

Position chocks at the front and rear of the left rear tire to keep the vehicle from rolling.

Place the lift at alignment height.

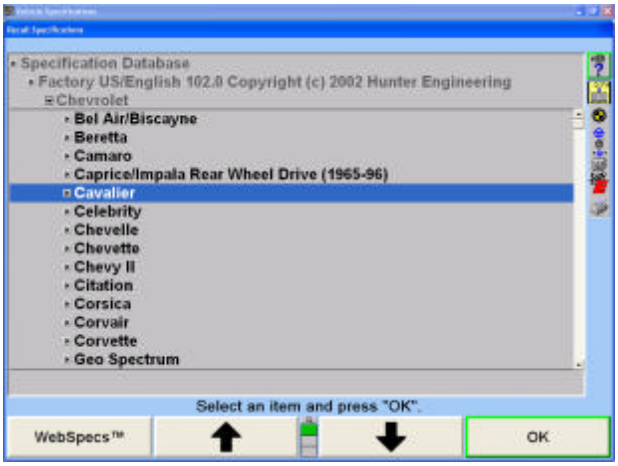
Check and adjust tire pressure to vehicle manufacturer's specification. Inspect for unevenly worn or mismatched tires.

Start the alignment program by pressing "Begin Alignment" on the "Logo" screen. The "Recall Specifications" popup screen will appear.



Press "↑" or "↓" to highlight the manufacturer of the vehicle being aligned.

Press “OK” to select the highlighted manufacturer. The next screen will list the models available from the selected manufacturer.



Press “↑” or “↓” to highlight the model of the vehicle being aligned.

Press “OK” to select that model.

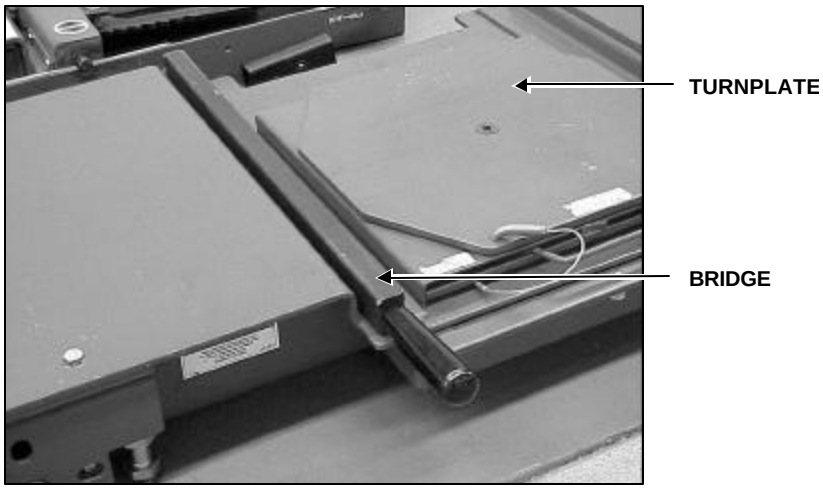
Continue in this manner until the vehicle is identified to the program.

The screen will change to the “Compensation Control” popup screen.

There are two methods of compensation, rolling and jacking. The method chosen for this example procedure is rolling compensation. *Refer to “Rolling Compensation”, or to “Jacking Compensation”.*

Verify that the pins are in the turnplates and slip plates.

Position a turnplate bridge in each pocket behind the turnplate so the runway surface and the bar surface are flush. Rotate the bridges so they are taller than wide.



Place wheel chocks that limit rearward motion approximately 15 inches behind the rear wheel(s).

Steer ahead with transmission in neutral and the parking brake off.

Mount the targets and wheel adaptors on the wheels. Refer to “Mounting Sensors or Targets onto Wheel Adaptors”.

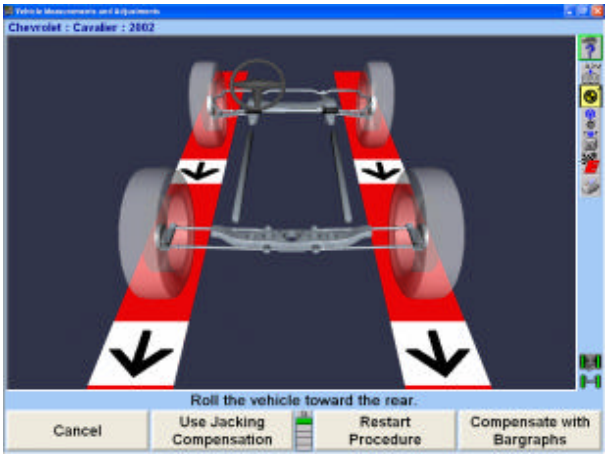
Level and lock the targets.

> NOTE: The targets should not be re-leveled at any time during the alignment. The only exception being - If the target is removed from the wheel adaptor during the alignment, (shim replacement, steering component replacement, etc.) the affected target must be re-leveled and re-compensated, using jacking compensation.

> NOTE: Beginning the rolling compensation procedure removes any previous compensation from the targets.

The screen instructs you to roll the vehicle rearward. Release parking brake and put transmission in neutral. Roll the vehicle rearward until the arrows turn green.

> NOTE: It is recommended to roll the vehicle by rotating the left rear tire. Do not push or pull the vehicle by the front (steering axle) tires or wheels during rolling compensation. Do not push or pull on spoilers, fascia moldings, or other “trim” accessories.



> NOTE: A vehicle with 28-inch diameter tires will require approximately 12 – 14 inches of movement. Smaller diameter tires will require less movement, while larger diameter tires will require more.

Stop rearward movement of the vehicle. The arrows will disappear for a moment.

If a new style remote indicator is used, indicators for all four wheels will be flashing, indicating to roll forward.

When the compensation arrows reappear, roll the vehicle forward to the original position.

When all four targets have been compensated, apply the vehicle parking brake and place the transmission in park, if applicable. On standard transmission vehicles, the transmission should be placed in neutral.

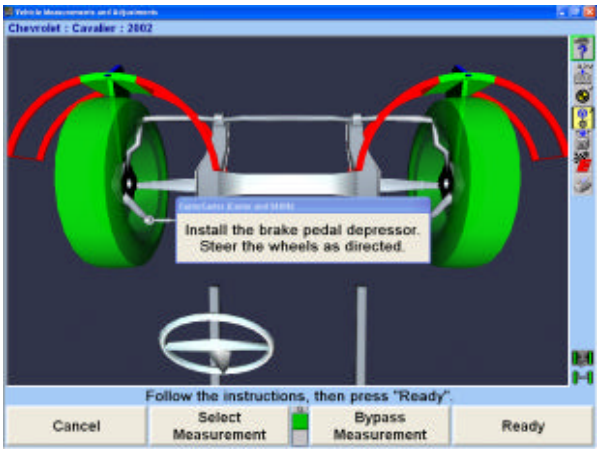
Position chocks at the front and rear of the left rear tire to keep the vehicle from rolling.

NOTE:	The rolling compensation procedure MUST end with the vehicle in the proper position to check and adjust the alignment.

After the targets have been compensated, remove the pins from the turnplates and slip plates.

Turn the turnplate bridges into the stored position.

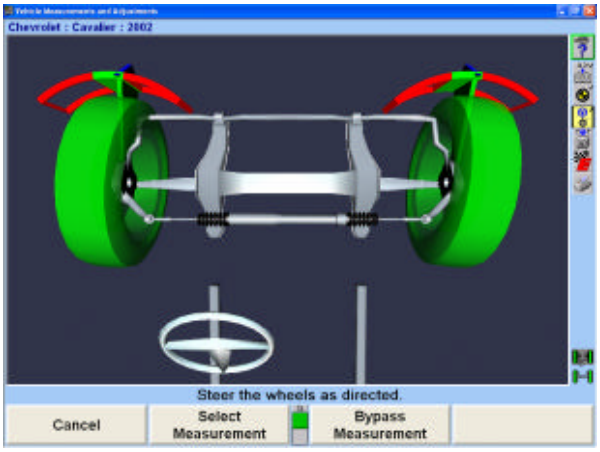
The screen will change to the “Caster and S.A.I. Measurement” popup screen that will direct you to measure caster.



Install the brake pedal depressor. Steer the wheels as directed and follow the on-screen directions.

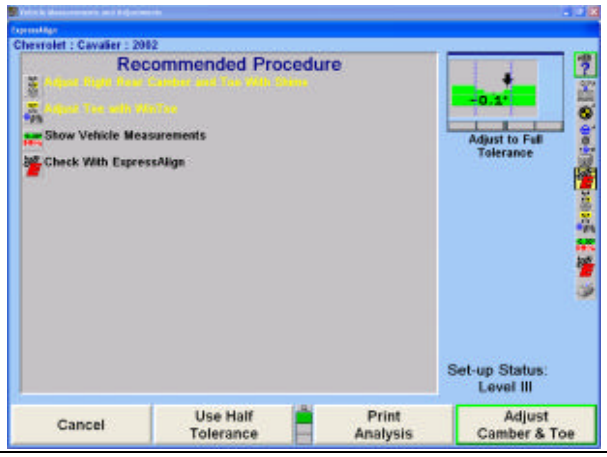
NOTE:	Do NOT block the front targets during the “Measure Caster” Procedure. One of the two rear targets may be blocked during the “Measure Caster” procedure.

After caster has been measured, the screen prompts you to steer the wheels straight ahead.



The measurements of the vehicle will be saved.

The screen will change to the “ExpressAlign®” popup screen.

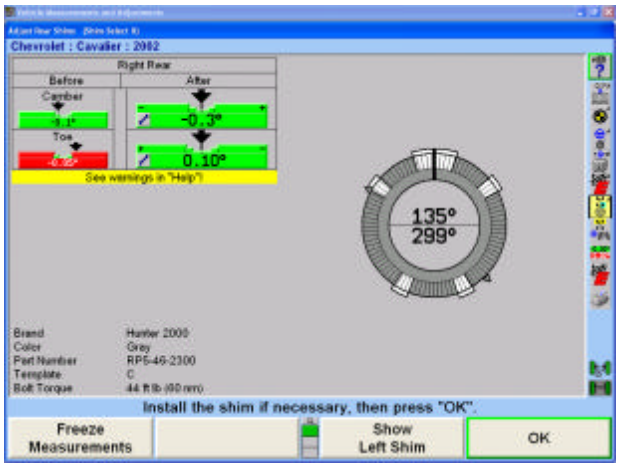


NOTE: The actual procedures displayed will vary depending on the vehicle and alignment angles that need to be adjusted.

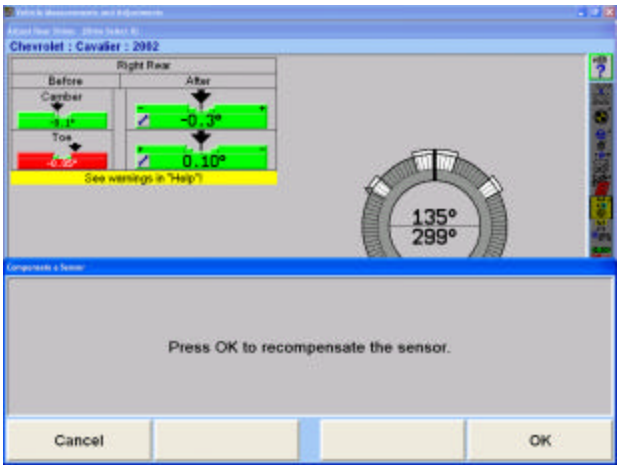
An icon will be displayed in the “ExpressAlign®” popup screen for each suggested procedure. Selecting the corresponding icon in the procedure bar will start the procedure that the icon represents.

Procedures that have yellow text in the “ExpressAlign®” popup screen refer to adjustments that must be made for the specified vehicle.

Selecting the ExpressAlign® icon in the procedure bar will prompt you through the recommended sequence for the alignment. In this instance, rear camber and toe will be the first necessary adjustment.



Remove the wheel to install shim. After installing shim and reinstalling wheel with target and wheel adaptor, the target must be re-compensated using jacking compensation.

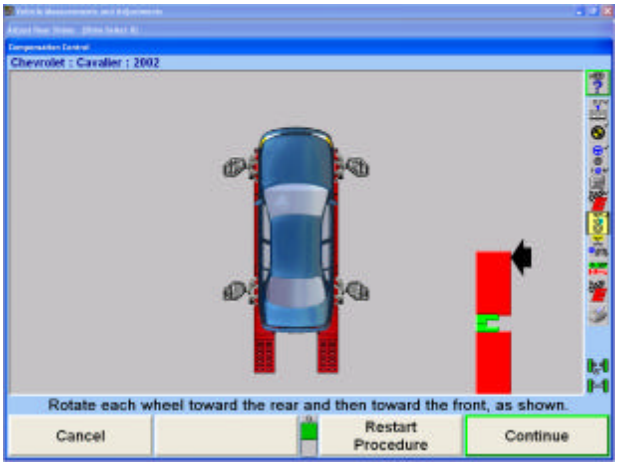


Press “Cancel” if no adjustments were made.

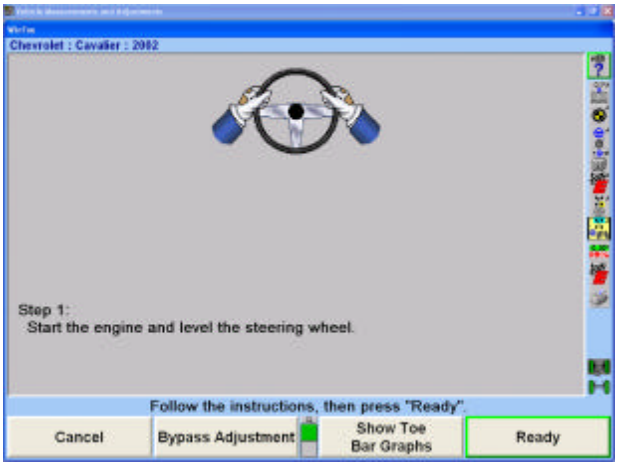
OR

Press “OK” to re-compensate the target.

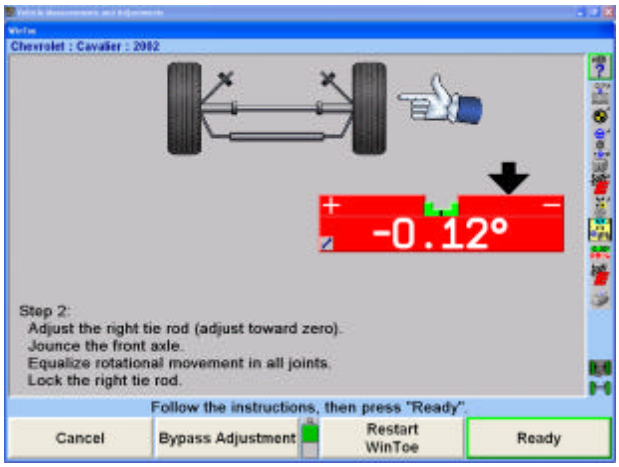
Follow the on-screen directions to compensate the target. Press “Continue” when finished.



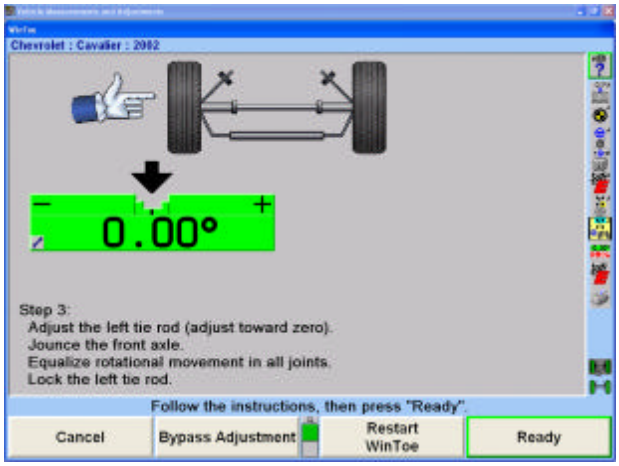
Follow the on-screen directions, then press “Ready.”



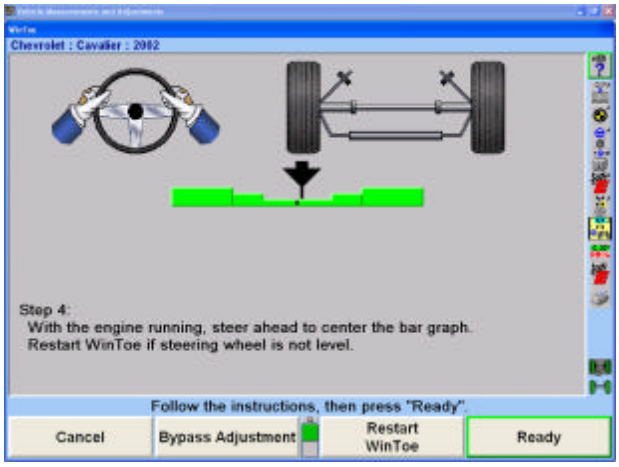
Adjust the right tie rod, follow the on-screen directions, then press “Ready.”



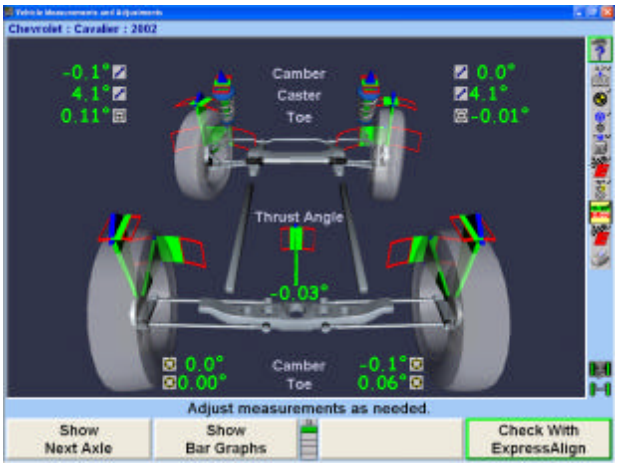
Adjust the left tie rod, follow the on-screen directions, then press “Ready.”



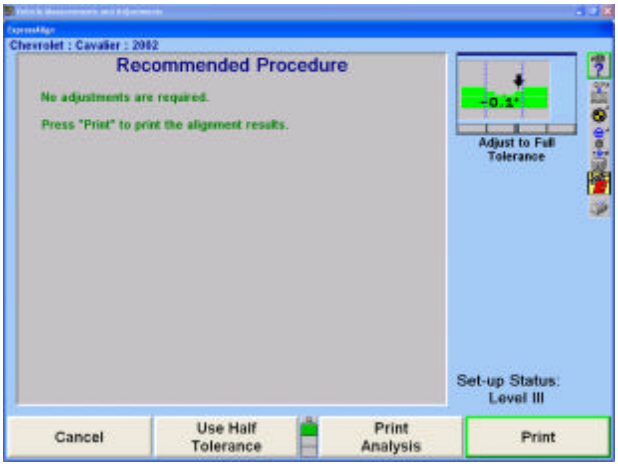
Steer ahead to center the bar graph. The steering wheel should be level. Press “Ready.” If the steering wheel is not level, restart WINTOE® and correct as necessary.



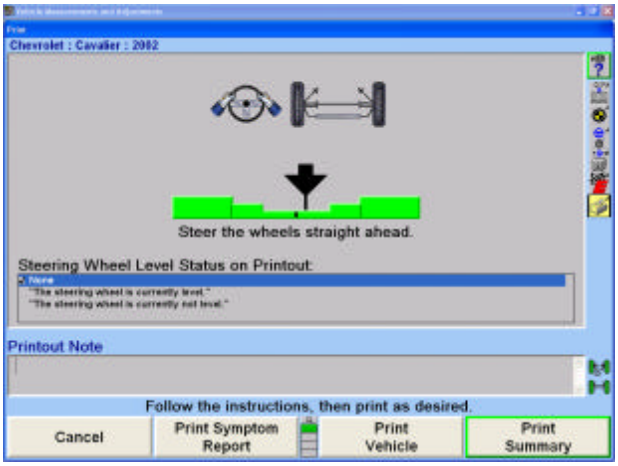
Press the “Check With ExpressAlign®” icon in the procedure bar.



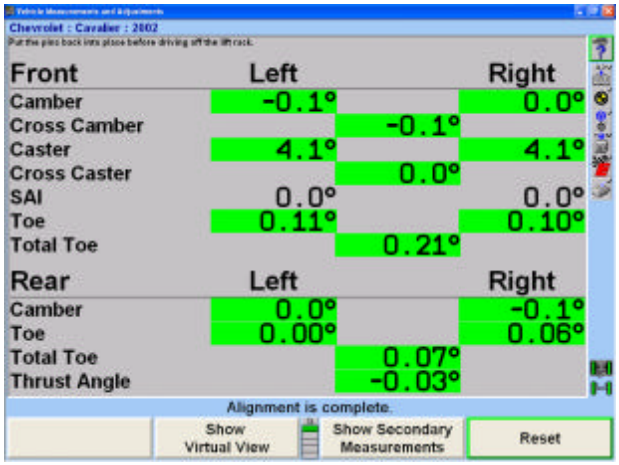
After all adjustments are completed, select the “Print” icon in the procedure bar to print the alignment results.



Press “Print Summary.” Before printing, the “Print” popup screen will allow the technician to input the current steering wheel status and make additional notes as needed. After steering ahead, add the necessary comments for the printout and select “Print Summary.”



After printing the results, the “Vehicle Measurements and Adjustments” primary screen will appear with the current vehicle measurements showing. The alignment is complete.



Verify that the pins are in place in the slip plates and turnplates before driving the vehicle off the rack.

An Example Alignment Job with the ExpressAlign® Adjustment Feature and without DSP400 or DSP600 Sensors

The “Total Four-Wheel” alignment procedure requires the use of all four sensors and is typically used when adjustments are available for rear camber and/or rear toe.

This example alignment job assumes that the system is configured as follows:

ENABLED
Display of Vehicle Specifications
Show Measurements Display After Compensation
Show Measurements Display After Caster
Verify Caster Adjustment
ExpressAlign Level III

Your system may be configured differently.

> NOTE: This section is an overview of an alignment job using the ExpressAlign® feature. For details about any procedure, *refer to the appropriate section of the manual or press “HELP” in the WinAlign® program.*

Prepare the vehicle for alignment as follows:

Position vehicle onto alignment rack with the front wheels centered on the turning angle gauges.

Place the vehicle transmission in park and apply the parking brake.

Position chocks at front and rear of the left rear tire.

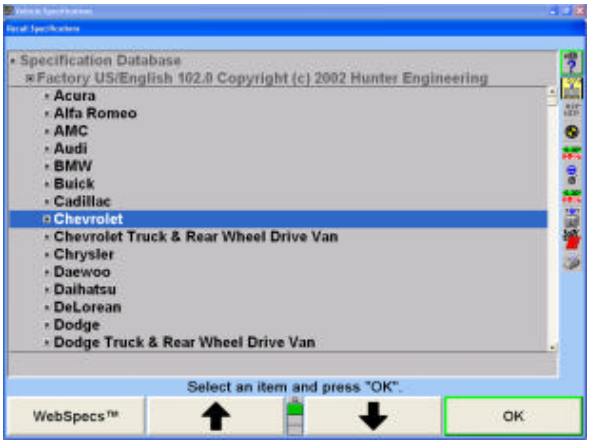
Place the lift at alignment height.

NOTE:	The alignment rack must be level to properly perform an alignment.

Inspect for unevenly worn or mismatched tires and adjust tire pressure to vehicle manufacturer's specification.

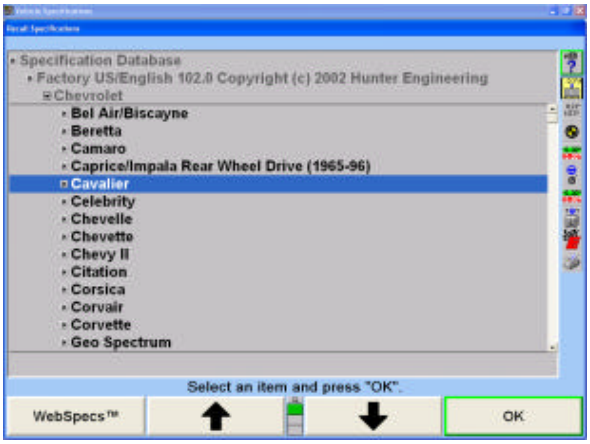
Inspect the suspension and steering linkage components for wear, looseness, or damage.

Start the alignment program by pressing "Begin Alignment" on the "Logo" screen. The "Recall Specifications" popup screen will appear.



Press "↑" or "↓" to highlight the manufacturer of the vehicle being aligned.

Press "OK" to select the highlighted manufacturer. The next screen will list the models available from the selected manufacturer.



Press "↑" or "↓" to highlight the model of the vehicle being aligned.

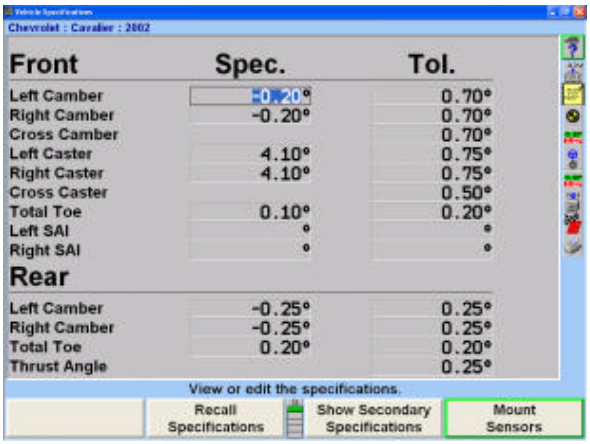
Press "OK" to select that model.

Continue in this manner until the vehicle is identified to the program.

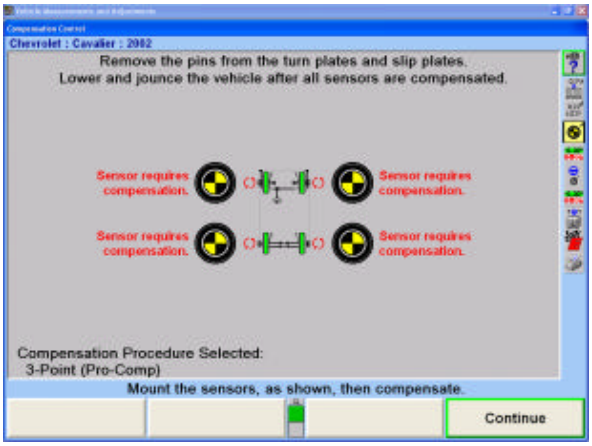
When the vehicle is identified to the program, the screen will change to the "Vehicle Specifications" primary screen.

The “Vehicle Specifications” primary screen displays the identification and alignment specifications for the vehicle chosen.

Confirm that the vehicle identified is the vehicle you have chosen, and then press the “Mount Sensors and Compensate” icon in the procedure bar.

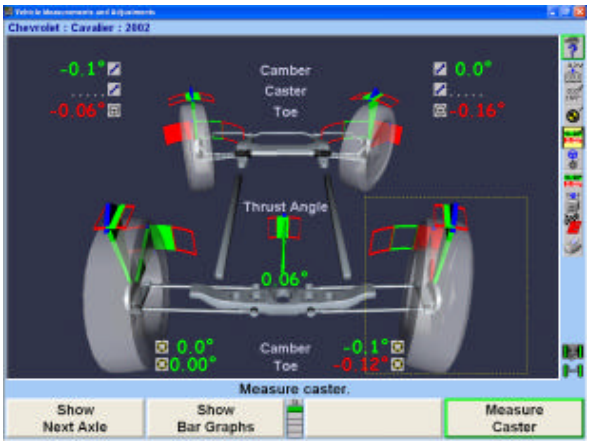


The screen will change to the “Compensation Control” popup screen.



Mount sensors on wheels and compensate them for runout. Refer to “Mounting Sensors or Targets onto Wheel Adaptors”.

After the sensors have been compensated, remove the pins from the turnplates and slip plates, then lower and jounce the vehicle.

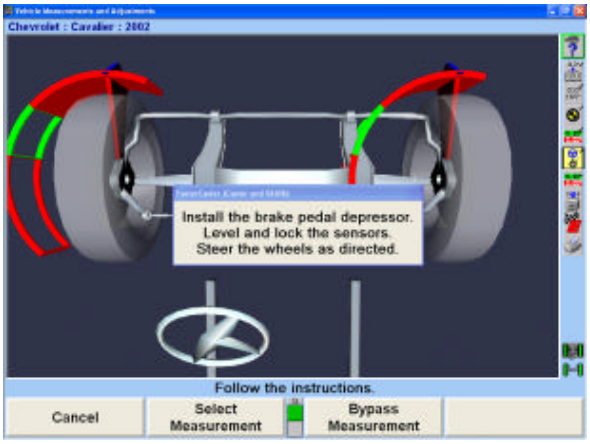


The screen will change to the “Vehicle Measurements and Adjustments” primary screen. The current vehicle alignment measurements are shown on this screen.

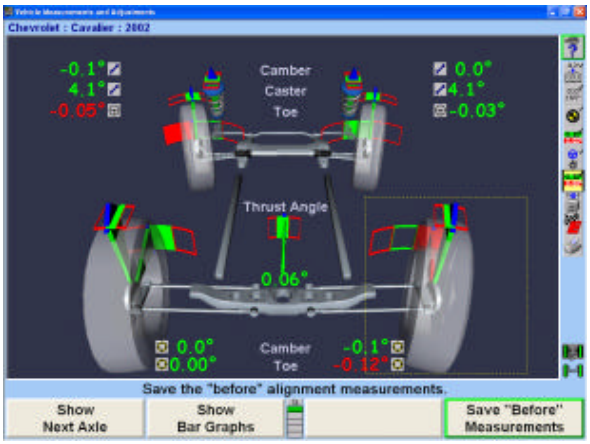
Press the “Measure Caster” icon in the procedure bar. The screen will change to the “Caster and S.A.I. Measurement” popup screen that will direct you to measure caster.

Install the brake pedal depressor, level and lock the sensors, and lower vehicle if raised.

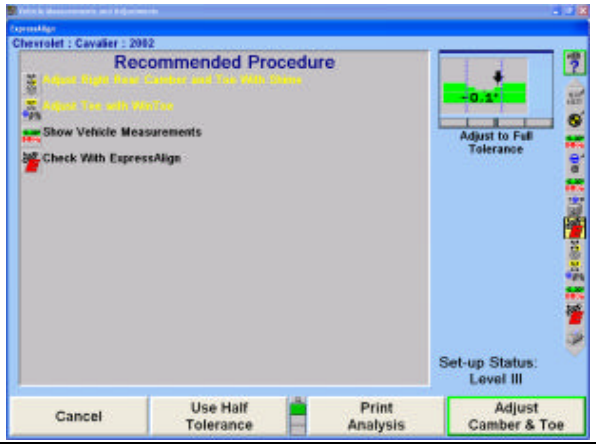
Steer the wheels as directed and follow the on-screen directions.



These are the initial measurements of the vehicle. Press the “Save ‘Before’ Measurements” icon in the procedure bar to save them for the printout. The screen will change to the “Save 'Before' Alignment Measurements” popup screen.



The screen will change to the “ExpressAlign®” popup screen.

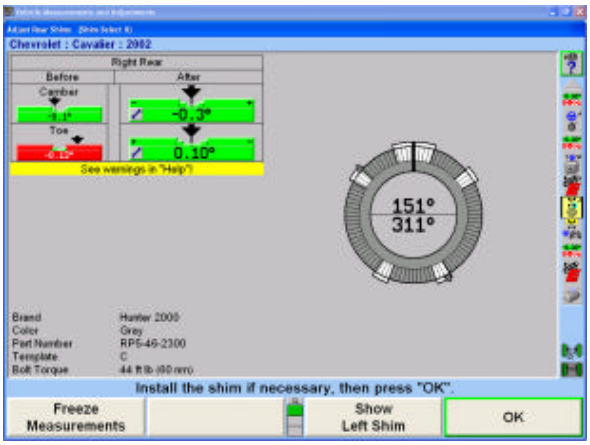


NOTE:	The actual procedures displayed will vary depending on the vehicle and alignment angles that need to be adjusted.

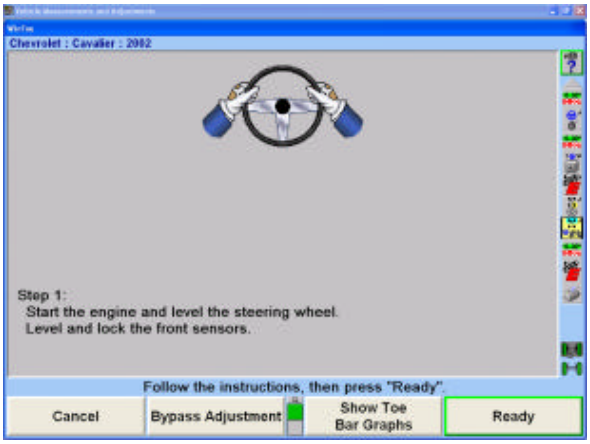
An icon will be displayed in the “ExpressAlign®" popup screen for each suggested procedure. Selecting the corresponding icon in the procedure bar will start the procedure that the icon represents.

Procedures that have yellow text in the “ExpressAlign®” popup screen refer to adjustments that must be made for the specified vehicle.

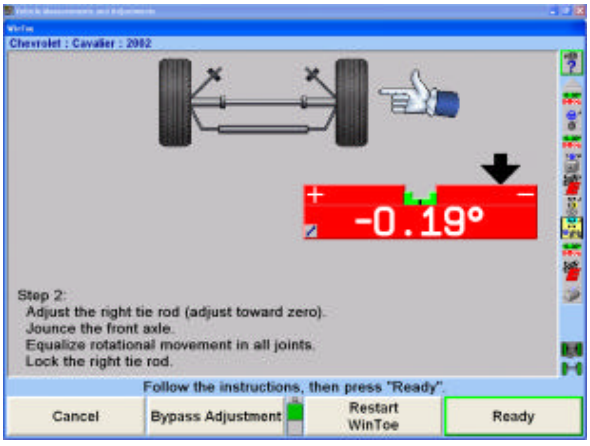
This vehicle uses shims to adjust rear camber and toe. Selecting the “Rear Adjust Camber & Toe” icon in the procedure bar will automatically proceed to Shim Select® II and display the correct shim for the necessary adjustment.



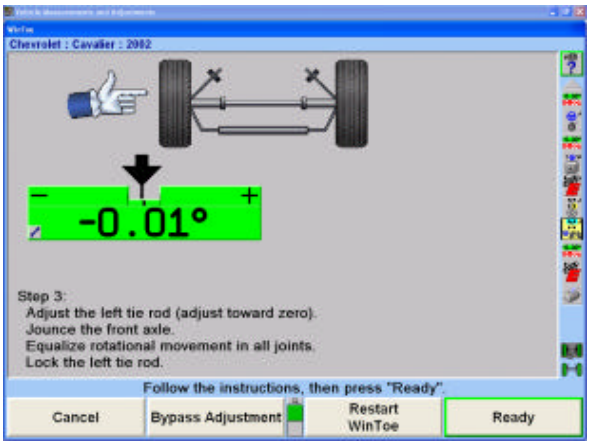
If the vehicle you are aligning does not use shims, ExpressAlign® will select and display the appropriate adjustment screen. Press “OK” after making adjustments and re-compensating the sensor.



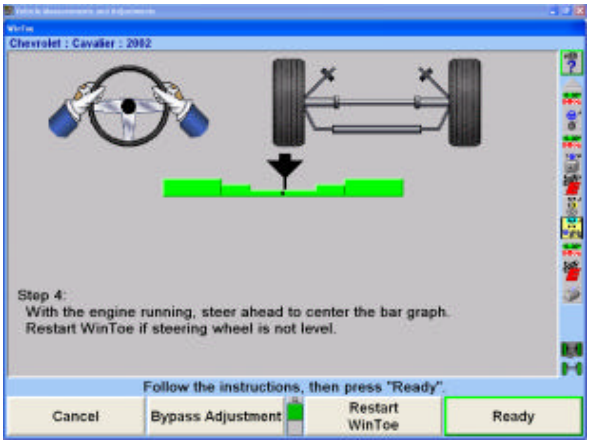
Make the adjustments indicated on the screen. Then press “Ready.”



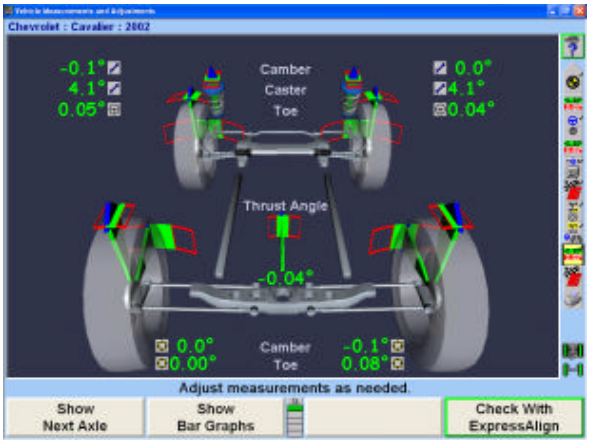
Make the adjustments indicated on the screen. Then press “Ready.”



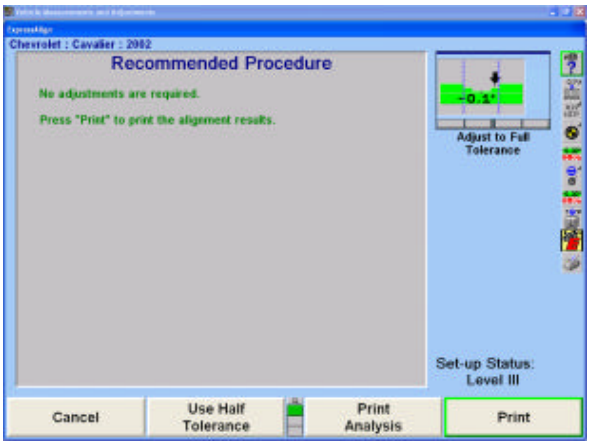
Steer ahead to center the bar graph. The steering wheel should be level. If the steering wheel is not level, restart WINTOE® and correct as necessary.



Press the “Vehicle Measurements and Adjustments” icon in the procedure bar and the “Vehicle Measurements and Adjustments” primary screen will appear.

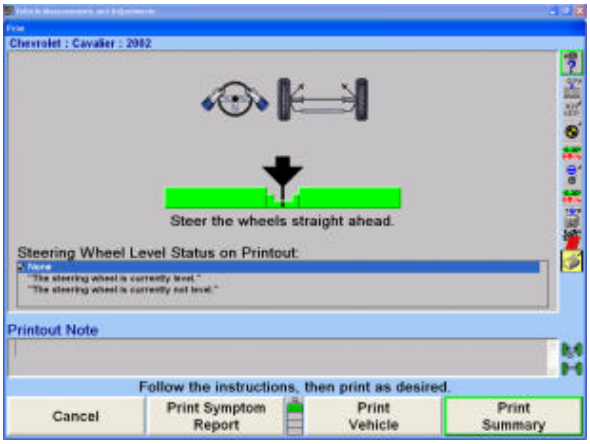


Select the “Check With ExpressAlign®” icon in the procedure bar.

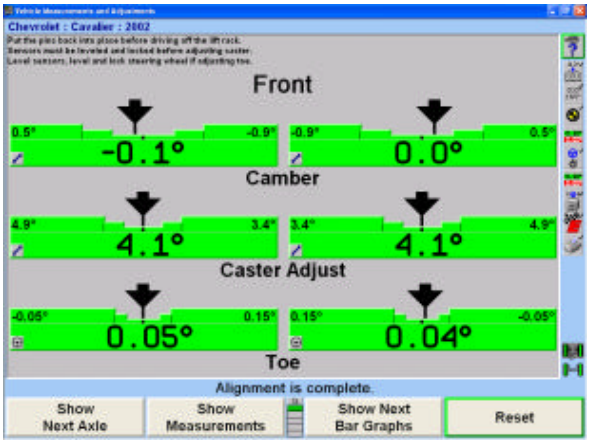


After all adjustments are completed, select the “Print” icon in the procedure bar to print the alignment results.

Before printing, the “Print” popup screen will allow the technician to input the current steering wheel status and make additional notes as needed. After steering ahead, add the necessary comments for the printout and select “Print Summary.”



After printing the results, the “Vehicle Measurements and Adjustments” primary screen will appear with the current vehicle measurements showing. The alignment is complete.



2. Basic Operation Information

Sensors and Targets

Mounting Sensors or Targets onto Wheel Adaptors

Sensors or targets 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 or target onto the adaptor (Either method may be used).

Center the wheel adaptor center casting between the upper and lower castings.

Tighten both center casting lock knobs very 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).

Attach sensor to 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.

Swing the sensor locking lever clockwise to the locked position.

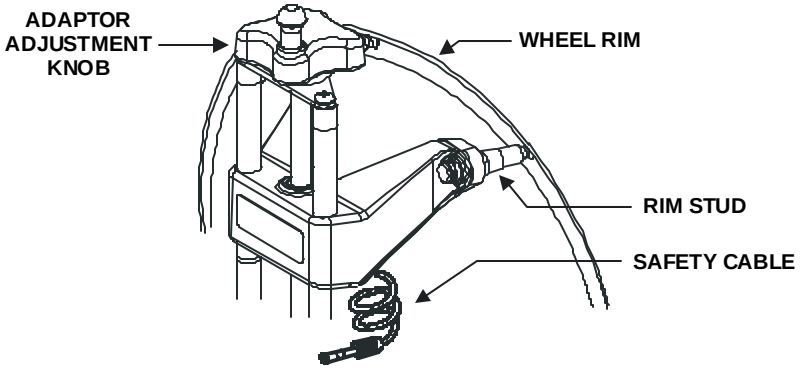
> ⚠ **CAUTION:** When mounting sensors or targets to the wheel adaptors, the sensor or target shaft must be fully seated. Make certain that there is no play or looseness between the sensor or target shaft and the wheel adaptor. Rotate the wheel while holding the target. Listen and feel for movement between the sensor or target and wheel adaptor. Runout compensation and alignment accuracy could be adversely affected if there is any movement between the sensor or target and wheel adaptor. Sensors or targets must fit tightly against the surface of the wheel adaptor or the lock may not hold. This could allow the sensor to fall and be damaged.

When the sensor or target is mounted, the locking lever should be rotated until firm hand pressure is applied. Tools should not be used to force the locking lever.

Mounting Wheel Adaptors Onto Wheels

Wheels with 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 rim lip.

Turn the adaptor adjustment knob to firmly grip the adaptor onto the wheel.

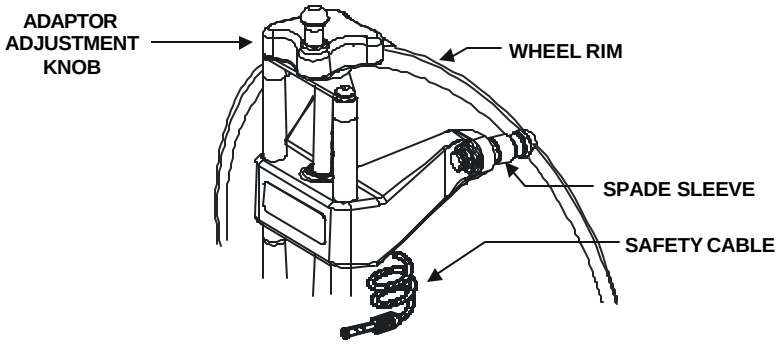
Connect the sensor safety cable to the air valve stem.

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

> ⚠ **CAUTION:** Do not use rim studs on alloy or clear coat wheels.

Wheels with No Rim Lip

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



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

> NOTE: If the rim/tire profile does not accept the adaptor rim studs, install spade sleeves over the rim studs. If spade sleeves are needed on one front wheel, they must be used on both front wheels. If spade sleeves are needed on one rear wheel, they must be used on both rear wheels.

Turn the adaptor adjustment knob to firmly grip the adaptor onto the wheel.

Connect the sensor safety cable to the air valve stem.

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

Connecting Conventional Sensor Cables

Connecting Sensor Cables with Optional Rack Wiring Kit

Connect each sensor to a rack wiring box with short sensor cables.

Connect a front rack wiring box to the console with a long sensor cable.

Connecting Sensor Cables without Optional Rack Wiring Kit

Connect the two rear sensors to the front sensors using sensor cables.

Connect the two front sensors to the console using sensor cables.

Compensating Conventional Sensors

General Compensation of Conventional Sensors

The sensors must be compensated to eliminate error in angle measurements caused by runout of the wheel and wheel adaptor.

The default setting for the alignment console is set for 3-point compensation. The default setting can be changed in Aligner Setup for either 2-point compensation or 3-point compensation (Pro-Comp® compensation).

The operator still has the option to override the default setting by adding 2-point compensation and rolling compensation in Aligner Setup under the Sensors heading / Compensation Options.

When these compensation options are added, softkeys will be available during the compensation procedure.

If a sensor that has been compensated should require re-compensation, pressing the compensate button twice within four seconds will begin the new procedure.

When pressing the sensor compensate button, momentarily depress (do not hold the compensate button). Also, do not disturb the sensor until the red LED responds.

Sensors may be compensated in any order; however, these precautions must be followed:

If a sensor is removed from a wheel, that sensor must be re-compensated when reinstalled. The other sensors do not need re-compensation.

During 2-point compensation and normal operation of conventional sensors, be certain no obstructions are blocking the infrared beams between sensors. Should a blockage occur, the affected sensor(s) shown on the illustration on the CRT will flash on and off and the displayed toe measurement of the sensor(s) will go blank until the obstruction is cleared.

When compensating sensors mounted to the vehicle drive wheels, place the transmission in NEUTRAL.

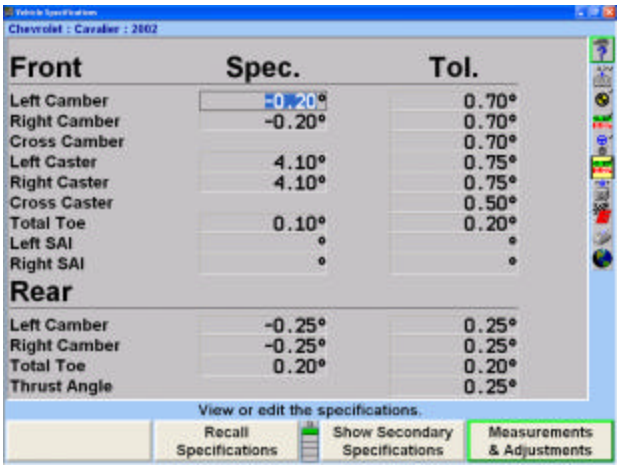
The lift rack should be level on leveling legs.

Roll-Check® Measurement Feature

After performing rolling compensation, it is necessary that the vehicle is steered ahead and that “Total Toe” is not excessive. Roll-Check™ verifies that both of these conditions have been met.

Vehicle Specifications

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



This primary screen is displayed by pressing “Vehicle Specifications” on any other primary screen. To change to one of the other primary screens, change to the second row of softkey labels, and press the appropriate softkey.

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.

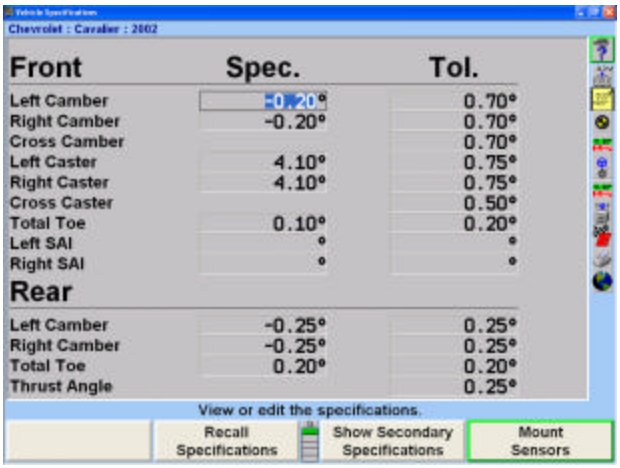
Setting the display units and formats for specifications and measurements.

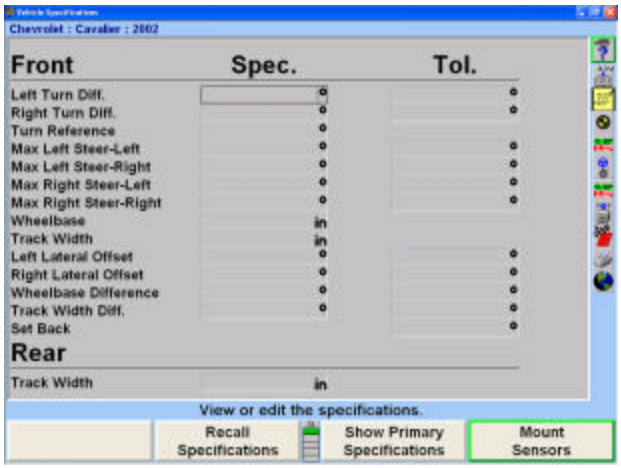
Primary and Secondary Specification Groups

The specifications and tolerances are shown in two different groups:

“Primary Specifications” are the usual camber caster total toe and thrust angle specifications and tolerances.

“Secondary Specifications” are S.A.I., toe-out-on-turns and maximum steering angle specifications and tolerances.



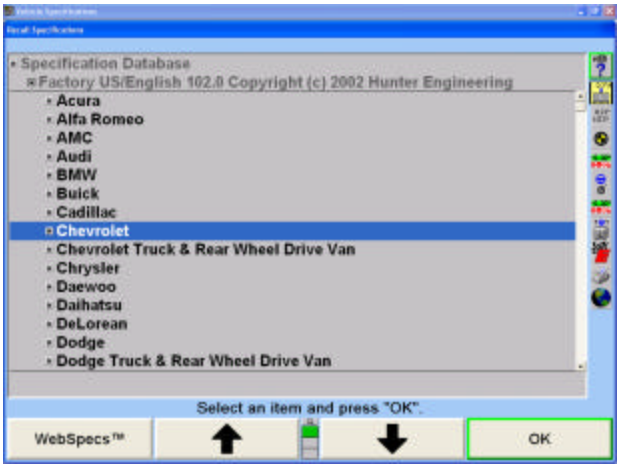


You may select “Show Primary Specifications” or “Show Secondary Specifications” from the “Vehicle Specifications” primary screen. “Secondary Specifications” displays both the front and rear axle. Secondary Specifications can be accessed from any primary screen where the “Show Vehicle Specifications” softkey is available.

Vehicle Specification Memory

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

The “Recall Specifications” popup screen is displayed by pressing “Recall Specifications” on the “Vehicle Specifications” primary screen.

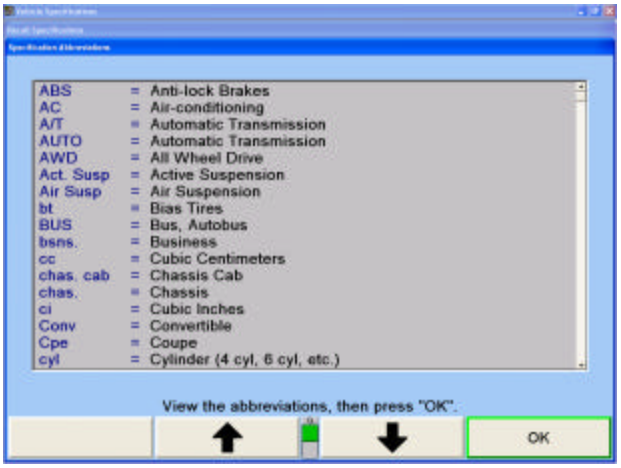


Specifications may be recalled from “Factory Specifications,” based on original equipment manufacturer specifications, “Factory Amendments,” or “User Specifications.” “Factory Amendments,” and “User Specifications" are created and stored into the computer’s memory by the equipment operator.

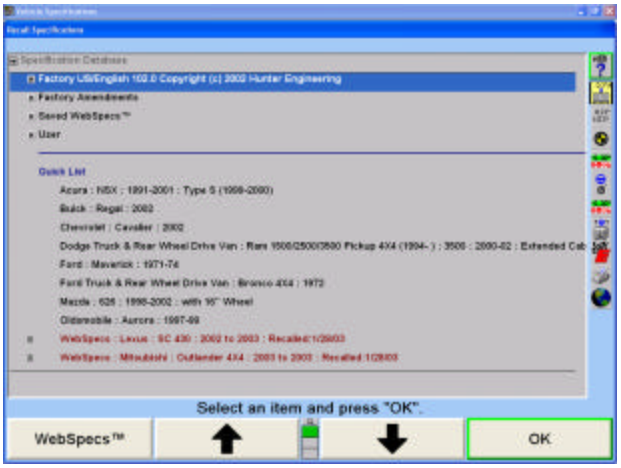
Although the specification database is extensive, some vehicle manufacturers and/or specific models may not be included in the factory specifications memory. Locate the alignment data in the alignment specification book or vehicle manufacturer’s service manual and manually enter the specifications on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

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

Pressing "List Abbreviations" identifies a list of abbreviations used in "Factory Specifications."



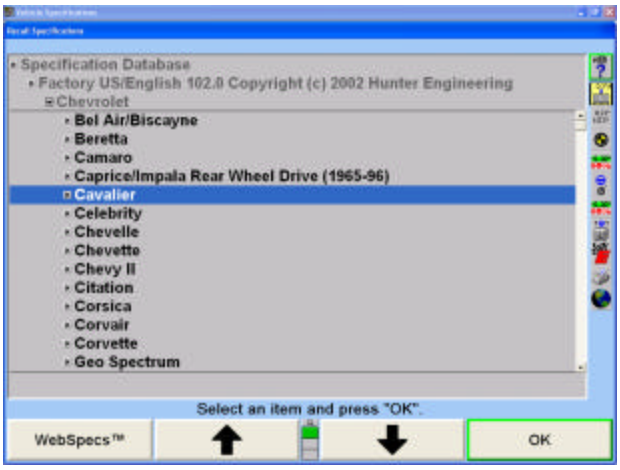
Also displayed in Recall Specifications is the "Quick List." The "Quick List" displays all the vehicles most recently worked on, as shown below.



The Quick List is not erased, but each new vehicle entry overwrites an older entry.

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 “Chrysler” as follows:

Type “C”; the selection changes to “Cadillac.”

Type “H”; the selection changes to “Chevrolet.”

Type “R”; the selection changes to “Chrysler.”

The more letters typed the more accurate the selection. This is also valid within the vehicle make selection.

In Set-up, you may select one of four sequences by which the vehicle is identified.

The four choices are:

Optimal

Year, Manufacturer, Model

Manufacturer, Year, Model

Manufacturer, Year and Model

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.

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" popup screen must be currently displayed:

Press ⬆ or ⬇ to highlight "Specification Database."

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

Press ⬆ or ⬇ to select "User" and press "OK." The screen will change to list user entered specifications.

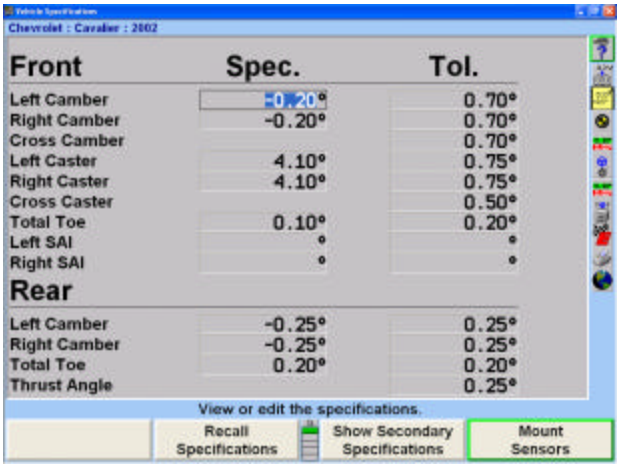
Press ⬆ or ⬇ to highlight the desired item and press "OK." The vehicle specifications will be retrieved from the "User" specification memory. When the specifications have been retrieved, the screen will change to display those specifications.

Editing Specifications

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.

> NOTE: 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".*

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."

> NOTE: 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.

> ⚠ **CAUTION:** 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.

Selecting Specification Formats

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

	specification	tolerance
Left camber	0.50°	± 0.25°

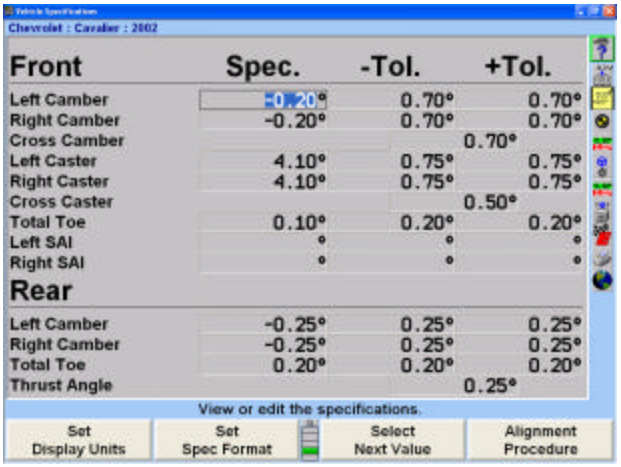
These are called symmetrical specifications because the tolerance range extremes are equal distance from the preferred specification. This permits a ± value to be used as a tolerance and does not require two placeholders for tolerances. Symmetrical specifications are most common.

Non-symmetrical specifications use an unequal ± tolerance such as:

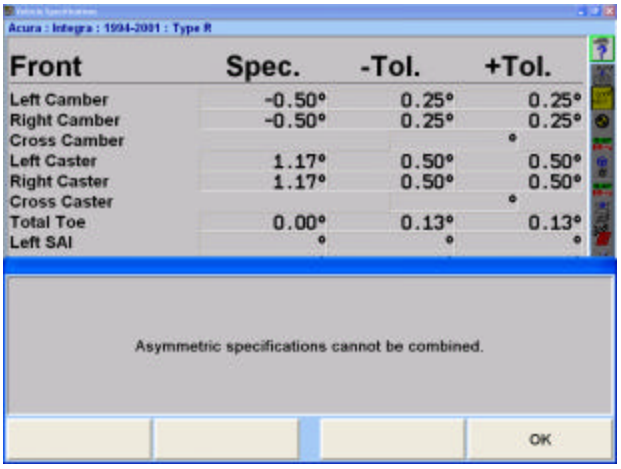
	specification	+ tolerance	- tolerance
Left camber	0.50°	0.50°	0.30°

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 “Enter” or “OK” to clear this error message.

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 ± 0.25° (1/4°),

front caster tolerance to ± 0.50° (1/2°),

front and rear total toe tolerance to ± 0.06” (1/16”, 0.13° 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.

Storing Specifications

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.

> NOTE: 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.

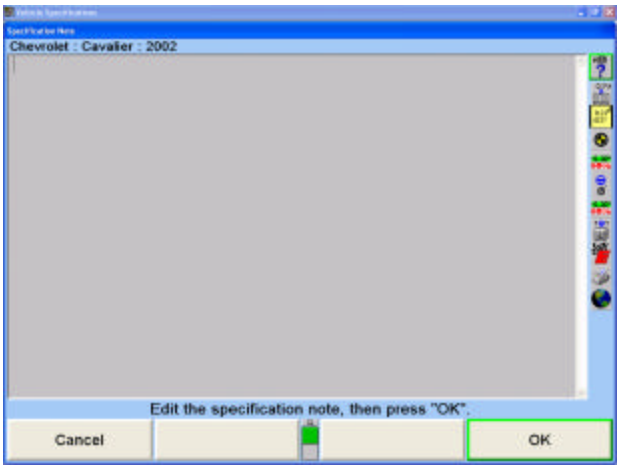
To enter and store a specification note, do either of the following:

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

OR

Open the “Recall Specifications” popup screen. Select the vehicle, press “OK” for the final selection. The “Show Spec Note” soft key 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” popup screen will appear.



Use the keyboard to type and/or edit the note as desired. Pressing “Cancel” will close the popup 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 paper clip” next to it (as shown by the arrow) in the “Recall Specifications” popup screen.

Storing "User Specifications"

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

These specifications can take two forms:

They can be manually entered onto a blank specification screen.

They can be 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.

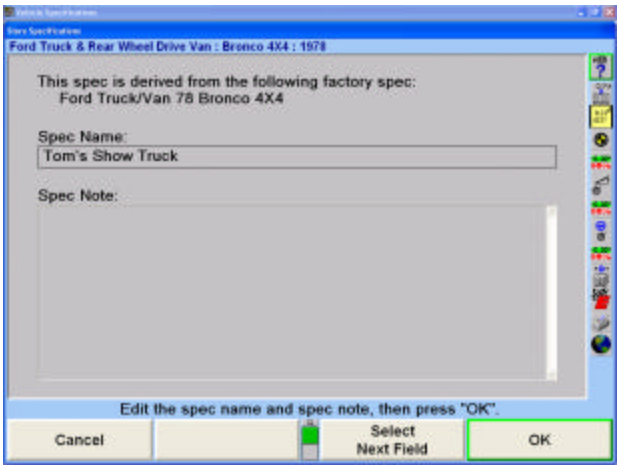
To store a specification:

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.

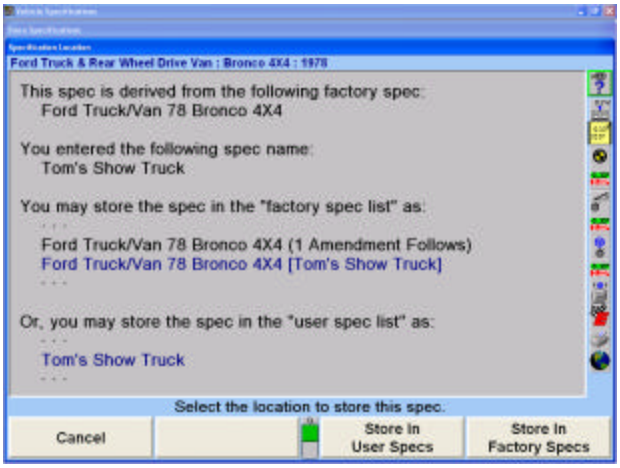
When the specifications are ready to store, press "Store Specifications." The "Store Specification" popup screen will appear.



Type in the identification of the vehicle. This is the name of the vehicle that will appear on the "Specification Recall" popup 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.

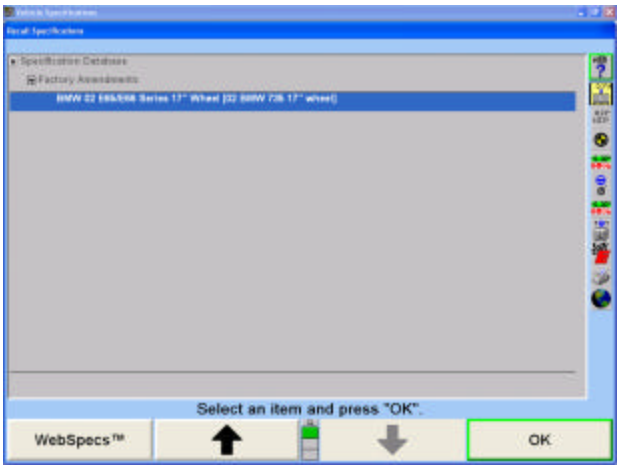
When saving to “Factory” specifications, if the specification ID is already used in the database, the specification will be saved as an AMENDMENT to the factory specification already in memory.

For recalling User Specifications, refer to “Selecting User Specifications,” page 65.

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 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” popup 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 Specifications.” The “Specification Note” should contain the contents of the Technical Service Bulletin.

WebSpecs.Netä Online Specification Database

WebSpecs.Net™ is an on-line, Internet-based, alignment specification database designed to be accessed from any PC with an Internet connection.

> NOTE: The WebSpecs feature is available in WinAlign® 5.1 and above, but the specs downloaded from a remote PC are only useable on versions of WinAlign® 6.1 and above.

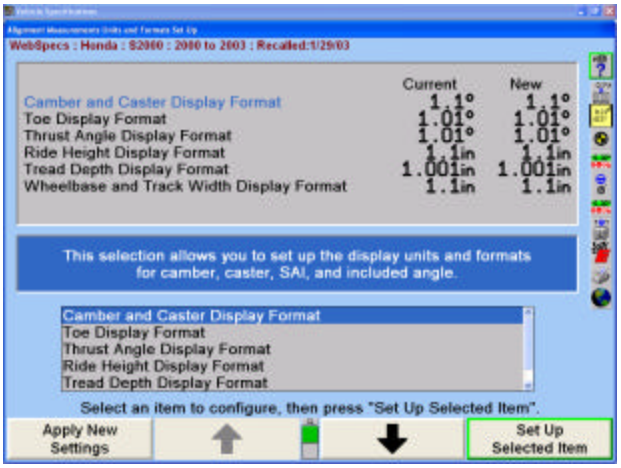
Selecting Display Units

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.

Press “Set Display Units” in the “Vehicle Specifications” primary screen. The “Alignment Measurement Units and Formats Setup” popup screen will appear listing “Current” and “New” settings.

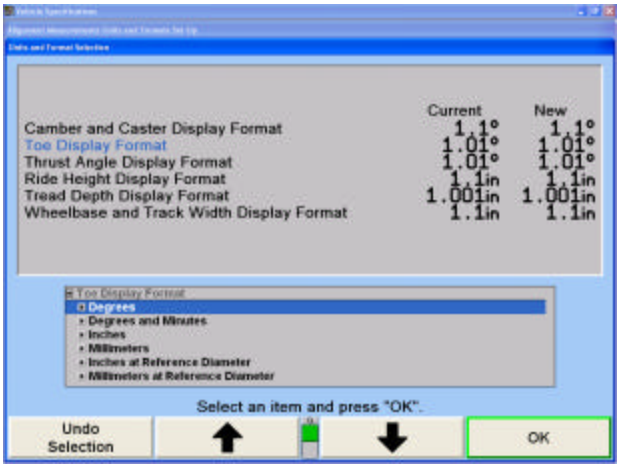
NOTE: The “Alignment Measurement Units and Formats Setup” popup screen may also be accessed by selecting “Alignment Measurement Units and Formats” from “Aligner Setup.” *Refer to “Aligner Set Up”.*

This popup screen allows the units and formats for the various alignment displays to be changed. Both the “Current” and “New” settings are shown as example measurements.



Press ⬆ or ⬇ to highlight a display format type. When a parameter type is highlighted, a brief explanation of the measurement type appears.

Press “Set Up Selected Item.” The “Units and Format Selection” popup screen appears to allow the units and formats to be selected. This popup screen continues to show the current and new settings for all the display formats.



Press ⬆ or ⬇ to highlight the desired units, then press “OK.” The screen changes to show the formats available for the selected units for the display format.

Press ⬆ or ⬇ to highlight the desired units, then press “OK.” If the selected format is fractional, a third selection must be made, in the same manner, to select whether the fractions should be reduced.

When the final choice is made, the popup screen closes and the display returns to the “Alignment Measurement Units and Formats Setup” popup screen. The new example for the display format shows the selection just made.

Press ↑ or ↓ to highlight another display format and continue to set up the units and formats.

If the change(s) should be applied only to the current vehicle, press “Apply New Settings.”

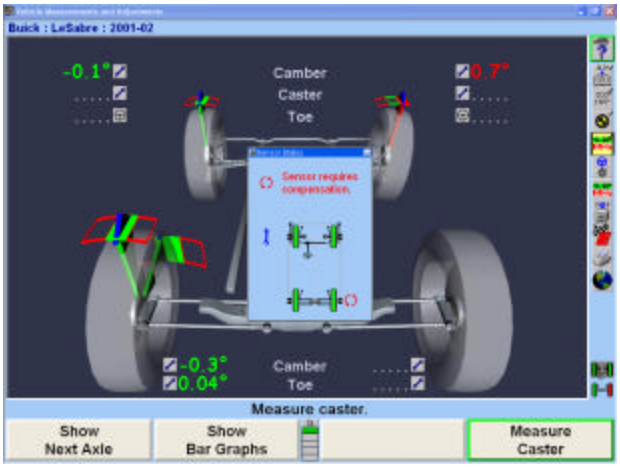
If the change(s) should be applied to the entire factory database each time the system is powered up, press “Set As Default.”

Press “Exit” to return to the “Vehicle Specifications” screen.

Vehicle Measurements and Adjustments

Vehicle Plan View Status Indicator

The “Vehicle Measurements and Adjustments” screen shows a graphic illustration of a vehicle and the measured alignment angles.



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

The geometry of the vehicle under alignment.

NOTE:	This feature is more useful for truck applications because automobiles all show similar alignment geometry.

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.

An alignment procedure is being selected, where one or more instances of the plan view are used to illustrate the steps of the procedure.

During Virtual View and ExpressAlign® screens.

The indicator shows:

The vehicle geometry.

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 individual wheels turn red when a sensor problem is present.

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

Bar Graph Adjustments

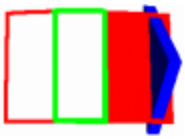
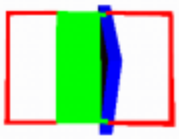
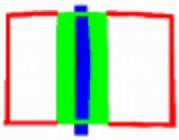
Bar graphs are used to show alignment angle information for each wheel. These bar graphs indicate the difference between the actual measurements of the vehicle and the recalled specifications. The adjustment tolerances determine the size of the center areas of the bar graph.

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.

The numerical values below the bar graphs represent the actual measurement. The “ideal” or “preferred” adjustment would find the wheel position indicator arrow centered over the white line of the center bar and the numeric value reading the preferred specification for the vehicle.

A red bar graph indicates the measurement is out of tolerance. On standard bar graphs, an “X” indicates the measurement direction on the bar graph is beyond the range of the bar graph. The “X” will change to an arrow when the measurement is adjusted into range of the bar graph.

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.

Range	Virtual View 3-D Bar Graphs	Standard Bar Graphs
Out Of Tolerance (beyond range of the graph)		
Out Of Tolerance		
Acceptable Adjustment (within tolerance)		
Preferred Adjustment		

If no 3-D bar graph is shown in Virtual View or the standard bar graph color is gray:

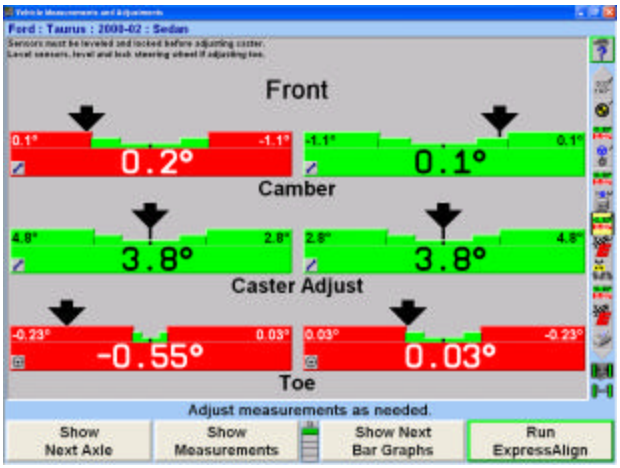
Either “no specification,” a “zero tolerance,” or “no tolerance” is entered for that angle.

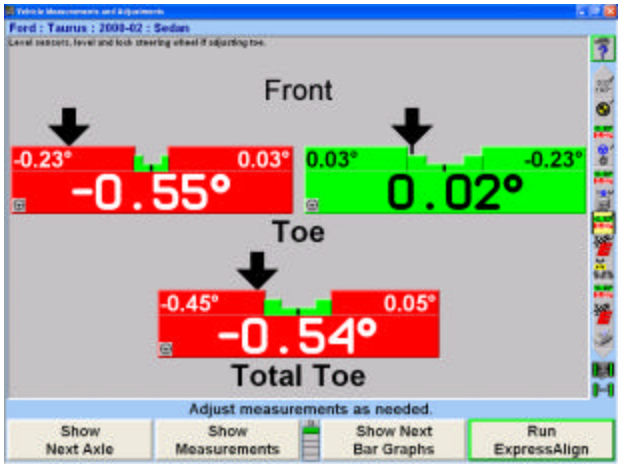
OR

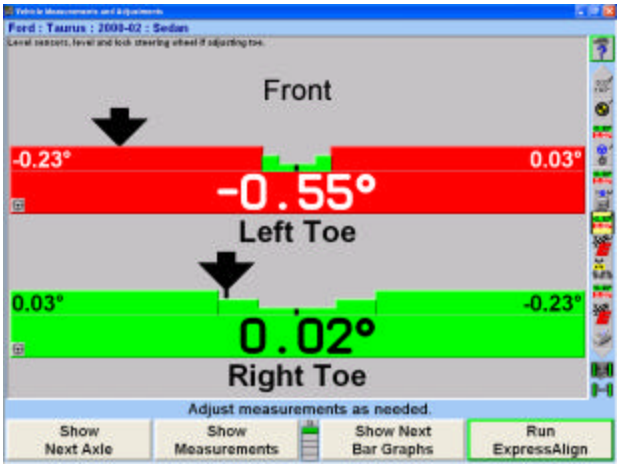
The sensors are experiencing some problem that prevents measurements, such as: the sensor is unplugged, uncompensated, or the toe beam is blocked.

Bar Graph Groups

The bar graphs can be viewed in various groups. Three examples are shown below.

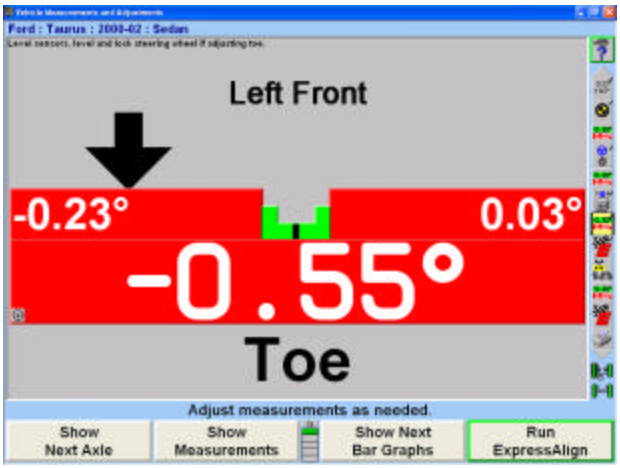






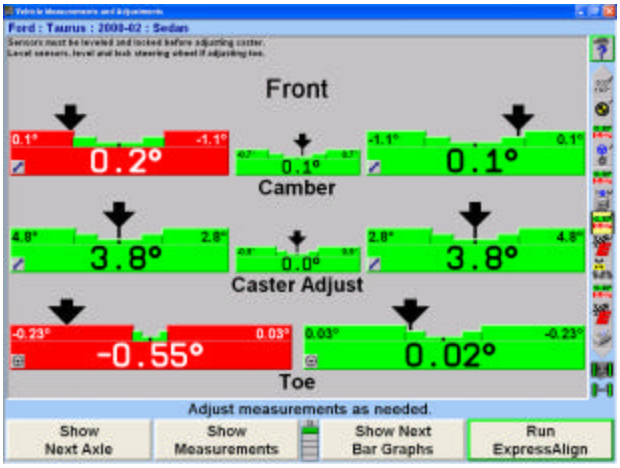
To view an alternative group or single bar graph, press “Show Next Bar Graphs.” Repeat to view the next bar graph group. When all enabled bar graphs have been viewed, the first enabled bar group will appear when “Show Next Bar Graphs” is pressed.

To view a single bar graph select the desired bar graph with a light pen or mouse. The system will “zoom in” on the selected bar graph and all other bar graphs will be removed from the screen.



To return to the previous bar graph display, click on the current bar graph with a light pen or mouse.

Like the “Vehicle Measurements and Adjustments” screen, cross camber and caster can now be displayed on the adjustment bar graph screen using the context sensitive menu.



Front Axle Bar Graphs Groups, Rear Axle Bar Graphs Groups, and Cross Bar Graph/Additional Cross Angles may be setup in aligner setup.

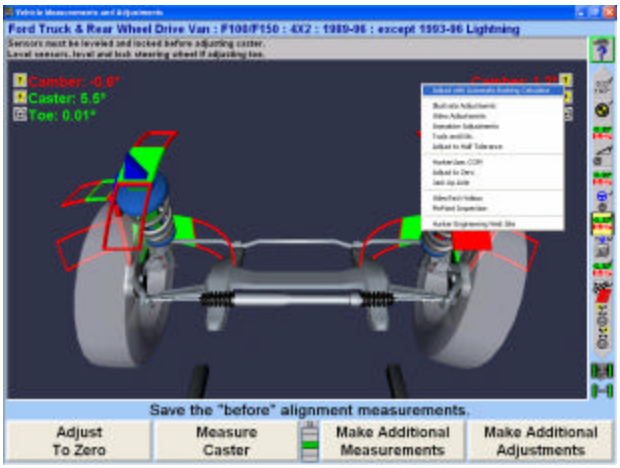
Context Sensitive Menu

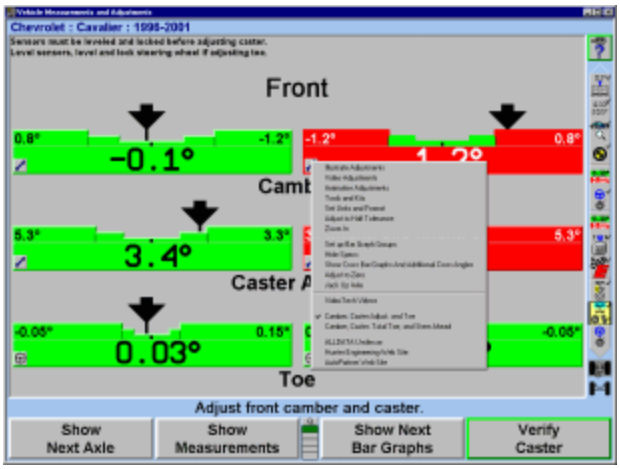
A context sensitive menu is available on the bar graph adjustment screen.

To view the menu, move the arrow cursor to the desired bar graph with a light pen or mouse, 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 bar graph 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 Graph Groups
Show Specs	Hide Specs
Show Cross Bar Graphs and Additional Cross Angles	Adjust With Automatic Bushing Calculator®

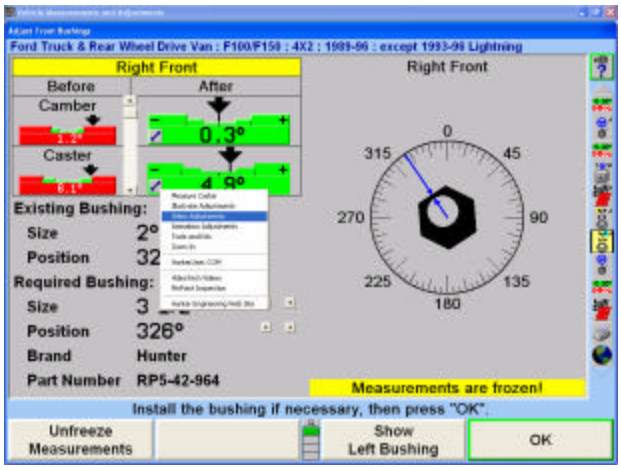




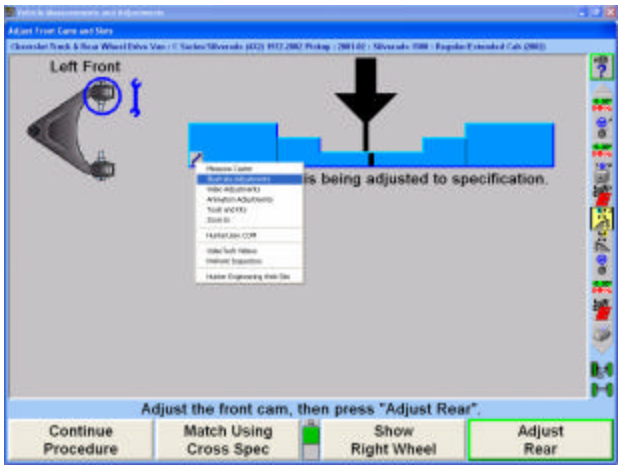
To select the desired item, continue moving the light pen or mouse until the desired item is highlighted.

Release the light pen or mouse button. The selected popup screen will appear.

Context sensitive menus are also available on power feature adjustment bar graphs.



Automatic Bushing Calculator



CAMM-Control Arm Movement Monitor

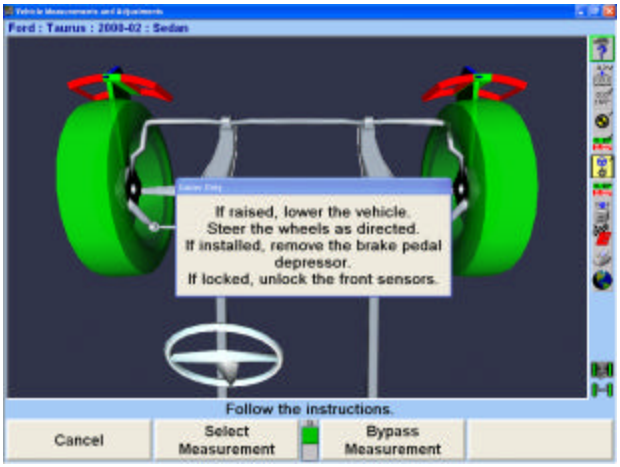
Alignment Procedure

Although the program begins a specific type of alignment, other types of alignment can be selected on the “Control Alignment Procedure” popup screen.

The aligner can be set to default to the type of alignment that will usually be performed. Some vehicle manufacturers recommend a particular type of alignment. This information is part of the stored factory vehicle specifications and will change the aligner to the recommended alignment type when the specifications are recalled, regardless of the default selection.

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., I.A. or turning angle may be useful “tools” to help determine front suspension or steering system problems with a vehicle.



Horizontal bar graphs are used to indicate wheel position or angle position in relation to the preferred position or specification. The center of each bar graph represents the preferred position of the wheel(s) or angle.

The Caster measurement display uses graphics and horizontal bar graphs to guide the steering of the wheels through the caster turn.

A wheel position indicator (either an “X” or an arrow) is positioned within the bar graph and shows the position of the wheel(s). The wheel position indicator will be left of center if the front wheels are steered too far to the left, right of center if the front wheels are too far to the right, or in the center valley of the bar graph if the front wheels are steered correctly (null position).

An “X” on a red bar graph indicates the wheels are steered beyond the range of measurement. Steer the wheels in the direction necessary to move the “X” toward the center of the bar graph. The “X” will change to an arrow when the wheel comes into range of the bar graph.

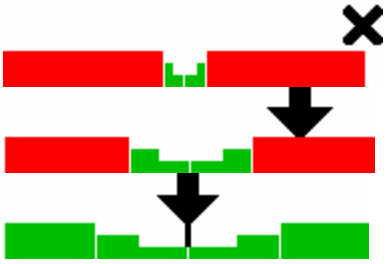
> NOTE: Total toe conditions greater than 2 inches or 4 degrees should be corrected prior to steering caster.

As the wheels are steered in the proper direction, the arrow will move toward the center. As the wheel approaches the acceptable tolerance, the center area will get larger. When the wheel is within tolerance, the bar graph will change to green.

Steered out of range (right)

Steered too far (right)

Steered correctly (null position)



When the wheel is in the proper position, the arrow will be over the thinnest section of the bar graph. The aligner will save the measurements and the bar graph will disappear.

> NOTE: It is not necessary to perfectly center the arrow in the bar graph when steering to measure caster, caster and S.A.I./I.A., or S.A.I./I.A. The wheel position is acceptable when the arrow is positioned within the center valley of the bar graph.

> NOTE: If WinAlign® determines that the brakes are applied or sensors are unlocked while measuring S.A.I., a prompt will appear asking you to check the sensors and/or brakes.

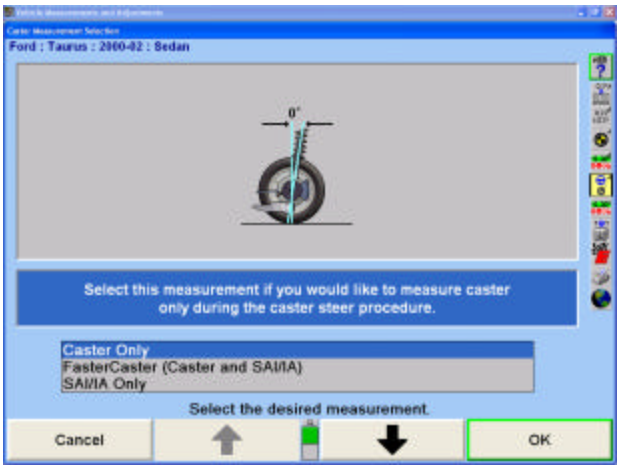
> NOTE: DSP400 Sensor Only:
> Unlike conventional sensors, DSP400 Targets should not be unlocked and re-leveled if the target has rotated so that it is not level after measuring caster.
> If the DSP400 Sensor targets have rotated so that they are not level after measuring caster but before adjusting caster, “Match Caster Adjust to Measured Caster” may be selected from the caster pull-down bar graph. This will allow WinAlign to electronically compensate for rotation.

Measuring Caster

Press “Measure Caster” on the “Vehicle Measurements and Adjustments” primary screen. The “Caster and S.A.I. Measurement” popup screen will appear.

If “Caster Only” is not the default:

Press “Select Measurement,” the “Caster Measurement Selection” popup screen will appear.



Press ↑ or ↓ until “Caster Only” is highlighted.

Press “OK” to select the measurement. The “Caster and S.A.I. Measurement” popup screen will appear.

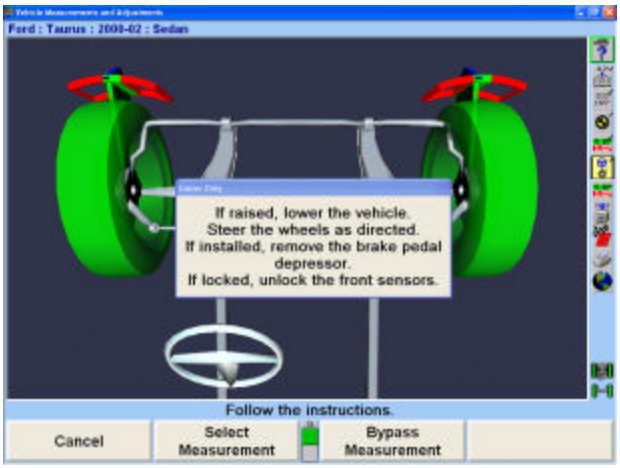
> NOTE: This selection will not change the aligner default setting. When the aligner is reset, the default settings will be applied.

Lower vehicle if raised and remove brake pedal depressor if installed.

Loosen the front sensor lock knobs.

A single bar graph is displayed along with a prompt to steer the wheels to the straight-ahead position.

Steer the wheels until the wheel position indicator is within the center valley of the bar graph and hold steady. The aligner will save the measurements and the display will change to show two bar graphs and prompt to steer left. Depending on conditions, you may be required to press “Ready” to continue.



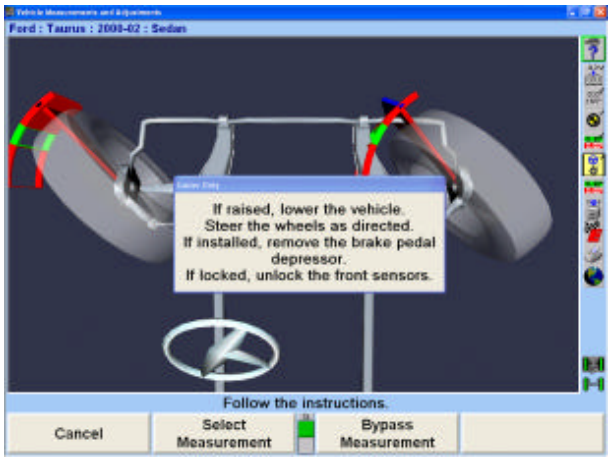
The left bar graph indicator is controlled by the left wheel, the right bar graph indicator by the right wheel.

Observing the bar graph display, steer the wheels to the left until either wheel position indicator is within the center valley of its bar graph. Hold the steering wheel steady.

The measurements will be saved and the bar graph will disappear.

Continue to steer the wheels until the remaining wheel position indicator is within the center valley of its bar graph. Hold the steering wheel steady until that bar graph disappears.

Two new bar graphs will appear and the steering wheel display will indicate to steer to the right.



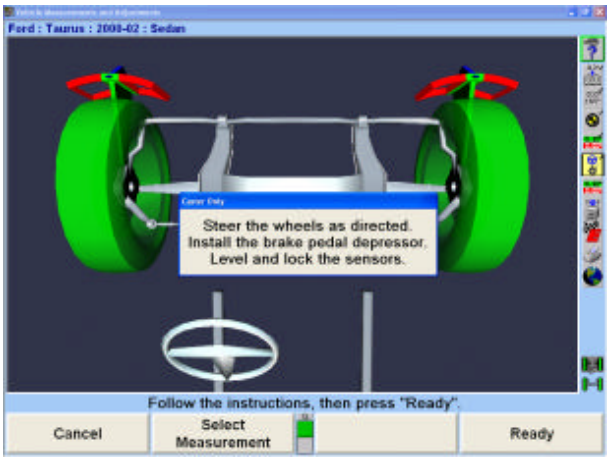
Observing the bar graph or virtual view display, steer the wheels to the right until either wheel position indicator is within the center valley of its bar graph. Hold the steering wheel steady.

The measurements will be saved and that bar graph will disappear.

Continue to steer the wheels as indicated until the remaining wheel position indicator is within the center valley of its bar graph. Hold the steering wheel steady until that bar graph disappears.

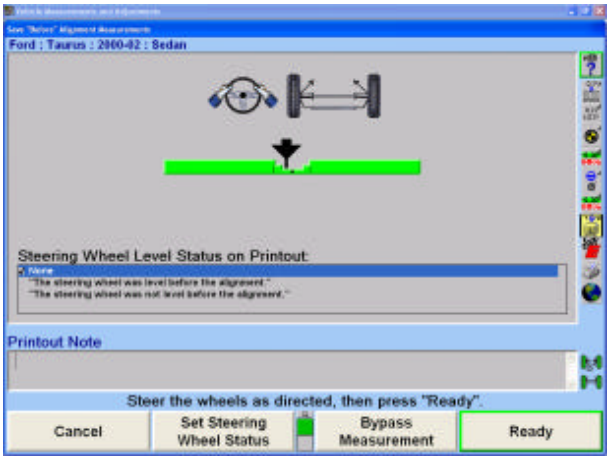
A single bar graph will appear.

Steer the wheels straight ahead until wheel position indicator is within the center valley of the bar graph. Install the brake pedal depressor and level and lock the sensors.



Press “Ready” and the “Vehicle Measurements and Adjustments” primary screen will reappear.

These are the initial measurements of the vehicle. Press “Save ‘Before’ Measurements” to save them for the printout. If “Set steering wheel status when measurements are saved” is enabled from “Aligner Setup,” the screen will change to the “Save ‘Before’ Alignment Measurements” popup screen. *Refer to “Aligner Set Up”.*



If “Set steering wheel status when measurements are saved” is disabled from “Aligner Setup,” and all measurements are stable, and the vehicle is steered straight ahead, then the “Save ‘Before’ Alignment Measurements” popup screen will be continued through. The screen will briefly appear and the settings will be automatically saved if everything is stable.

Make sure the vehicle is in the correct condition to save the “Before” measurements. Jounce the vehicle, then steer the wheels straight ahead until the bar graph indicates a null position.

For printouts, highlight the steering wheel level status. This message will be displayed on printouts. In ExpressAlign® it is necessary to steer ahead prior to saving the current status.

Press “Ready.” When the measurements are stable, the program will save them for ExpressAlign®, Work Management printout.

The system will save the measurements and the screen will return to the “Vehicle Measurements and Adjustments” primary screen if ExpressAlign® is not enabled.

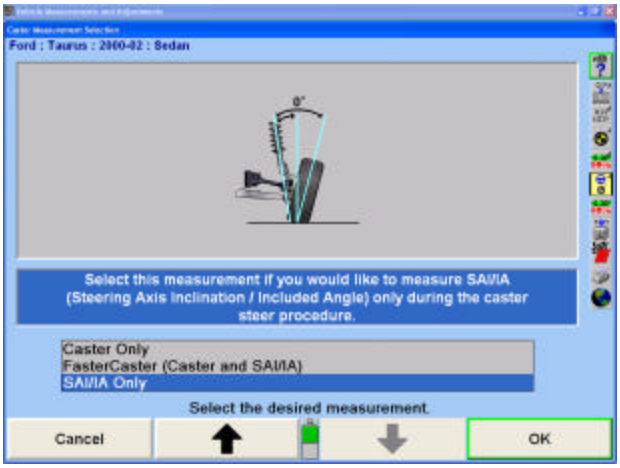
Measuring S.A.I. and Included Angle

Press “Measure Caster” on the “Vehicle Measurements and Adjustments” primary screen. The “Caster and S.A.I. Measurement” popup screen will appear.

If measuring “S.A.I./I.A. Only” is not the default:

Press “Select Measurement,” the “Caster Measurement Selection” popup screen will appear.

Press ↑ or ↓ until “S.A.I./I.A. Only” is highlighted.



Press “OK” to select the measurement. The “Caster and S.A.I. Measurement” popup screen will appear.

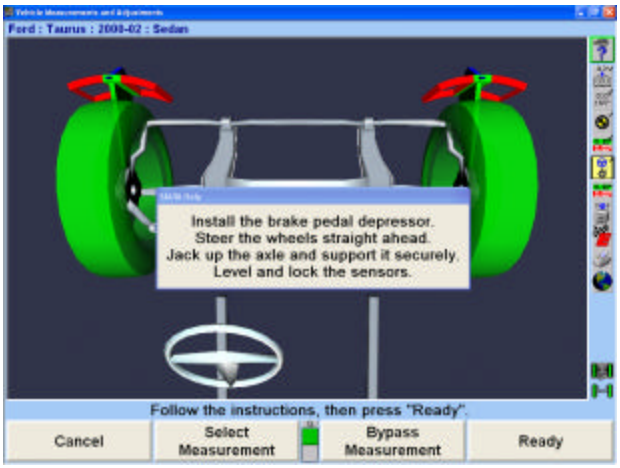
> NOTE: This selection will not change the aligner default setting. When the aligner is reset the default settings will be applied.

Lock the front brakes using a brake pedal depressor.

Steer the wheels straight ahead.

Jack up the front axle until the front wheels clear the turning angle gauges or rack. The jack should securely support the vehicle.

Level and lock the sensors.



Press “Ready.”

Perform the S.A.I. turn while observing the bar graphs in the same manner as the caster turn. *Refer to “Measuring Caster,” below.* When S.A.I. measurements are completed, the screen will change to the “Vehicle Measurements and Adjustments” primary screen with the S.A.I. and I.A. measurements shown.

Lower the vehicle.

> NOTE: While lowering the vehicle, camber and S.A.I. measurements will change. However, included angle measurements will remain constant.

Measuring Caster and S.A.I./I.A. Simultaneously (FasterCaster®)

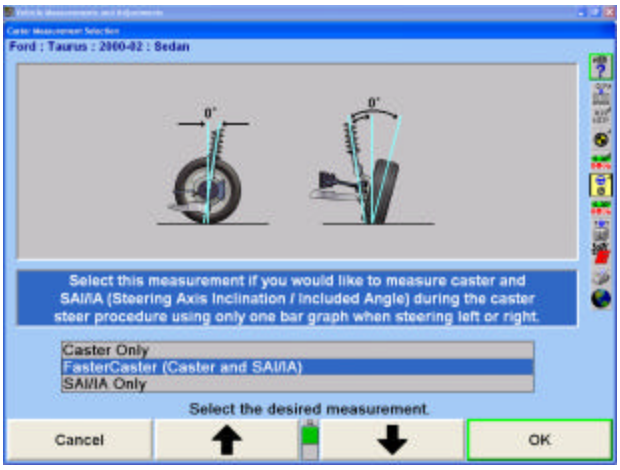
The FasterCaster® measurement feature uses a single bar graph indicator instead of using both a left and right bar graph indicator.

Press “Measure Caster” on the “Vehicle Measurements and Adjustments” primary screen. The “Caster and S.A.I. Measurement” popup screen will appear.

If measuring “FasterCaster® (Caster and S.A.I./I.A.)” is not the default:

Press “Select Measurement,” the “Caster Measurement Selection” popup screen will appear.

Press ⬆ or ⬇ until “FasterCaster® (Caster and S.A.I./I.A.)” is highlighted.



Press “OK” to select the measurement. The “Caster and S.A.I. Measurement” popup screen will appear.

NOTE: This selection will not change the aligner default setting. When the aligner is reset, the default settings will be applied.

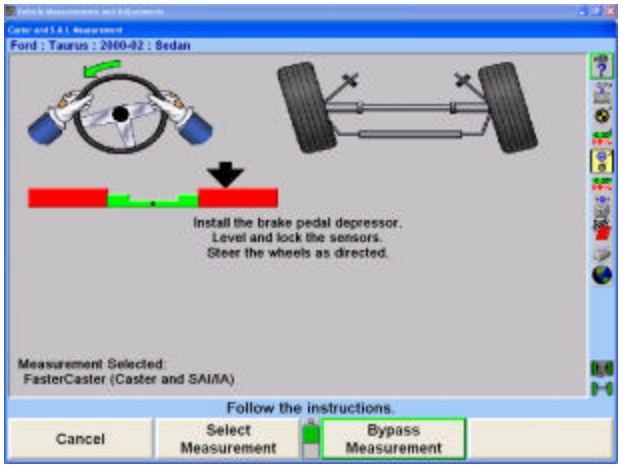
Lock the front brakes using a brake pedal depressor.

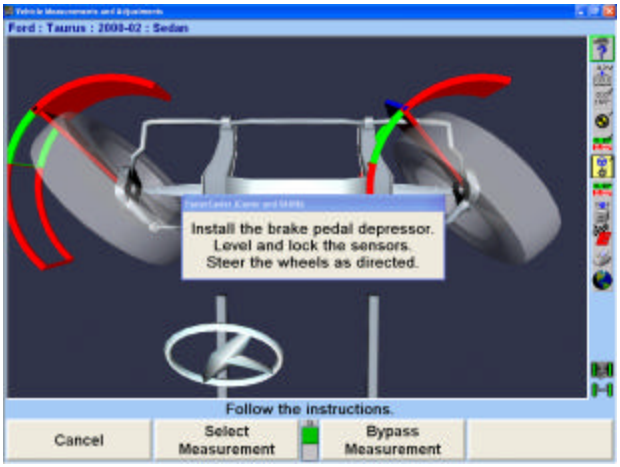
Steer wheels straight ahead.

Level and lock the sensors.

Press “Ready.”

The aligner will save the measurements and the display will change to show a bar graph and prompt to steer left.

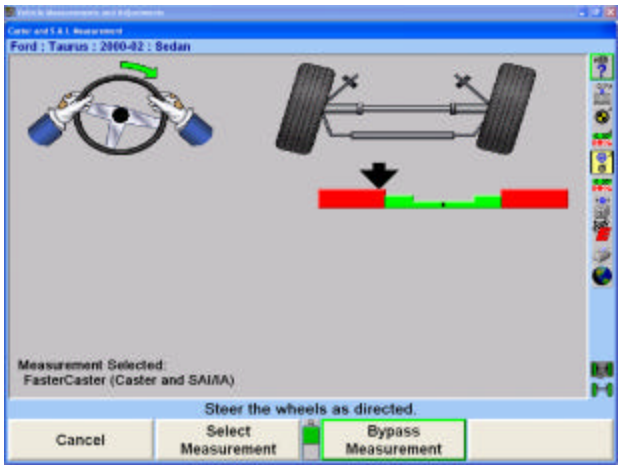


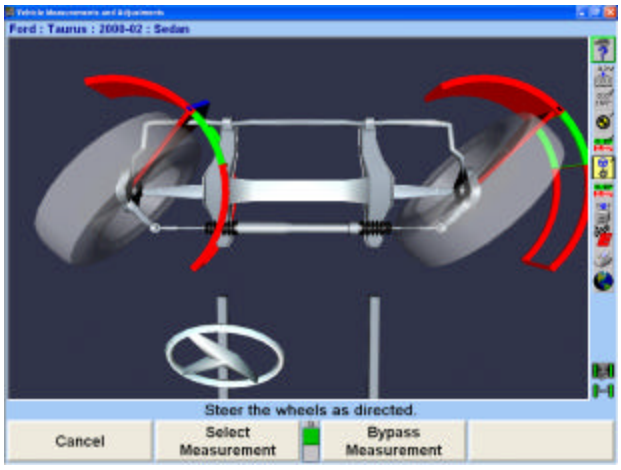


The single left bar graph indicator is controlled by the left wheel.

Observing the bar graph display, steer the wheels to the left until the wheel position indicator is within the center valley of its bar graph. Hold the steering wheel steady until the bar graph disappears.

A single right bar graph will appear and the steering wheel display will indicate to steer to the right.





Observing the bar graph display, steer the wheels to the right until the wheel position indicator is within the center valley of its bar graph. Hold the steering wheel steady until the bar graph disappears.

A single bar graph will appear.

Steer the wheels straight ahead until wheel position indicator is within the center valley of the bar graph.

When the caster and S.A.I. measurements are completed, the screen will change to the “Vehicle Measurements and Adjustments” primary screen with the caster, S.A.I., and included angle measurements shown.

Symmetry Angle/Set Back Measurements

The following measurements are available by selecting “Symmetry Measurements/Set Back” from the “Additional Measurement Procedures” screen.

Front Set Back

Rear Set Back

Wheelbase Difference

Left Lateral Offset

Right Lateral Offset

Track Width Difference

Axle Offset

Toe Raised Procedures

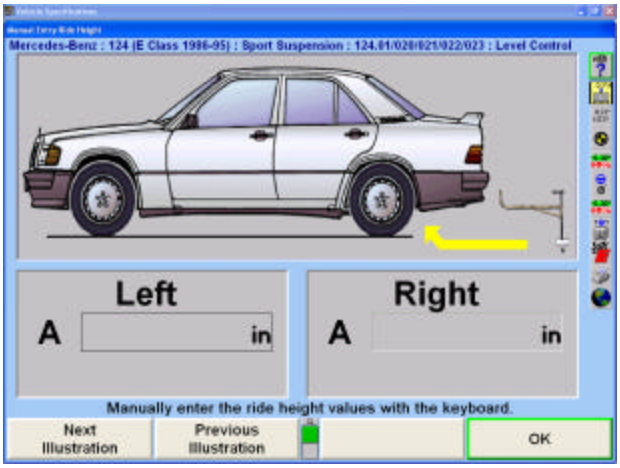
The “Toe Raised Procedure” is an adjustment that is required for some specific VW/AUDI models. If one of these models is recalled from the specification database, the “Toe Raised Procedure” will be automatically entered during the alignment procedure.

Ride Height Measurements

> NOTE: Ride height specifications should be used only as an initial screening test. Measure ride height using the OEM procedure to verify that components meet the OEM requirements.

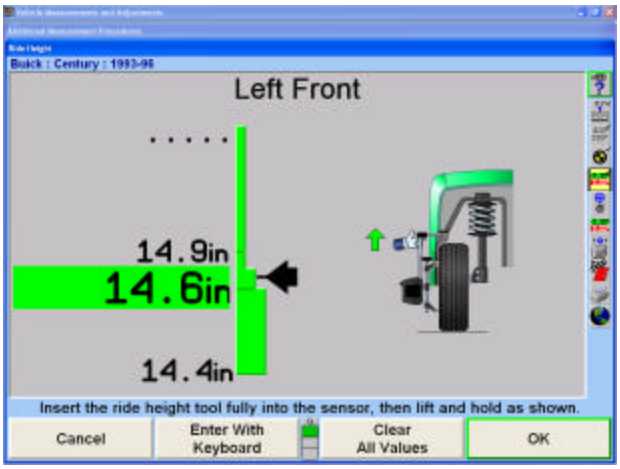
Ride Height Dependent Specifications

Some manufacturers require ride height to be measured to determine the appropriate alignment specifications. Enter ride height measurement(s) into the left and/or right dialog box of “Manual Entry Ride Height” popup screen. WinAlign will use the ride height data to generate the recommended front and rear camber, caster, and toe specifications.



Zoom

When measuring Ride Height using the RH tool, the aligner will detect which wheel is being measured, and will zoom to the bar graph and image of that wheel. After the measurement has been taken, the fender will turn green if the measurement is within specifications, or red if it is out of specifications, as shown below.



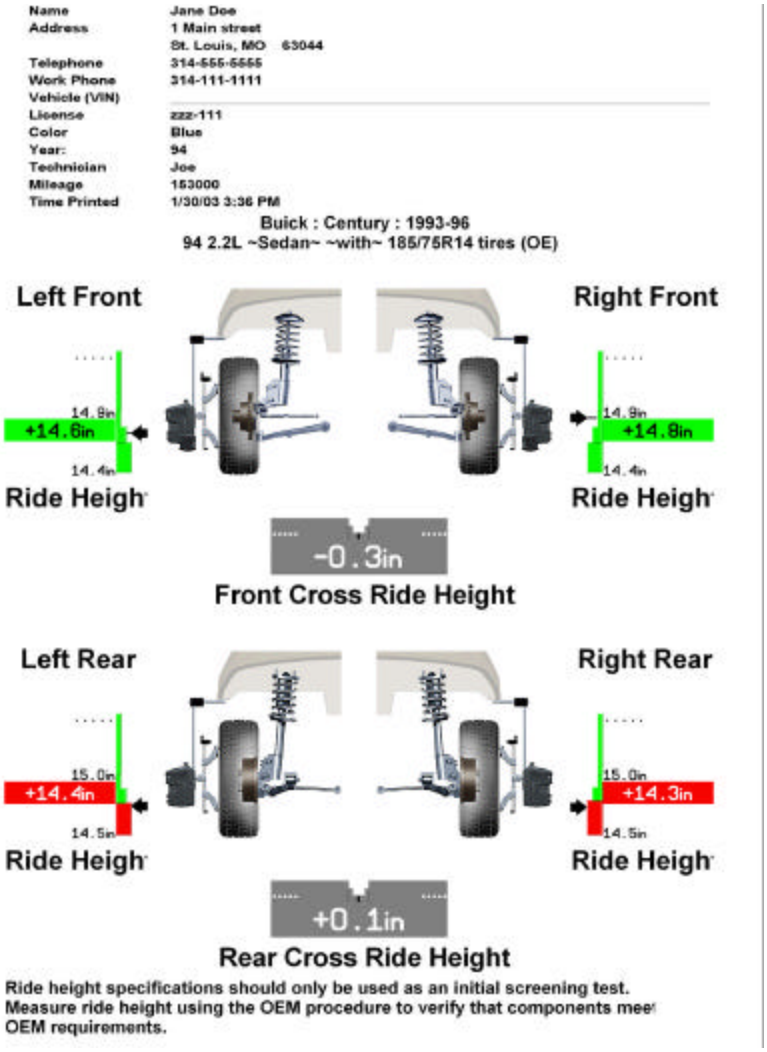
The screen will remain on the individual wheel for about ten seconds, and then it will display all four wheels.

To disable the zoom, press “Disable Zoom.”

> NOTE: The screen will not zoom if the keyboard is being used to enter the measurements.

Printing Ride Height

When “Print Ride Height” is selected all the bar graphs shown on the screen and any specifications used will be printed.



Tire Condition

The tread condition, tread depth, and tire pressure should be evaluated, before continuing with the alignment procedure

Tire Information

Tire information entered in the “Edit Tire Information” popup screen will appear on the printout summary.

Illustrating Vehicle Adjustments

WinAlign® software contains illustrations for adjustments. These illustrations are drawings and photographic images of the Original Equipment Manufacturer's method of adjustments. They also provide instructions or information necessary to make the adjustments.

Rear Adjustments

Rear Shims

Full contact shims can be used to adjust the camber and toe of the rear wheels of some vehicles. The shim is mounted between the hub/spindle assembly and the rear axle flange. The shim is tapered, which changes the angle between the spindle and the axle, thereby adjusting rear individual toe and/or camber.

> ⚠ **WARNING: Do not use a full contact shim on vehicles with rear disk brakes unless the brake caliper is mounted to the spindle backing plate, not to the axle assembly. The rotor and caliper must move together when installing a shim in the rear.**

Adjusting the Shim Display Size

The display can be adjusted such that the shim appears life-sized. *Refer to "Aligner Set Up".*

Front Adjustments

Front Shims

Some vehicles with SLA-type (short/long arm) suspensions have shims placed between the vehicle frame and the pivot arm of the upper control arm. Placing the correct amount of shims at each pivot arm mounting point simultaneously adjusts both camber and caster of the wheel. It is difficult to compute the required shim changes, especially when the upper control arm is not symmetric. The specification database includes information that allows the system to correctly compute the shim changes required, even for non-symmetric upper control arms.

CAMM® (Control Arm Movement Monitor) for Front Cams and Slots

CAMM® will determine the cam or slot that should be adjusted first (front or rear). When no adjustments have been made and the adjustment is off the scale an "X" appears.

WINTOE® Toe Adjustment System

WINTOE® is a software feature that allows the adjustment of front toe on vehicles with an independent tie rod adjustment for each wheel. Using WINTOE® will provide the desired toe settings for each wheel and insure the desired steering wheel position, normally without the need to readjust or touch up settings. Additionally, WINTOE® eliminates the need to lock the steering wheel during toe adjustments.

Automatic Bushing Calculator® Adjustment Feature

Automatic Bushing Calculator® (ABC) provides assistance in determining the correct bushing size and proper positioning for the required adjustments.

Adjusting With Axles Raised

A vehicle may require that the wheels be raised to make an adjustment to rear or front camber and caster. When the wheels are raised, the sensors will move and the angles will change. If the instructions are followed, the software compensates for the movement of the sensors to allow accurate adjustment.

Print Selections

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.

Printing the Vehicle

When selecting “Print Vehicle” a second dialog box will open with the options “Before Measurements,” “Current Measurements,” or “Before and Current.” These selections can be accessed from the “Vehicle Specifications” or “Measurements and Adjustments screens.”

Or

The options can be selected by pressing the printer icon  on the Procedure Bar.

ExpressAlign® Alignment Adjustment System

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 power tools that are applicable, (such as shims, WINTOE®, CAMM®).
- The applicable adjustment illustrations and videos.

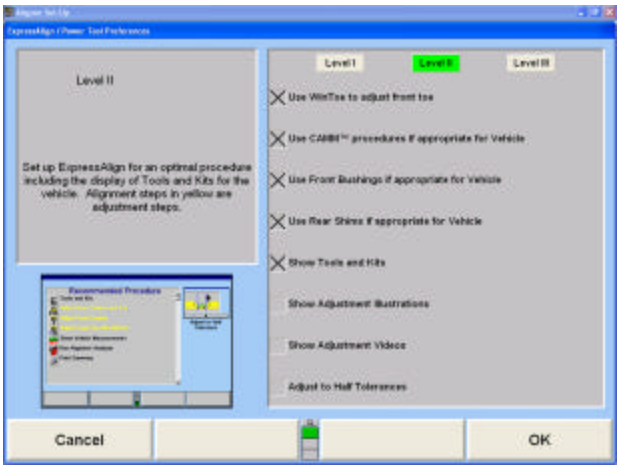
Then ExpressAlign® creates a custom alignment procedure that allows the technician to perform only the procedures needed for the selected vehicle.

NOTE: ExpressAlign® may display bar graphs and prompt to adjust an angle that is out of specification that is non-adjustable according to the vehicle manufacturer. ExpressAlign® displays these bar graphs to indicate a possible problem within the suspension or steering components that needs to be diagnosed and repaired for proper 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.

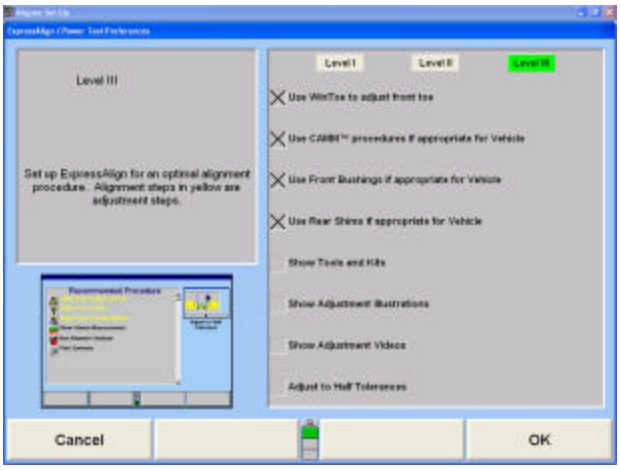
Three levels of ExpressAlign® can be selected from the ExpressAlign® Setup, or a custom setup can be chosen.

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.



Items may be selected individually for a custom ExpressAlign® setup.

The items available include:

Use WINTOE® if appropriate for Vehicle

Use CAMM® procedure if appropriate for Vehicle

Use Front Bushings if appropriate for Vehicle

Use Rear Shims if appropriate for Vehicle

Show Tools and Kits

Show Adjustment Illustrations

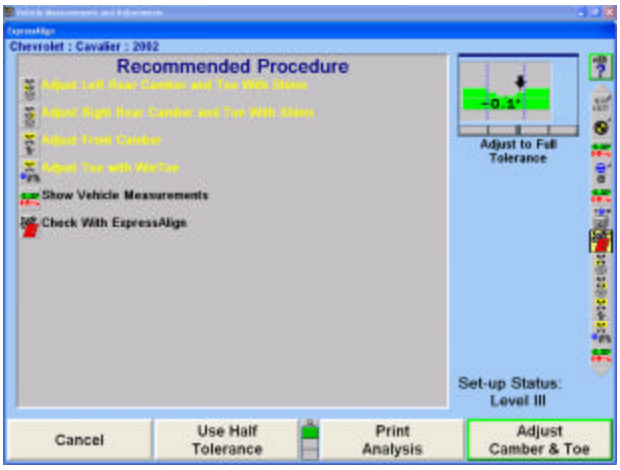
Show Adjustment Videos

Adjust to Half Tolerances

ExpressAlign® can be setup from “Aligner Setup,” or while ExpressAlign® is running, it can be setup by selecting “Setup ExpressAlign” softkey.

ExpressAlign® cannot be disabled while using “ExpressAlign” to perform an alignment job. ExpressAlign® can only be disabled from “Aligner Setup.”

After the vehicle is selected, inspected, sensors mounted and compensated, caster is measured, but before measurements are saved, the “ExpressAlign®” popup screen will be displayed as shown below.



NOTE: The actual procedures displayed will vary depending on the vehicle and procedures that are enabled or disabled in “Setup ExpressAlign.”

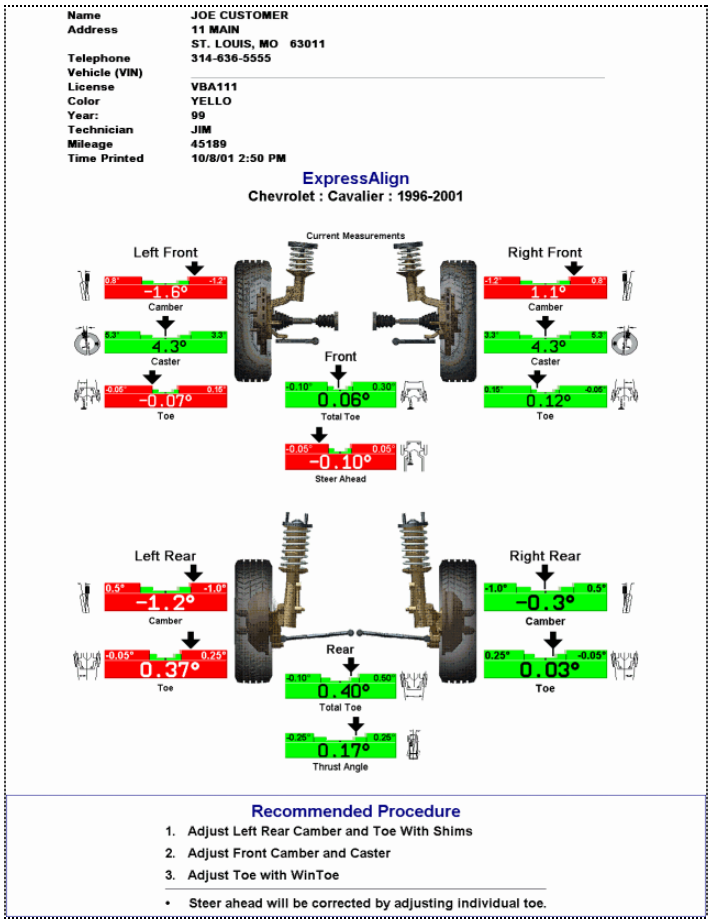
On the ExpressAlign® screen, press the icon on the procedure bar that corresponds to the step to be completed. During the procedure, continue to press the next icon on the procedure bar in order to progress through the procedure. As you go through the procedure, the current step will be highlighted on the procedure bar.

An icon will be displayed in the “ExpressAlign®” popup screen for each suggested procedure.

The procedure created by ExpressAlign® will be displayed in the vertical procedure bar on the right side of the screen.

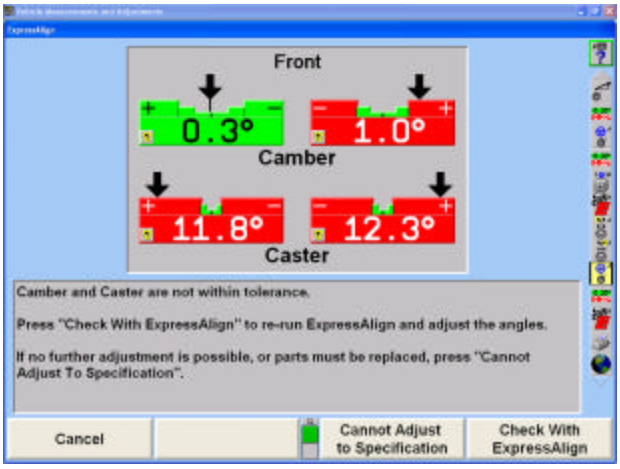
Procedures displayed with yellow text in the “ExpressAlign®” popup screen refer to adjustments that **must** be made for the specified vehicle. Procedures displayed with black text are for measurement verification or to provide assistance during the alignment.

Selecting “Print Analysis” from the softkey panel of the “ExpressAlign®” popup screen will print all measured angles with the recommended procedures required to adjust the angles.



Selecting “Use Half Tolerance” from the softkey panel of the “ExpressAlign®” popup screen will reduce the specification tolerance to half of the original equipment manufacturer’s recommended tolerance.

If one side of the vehicle is within specification, ExpressAlign® will allow the side that is out of specifications to be adjusted with the “One-Sided Adjustments” procedure. If you complete the alignment and an angle has not been adjusted to within specifications, ExpressAlign® will allow you to select “Cancel,” “Cannot Adjust to Specifications” or “Check With ExpressAlign.”



Selecting “Cancel” will return you to the “Vehicle Measurements and Adjustments” primary screen.

Selecting “Cannot Adjust to Specification” will allow you to proceed with the angle not adjusted in ExpressAlign®.

Selecting “Check With ExpressAlign” will create a new ExpressAlign® procedure and return you to the “ExpressAlign®” popup screen.

Online Features

ShopResults.NET™

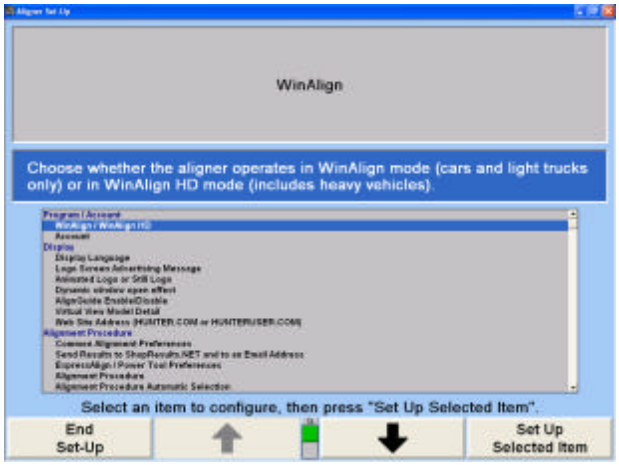
The ShopResults.NET™ Online Service is a subscription feature of WinAlign® software designed to archive alignment results on the web. These results can be viewed by the shop owner, the vehicle owner, and national accounts having the appropriate Internet access.

3. Aligner Set-Up

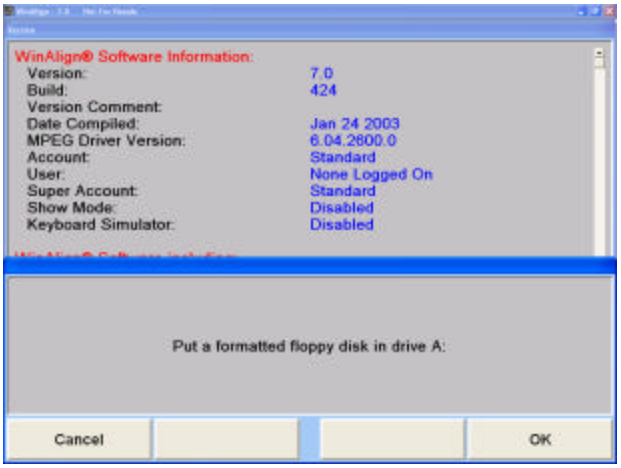
Set-Up

The aligner can be configured to meet many different operating needs. For example, the “Customer Identification” screen can be removed from the prompt sequence so it does not automatically appear at the beginning of the alignment process, but is still accessible through the menu selection. Other selections such as the default alignment procedure can be set. The Set-Up selections are stored on the hard drive and recalled each time the program needs them. Modify Set-Up by pressing “Service Programs” on the logo screen. The menu labels will change.

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



The current settings can be saved to disk or printed. To access these settings along with WinAlign® technical information press CNTRL+Shift+K1. The “Version” screen may take several seconds to appear. Select “Print” to print all the settings and WinAlign information, or select “Copy Log files to Floppy Disk.”



If “Copy Log files to Floppy Disk” is selected the screen will request the user to insert a formatted floppy disk into the drive. Select “OK” and the information will be copied.

The information in Set-Up can only be restored manually.

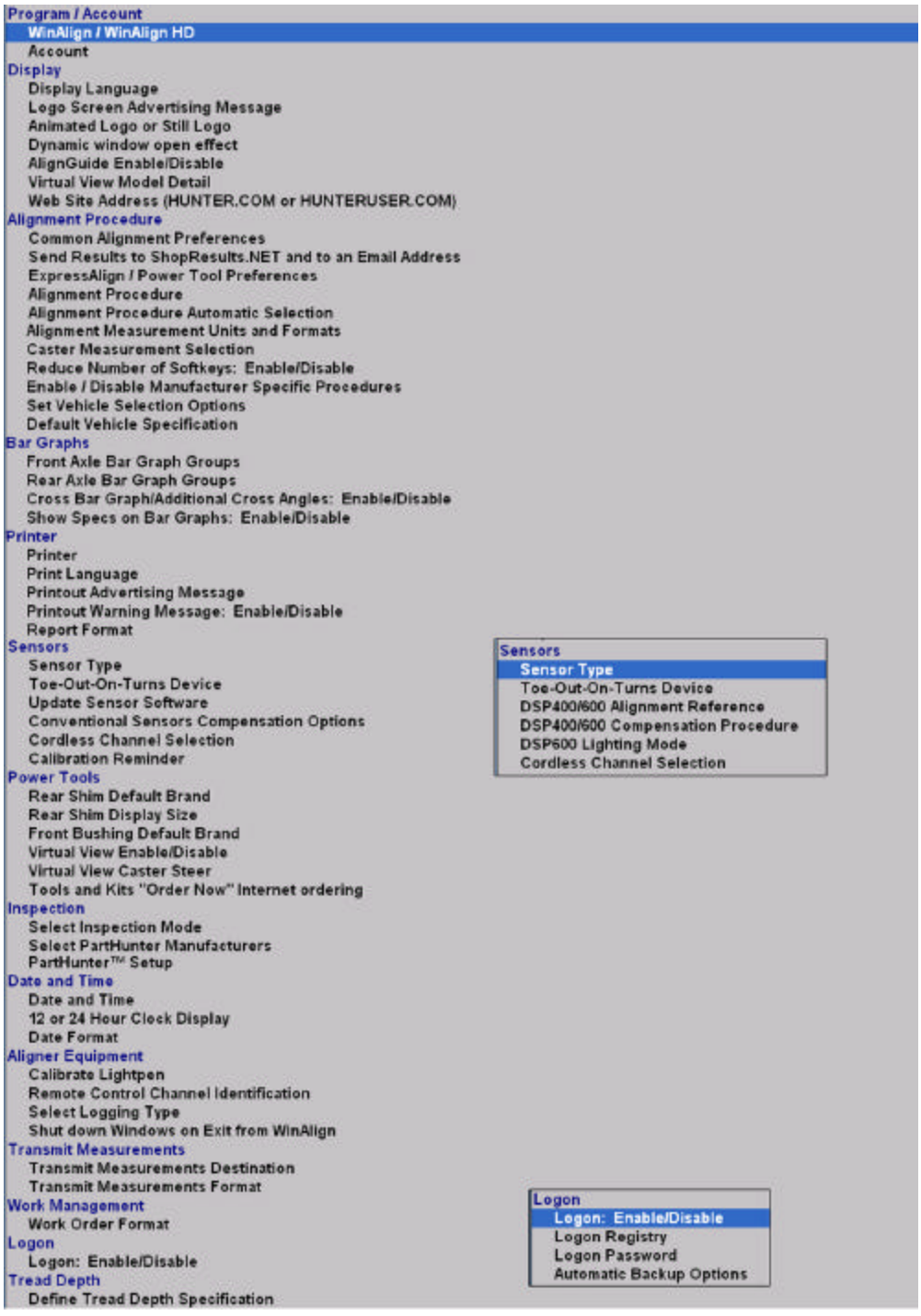
Factory Settings for Aligner Set-Up

Account	Standard
Display	
Display Language	English
Logo Screen Advertising Message	Blank
Animated Logo or Still Logo	Animated
Dynamic window open effect	Disabled
AlignGuide Enable/Disable	Enabled
Virtual View Model Detail	Detailed
Website Address (Hunter.com or HunterUser.com)	HunterUser.com
Alignment Procedures	
Common Alignment Preferences	Show Measurement Display after Compensation, Show Measurement Display after Caster, Display DSP400 compensation instructions, Verify Caster Adjustment
Send Results to ShopResults.NET and to an Email Address	Enabled
ExpressAlign Preferences/Power Tool Preferences	Level III
Alignment Procedure	ExpressAlign Total Alignment with Power Tools
Alignment Procedure Automatic Selection	Automatically switch to Recommended Procedure
Alignment Measurement Units and Formats	
Camber and Caster Display Format	Degrees
Toe Display Format	Degrees
Thrust Angle Display Format	Degrees
Ride Height Display Format	Inches
Tread Depth Display Format	Inches
Wheelbase and Track Width Display Format	Inches
Caster Measurement Selection	Caster Only
Reduce Number of Softkeys Enable/Disable	Disabled
Enable / Disable Manufacturer Specific Procedures	Disabled
Set Vehicle Selection Options	Selection Sequence Optimal
Default Vehicle Specification	None (Choose vehicle specification every time)
Bar Graphs	
Front Axle Bar Groups	Camber, Caster Adjust and Toe; Camber, Caster, Total Toe and Steer Ahead
Rear Axle Bar Groups	Camber, Toe, Total Toe and Thrust Angle
Cross Bar Graph/Additional Cross Angles: Enable/Disable	Disabled
Show Specs on Bar Graphs: Enable/Disable	Enabled
Printer	
Printer	Hunter Driver - IBM PPR
Print Language	English
Printout Advertising Message	Blank
Print Warning Message Enable/Disable	Enabled
Report Format	Standard Format
Sensors	
Sensor Type	DSP306
Toe-Out-On-Turns Device	None
Update Sensor Software	Sensor requires version "1.5"
DSP400/600 Alignment Reference	Runway Reference Plane
Conventional Sensors Compensation Options	Blank
DSP400/600 Compensation Procedure	Rolling Compensation using the Virtual View
DSP600 Lighting Mode	Standard Mode
Cordless Channel Selection	Console Channel: HFSS 1
Calibration Reminder	Never Remind
Power Tools	
Rear Shim Default Brand	Hunter 2000
Rear Shim Display Size	NA
Front Bushing Default Brand	Hunter
Virtual View Enable/Disable	Enabled
Virtual View Caster Steer	Enabled
Tools and Kits “Order Now” Internet ordering	Enabled
Inspection	
Select Inspection Mode	Part List Inspection
Select PartHunter Manufacturers	(All are selected)
PartHunter Setup	Use PartHunter Database, Display the part quantity on the PartHunter Information Screen, Print the price on the inspection printout, Print the quantity on the inspection printout
Date and Time	
Date and Time	Current time and date
12 or 24 Hour Clock Display	12 Hour Clock Display
Date Format	MM/DD/YY
Aligner Equipment	
Calibrate Light Pen	NA
Remote Control Channel Identification	Remote Control channel setting: A, O
Select Logging Type	Statistical Logging
Shut down Windows on Exit from WinAlign	Disabled
Transmit Measurements	
Transmit Measurements Destination	Transmit Measurements to a file.
Transmit Measurements Format	Partial Measurements C111 Audit Format A
Work Management	
Work Order Format	Custom Forms
Logon	
Logon Enable/Disable	Disabled
Logon Registry	NA
Logon Password	NA
Automatic Backup Options	Keeps backups for two days. Overwrite oldest backup. Backup path C:\Backup.dat
Tread Depth	
Define Tread Depth Specification	Not defined

The “Aligner Set-Up” primary screen provides a list box of Set-Up items. Press ⬆ or ⬇ to highlight the desired selection. When an item is highlighted, the current setting appears on the screen, along with an explanation of the item.

Press “Set-Up Selected Item” to open the popup screen to Set-Up the highlighted item.

To move from a major heading to another major heading, press ⬆⬆ or ⬇⬇ from the second tier of softkeys. The following is a list containing all the Set-Up options including options using Digital Video.



Press “End Set-Up” after all the desired changes have been made to exit Set-Up and save changes.

Program/Account

Setting up the Program

If using the standard WinAlign® key, there will be no options for setting up the program.

With the appropriate electronic key, the Program/Account Set-Up selection will provide a choice for selecting between WinAlign® and WinAlign HD®.

Display

Setting up the Display Language

The Display Language identifies the language that appears on the screen displays. This selection will not change the language used in the printouts.

Alignment Procedures

Setting up the Common Alignment Preferences

> NOTE: ExpressAlign® must be disabled before a standard alignment procedure can be Set-Up as a default.

Setting up the Caster Measurement Selection

This selection will Set-Up the aligner program to measure Caster Only, FasterCaster (Caster and SAI/IA), or SAI/IA Only as the default.

Setting up the Reduce Number of Softkeys: Enable/Disable

When “Reduce Number of Softkeys” is enabled, the number of softkeys that are normally shown for a particular screen will be reduced to only the number of softkeys needed for a typical alignment.

Setting up the Enable/Disable Manufacturer Specific Procedures

> NOTE: When enabled, the standard account is available along with any manufacturer specific accounts, such as Mercedes-Benz. When enabled, if recalling a vehicle that requires a manufacturer specific account, the program will display a popup that prompts to go to Aligner Set-Up and select the manufacturer specific account to align the vehicle using manufacturer specific procedures. If this is disabled, the standard account will function and no account selection will be available.

Bar Graphs

Setting up the Front Axle Bar Groups

This item will select the bar graphs to be available while viewing the front axle measurement screen. Each bar graph configuration chosen can be viewed by pressing “Show Next Bar Graphs” on the “Vehicle Measurements and Adjustments” primary screen.

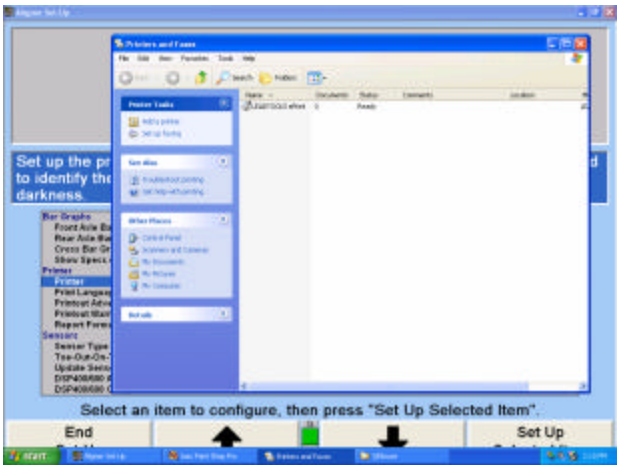
Setting up the Rear Axle Bar Groups

This item will select the bar graphs that will be available on the rear axle measurement screen when “Show Next Bar Graphs” is pressed on the “Vehicle Measurements and Adjustments” primary screen.

Printer

Setting up the Printer

When “Printer” is selected, the Windows Print Manager screen appears.



From the “Print Manager” screen, highlight the printer that you are using.

Click on “File” and then select “Set As Default.” This will set the printer as the default printer for the console.

> NOTE: If the printer is already set as default, there will be a check mark to the left of “Set As Default,” which indicates the printer is already the default printer.

To exit printer Set-Up, click on “File,” and select “Close.”

Setting up the Print Language

The Print Language identifies the language that appears on the printouts. This selection will not change the language on the screen displays.

When “Print Language” is selected, the “Print Language” popup screen appears with the setting on the screen.

A list of the available languages is shown along with the current setting.

Press ⬆ or ⬇ until the desired language is highlighted.

Press “OK.” The program selects the highlighted language for the printouts and returns to the “Aligner Set-Up” primary screen.

Tread Depth

Setting up the Defined Tread Depth Specification

Type in a tread depth to be used as the minimum specification.

4. Detailed Operation Information

Log On

The “Log On” option provides a way to identify the user. The primary use of log on is to allow a user to customize alignment program settings according to his or her preferences in the setup program.

Work Management Database

Custom Forms (Default Format)

Entering Customer Information

Customer information can be entered on the “Edit Customer Identification” screen or “Edit Work Order” popup screen.

The “Edit Customer Identification” popup screen (on the left) will appear at the beginning of the alignment procedure, only if “Edit Customer Identification” is selected in “Aligner Setup” under “Common Alignment Procedures.” The “Edit Work Order” popup screen (on the right) will appear at the beginning of the alignment procedure, only if “Work Management” is selected in “Aligner Setup” under “Common Alignment Procedures.”

Managing the Database

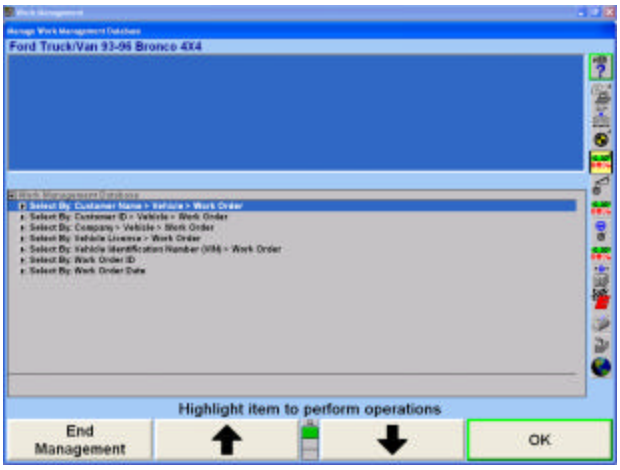
The “Manage Database” softkey allows data to be added, changed, or deleted from the database without affecting the current work order. The data can also be displayed in charts, filtered, and used to generate mailing labels and form letters.

Recalling a Customer/Vehicle

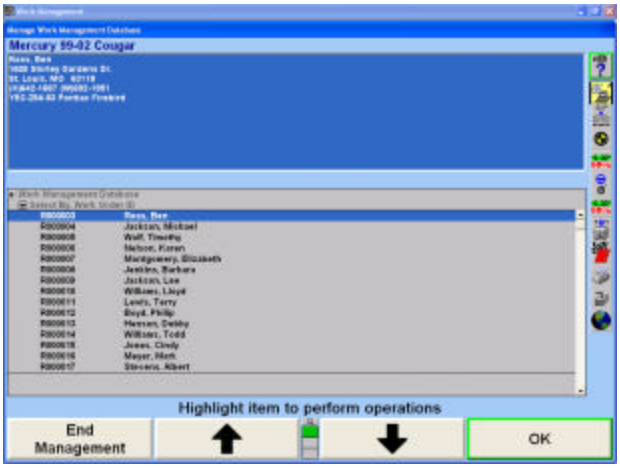
Use “Recall Customer” to recall an existing customer/vehicle into the current work order.

Recalling a Work Order

Press “Recall Work Order” in the “Work Management” primary screen. The “Recall Work Order” popup screen will appear, as shown below.



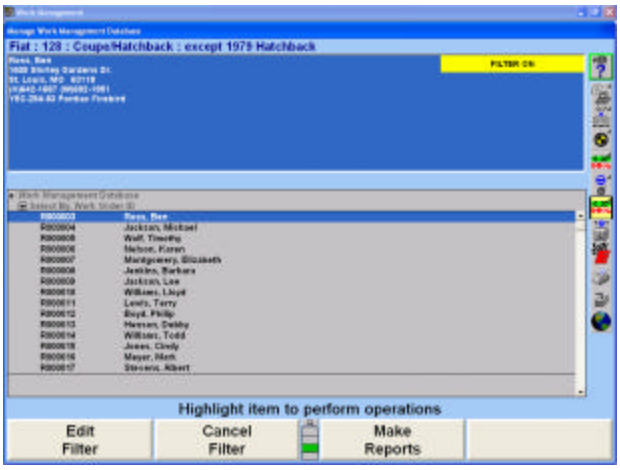
Press ⬆ or ⬇ to highlight the desired method of recalling the information, then press “OK.” The screen will change to display a list of customers sorted by name or company, vehicle license numbers, vehicle identification number, work order identifications, or work order dates, as shown below.



Continue making selections until the desired worker order is chosen. The selected work order will become the active work order.

Filtering Data

Filtering is a method of instructing the database to display only certain customer, vehicles, and work orders. A filter will reduce the amount of data in the database you view. For example, to view only those customers whose last names begin with the letter “B,” create a filter to select customers whose last names begin with the letter “B.” Once a filter is selected, all subsequent actions taken in “Manage Database” will use that filter to choose records from the database (creating reports or form letters). When a filter is being used, a yellow box will appear in the upper right hand corner, as shown below.

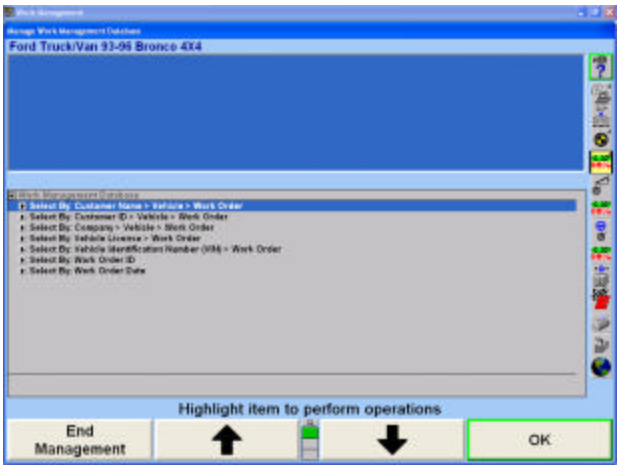


Creating Form Letters

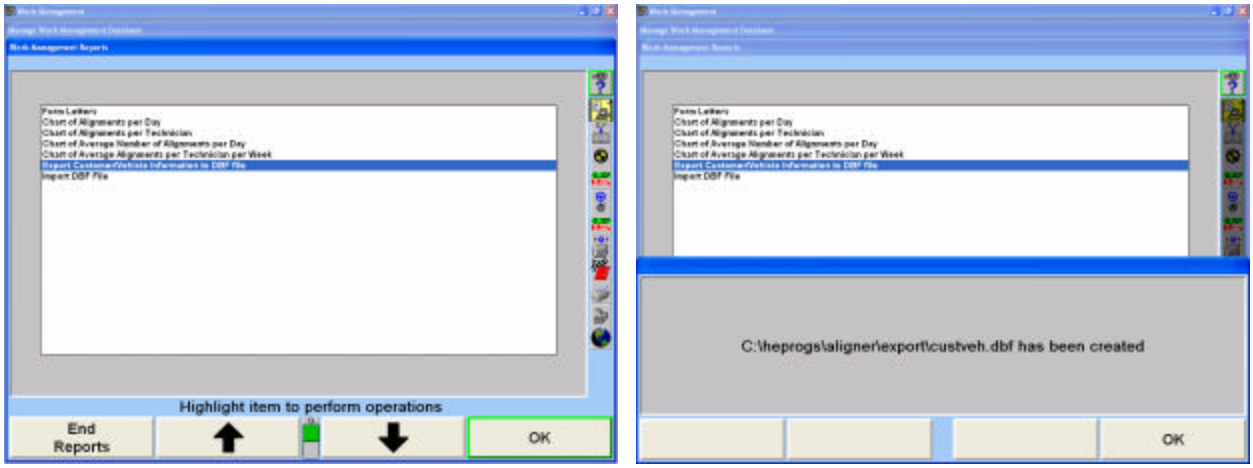
Work Management provides a word processing function so that letters can easily be created and sent to your customers.

Exporting Customer Database Files

Press “Manage Database” on the “Work Management” primary screen. The “Manage Work Management Database” popup screen will appear, as shown below.



Press “Make Reports.” The “Work Management Reports” popup screen will appear, as shown below.



Press ⬆ or ⬇ to highlight “Export Customer/Vehicle Information to DBF file.” A popup screen will appear stating the files are being converted. After a few seconds, a popup screen will appear stating the exported database is stored at “C:\ALIGNER\EXPORT\CUSTVEH.DBF” on the hard drive.

Importing DBF Files

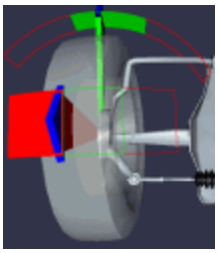
To import a DBF file into the Work Management database, the data fields MUST be in the exact order and length no longer than specified below.

“COMPANY”	character field	80 characters long
“LASTNAME”	character field	40 characters long
“FIRSTNAME”	character field	40 characters long
“STREET”	character field	80 characters long
“CITY”	character field	40 characters long
“STATE”	character field	40 characters long
“ZIPCODE”	character field	12 characters long
“HOMEPHONE”	character field	20 characters long
“WORKPHONE”	character field	20 characters long
“VIN”	character field	20 characters long
“LICENSE”	character field	20 characters long
“COLOR”	character field	20 characters long
“YEAR”	character field	6 characters long
“MAKE”	character field	40 characters long
“MODEL”	character field	80 characters long

Virtual View

3-D Bar Graphs

Virtual View is a WinAlign feature that allows the user to view alignment angles in a 3-D perspective. This feature provides the user with a detailed view of the angles and their status in respect to alignment angle specifications. If the measured angles are within tolerance, the arrows will be green. If the measured angles are marginal, the arrows will be shown in yellow (if half-tolerances are enabled). If the measured angles are out of specification, the arrows will be shown in red. The arrowhead of the alignment angle will protrude through a 3-D specification bar graph showing the current angle status.

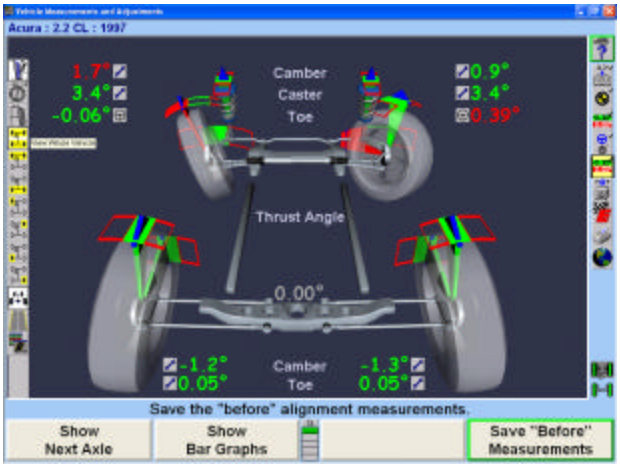


NOTE: If measurements have not been taken or are not available, the 3-D bar graph will not be shown in Virtual View.

Virtual View is available only on 611/811 Aligners.

From the “Vehicle Measurements and Adjustments” screen, you may toggle between Virtual View, bar graphs, or measurements by pressing “Show Bar Graphs” from the softkeys. Virtual View is the default “Vehicle Measurements and Adjustments” screen, however, may be disabled in “Aligner Setup.”

Virtual View displays all measured angles of the vehicle on one screen. It is no longer necessary to switch screens to view measurements on the front axle or the rear axle. Camber and toe for both axles, caster for the front axle, and thrust angle are all displayed adjacent to the appropriate wheel in Virtual View.



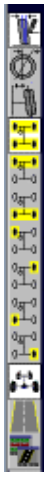
A Plan View Indicator, located along the right side of the screen, shows which axle is being adjusted. The axle with the gray background is the one that is being adjusted, and corresponds to the view on the screen.

The Procedure Bar is located along the right side of the screen, above the Plan View Indicator. As each step in the alignment is completed, a checkmark will appear next to each procedure icon.

Virtual View Angle Selector

When Virtual View appears, the Virtual View Angle Selector on the left side of the screen will appear when the cursor is moved over that portion of the screen, allowing you to select a variety of wheel and angle views. The selected views will be shown with a white background.

The vehicle frame icons, with specific wheels highlighted, will select the overall Virtual View. You may select to view the entire vehicle, front axle, rear axle, or any individual wheel. Toe, caster, and camber angles may be viewed specifically from any view by selecting the alignment angle icons.



Selecting “  ” will view the camber of the selected wheel(s).

Selecting “  ” will view the caster of the selected wheel(s).

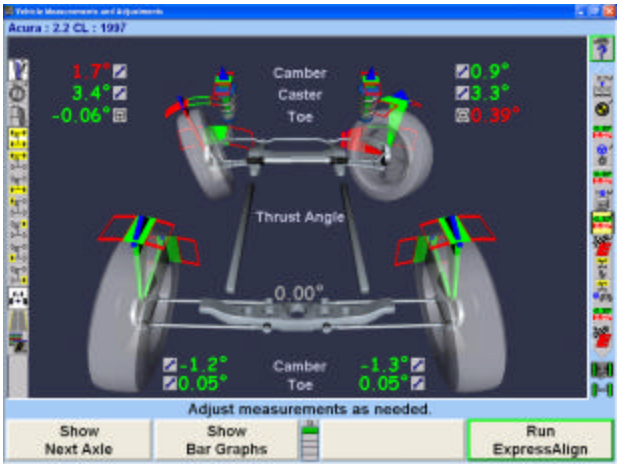
Selecting “  ” will view the toe angle of the selected wheel(s).

Selecting “  ” will turn the on-screen road graphic on and off.

Selecting “  ” will return the vehicle frame view to the “overall vehicle view.”

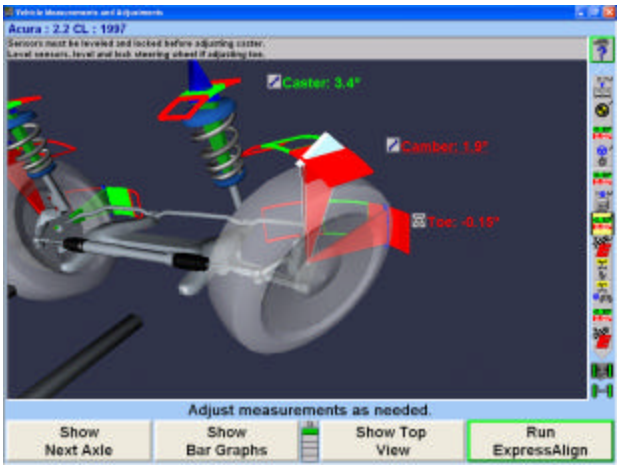
Selecting “  “ will allow viewing of Virtual View and measurement screens simultaneously. Dual screen is recommended for systems with two monitors available.

The preferred method of selecting vehicle views and alignment angle views is by clicking the mouse inside of the yellow view box. As the mouse navigates across the screen, several view boxes will be available for selection.

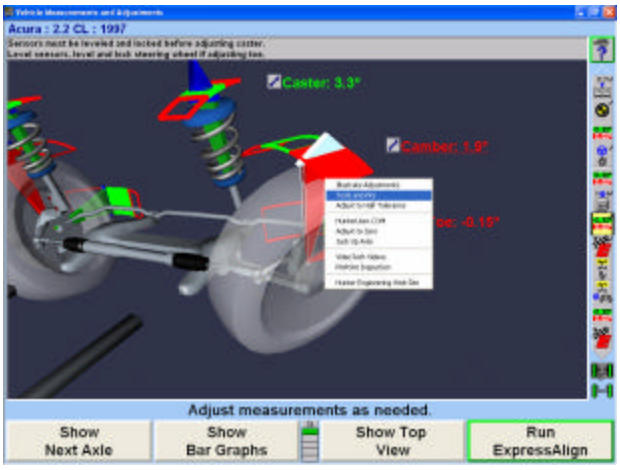


After selecting any view, clicking the right mouse button will return you to the previously selected view.

Highlighting any of the on-screen measurement values will highlight the corresponding arrow in white. The arrow protrudes through the 3-D specification bar graph for the selected measurement. When selecting an on-screen measurement, the selected measurement value will be underlined.



A pull down menu is available from the Virtual View screen by holding the mouse down on the desired 3-D graphic, on the measurement value, or by clicking on the button adjacent to the measurement.



Vehicle Inspection

"Point and Click" Inspection Mode

"Point and Click" inspection integrates Hunter's standard parts inspection list with digital photos and 3-D parts drawings all on the same screen. Photos are displayed on the left side of the screen and a scrollable list of inspection parts is shown on the right. If you click on a part in the photo or a part in the list and hold down the light pen or left mouse button, a menu will pop up. From this menu, you may set the status on the part, access the MAP inspection guidelines, or play MAP Inspection Videos.

Tools and Kits

Introduction to Tools and Kits

Tools and Kits database is an extensive database designed to give a guided overview of hand tools and aftermarket parts and kits needed to make any particular alignment adjustment. The database is presented through images and descriptions of the actual tools and kits that are based on vehicle specifications and alignment angle.

On-The-Job-Training

Requires DIGITAL-VIDEO Option.

OJT uses on-screen animation's and video to convey simple, concise, instruction to the technician for three major alignment related categories.

WinAlign Operation

Alignment Concepts

Vehicle Adjustments

OJT is designed to be used with the *WinAlign Multimedia* CD-ROM's when no alignments are being performed.

OJT is accessed from the softkeys on the logo screen.

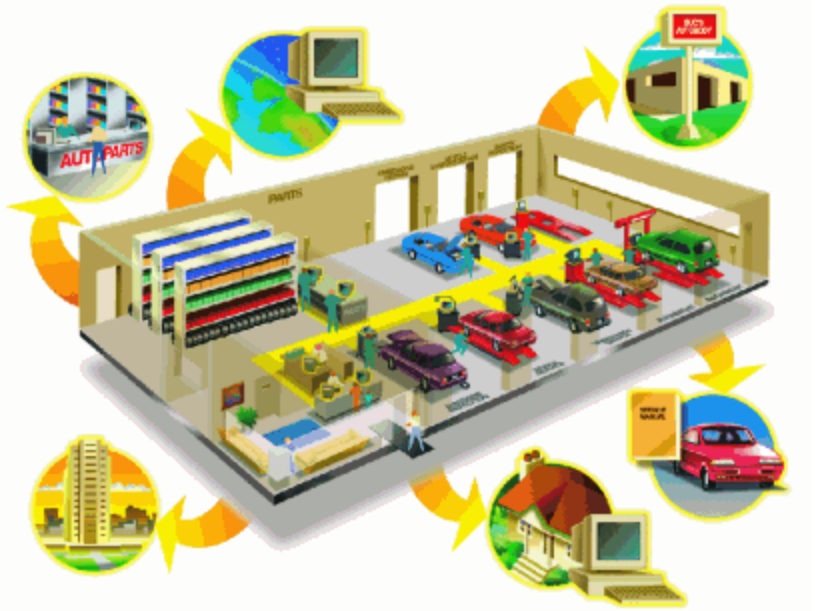
The primary screen of *OJT* offers the following three choices. A detailed sub menu structure is attached:

To exit *OJT,* select the “Exit” icon at the bottom right side of the display. This will automatically return you to the WinAlign program at the “Logo” screen.

i•SHOP Standards

i•SHOP Overview

An i•SHOP-compliant shop is able to share vehicle information with every workstation in the garage, whether it is an accounting system, the shop management computer, a diagnostic system, or an alignment system.



ASANetwork Manager

The ASA Network is a work order management system much like i•SHOP, is primarily targeted towards specific accounts requiring ASANetwork compatibility. The ASANetwork streamlines the work order process and manages all aspects of the work order from order writing, to performing the services, to completing the sale, to cataloging the customer's history.

VideoTech

VideoTech Overview

VideoTech requires the Digital-VIDEO option. VideoTech requires either the Multimedia CD set or the Multimedia DVD.

"VideoTech" is designed to help the technician diagnose specific vehicle problems in alignment, tires, and brakes. "VideoTech" uses video and animation segments that can be viewed prior to vehicle service, or during the alignment procedure.

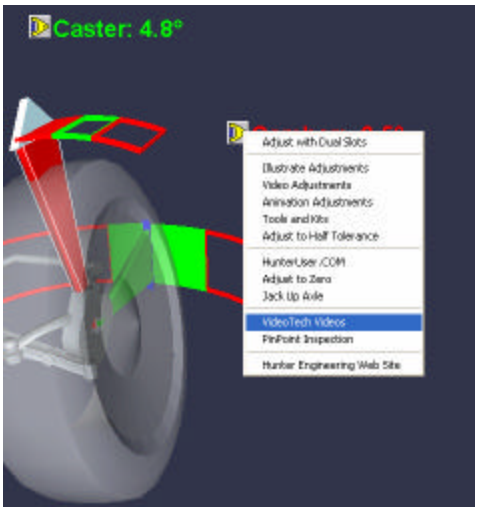
VideoTech is divided into five categories:

- Tire Wear
- Vibration and Noise
- Adjustment Concepts
- Advanced Alignment Concepts
- Handling Conditions

Accessing VideoTech

To access VideoTech, from the logo screen expand the softkeys to display the "VideoTech" softkey. The "VideoTech" softkey is also available under the "Service Programs" tier of softkeys.

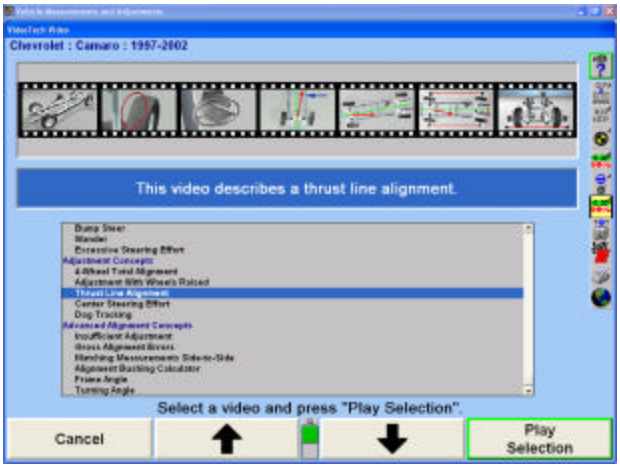
"VideoTech" is also accessed within the alignment procedure. Place the cursor over an alignment bar graph, click and hold, and a drop down menu will display with the "VideoTech" option available, as shown in the closeup below.



Playing a VideoTech Video

Install the “VideoTech” CD or the Multimedia DVD into the CD/DVD player on the aligner.

Select “VideoTech.” This will bring up a menu list for all videos available, as shown below.



Scroll through the list and select the appropriate subject by highlighting it. When highlighted, a window will display at the top of the screen with a brief description and screen shots from the video chosen.

Press the “Play Selection” softkey when the appropriate selection is highlighted.

5. Equipment Information

WinAlign Multi-disk Backup/Restore

The WinAlign Multi-disk Backup/Restore procedure saves files modified by WinAlign to floppy disk(s). The saved files can be restored later by using the restore procedure.

> NOTE: The restore procedure does not install the WinAlign software.

WinAlign modifies files when any of the following occur: setup is changed, a vehicle specification is stored, a vehicle specification note is stored, the logon registry is changed, a work order is stored, a form letter is stored or a filter is stored.

Backup should be performed on a regular basis. How often backup is performed depends on what features of WinAlign are used. The following backup schedules are suggested:

If you do not use Work Management then back up weekly.

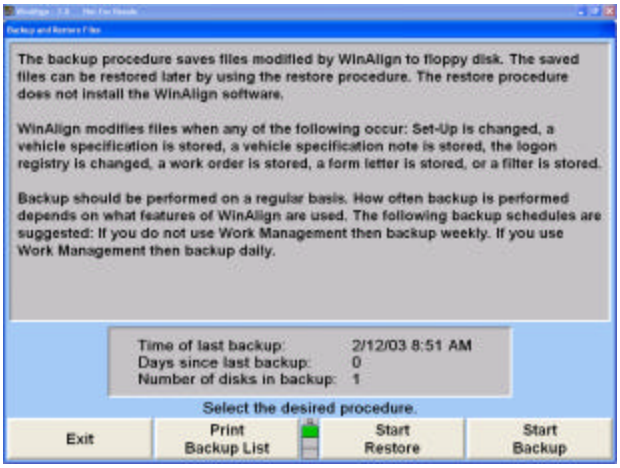
If you use Work Management, then back up daily.

Backup and Restore Procedures

To access the Backup/Restore utility, press “Service Programs” on the logo screen. The menu labels will change.

Press “Backup and Restore” from the “Service Programs” softkey menu.

The Backup and Restore screen presents initial information about WinAlign backup. It also displays the time of the last backup, the number of days since the previous backup, and the number of disk(s) in the most recent backup set.



Backup Procedure

> **CAUTION:** If the machine is reset, or the backup procedure is canceled at anytime during the back up procedure, WinAlign deletes the backup file from the floppy disk and the backup is invalid. It is strongly recommended that Cancel or Reset is not used during the procedure.

Select “Start Backup” or press K4. WinAlign will prompt to insert a formatted 1.44 High Density disk in Drive A.

Insert a formatted disk in Drive A.

WinAlign will check the inserted disk for formatting, write-protection, and the existence of previous back up data. If the disk contains an earlier backup, WinAlign will inform you that the disk contains data, and ask for confirmation to overwrite the disk. Select “OK” to proceed with the backup.

> **CAUTION:** If the disk contains the latest backup prior to the one being performed, it is recommended that you **do not overwrite** the disk. Select “NO.” WinAlign will prompt you to insert another disk. Insert a disk, either blank or from another set, and begin backup process again.

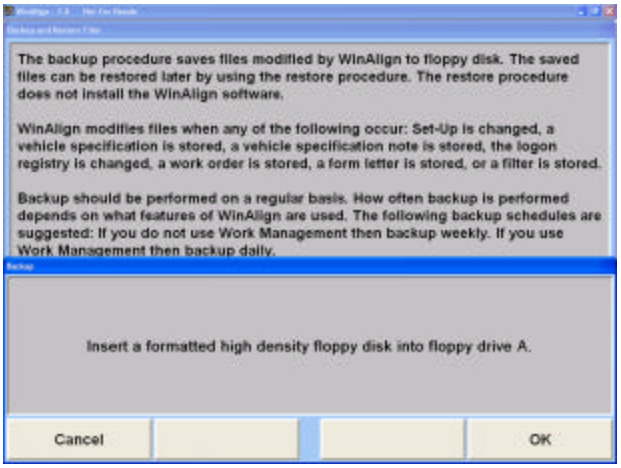
If the backup requires more than one disk, WinAlign will prompt you to remove, and label as “WinAlign Backup” followed by the disk number and the current date and time and to insert a new disk for each disk required to complete a successful backup.

After WinAlign completes backup procedure, you will be prompted that the backup was successfully completed. Select “OK” and exit backup program.

Label the floppy disk(s) as “WinAlign Backup” followed by the disk number and the current date and time.

Restore Procedure

Begin the restore procedure by selecting the “Start Restore” on the Backup and Restore Files screen.



Insert disk one of the current backup into drive A. WinAlign will verify that the disk can be read and that it contains a valid backup.

If the backup data being restored requires more than one disk, WinAlign will prompt the user to insert each disk in the set (one at a time) to verify each disk. Remove and insert the appropriate disk as requested.

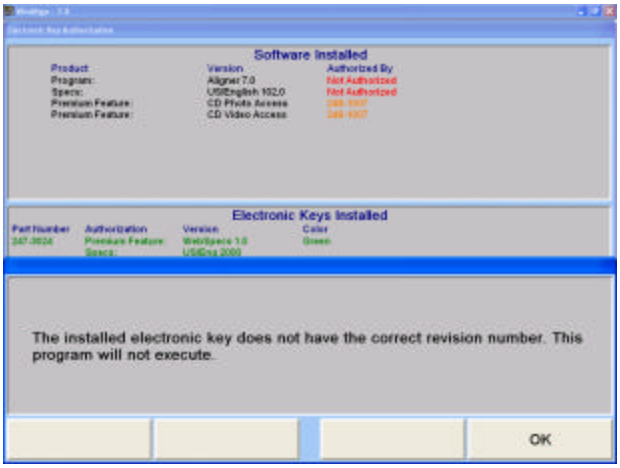
> NOTE: This step is a necessary step for the restore procedure. It insures that all of the disks in the backup set are accounted for so that the restore procedure may begin.
> If you do not have all of the disks for the restore procedure, you can cancel Restore at this time by selecting "Cancel."

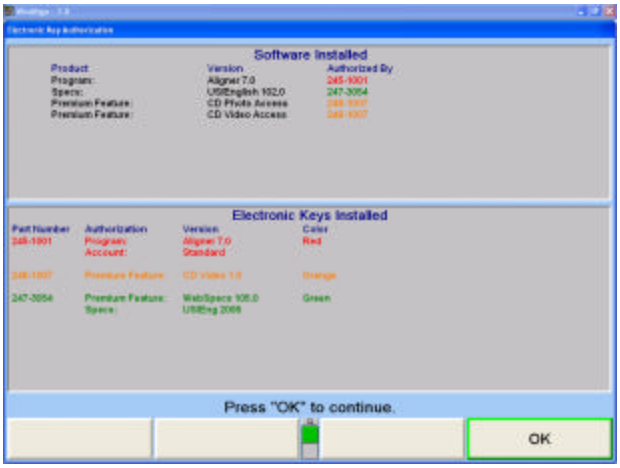
> **CAUTION:** After WinAlign has verified all the disks in the backup set, it will prompt to insert disk one of the set again. It is at this point that the restore procedure begins. If the restore procedure is interrupted at any time during the process, one or more files in WinAlign may be corrupted. This would require a complete re-installation of WinAlign.

Select "OK" when the "Restore completed successfully" screen appears, and exit the restore program.

Electronic Keys

Included with a shipment of diskettes are one or more electronic keys that look similar to large watch batteries. These keys are needed to run the WinAlign program. If the program is loaded onto a 411/611 unit without the proper keys being inserted in the Hunter Interface Board or Hunter Interconnect Board, an error message will appear, similar to the one shown below on the left.





Electronic keys can be placed in any of the available sockets on the Hunter Interconnect Board and/or the electronic key holder. It does not matter which key is in which socket.

A red key is always required to run WinAlign. A green key is required to access the Factory Specification Database If the aligner has a CD-ROM an orange key is required to use the WinAlign features, which access the CD-ROM, such as the digital photos (adjustment illustrations and inspection illustrations) or the MPEG video segments (Just-In-Time Training™ and adjustments videos).

WinAlign will **NOT** operate properly if the required electronic keys are not installed!

Additional keys can be used to allow access to other features within WinAlign. An additional orange key provides access to Digital-VIDEO and Digital-PHOTO. A yellow key provides access to features that meet the needs of certain national accounts.

6. Additional Information

Cradle Adjustment

The construction of passenger vehicles has changed drastically in the last twenty years. Rear wheel driven, full-framed cars, with conventional upper control arm adjustments for front camber and caster are no longer the majority of vehicles being serviced.

The majority of the passenger vehicles on the road today are front wheel driven, unibody vehicles using some form of front strut suspension and often limited to minimal front camber and/or caster adjustments.

Although many aspects of alignment have changed due to the design of the newer vehicles, one of the major issues is the presence of a subframe assembly often referred to as a "cradle."

Why has the "cradle" become an alignment issue?

Many of the FWD, unibody vehicles are equipped with little, if any, front camber and/or caster adjustments. This lack of adjustment has created a need to find additional methods to adjust alignment angles to within the manufacturer's specifications.

One of the methods discovered, which may work on some vehicles, is to re-position the cradle assembly forward, rearward or side-to-side. Since the lower control arms attach to the cradle assembly's frame rails, re-positioning or shifting the cradle assembly will reposition the lower ball joints and change camber and/or caster angles.

Vehicles designed with rear cradle assemblies rely on the cradle to maintain proper control arm position for rear camber, toe, and thrust angle.

Is it possible to reposition a cradle without frame equipment?

Yes, it is possible to reposition the cradle assembly without frame equipment in most cases. Many cradle assemblies have been re-positioned unknowingly by technicians performing service procedures such as transaxle repair and engine removal.

Bolting a cradle assembly to the body of the vehicle seems simple, but without the knowledge of how the cradle assembly position can affect alignment angles, it is easy to position the lower control arms far enough away from their intended position to cause alignment angles to be out of specification.

A basic understanding of the interaction between the cradle assembly and the alignment angles will provide the alignment technician with the knowledge to check the cradle position and reposition it when needed.

What are the procedures for properly positioning a cradle assembly?

The procedures differ from manufacturer to manufacturer, however the concept behind shifting the cradle assembly and the affect it has on alignment angles, tire wear, suspension components, driveline components and steering components remains constant throughout the industry.

> **⚠WARNING: The important fact to remember is the cradle assembly has one, and only one correct position, which is generally determined by alignment holes between the cradle assembly and the body of the vehicle.**

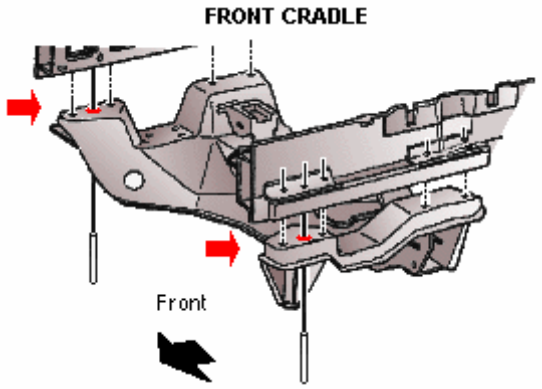
> **⚠WARNING: The information contained in this section is not intended to be a substitute for the vehicle manufacturer's service information regarding the cradle assembly.**

Definition

The term "cradle" is often used to describe a subframe constructed of two side frame rails with transverse supporting cross members. The frame rails and cross members may be welded or bolted together and are attached as an assembly to the unibody structure with bolts and insulating bushings. This assembly forms a cradle for the driveline and the engine.

Why are cradle assemblies used?

The cradle assembly serves as a mounting platform for the entire driveline assembly and the lower control arms of the suspension on front or rear driven vehicles equipped with transverse mounted engines. A considerable savings in both time and money is realized utilizing this design, since the engine, transmission, differential, and lower suspension components can be assembled and installed as a unit.



What is the proper position for the cradle?

In general, the position of the cradle in respect to the unibody must be at a location that provides proper driveline, suspension, and steering alignment. The exact position of the cradle assembly is normally documented in the manufacturer's service manual.

What happens if the cradle is out of position?

It is possible, however, for the cradle assembly to be secured in a position that is slightly off to one side or slightly forward or rearward of the intended position. This is due to the enlarged frame holes in the cradle rails.

Over-sizing of the frame holes is needed to simplify the attachment of the cradle assembly to the body of the vehicle. Unfortunately, this over-sizing also may allow the cradle to be positioned incorrectly with the body of the vehicle.

An improperly positioned front cradle assembly can affect camber caster setback and S.A.I./IA. The result may be:

insufficient adjustment range

premature tire wear

vehicle instability

improper drive line angles

In addition, since the upper suspension components (i.e. struts, stabilizer bar frame bushings, etc.), steering gear and upper engine mount are attached to the body, an incorrect position of the cradle assembly to the body may produce undesired stress on suspension and steering components.

An improperly positioned rear cradle may affect rear camber, toe and thrust angle. This may result in undesired “dog-tracking” and premature tire wear.

Vehicles with Adjustable Cradles by Manufacturer

The following list represents the majority of vehicle models having a unibody construction with moveable front frame rails, often called a “cradle assembly.”

Front Adjustable Cradles

Buick

Century (86-02)

Electra / Park Avenue (85-90)

LeSabre (86-99)

Park Avenue / Ultra (91-02)

Reatta (88-91)

Regal (88-02)

Rendezvous 4x2 and 4x4 (02)

Riviera (86-99)

Cadillac

Allante' (87-93)

DeVille incl. Concours (85-99)

Eldorado (87-02)

Fleetwood / Sixty Special FWD (88-93)

Seville (87-02)

Chevrolet

Celebrity (86-90)

Lumina (90-01)

Lumina APV (90-96)

Monte Carlo (95-99)

Venture 4x2 and 4x4 (97-02)

Chrysler

Cirrus (95-00)

Sebring Convertible (96-00)

Dodge

Stratus (95-00)

Ford

Taurus Sedan and Wagon (86-99)

Thunderbird (89-97)

Windstar (99-02)

Lincoln-Mercury

Continental (88-94)

Mark VIII (93-98)

Cougar (89-97)

Sable Sedan and Wagon (86-99)

Oldsmobile

Aurora (95-99)

Cutlass Ciera (86-96)

Cutlass Cruiser (86-96)

Cutlass Supreme-all models (88-97)

Delta 88 (86-87)

Eighty Eight (incl. LSS) (88-99)

Intrigue (98-02)

Ninety Eight (85-96)

Regency (97-98)

Silhouette (90-02)

Toronado (86-92)

Plymouth

Breeze (96-00)

6000 incl. AWD (86-91)

Aztek 4x2 and 4x4 (01-02)

Pontiac

Bonneville (87-99)

Grand Prix (88-02)

Montana 4x2 and 4x4 (98-02)

Trans Sport (90-98)

Saturn

S-Series (SL/SC/SW) (91-02)

Vehicles with Adjustable Rear Cradles

Ford Thunderbird (89-97)

Mercury Cougar (89-97)

Always refer to the manufacturer's service information prior to attempting a change in cradle position. Each model requires a specific alignment technique unique to its cradle-to-body design.

Camber and Steering Axis Inclination (S.A.I.) Angles

What to look for?

The position of the cradle assembly may be incorrect due to collision, improper mounting bolt torque or incorrect placement after having been removed during engine or transaxle repair.

Inspect the cradle rails and cross members for damage. Bent or damaged cradle assembly components are good indicators that the cradle may have moved.

The inability to adjust camber to preferred specification on either side of the vehicle is another sign that the cradle may be out of position. S.A.I. measurements are also quite helpful in determining cradle position.

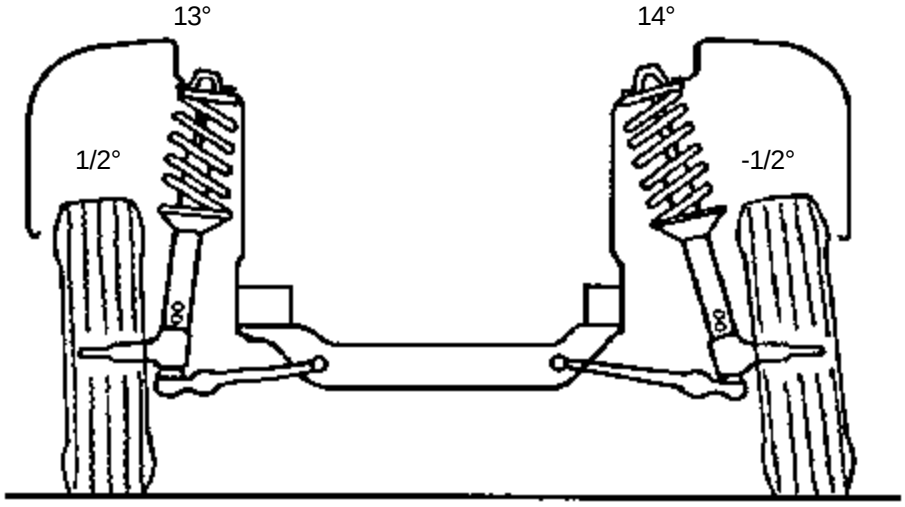
How does the cradle position effect camber and S.A.I.?

Since the front cradle assembly controls the lower control arm position, incorrect placement side-to-side will affect front camber and Steering Axis Inclination (S.A.I.).

When the cradle assembly is moved sideways, one lower control arm is moved outward decreasing camber and increasing S.A.I. The other lower control arm moves inward increasing camber and decreasing S.A.I.

An incorrect side-to-side position of the rear cradle assembly will affect rear camber in the same manner.

The following example may clarify what occurs when the cradle assembly shifts to one side or the other.



EXAMPLE:

left camber = + $^{1}/_{2}$°

right camber = - $^{1}/_{2}$°

left SAI = 13°

right SAI = 14°

desired camber = 0°

Shifting the cradle to the positive camber side would equalize camber and SAI.

The example above illustrates a combination of camber and S.A.I., which may indicate the need for repositioning or "shifting" of the cradle assembly. The cradle position should be checked using the manufacturer's centering instructions. In this example, moving the cradle assembly to the positive camber side will reduce the difference in camber and S.A.I.

What are the affects of an improperly positioned cradle?

Although it is true that "shifting" a cradle often times brings "factory non-adjustable" or "out-of-adjustment" alignment angles closer to preferred specification, the side affects may be undesirable.

Shifting a cradle assembly away from proper alignment with the body, for the sake of reducing camber and S.A.I. difference, may result in unwanted torque steer, bump steer or damage to drive shaft assemblies.

Vehicle manufacturers specify the correct procedure for insuring a proper alignment of the cradle assembly to the body of the vehicle. Most of these vehicles have alignment holes in the cradle assembly and body of the vehicle, which require the use of an alignment dowel or similar device to establish the precise location of the cradle assembly.

> ⚠ **WARNING: Variance from the manufacturer's procedure is an assumed liability and should not be taken lightly, as the results may be costly and dangerous.**

Caster and Setback Angles

What are the signs to look for?

The existing position of the cradle assembly may be incorrect due to collision, improper mounting bolt torque, or incorrect placement after being removed for engine or transaxle repair.

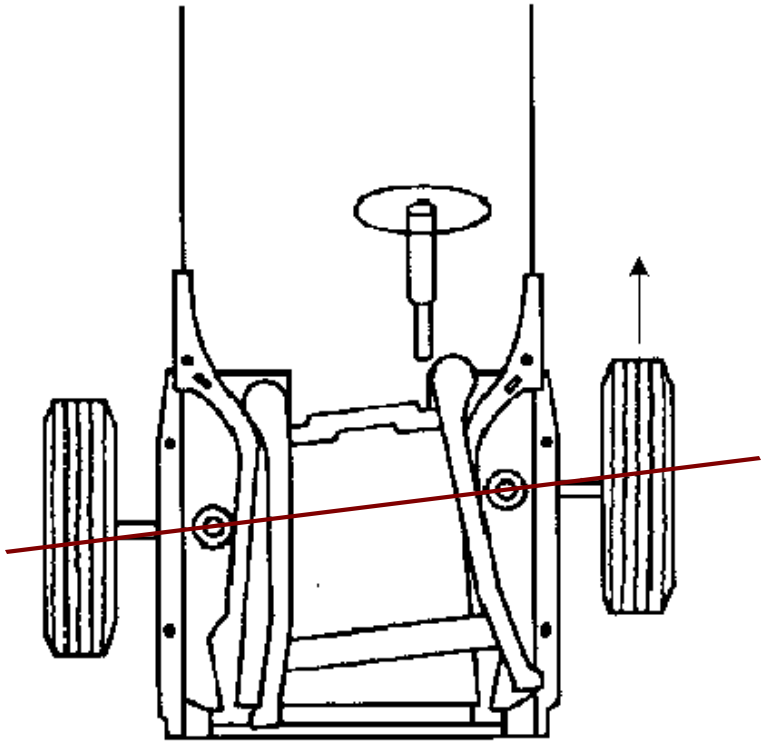
Inspect the cradle rails, lower control arms, and cross members for damage or signs of collision. Bent or damaged cradle assembly components are good indicators that the cradle may have moved.

Check the torque of the cradle mounting bolts and adjust as needed using the manufacturer's torque specification and procedure. Improperly torqued mounting bolts may allow the cradle to reposition itself during acceleration and braking.

The inability to adjust caster to preferred specification on either side of the vehicle is a sign that the cradle may be out of proper position. Another good indicator is when a significant amount of setback accompanies a low caster reading.

How does the cradle position effect caster and setback angles?

Since the front cradle assembly controls the lower control arm position, incorrect placement corner-to-corner affects front caster and setback angles. When the cradle assembly is moved forward on one side and rearward on the other side, one lower control arm is moved rearward decreasing caster and increasing setback. The other lower control arm moves forward increasing caster and increasing setback.



An incorrect corner-to-corner position of the rear cradle assembly will affect rear individual toe and thrust angle.

The following example may clarify what occurs when the cradle shifts forward on one side and rearward on the other side.

EXAMPLE:

left caster = 2°

right caster = 4°

setback = - 0.80

desired caster = 3°

The cradle has shifted rearward to the left causing the left lower control arm to move rearward and decreasing left caster. This also increased negative setback.

The cradle moved forward on the right side causing the right lower control arm to move forward and increasing caster. This also increased negative setback.

The example above illustrates a combination of caster and setback, which may indicate the need for repositioning or “shifting” of the cradle assembly.

Shifting the cradle to a centered position would reduce setback and reduce the difference in left and right caster bringing them closer to preferred specification. The cradle assembly should be checked for proper positioning using the manufacturer’s centering instructions.

Ride Height Specifications

Ride height specifications are determined by the height of the vehicle to a point specified by the manufacturer within specific tolerances.

Damage to vehicle suspension and a poor alignment can be caused when ride height is not within the manufacturer's specifications.

Toe Change

Front toe can change to an extreme toe-in or toe-out condition, depending on the location of the steering arms, when the steering linkage is forced into a downward operating position from sagging front coil springs. The result is heavy tire wear and poor handling characteristics.

Camber (Side-Slip)

A small amount of sag in the springs will increase lateral movement of the wheels, causing tires to slide laterally across the pavement. The result is extreme tire wear.

Shocks and Struts

Sagging springs will shorten the shock absorber causing the frame to be closer to the rubber strike out bumper. The result is the car will "bottom out."

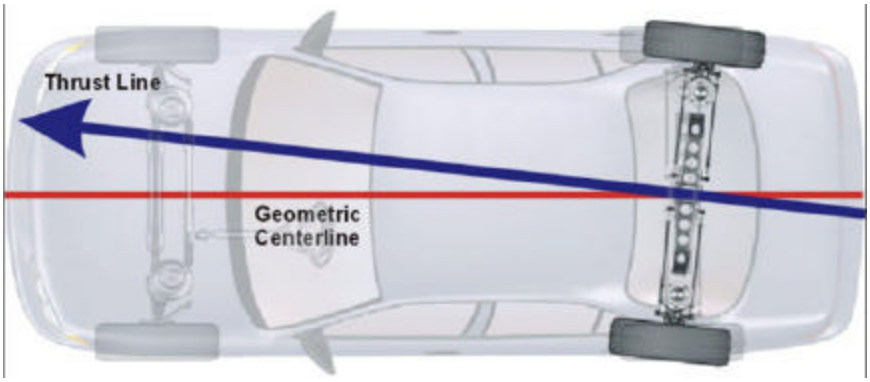
Rear Springs

Caster and camber suffer the most when the rear springs are sagging. The result is poor handling and tire wear.

7. Glossary

Alignment Types

Geometric Centerline Alignment

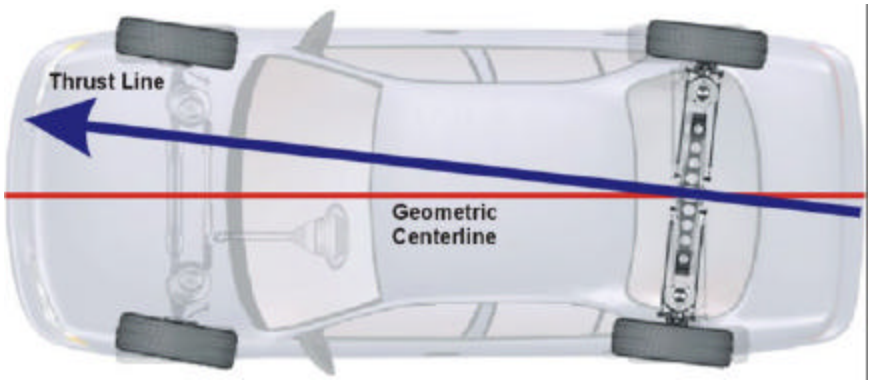


Toe on each front wheel is measured and adjusted using the geometric centerline of the vehicle as a reference.

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 rear wheels of the vehicle (either solid axle or independent suspension) create a thrust line that is not parallel to the geometric centerline, the steering wheel position may not be centered properly as the vehicle moves in a straight direction.

Thrust Line Alignment

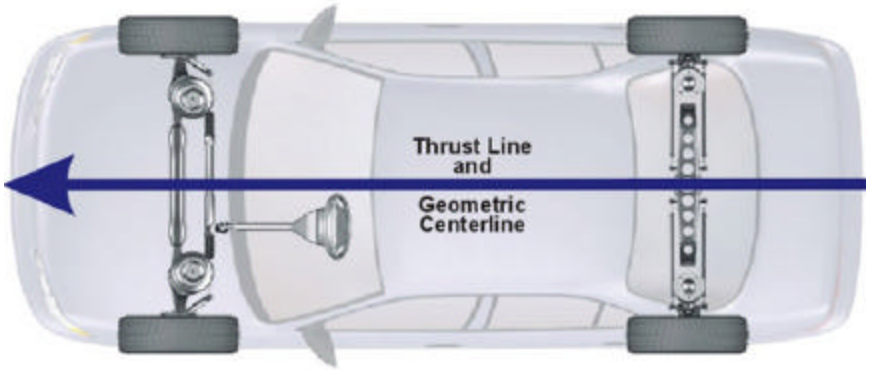


Aligning the front wheels to the thrust line of a vehicle is a significant improvement over aligning to the geometric centerline.

In the thrust line method, rear individual toe is measured (but not adjusted). The thrust line created by the rear wheels is used as a reference for aligning the front wheels.

As a result, the operator is assured of a straight steering wheel as the vehicle moves straight ahead.

Total Four-Wheel Alignment



Total four-wheel alignment is the ultimate wheel alignment service. Rear individual toe is measured, then adjusted to the factory specifications. If adjusted correctly, the thrust line of the rear wheels becomes parallel to the geometric centerline of the vehicle.

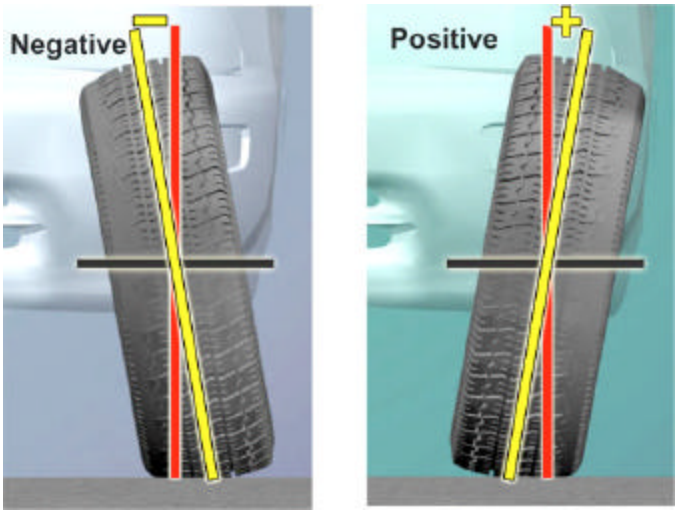
The front wheels are then aligned to the rear wheel thrust line.

Total four-wheel alignment provides the ability to correct a dog-tracking condition and assures a straight steering wheel as the vehicle moves in a straight line.

Alignment Angles and Measurements

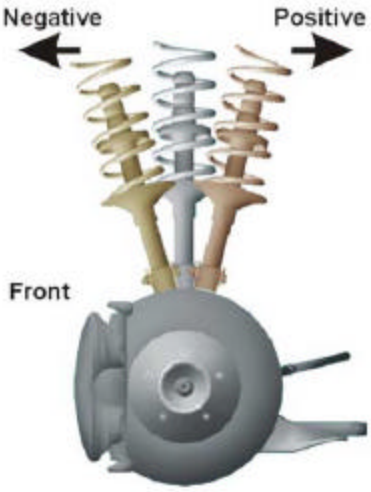
This section provides definitions to terms used in the manual.

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

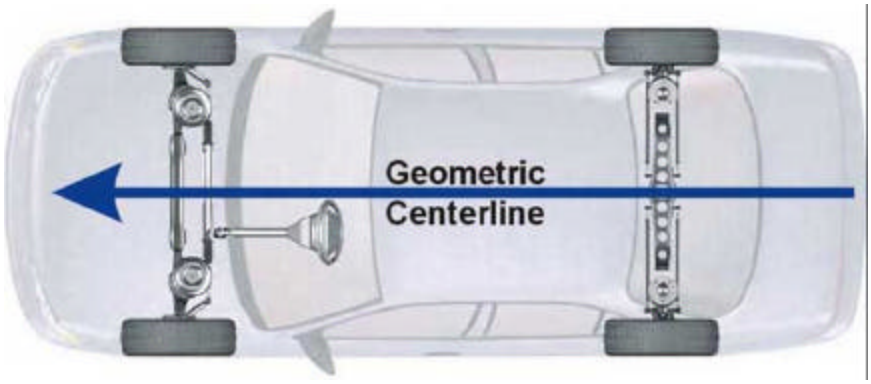


The forward or rearward tilt of the steering axis in reference to a vertical line as viewed from the side. This angle is measured and displayed in degrees. Caster is positive when the top of the steering axis is tilted rearward and is negative when the top of the steering axis is tilted forward.

Frame Angle

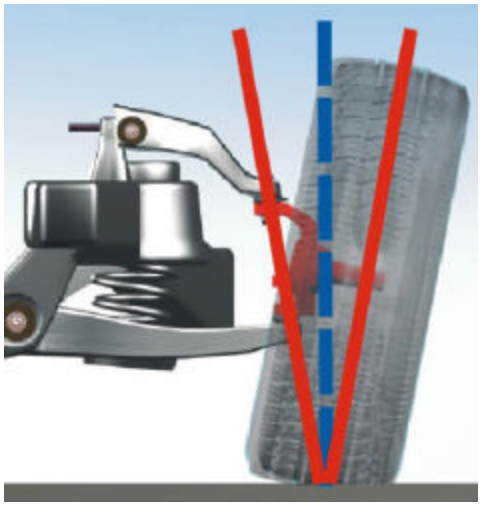
The angle (from a side view) formed by a horizontal line and a line drawn parallel to the frame. Frame angle is positive when the frame is higher at the rear and is negative when the frame is lower at the rear. The aligner does NOT calculate frame angle.

Geometric Centerline



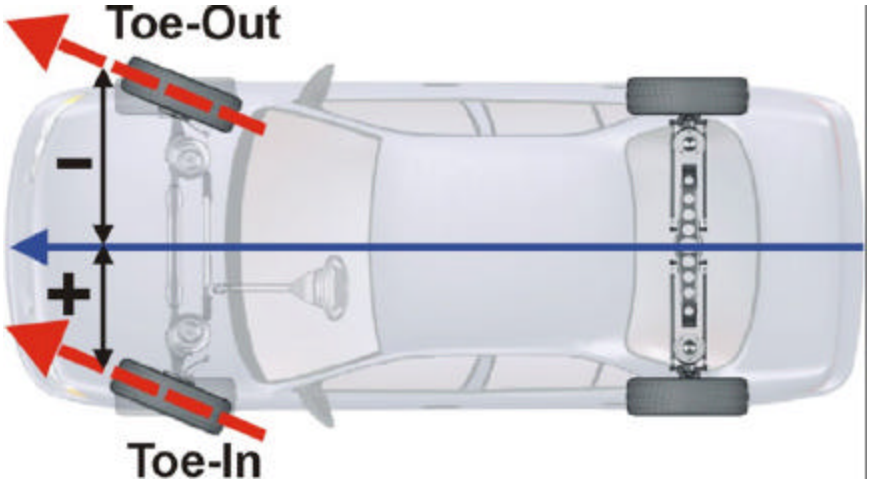
This is a line drawn through the midpoint of the front and rear axle.

Included Angle (I.A.)



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

Individual Toe

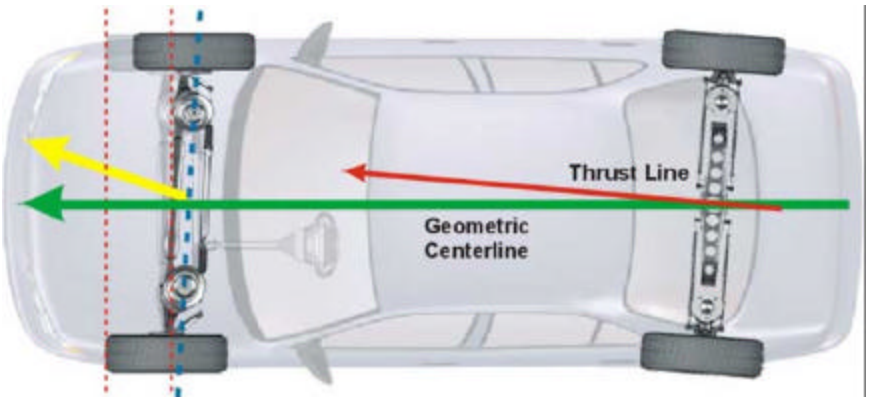


The angle formed by a horizontal line drawn through a plane of one wheel referenced to the reference line of the vehicle. Individual toe is measured in degrees but may be displayed in degrees, inches or millimeters. Toe-in is when the horizontal lines intersect in front of the wheel. Toe-out is when the horizontal lines intersect behind the wheel.

Ride Height

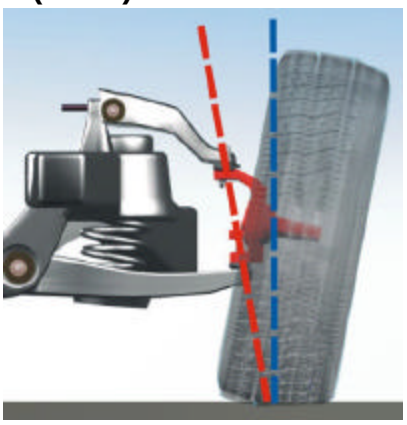
The height of the vehicle to a point specified by the manufacturer within specific tolerances.

Setback



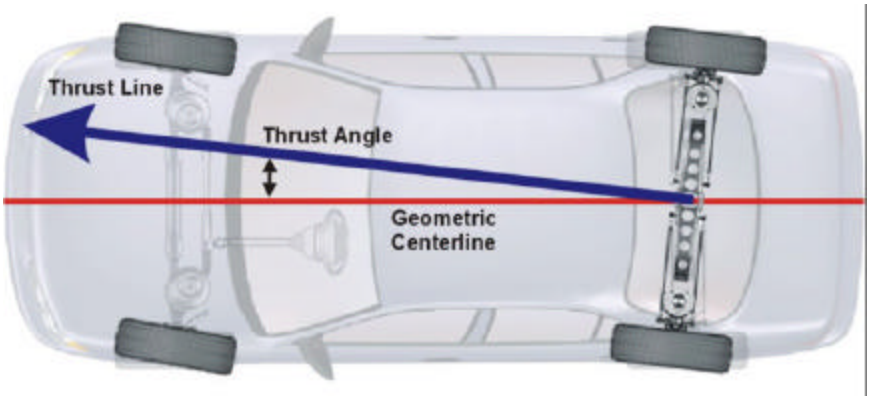
The angle formed by the geometric centerline and a line drawn perpendicular to the front axle. Setback is positive when the right wheel is behind the left wheel. Setback is negative when the left wheel is behind the right wheel. A setback condition will not affect the accuracy of the system.

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.

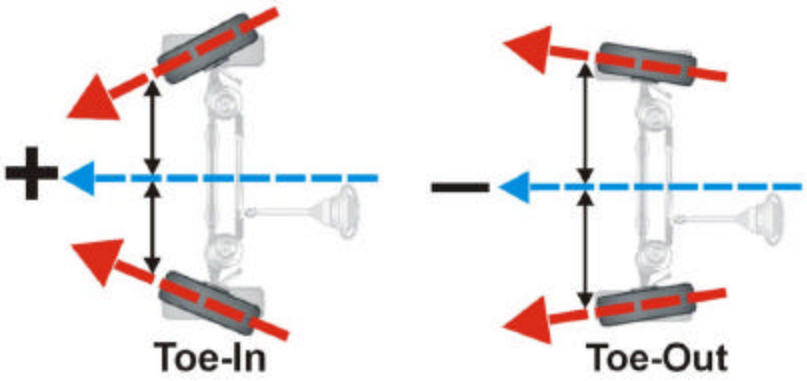
Thrust Angle and Thrust Line



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

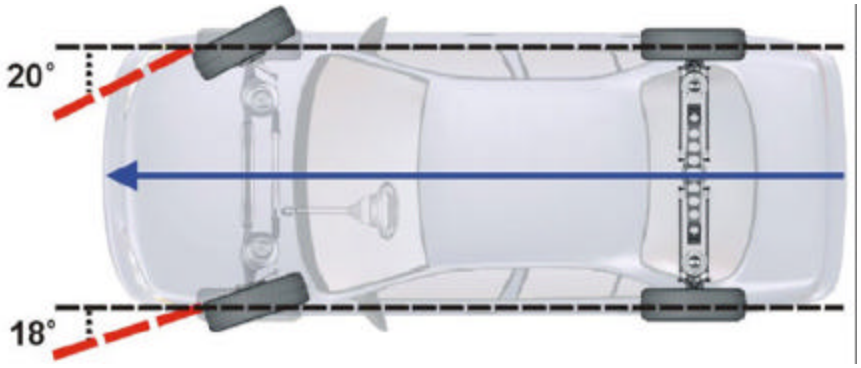
The bisector of total toe angle of the axle is the Thrust Line.

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.