



**EEWA-107/108 Wheel Aligner  
with Windows 95  
and Pro32™ Software**

*Operator's Manual*



**Form #5647-1**

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# ***EEWA-107/108***

## ***Wheel Aligner***

### ***with Pro32™ Software***

#### ***Operator's Manual***

#### Print History

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## SAFETY INFORMATION

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### **For your safety, read this manual thoroughly before operating the EEWA-107/108 Aligner**

The EEWA-107/108 Aligner is intended for use by properly trained, skilled automotive technicians. The safety messages presented in this section and throughout the manual are reminders to the operator to exercise extreme care when performing wheel alignments with this product.

There are many variations in procedures, techniques, tools, and parts for servicing vehicles, as well as the skill of the individual doing the work. Because of the vast number of vehicle applications and potential uses of the product, the manufacturer cannot possibly anticipate or provide advice or safety messages to cover every situation. It is the automotive technician's responsibility to be knowledgeable of the vehicle to be aligned. It is essential to use proper service methods and perform wheel alignments in an appropriate and acceptable manner that does not endanger your safety, the safety of others in the work area or the equipment or vehicle being serviced.

It is assumed that, prior to using the EEWA-107/108 Aligner the operator has a thorough understanding of the vehicle systems being serviced. In addition, it is assumed he has a thorough knowledge of the operation and safety features of the alignment rack or lift, and has the proper hand and power tools necessary to perform wheel alignments.

When using your garage equipment, basic safety precautions should always be followed, including:

1. Read all instructions.
2. Care must be taken as burns can occur from touching hot parts.
3. Do not operate equipment with a damaged power cord or if the equipment has been dropped or damaged until it has been examined by a qualified serviceman.
4. Do not let cord hang over edge of table, bench or counter or come in contact with hot manifolds or moving fan blades.
5. 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 than the equipment may overheat. Care should be taken to arrange the cord so that it will not be tripped over or pulled.
6. Always unplug equipment from electrical outlet when not in use. Never use the cord to pull the plug from the outlet. Grasp plug and pull to disconnect.
7. Let equipment cool completely before putting away. Loop cord loosely around equipment when storing.
8. To reduce the risk of fire, do not operate equipment in the vicinity of open containers of flammable liquids, such as gasoline.
9. Adequate ventilation should be provided when working on operating internal combustion engines.
10. Keep hair, loose clothing, fingers, and all parts of body away from moving parts.
11. To reduce the risk of electrical shock, do not use on wet surfaces or expose to rain.
12. Use only as described in this manual. Use only manufacturer's recommended attachments.
13. ALWAYS WEAR SAFETY GLASSES. Everyday eyeglasses only have impact resistant lenses, they are NOT safety glasses.

**IMPORTANT !! SAVE THESE INSTRUCTION -- DO NOT DISCARD !!**

# SAFETY INSTRUCTIONS

## IMPORTANT!! SAVE THESE INSTRUCTIONS



Risk of electrical shock.

- **Do not operate equipment with a damaged power cord or if the equipment has been dropped or damaged, until it has been examined by a qualified service person.**
- **If an extension cord is necessary, a cord with a current rating equal to or greater than that of the equipment should be used. Cords rated for less current than the equipment can overheat.**
- **Unplug equipment from electrical outlet when not in use. Never use the cord to pull the plug from the outlet. Grasp plug and pull to disconnect.**
- **Do not expose the equipment to rain. Do not use on wet surfaces.**
- **Plug unit into correct power supply.**
- **Do not remove or bypass grounding pin.**

*Contact with high voltages can cause death or serious injury.*



Risk of electrical shock. High voltages are present within the console unit.

- **There are no user serviceable items within the console other than the keyboard and printer.**
- **Service on the unit must be performed by qualified personnel.**
- **Do not open any part of the console other than noted areas.**
- **Turn power switch off and unplug the unit before servicing.**

*Contact with high voltages can cause death or serious injury.*



Risk of eye injury. Debris, dirt, and fluids may drop from vehicles.

- **Knock off any loose debris. Clean surfaces as needed to avoid any materials from falling.**
- **Wear approved safety glasses when servicing.**

*Debris, dirt, and fluids can cause serious eye injury.*



Risk of crushing. Vehicles may roll off alignment lift if not secured.

- **Leave automatic transmission in park or manual transmission in gear unless equipment operation steps require vehicle in neutral.**
- **Apply parking brake unless equipment operation steps require wheel movement.**
- **Use wheel chocks whenever vehicle is positioned on the lift.**
- **Follow rack or lift manufacturer's safety recommendations when lifting a vehicle.**

*Vehicles rolling off lifts can cause death or serious injury.*



Risk of entanglement or crushing. There are moving parts on vehicle lifts during operation.

- **Keep all persons clear of lifts.**
- **Read lift manufacturer's operation instructions carefully.**
- **Follow lift manufacturer's safety recommendations.**

*Contact with moving parts could cause injury.*



Risk of pinching or crushing body parts when jacking vehicles.

- **Keep hands and other body parts away from jacking surfaces.**
- **Do not use unapproved adapters (i.e. wooden blocks) when jacking a vehicle.**
- **Do not bypass any jack manufacturer's safety features.**
- **Read jack manufacturer's operation instructions carefully.**
- **Follow jack manufacturer's safety recommendations.**

*Improperly used or maintained jacks can cause injury.*



Risk of burns.

- **Do not touch hot exhaust systems, manifolds, engines, radiators, etc.**
- **Wear gloves whenever performing a service near hot components.**

*Hot components can cause burns.*



Risk of injury. Tools may break or slip if improperly used or maintained.

- **Use the correct tool for the task.**
- **Frequently inspect, clean, and lubricate (if recommended) all tools.**
- **Follow recommended procedures when performing vehicle services.**

*Tools that break or slip can cause injury.*

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# ***EEWA-107/108 Aligner***

## **Getting Started**



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## Introduction

This section is designed as a starting point for owners and operators of the Sun Model EEWA-107/108 *Pro32™* Aligner. The *Pro32™* software provides a powerful tool for service centers who offer wheel alignment services. The setup, operation, and maintenance of the EEWA-107/108 is covered in sections 2 - 4. The first part of this section describes what is necessary to get started using the Aligner. The components of the system are described, and navigation through the software is shown.

The Sun Model EEWA-107/108 and Microsoft Windows™ 95 requires a very specific set of computer hardware components. All these components are integrated together to optimize the speed and functionality of the software. Substitution of these items, or the addition of any other computer components to the aligner, could compromise proper operation and is not recommended. Consult Sun/Snap-on Technical Support prior to performing any changes to the hardware configuration.

Microsoft Windows™ 95 operating system is used as the base platform for the aligner. This manual does not attempt to discuss the navigation and variety of features found within Windows. Refer to the Windows™ 95 Manual or the on-line help for information about the operating system. Do not manipulate, change, or copy any files or system configurations unless qualified to do so. The aligner may not operate properly if unauthorized changes have been made.

Thank you for purchasing the Sun Model EEWA-107/108 *Pro32™* system. We at Sun are confident this state of the art alignment machine will provide many years of profitable service. Should any additional assistance or information be required, call the following number in the USA:

**1-800-362-8326**

**or**

**1-501-450-1500**

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## Getting Started

The Sun Model EEWA-107/108 with *Pro32™* software offers extraordinary power and versatility. This section of the manual describes how to begin enjoying the many features and benefits of the Aligner. References are often made to other sections of this Operator's Manual.

### Assembly and Setup

Installation and setup of a new EEWA-107/108 is best handled by a qualified Sun/Snap-on Representative. If unsure of who to contact, refer to the back of this manual.

The aligner must be calibrated to at least one rack, lift, or other surface where wheel alignments are to be performed.

All software is loaded onto the computer's hard drive. The Compact Disc shipped with the unit contains the alignment software as a backup, and is not needed when performing alignments.

Instructions for operational setup of the EEWA-107/108 program are covered in detail in Section 2 of this Operator's Manual. The setups for the PC hardware and Microsoft Windows™ 95 are preset at the factory and should not be altered.

### Aligner Location

Each shop is unique. Locate the aligner in a location that provides the most convenience for the operator. Remember, visual contact with the monitor is necessary during most steps of a wheel alignment. Most shops position the aligner in front of the alignment lift, offset to either the left or right sides.

### Power ON

The power switch for the EEWA-107/108 is located on the rear of the unit (see *Figure 3 on Page 20*). This switch turns on all of the aligner's components. Make sure the monitor's power switch and the computer's power switch (in lower cabinet) are left in the ON position at all times.

When the power switch is turned on, the unit initiates the computer boot-up. Text should appear on the screen as boot-up begins and counting numbers are shown as the memory of the unit is checked and

verified. Many additional lines of computer configuration will appear on screen and scroll up as the computer completes the system boot sequence. As Windows™ 95 loads the Windows™ 95 logo will be on the screen. The *Pro32™* Logo screen (*Figure 1*) will appear next as Windows finishes loading.



*Figure 1. Pro32™ Logo Screen*

Click on the OK button to advance to the *Pro32™* Home Alignment screen (*Figure 2*), indicating the Aligner is ready for operation. This boot sequence should take about three minutes. If any problems are encountered during the Power On boot-up sequence, consult the Maintenance and Service section of this Operator's Manual.



*Figure 2. Home Alignment Screen*

## Aligner Components

### Console

The console houses many of the aligner components including the power supplies, the computer system, the head interface components, and provides places for the display monitor, keyboard, and printer. The measuring heads are placed on the sides of the lower cabinet when not in use.

The upper shelf of the console provides a location for the display monitor, pointing device (mouse, trackball, trackpad, or light pen), and keyboard. The monitor has on-screen adjustments for size, brightness, etc.

In the middle of the console beneath the upper shelf is the printer drawer. The printer is accessed by lifting the hinged door and sliding out the drawer.

The lower part of the console houses the computer system. The computer has a front-mounted power switch that should remain in the ON position. The computer also contains a CD-ROM drive, a floppy drive, and hard drive. The 4 measuring heads hang from each side of the lower cabinet.

**NOTE:** *Be careful not to expose the aligner or measuring heads to water, heavy dust environments, or operations that produce metal chips. Do not block the rear of the computer or disable the cooling fan.*

The main ON/OFF switch for the aligner is located on the rear of the console. The monitor and computer have power switches as well – these should be left in the ON position at all times. The main power cable connects to the rear of the unit. Next to the plug are a series of protective fuses. In the event of a power overload, one or more of these fuses may blow, rendering the aligner unusable. Check the fuses whenever the unit is non-operational.

The head interconnect cables plug into the back of the console. There are 6 female connectors – one for each of the 4 heads, one for the optional remote display unit, and one spare. When the aligner is utilized with a rack wiring kit, all 6 connectors are used. The connectors are universal – it does not matter which head is plugged into any of the 6 connectors. See *Figure 4* on next page.



**Figure 3. EEWA-107/108 Front View**

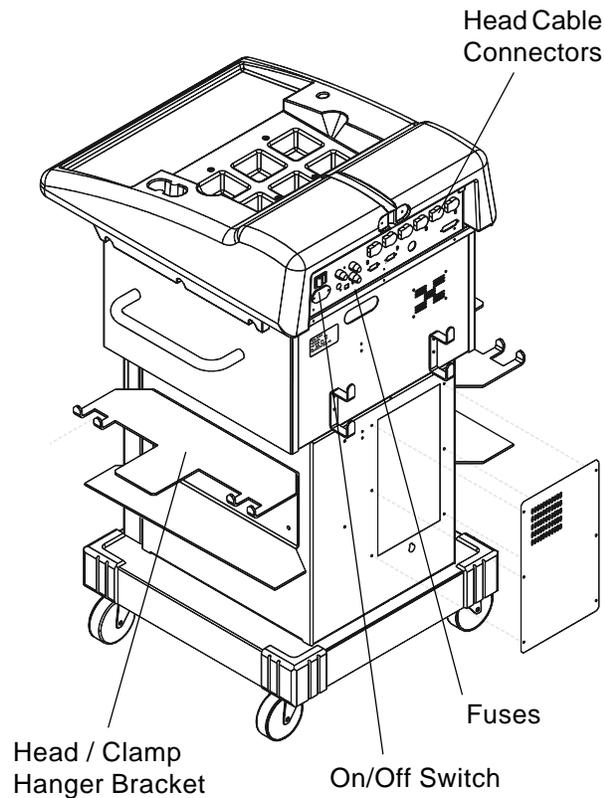
## Computer Connections

Installation of the Sun Model EEWA-107/108 includes connection of devices to the computer. Should there be any reason to examine those connections, or change a component such as the pointing device, there is an access panel located on the rear of the console.

**CAUTION!** *There are no serviceable parts inside the computer. DO NOT attempt to open the computer case for any reason. Call for service if a computer problem is suspected.*

### **⚠ WARNING**

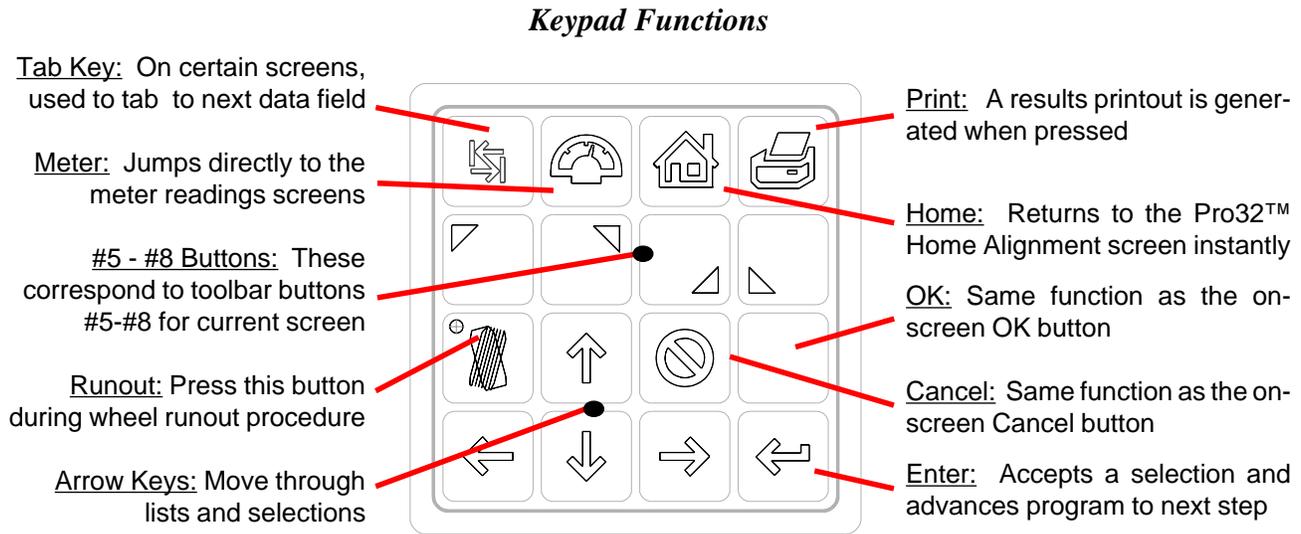
**DO NOT CHANGE COMPUTER CONNECTIONS OR COMPONENTS UNLESS INSTRUCTED BY SUN/SNAP-ON PERSONNEL.** Remove power from the aligner prior to removing cover. Call for a certified Sun/Snap-on technician if you are in doubt as to how to make any connection. Making a connection incorrectly could damage the unit and void the warranty.



**Figure 4. Console Rear View**

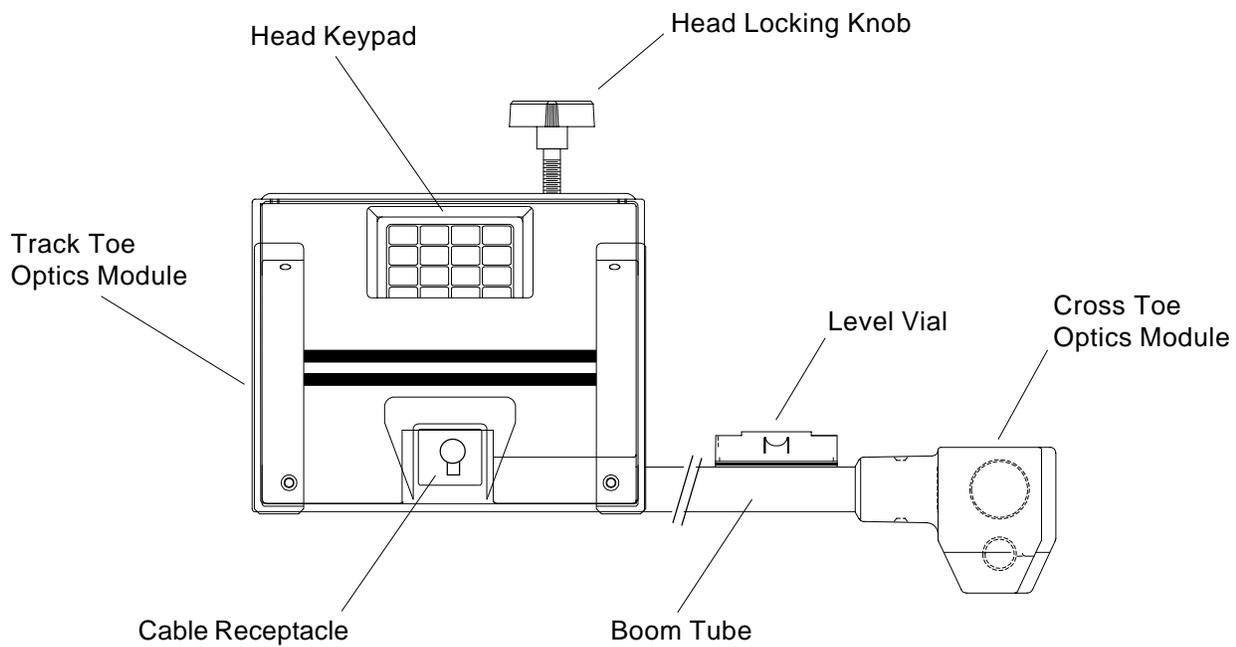
## Measuring Heads

The operation of the Sun Model EEWA-107/108 can be controlled at any of the measuring heads. Study *Figure 5* below to become familiar with the layout of the head keypads.



**Figure 5. Head Keypad Layout**

*Figure 6* below shows some of the components of the Sun Model EEWA-107/108 optical measuring heads.

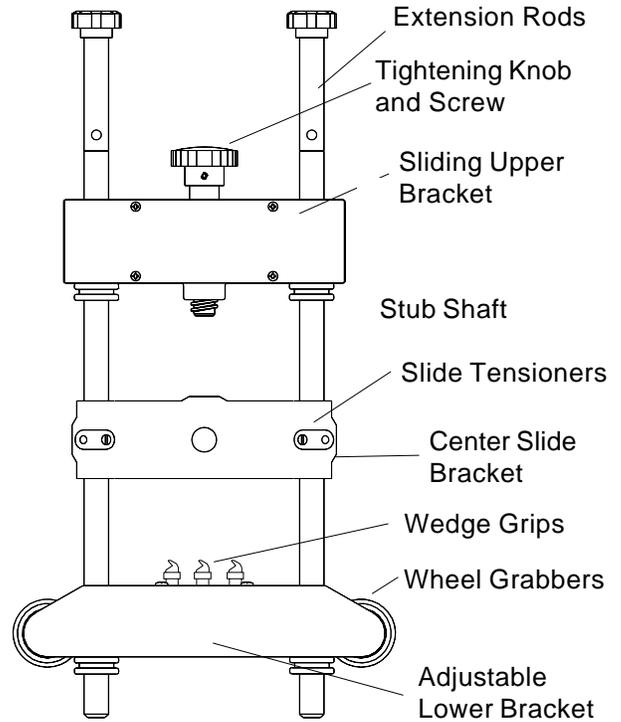


**Figure 6. Head Components**

### Wheel Clamps

The wheel clamps allow for placement of the heads on a variety of vehicles. *Figure 7* identifies the components of the wheel clamp. See *Page 49* of this manual for instructions on how to attach the clamp to various wheels.

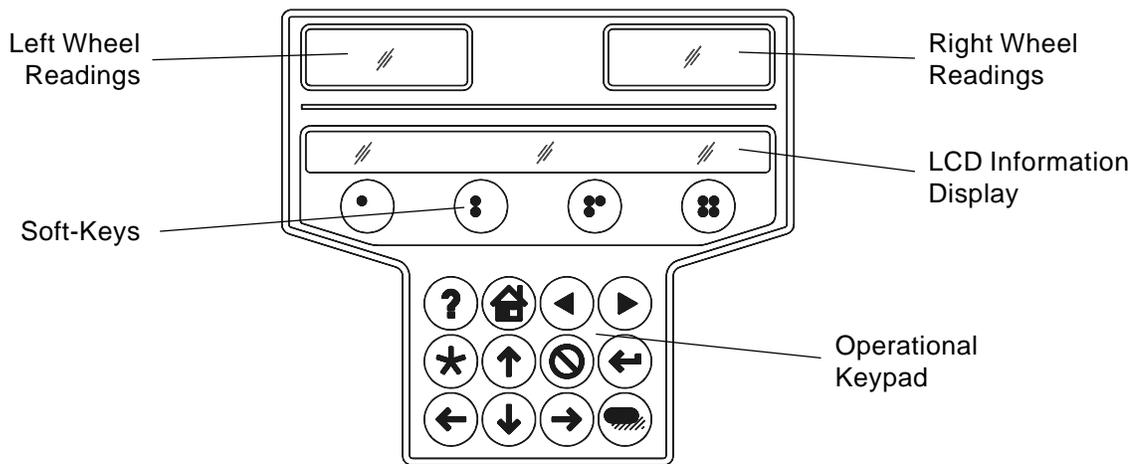
Notice the wheel clamps are adjustable to different wheel sizes by moving the upper and lower brackets. The center slide bracket can be moved to any position prior to wheel runout compensation, allowing for a clear line of site for the toe measurement system.



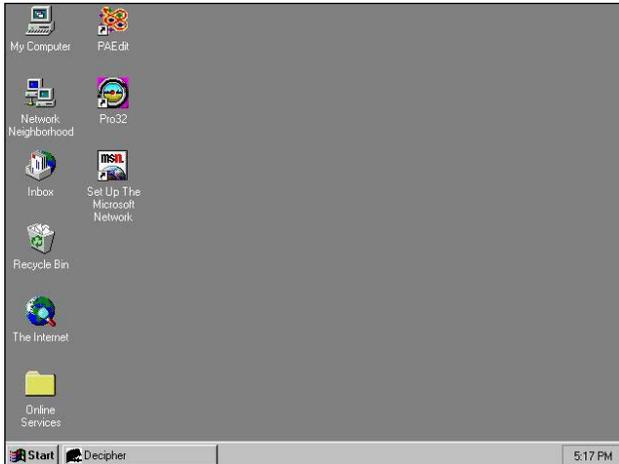
*Figure 7*

### Remote Display Unit (Optional)

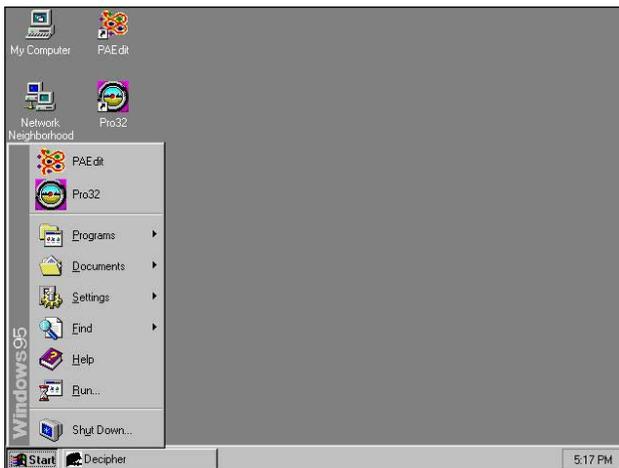
The optional Remote Display unit is handy when adjusting the vehicle. It is not necessary to be in visual contact with the console monitor, since the Remote Display can show all necessary information. There are 2 LED windows to show live angle readings, an LCD display that shows information about the current function, and a full operational keypad.



*Figure 7A -- Remote Display Unit*



**Figure 8 - Windows Desktop**



**Figure 9 - Start Button Functions**



**Figure 10 - Starting a Program**

## Navigation

Before we begin to explore the many features of the Sun Model EEWA-107/108 with *Pro32™* software let's become familiar with the basic navigation and operation of the aligner.

### Microsoft Windows™ 95

Windows is a graphical, point and click software environment. In general, using the pointing device, move the on-screen pointer to the desired location and click (using the left button of the mouse or trackball). This enables the desired function.

#### Windows Basics

Depending on how the system is set up, various items, called *icons*, appear on the *desktop* when Windows is started (*Figure 8*). Any of the icons functions on the desktop can be started by using the pointing device to *double-click* on the icon.

Along the bottom of the desktop is the *taskbar*, which shows any programs that are running. Clicking on *Start button* allows you to start a program, open a document, change system settings, get help, find items on the computer, and more (*Figure 9*). Moving up from Start, any item with an arrow expands outwards as you point to it. To start a program, point to Programs and then to the folder, such as Accessories, that contains the program, and then click on the program (*Figure 10*). A new button for the program appears on the taskbar.

Depending on what you're working on, other indicators can appear in the notification area on the taskbar, such as a printer representing a print job or a clock.

Multiple programs can be run simultaneously under Windows. You can use the taskbar to switch between open windows by clicking the button on it that represents the window you want to switch to. You can also use the *Alt-Tab* key combination to move through each open window, stopping on the desired program. The active window appears in front of any other windows.

A *minimize* and *maximize* button are found in the upper-right corner of the window. To quit a program, click on the *Close button* (X) in the upper-right corner of the window. In addition, most programs have an Exit or Close command under File on the menu bar.

### Shutting Down the Computer

It is necessary to shut down Windows before you turn off or restart the aligner or the computer.

**Caution! To avoid damaging important files, always shut down Windows before turning off the aligner.**

Use the following steps to shut down the aligner from within the *Pro32™* Alignment software:

1. Return to the Home Alignment screen.
2. Click on the "Shutdown Windows" button located in the lower left corner. 
3. Answer "Yes" when prompted. A screen message lets you know when you can safely turn the power off to the aligner.



Figure 11. Shut Down Windows Box

From the Windows 95 desktop:

1. Close any programs or windows that may have been opened.
2. Click the Start button, and then click Shut Down.
3. On the Shut Down Windows box that appears (Figure 11), make sure "Shut down the computer?" is selected. Click "Yes" to proceed.
4. A screen message lets you know when you can safely turn the power off to the aligner.

### Changing System Settings

Using *Control Panel*, you can change the way Windows looks and works. To change Windows settings:

1. Click the Start Button, and point to Settings.
2. Click Control Panel.
3. Double-click the icon the represents the settings desired to be checked or changed.
4. Most dialog boxes in Control Panel have tabs to see more settings.
5. For specific information about the settings found under each icon, look up Windows Help.



Figure 12. Control Panel

Helpful icons in Control Panel include *Add/Remove Programs*, *Date/Time* settings, *Display* settings, *Mouse* settings, *Printers*, and a *System* feature for reviewing and changing hardware settings.

### Display Properties

The look of the desktop and settings of the display system can be changed by double-clicking the Displays icon under Control Panel. Settings such as desktop background patterns and colors combinations, screen savers options, and display font sizes

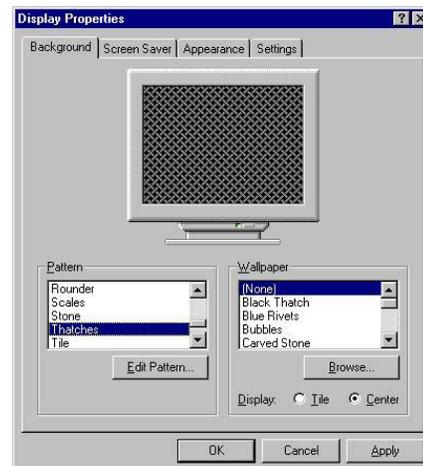
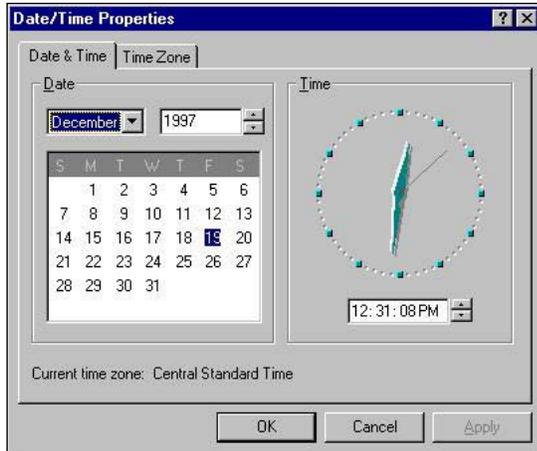
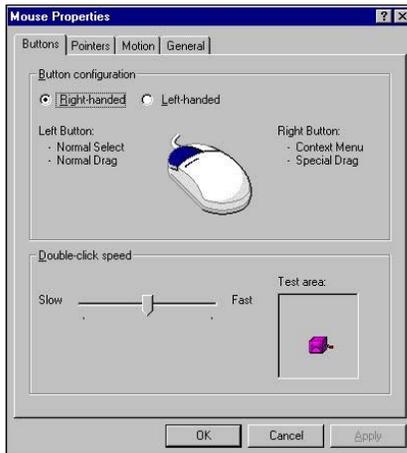


Figure 13. Display Properties



**Figure 14. Date/Time Settings**



**Figure 15. Mouse Properties**



**Figure 16. Printers Folder & Properties**

can be changed from the dialog box and associated tabs (Figure 13).

**Caution!** The Pro32™ software is designed to run at the 1024x768 resolution setting. Do not alter this. Do not select the Large Font setting – Small Font must be selected.

### Date/Time Settings

On occasion it may be necessary to correct the time or date used by the computer. Double-click the Date/Time icon to bring up the dialog box (Figure 14). Make the desired changes, click Apply, and then OK to exit. Click Cancel to exit without making any changes to the settings.

### Mouse Properties

To alter the way the mouse (or other pointing device, except light pen) acts, double-click Mouse from Control Panel. You can change the left/right mouse button functionality, double-click speed, movement sensitivity, and what pointers are used to represent various desktop actions. As changes are made, click Apply, and OK to exit. Click Cancel to exit without making any changes to the settings.

### Printers

The Printers folder, which can be accessed from either Control Panel, Start/Settings, or My Computer, allows you to manage printer functions (Figure 16). Add Printer launches a wizard to assist with adding a new printer. To see the settings for any installed printer, highlight the icon by left-clicking once, then right-clicking to reveal a menu, and point to the Properties selection and left-click. The dialog box and its tab allow changing of many printer attributes and functions (Figure 16). Double-clicking on any printer icon brings up Print Manager, showing the status of any jobs in the printer's queue.

### Model EEWA-107/108 Software

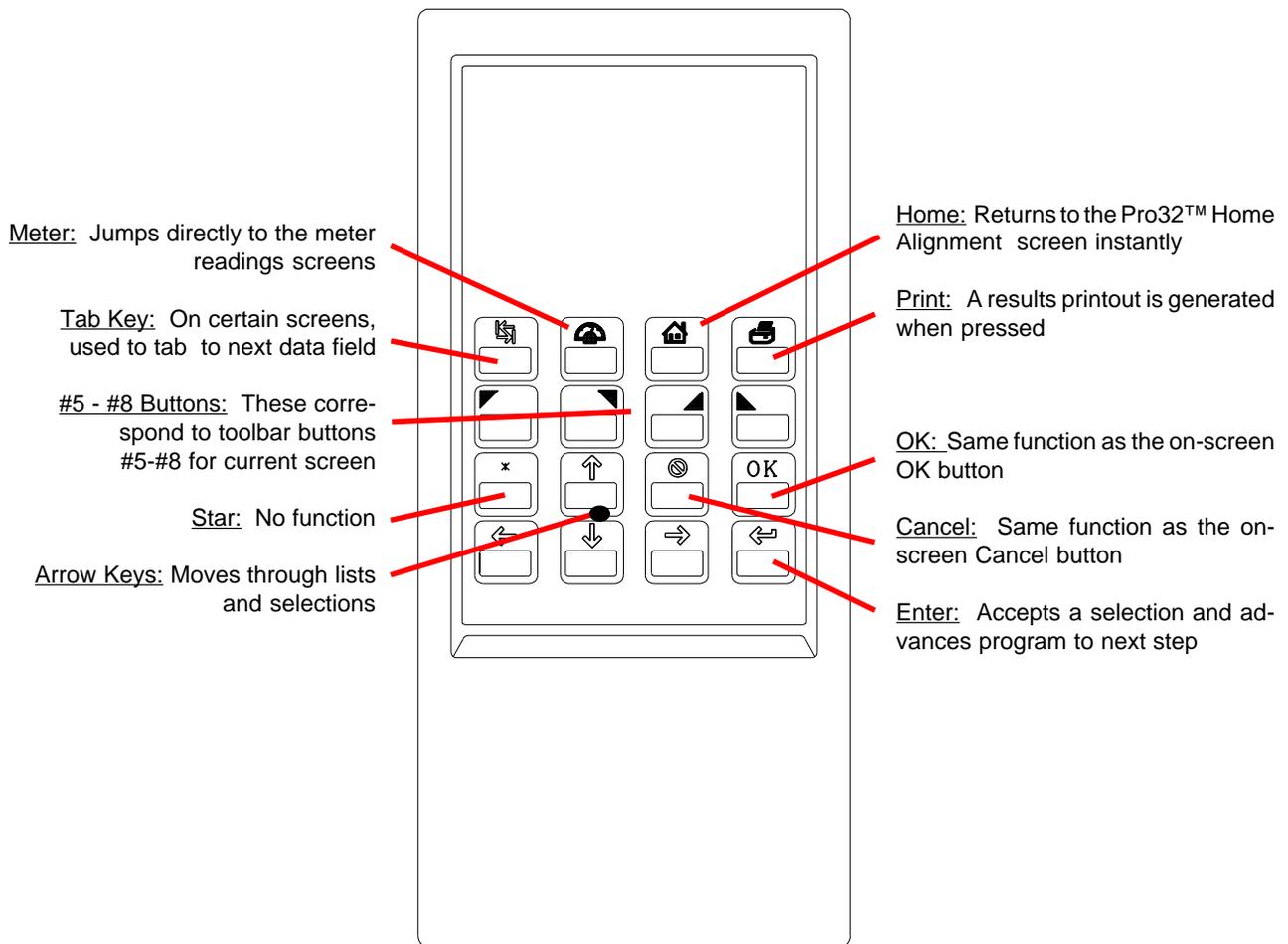
There are several ways to control movement within the aligner program. Some EEWA-107/108 Aligner model may be equipped with a hand-held remote control whose various buttons permit full aligner function. In addition, the measuring heads on all models are fitted with a keypad with the same button layout as the remote, allowing operation from any wheel (see *Page 22*). Models equipped with the optional remote display unit will also have a similar keypad. Study *Figure 17* carefully to become familiar with the functions of each button.

As noted earlier, Windows is a point-and-click software environment. The *Pro32™* software included with the EEWA-107/108 models is a true Windows 95 application, meaning it follows Windows navigation conventions. Use the pointing device to navi-

gate through the software as you would with any Windows program. Most functions require a single mouse click to initiate, while a few require double-clicks. The right mouse button is not utilized within the *Pro32™* alignment software.

An IBM-style keyboard is included for data entry. All aligner functions can also be controlled from the keyboard as well as the remote (if supplied) and the measuring heads. The function keys (F1 - F12) located on the top row of the keyboard have decals that are the equivalent of the remote and keypad buttons. Refer to the diagram for identification of the icons and their respective functions.

In addition, the optional keyboard has a "Print Screen" key. When this key is pressed the currently displayed screen will be captured and printed.



**Figure 17. Remote Control (if equipped)**

### Screen Layout and Navigation

The Pro32™ software features a common interface throughout its many screens. Becoming familiar with the various screen navigation functions is essential for efficient use of the EEWA-107/108 software. Here are some of the essential elements:

Access Help    Jump to Meter Screens    Return to Main Screen    Print

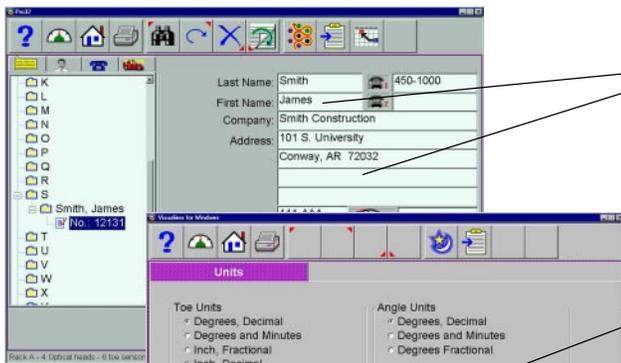


**Toolbar** – these buttons appear on every screen, and correspond to the F1-F12 keys on the keyboard, as well as the keys on the remote. The functions for F1-F4 are common to every screen, while the functions of F5-F12 vary depending on the screen

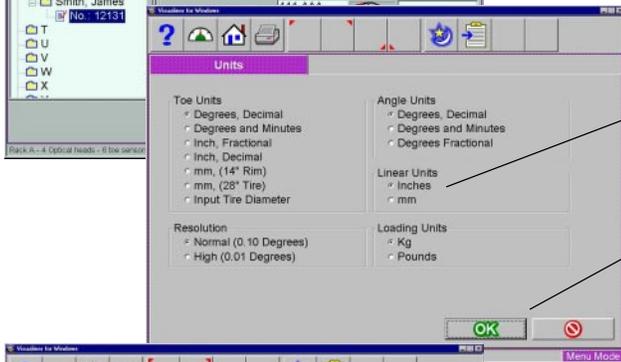
**Screen Tabs** – these tabs move to other major areas of aligner operation. Each tab contains a new set of Function Icons to perform functions related to the title on the tab

**Function Icons** – when the pointer is positioned over any function icon, a text pop-up appears describing its function. When the left mouse button is clicked, this function begins

**Status Bar** – contains aligner setup and information on the vehicle selected

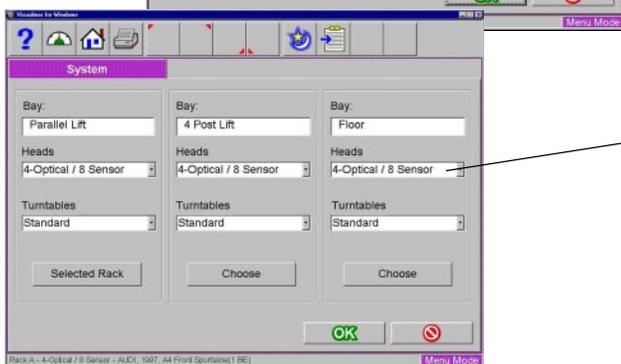


**Text Fields** – some screens have text blocks that allow the user to type information



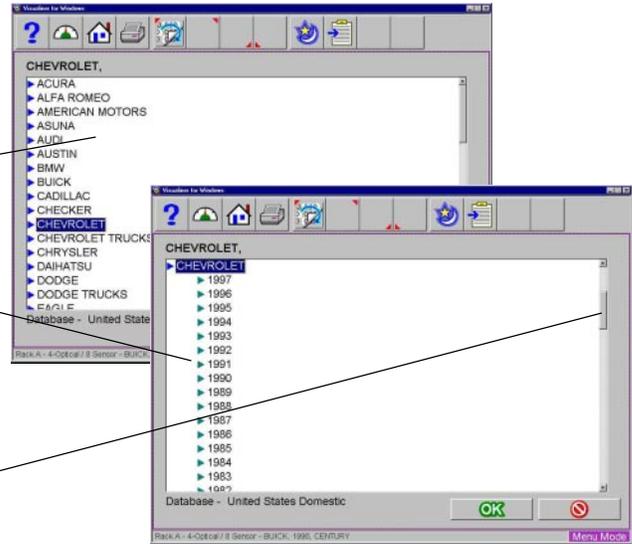
**Radio Buttons** – enables the selection of one item amongst a list. Click on the button to the left of the description to enable that function

**OK and Cancel Buttons** – most screens have these two buttons. **OK** saves the information and/or tells the software the user is ready to move to the next step. **Cancel** leaves the screen, losing the information and/or moving back a step, or possibly skipping the step shown on-screen



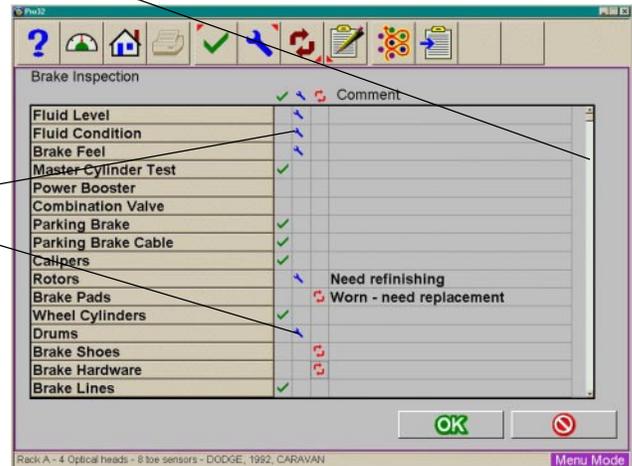
**Drop-Down Selection Boxes** – used on several screens to choose among different options

**Drill Down Selections** – on the Vehicle Selection screen there are a series of choices with an arrow next to them. To make a manufacturer selection, double-click with the pointing device to expand to the next level. Double-click on the year to further expand for the model selections. To completely contract the selection, double-click on the arrow or name of the manufacturer



**Scroll Bars** – when these are present on the screen, either vertical or horizontal, clicking on the arrow moves the screen view in that direction to show additional selections or information. You can also click and hold the center slider and move it up or down to create large movement.

**Click to Select** – some screens feature columns and rows where a specific action is indicated. To use these, click in the box as desired



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# ***EEWA-107/108 Aligner***

## **Setup - Preferences**



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## Setup - Preferences

The Preferences Tab is used to setup various functions and features within the *Pro32™* software. Numerous operating attributes or “preferences” can be altered to suit the operators individual tastes. Although the Sun EEWA-107/108 is shipped with the most common elements selected as default, an operator is able to tailor several elements of the alignment process as well as the display features to customize his machine. Operator preferences can be altered before the alignment process begins or any time thereafter.

### Preferences Screen

The Preference Screen (*Figure 18*) allows access to the following setup selections, each identified by an icon (see *Figure 19*):

**Interaction** – controls several functions which alters interaction between the software and the user

**Units** – selects the units to be displayed for angle and linear measurements

**CSR** (password protected) – allows a Sun/Snap-on Service Technician to access controlled maintenance screens

**Shop Guide** – activates access to “Shop Key”, an optional shop management networking system offered by Sun/Snap-on

**Pro32™ Wizards**– allows selection of any pre-programmed alignment sequences

**Store Name** – allows a store name and address to be entered for the customer printout

**Languages** – selects from various languages for the screen and printout

**System** – selects the rack, turntable, and head configuration

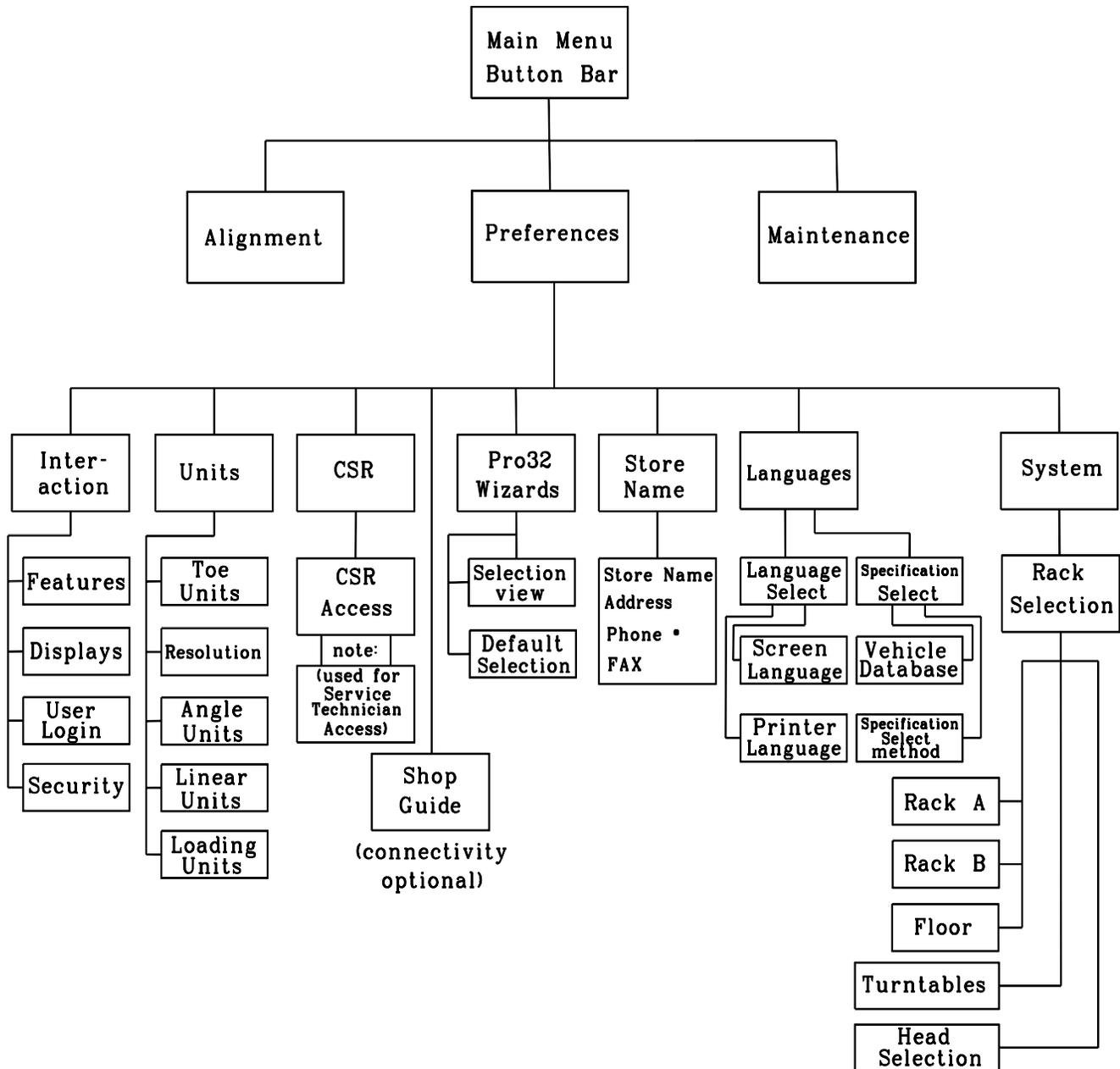
Use the pointing device to place the pointer directly over the desired topic, then press the left mouse button. Each setup topic is described in depth in the following pages.



*Figure 18. Preferences Tab*



*Figure 19. Preferences Icons*



### Preferences Tab Flow Chart

Many Preference items are done once at the time of aligner installation and do not need to be changed. Others are software, user-interface related and may be changed depending on operator preference. Here is a list of setup items typically found in each category:

#### One Time, Upon Installation

Head Configuration  
 Turntables - Standard or Electronic  
 Logo Display  
 Dealer Address and Phone Number for Printout  
 Calibration Check  
 Specification Selection Method

#### User Configuration Changes

Pro32™ Configuration  
 Rack Selection  
 Languages of Screen/Printout  
 Units of Measure  
 Shim Provider Selection



## Interaction

The Interaction icon launches a series of screens that allows alteration of the interaction between the user and the software. The Interaction setup uses tabs as follows:

### Displays

Allows the choice of several logos (see Figure 20) which appear on the Logo screen. Custom logos may be placed in the “logo” subdirectory of the program on the hard drive for operators who have a license to use them. Users may also create their own logos in the “BMP” (bitmap) graphics format and copy to the “logo” subdirectory.

**NOTE:** *Unauthorized use of copyrighted logos may be illegal without license or the owner’s permission.*

### Features

Provides control of three operational properties (see Figure 21):

**OEM Pro32™ Wizard** – selects how the Pro32™ system is applied to the alignment process. The Standard Pro32™ Wizard selection activates the default sequence. The other two selections force the computer to always use the OEM recommended procedure or to use OEM and prompt the user first.

**Default Shim Manufacturer** – selects the brand of aftermarket rear shim utilized during the rear alignment process on many front wheel drive cars. Each selection enables a special program designed by the shim manufacturer to determine the correct shim to use for rear camber and/or toe correction.

**Calibration Check Sensitivity** – alters the point at which an 8-sensor aligner is prompted to re-calibrate. Normal Threshold is recommended. High threshold should only be used in a very high confidence situation, where the operator feels sure that none of the heads have been compromised since last calibration.

**MAP** – allows viewing of MAP guidelines from the Inspection icon.

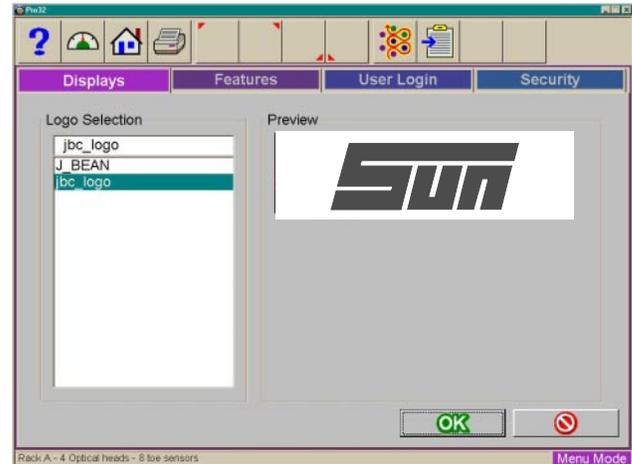


Figure 20. Displays, Logo Selection

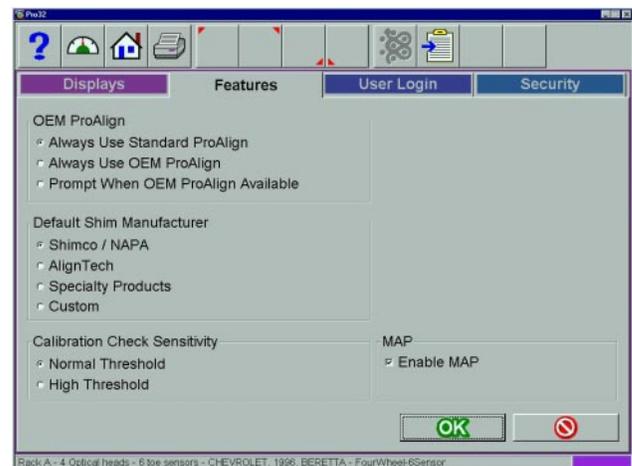
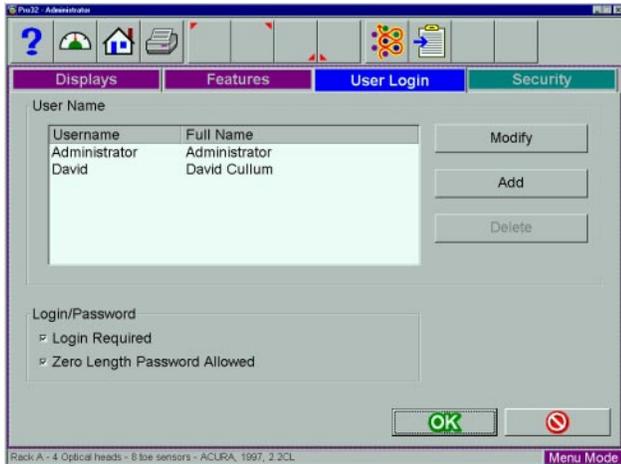


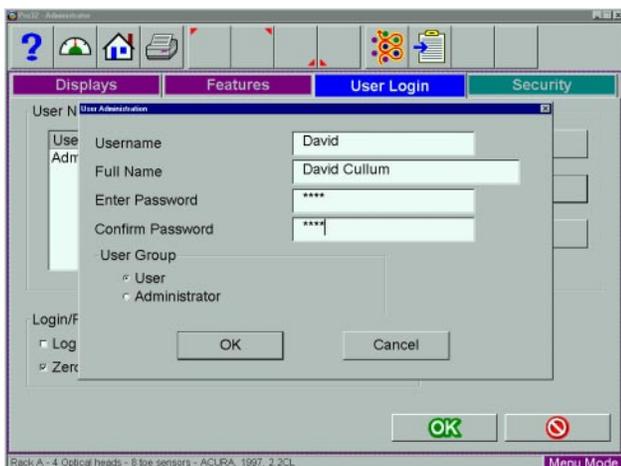
Figure 21. Features Selection Screen



**Figure 22. Login Setup Screen**



**Figure 23. Opening Screen with Login Activated**



**Figure 24. Add User Window**



## User Login

This utility is used to control access to the aligner software and track usage. When login is activated, only “authorized” users who have been set up with a user name and password can operate the aligner.

The User Login tab allows editing of the operator authorization feature. The Login Setup screen (*Figure 22*) allows operators to be added, deleted or modified. When the *Administrator* is logged in, he can perform several changes within the Login command screen, such as modify, delete, or add users. He can also change whether a user must have a password or not to run the software. Any number of operators can be added (*Figure 24*). Each user can select a unique password for security.

Ultimate control of the operator login process is with the Administrator of the system. The Administrator can be the primary operator, the shop manager, shop owner, or anyone who takes responsibility for the aligner. If the login function is to be activated, it is suggested that the appointed Administrator immediately change his password in order to secure control of the login process.

The aligner is shipped so that no login or password is required to operate the unit. When login is activated, all control will cease until a proper login is registered (*Figure 23*). To activate the login requirement, the box at the lower left of Login screen must be checked.

To login, select the Login icon (F10) from the toolbar at the top of most screens. Select the operator name among the listed users to begin aligner operation, and enter the password if applicable. Although no password is required, it is recommended when the machine has more than one operator.

**IMPORTANT NOTE:** *If Login is activated, ALL control of the computer is inactivated until a valid operator has successfully logged in with the correct password. The operator then can navigate the Pro32™ Alignment software as well as switch between other Windows applications.*



### Logout

Selecting the Login button on the toolbar (F10) when a user is logged in opens the "Logout" window (Figure 26). Two selections are available, Logout and Logout and Shutdown Windows. This screen is used to secure the aligner when not use. Both login and logout commands can be selected anywhere within the Pro32™ program since the icon is present on the toolbar on most screens. Remember, the machine cannot be controlled or even shut down without a proper Login (if activated).



Figure 25. Logout Window

### Lost or Forgotten Passwords

If the "Administrator" loses or forgets his/her password on a machine with Login activated, the operator is required to contact Sun/Snap-on Technical Support to obtain an authorization code necessary to unlock the software to reenter an Administrator password. If a user forgets his/her password it will be necessary for the Administrator to change the user to a new password.

### Usage Log

Whenever the Login function is activated, all user activity is recorded in a database file on the hard drive called ALIGNMENTDATA.MDB. This data file can be viewed with common database viewers such as Microsoft Access. The file contains most of the data generated by the alignment process.

### Security

Security is a utility screen used to activate features (options) embedded within the operating software (see Figure 26). Some software options may be purchased after the initial sale of the Aligner. To activate optional features, an operator or Factory Representative will be required to obtain "activation codes" which enables software feature usage. Activation codes can only be obtained through the Sun/Snap-on Factory Service organization. Before obtaining codes, proper authorization must be verified. Information about the aligner will be required before codes are released. You must provide the machine serial number, which is located on a label at the rear of the machine. The "HIB" serial number, which is located on the Security screen lower left, must be provided. Any options which have been purchased must be described. All aligners are entered into a computer database at the factory with the installation location and activated feature information.

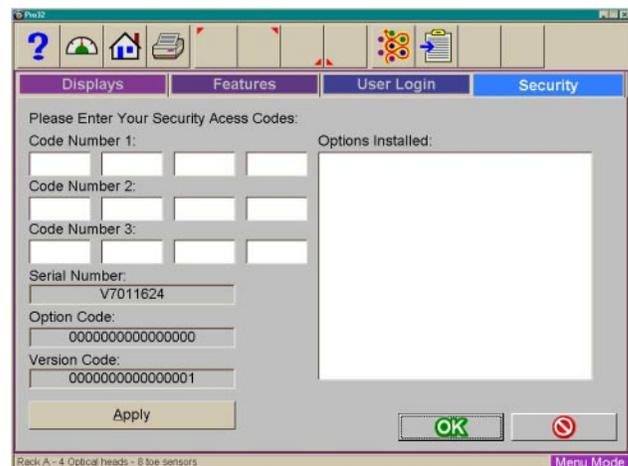


Figure 26. Security Options Screen

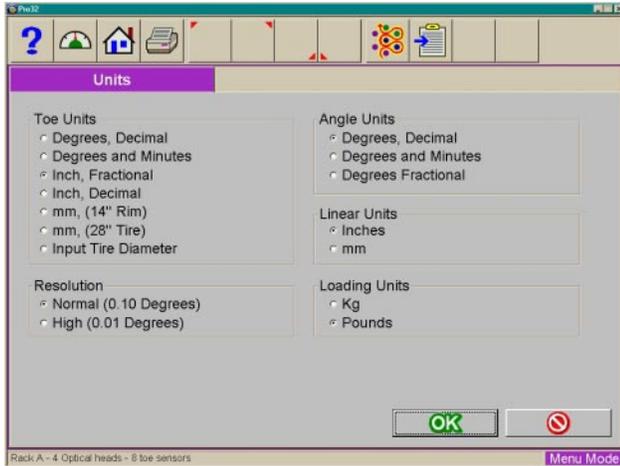


Figure 27. Units of Measure Selection

0.12  
1.34mm  
7.4+2

## Units

There are many different units of measurement for wheel alignment angles and dimensions depending on local practices, vehicle manufacturer requirements, or operator preference. Choose the Units icon from the Preferences tab. Click on the radio button next to the desired selection of units of measure (see Figure 27). Once a prescribed unit of measure has been chosen, all readings and specifications will be stated in those units on all readings screens.

**Toe Units** – move the pointer over the toe units best suited to the operator's requirements and highlight the button left of the desired unit. The choices are, with examples:

- Degrees, Decimal – 0.5 degrees
- Degrees and Minutes – 0' 30"
- Inch Fractional – 1/4"
- Inch Decimal – 0.25"
- mm (14" rim) – European metric display – 20 mm
- mm, (28" tire) – US metric display – 20 mm
- Input tire diameter – prior to bringing up toe specifications during the alignment program, the Pro32™ Aligner will ask for the actual vehicle tire diameter. The toe specs and readings will then be calculated based on that input value.

## Resolution

Use the Resolution selection to choose how numeric displays are to be read during the alignment program. Choices are Normal (0.10 degree or tenths of a degree) or High (0.01 degree or hundredths of a degree) resolution. Regardless of choice it won't effect the accuracy of the Sun Model EEWA-107/108, simply the number of digits after the decimal point and the associated roundoff.

The selection will effect the way Alignment readings are viewed. Adjustments using a 0.1 degree resolution will be easier to obtain than when using the 0.01 degree setting. Aligning the car to within a hundreds of a degree requires a greater degree of precision on the technicians part to obtain exact readings.

### Angle Units

Specify the units in which all angular measurements will be displayed such as: caster, camber, SAI, included angle, thrust angle, etc.

Examples:

- Degrees, Decimal – 0.5 degrees
- Degrees and Minutes – 0' 30"
- Inch Fractional – 1/4"

### Linear Units

Specify the units in which all linear measurements (setback, vehicle dimensions, etc.) will be displayed.

### Loading Units

Where applicable, values can be expressed in either Kg (kilograms) or in Pounds.



### Connectivity

An interface is available for interconnecting the Pro32™ Aligner to a Shop Key store management computer system. This interface will allow sharing of information which can be used to calculate costs, control inventory, and manage jobs. See your Sun/Snap-on Sales Representative for details regarding shop connectivity.

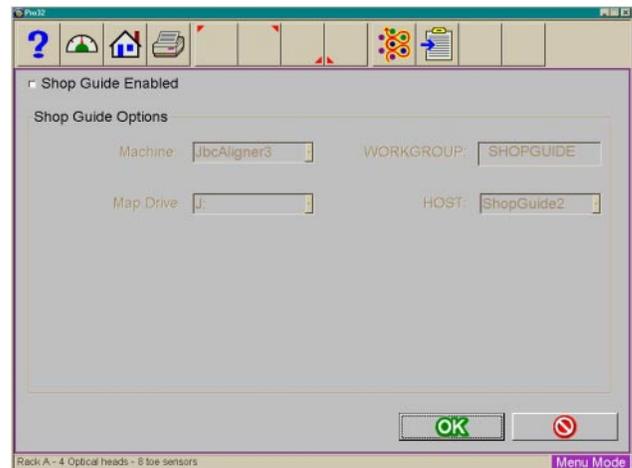


Figure 28. Connectivity Option Setup



### Pro32™

The Pro32™ Wizard selection allows for choosing a pre-programmed alignment process. The Pro32™ Wizard screen (Figure 29) also allows you to select which Pro32™ Wizard process is set as the default procedure.

The procedures set the aligner to follow a certain path toward an end result, a completed alignment. Each pre-programmed procedure sets the aligner up to perform certain functions in a predetermined order and whether certain functions can be skipped. Also controlled is the measurement head setup.

Several OEM procedures are pre-programmed to follow manufacturers recommended alignment methods.



Figure 29. Select a Pro32™ Procedure



**Figure 30. Enter Store Name**



**Figure 31. Screen and Printer Language**



**Figure 32. Specification Database Selection**



## Store Name

Information entered into the Store Name selection will be utilized on the alignment results printout. Several lines of information is available for printing. See *Figure 30*. The name of the business, address, city and state are entered. Also available for display is a phone and fax number if desired.



## Languages

A variety of different languages are available for the *Pro32™* Aligner. This feature allows a printout in a language different from the screen operating language. When the Languages icon is selected from the Preferences tab, two additional tab selection screens appear:

**Languages** – selection of screen and printer languages

**Specifications** – selection of the database of vehicles from a variety of countries or regions.

### Languages

To change the language displayed on the screen or printout, select the language in the list using the pointing device, or arrow up/down (see *Figure 31*). Select "OK" when the desired language is highlighted. Notice the "scroll bar" on the right side of the language window, indicating additional choices are available. Use the pointing device to move to down. All screens will now be in the chosen language. English is the first selection on the list, should it become necessary to change the unit back to the default setting.

### Specifications

The *Pro32™* software contains wheel alignment specifications for the vehicles from many countries and markets. This setup option (*Figure 32*) allows for changing the spec database to suit the country where the *Pro32™* is operated. Also, the order in which the make, model, and year appear can be altered.

*Note: Some automotive markets not specifically identified on this screen have vehicles from a variety of sources. It may be necessary to change databases in order to locate specifications on some vehicles.*



## System Setup

The three "Select" buttons on the left side of the screen allows the aligner to be used on any one of three racks (alignment surfaces) in the shop, which are named by default as Rack A, Rack B, and Floor. The names of each can be changed as desired by editing the text field (i.e. "4-Post Lift"). Any of the three calibrated alignment work surfaces can be utilized as needed by moving the aligner instrumentation. In most shops the primary alignment lift is designated as "Rack A".

***IMPORTANT NOTE: In order to perform accurate alignments, each lift/rack surface must be properly calibrated.***

Select the rack type used to perform most wheel alignments. The rack choice must be changed whenever using a different surface for performing alignments. See *Figure 33*.

### Turntables

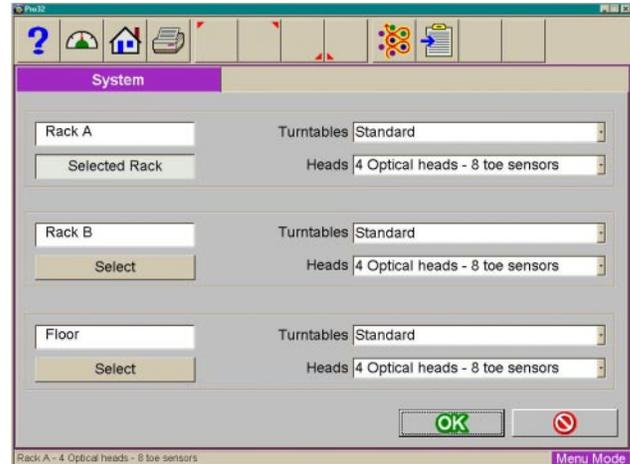
Each of the above rack/floor selections also contain control for selecting whether each alignment position utilizes Standard mechanical-type or Electronic Turntables. The overwhelming majority of rack/lifts use mechanical-type turntables. Sun/Snap-on also offers Electronic Turntables to automate some measurements such as Toe Out On Turns.

***CAUTION: DO NOT select Electronic turntables unless lift is so equipped. Operational problems will be created if an error is made with turntable setup.***

### Heads

Also selected on this screen is the measuring head configuration. The Model EEWA-107/108 offers two types of sensor configurations, 6 or 8 sensors – make sure the proper one is chosen. Normally, once established, this setting will not change. A 2-head setting is possible to allow the aligner to be used with the front heads only on large vehicles where a line of site from the front to rear is not possible.

Once the desired rack, turntable, and head configuration has been selected place the pointer over the "OK" button to save the selections.



***Figure 33. System Setup Screen***

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# ***EEWA-107/108 Aligner***

## **Operation Instructions**



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## Introduction

What is an "Alignment"? An Alignment is defined as the process of returning a vehicle's geometric angles to manufacturers specifications. The three commonly adjustable angles are camber, caster, and toe. Angles not usually adjusted but which are measured for diagnostic reasons are SAI, Included Angle, toe-out-on-turns, setback, and maximum turn angle.

The Sun Model EEWA-107/108 *Pro32™* Alignment system guides an operator through the procedures necessary to measure a vehicle's angles and to complete an alignment. A similar path can be followed to attain readings on the majority of vehicles.

The Sun Model EEWA-107/108 *Pro32™* Alignment system is more than electronic gauges, rather it is a technicians' assistant. The machine can assist the technician with inspection reports, compiling customer databases, custom vehicle specifications, and illustrate the adjustment procedures of most vehicles. In addition, the Aligner assists with all aspects of the wheel alignment from measuring the important wheel alignment angles to assisting with vehicle adjustments if necessary to correct any out of specification conditions.

The *Pro32™* software is "Windows icon driven", meaning that each screen contains several options or selections represented by icons. In most cases the instructions on screen will describe what actions to take next. Follow these instructions carefully to insure good results.

The following pages outline the steps to perform a complete wheel alignment. Detailed are the "Pro32™ programmed steps" to gather all necessary alignment readings. These steps are consistent with accepted wheel alignment practices in the industry. In some cases these steps can be eliminated or skipped in order to speed up the gathering of alignment readings if allowed in the Pro32™ procedures. If at any time there is a question during the alignment process, press the Help key to access the operator help screens.

## Steps to Performing a 4-Wheel Alignment

There are many reasons why a wheel alignment may be performed on a vehicle such as:

- Accelerated or uneven tire wear
- Pulls, wandering, or other steering or handling problems
- After replacement of worn suspension or steering system components
- After-collision repairs
- Routine vehicle maintenance

Regardless of the reasons for alignment, it is important that the technician perform these steps necessary to address and correct all problems.

1. Gather information from the vehicle owner – ask about any drivability problems that may be symptoms of misalignment. Inquire if the vehicle has been in a collision or has had any recent parts replaced.
2. Perform a test drive to verify owner's complaint – try to recreate the problem. If unable to duplicate, have the vehicle owner explain further or have him/her drive with you.
3. Place vehicle on the alignment lift – center the vehicle on the lift and turntables. Place the lift at a solid, level position.
4. Inspect the tires for any signs of abnormal wear – the tires usually reflect any misalignment conditions.
5. Perform a thorough inspection of suspension and steering system components -- many misalignment problems are created by worn or damaged components. Replace defective parts prior to performing the alignment. Always check tire pressure and ride height. Refer to manufacturer recommendations and tolerances when checking suspension and steering systems.
6. Mount measuring heads to the vehicles wheels. Use the safety straps in the event of grip failure.
7. Choose the proper Pro32™ Wizard procedure for the vehicle – the best alignment for the majority of vehicles is a 4 head 4 wheel alignment using the 6 or 8 sensor mode depending on your equipment features.
8. Perform runout compensation – the purpose of performing runout is to eliminate any measurement errors due to the wheel and clamp mounting. Take the time necessary to perform runout correctly.
9. Measure caster, camber, and toe – follow the procedures on the screen carefully. Refer to Operation Instructions for further instructions.
10. Determine what needs to be done – study the measured angles for the front and rear prior to performing corrections to match misalignment with any symptoms discovered earlier. If necessary, use the Pro32™ advanced functions to diagnose further problems (such as SAI / Included Angle, Toe out on Turns, Toe Curve Change, etc.). Examine the vehicle and any reference materials to determine the procedures for angle corrections. Determine what items are needed to correct any problems (i.e. after-market kits, special tools, etc.).
11. Make any needed angle corrections – center the steering wheel carefully when prompted. If the front total toe is beyond 1/2° (1/4") in or out, first adjust the front toe to zero. Then, use this order of adjustment:
  - a. Rear camber
  - b. Rear toe
  - c. Front caster
  - d. Front camber
  - e. Front toe

Use the many adjustment assistant features built into the Pro32™ software to aid with proper angle correction. After performing any caster adjustments, re-measure to verify the results.
12. Re-center the steering wheel and readjust front toe if needed – crooked steering wheels are the leading cause of customer dissatisfaction with wheel alignments. This simple step will minimize the number of comebacks.
13. Print the results – the printout is useful for showing the customer before and after results. Many shops keep a printout on file for future reference.
14. Perform a test drive to verify proper alignment.
 

Have all the owner's drivability complaints been solved? Does the vehicle drive straight? Is the steering wheel straight? If necessary, bring the vehicle back on the alignment lift and correct any problems.

## Mounting the Wheel Clamps/Measuring Heads

Prior to beginning an alignment, attach each wheel clamp/head assembly to a vehicle wheel. There are several ways the wheel clamps can be attached to accommodate various wheel configurations. See *Figure 35*.

### Option 1

This option is used on many stamped steel rims. Use the knife edge as shown. Secure the clamp from the inside out by turning the lock knob several turns clockwise.

### Option 2

This option is used on many custom rims with painted or polished surfaces that need extra care. Set the rubberized surface inside the wheel rim as shown. Secure the clamp from the inside out by turning the lock knob several turns clockwise.

### Option 3

This option is used on many standard and custom rims with no inside bead surface. Use the adapters supplied with the wheel clamp to insert between the wheel tire and the outside edge of the rim. Secure the clamp by turning the lock knob several turns counterclockwise.

### Option 4

This option is used on some standard and custom rims with no opportunity to clamp from the outside in and very narrow edges on the wheel rim. Clamp from the inside out. Secure the clamp from the inside out by turning the lock knob several turns clockwise.

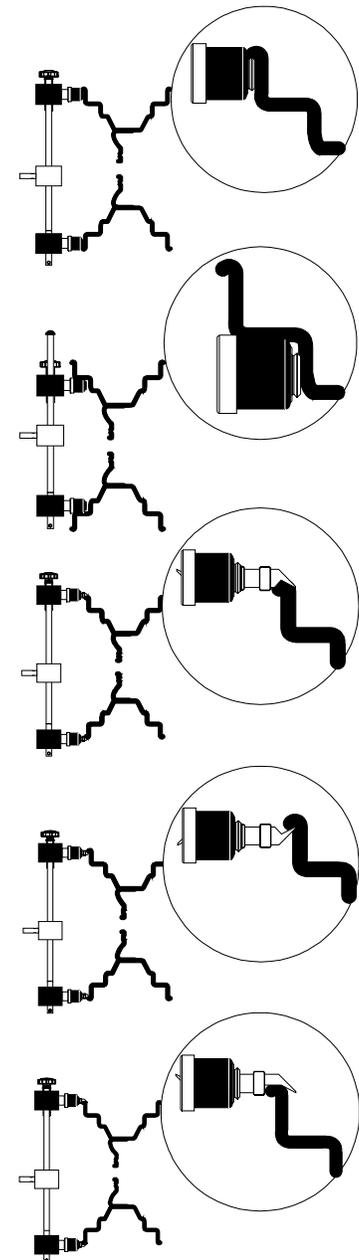
### Option 5

This option is used on many standard and custom rims as above with low profile tires where a thin adapter is required between the wheels tire and rim. Secure the clamp by turning the lock knob several turns counterclockwise.

**NOTE:** Always secure the wheel clamps using the supplied safety straps onto each wheel to insure the head does not fall off the vehicle.

### Dual Wheels

An optional Dual Wheel Offset Adapter is available for some pickups, motor homes and larger trucks to accommodate the difference in track width in the rear due to the dual wheel configuration. To use this adapter, remove the front head assembly from the wheel clamp shaft. Place the Offset Adapter on the clamp shaft and tighten the locking knob. Place the head on the adapter shaft, tighten the knob, and mount the clamp using one of the methods above.



**Figure 35. Wheel Clamp Attachment Methods**



Figure 36. Home Alignment Tab Screen

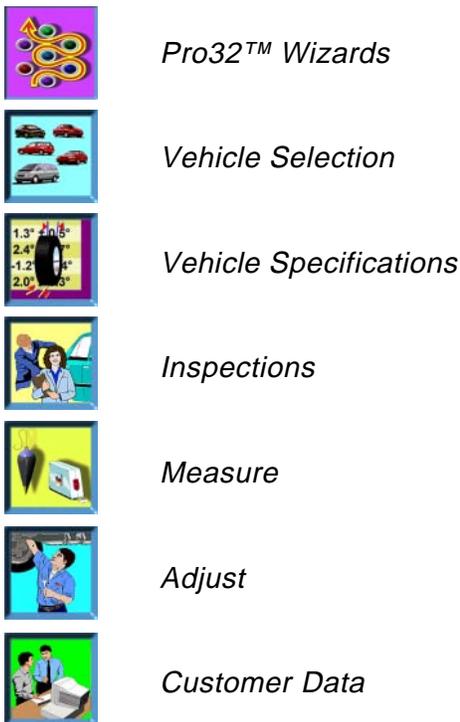


Figure 37. Home Alignment Icons

## Home Alignment Tab

All wheel alignment functions begin from the Home Alignment tab which is the default or “home” screen. The screen, shown in *Figure 36*, contains a series of icons that execute alignment related functions. The Home key, located along the toolbar and on each head keypad, always returns to this screen. A description of the function icons is given below.

**Pro32™ Wizard** – The Pro32™ selection launches a pre-programmed alignment process of gathering the alignment angles. The process is directed by the Pro32™ Wizard that is selected at that time. See *Page 39* for Pro32™ Wizard selection and details.

**Vehicle Selection** – Selects the Make, Year, and Model of the vehicle to be aligned

**Vehicle Specification** – Displays the selected vehicle’s alignment specifications and gives access to adjustment animations and assistance

**Inspections** – Six Inspection screen are available under Inspections as well as a Diagnostics icon. These are Pre-Alignment Inspection, Tire Inspection, Brake Inspection, Under Car Inspection, Under Hood Inspection, and Courtesy Inspection

**Measure** – Allows quick access to several angular measurement screens such as Caster, SAI, Steering Angles, and Vehicle Dimensions

**Adjust** – This selection gives access to a variety of features that assist the technician with adjustment of alignment angles. Some of these features include Live Caster, A-Arm Adjust, Rear Shim Programs, and Cradle Adjust

**Customer Data** – Opens a data entry screen used to record a customers information and well as his vehicle information. Information can then be retrieved alphabetically.



## Using the Pro32™ Procedure

The Pro32™ Wizard procedures set the aligner to follow a certain process path resulting in a completed alignment. Each pre-programmed procedure, called a Pro32™ Wizard, sets the aligner up to perform certain functions in a predetermined order and determines whether certain functions can be skipped. Also defined in the Pro32™ procedure is the measurement head setup.

### **Pro32™ Wizard versus Manual Operation**

When the Pro32™ icon is selected from the Home Alignment tab, the alignment process is performed using the Pro32™ Wizard that is currently selected. A technician can also choose to manually execute individual alignment functions directly from the Main Alignment tab by pressing the appropriate icon, such as Measure. Generally, it is recommended to use the Pro32™ process to obtain the initial readings.

### **Typical Pro32™ Wizard Procedures**

Several Pro32™ Wizard procedures are pre-programmed at the factory to follow manufacturer's recommended and industry recognized alignment methods.

When the EEWA-107/108 Aligner is turned on for the first time a "factory default" Pro32™ Wizard is in place. To change to a different wizard, use the Pro32™ setup found on the Preferences tab. Refer to *Page 39* for additional information.

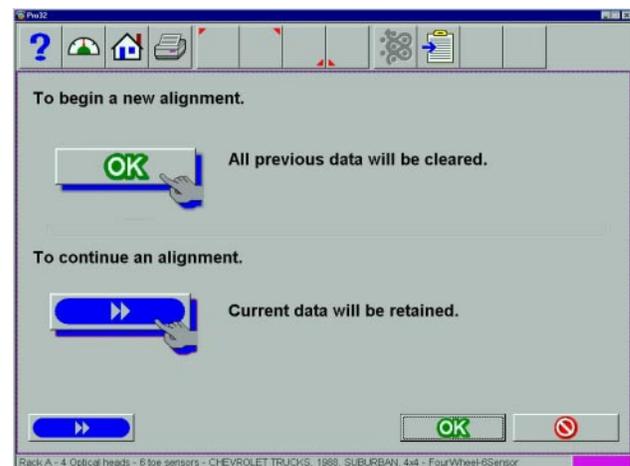
**The following procedures are a sample of a basic alignment process from start to finish using the standard 4 wheel 6 sensor wizard.**

#### **Step 1. Launch Pro32™**

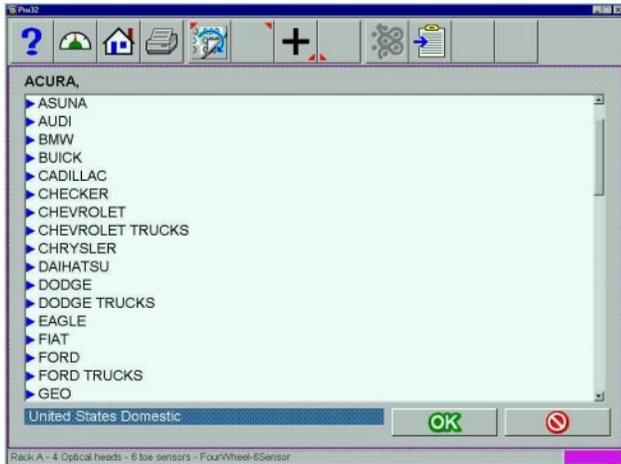
Click on the Pro32™ icon on the Home Alignment screen.

#### **Step 2. Begin a New Alignment**

This screen (*Figure 38*) gives the choice to start a new alignment or continue with an alignment already in progress. If the "OK" icon is selected the computer memory of the previous alignment is erased allowing a new customer and vehicle to be setup. If the "Continue current alignment" icon is selected, all customer, vehicle, and alignment measurements are retained and the software returns to the alignment readings screens.



*Figure 38. Begin a New Alignment*



**Figure 39. Select Vehicle Make**

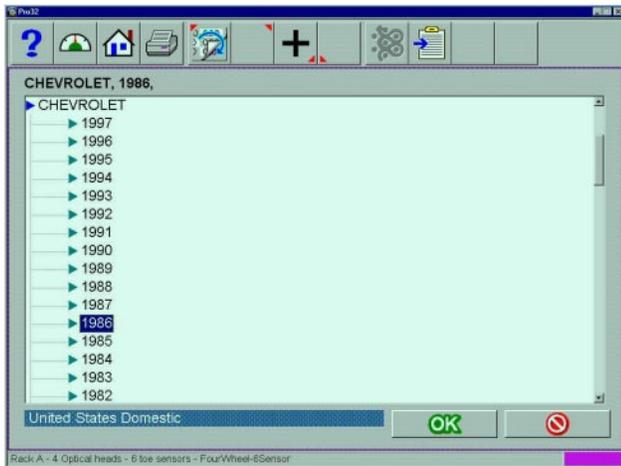
**Step 3. Select Vehicle Manufacturer, Year and Model**

*Note: The order the manufacturer, year, and model appear will vary depending on how the specifications are set up (see Page 40).*

**Vehicle Manufacturer (Figure 39)**

This screen shows the vehicle manufacturers in the Pro32™ specification database. The vertical scroll bar on the right indicates there are additional choices further down the page. Click on the down arrow on the scroll bar move down. Using the down arrow key on the keyboard also moves down the screen. Once the desired manufacturer is in view, double-click on the name to expand out the model selections. Double-click again to contract. Also, the keyboard's right arrow key expands and the left arrow key contracts the list.

.....  
*TIP: To move to the manufacturer selection quicker, using the keyboard, press the first letter of the manufacturer name. This causes the selection bar to move directly to the first name starting with that letter (i.e. press "H" - moves to Honda).*  
 .....



**Figure 40. Select Vehicle Year**

**Vehicle Year (Figure 40)**

Select the year of manufacture using the up/down keys or pointing device on the scroll bar to move up or down to the desired year, then double-click or press the right arrow key to expand out the years this model was made.



**Figure 41 -- Select Vehicle Model**

**Vehicle Model (Figure 41)**

Use the direction keys or pointing device to select the model of the vehicle, then select "OK", press Enter, or double click the selection.

### Custom Specifications

Alignment specifications that have been added by the operator reside in a special database. To retrieve these specifications go to the Vehicle Manufacturers screen and select Custom Specifications on the toolbar (F5). Any custom specifications that have been previously added will be listed in a similar manner as the OEM specs (see Figure 42). Click on F5 again to return to the OEM specification selection page.

Additional custom specifications can be added by clicking on the “plus” button (F7) on the toolbar (see below for details). Records are deleted by first highlighting the record and then clicking on the “X” button (F8) on the toolbar.

### Step 4. View Specifications

This screen displays the Year, Manufacturer, and Model of the selected vehicle with Minimum, Preferred and Maximum specifications for the front and rear wheels (Figure 43). Dashes in any position indicate there are no manufacturer specifications for that wheel or angle. For angles not displayed on this screen, refer to the specification book included in the literature package. A “wrench” icon to the right of the specifications field indicates *Pro32™* has assistance available for adjusting that angle. Clicking on the wrench launches the adjustment help features described on the next page. The Edit Specs toolbar button (F8) allows editing of the displayed specifications prior to beginning the measurements. This is useful if a Technical Bulletin has been issued that alters manufacturer’s specifications.

### Editing Specifications

To edit the displayed specifications, click on toolbar button F8, Edit Specifications. The toolbar configuration will change, with a plus and minus sign displayed (F6 and F7). Use the pointer to click on the specification to be edited (i.e. left camber). Once it is highlighted, use the plus and minus buttons to change the specification as needed. Notice that when the left value is changed the right value changes at the same time. Use the pointer to move to any other values to be changed. If any mistakes are made, or the user wants to return to manufacturer’s specifications, click on Restore (F8). When all editing is complete, click on OK. Since these edited specs are now custom, a prompt appears to enter in a description of the new custom specification (Figure 44).

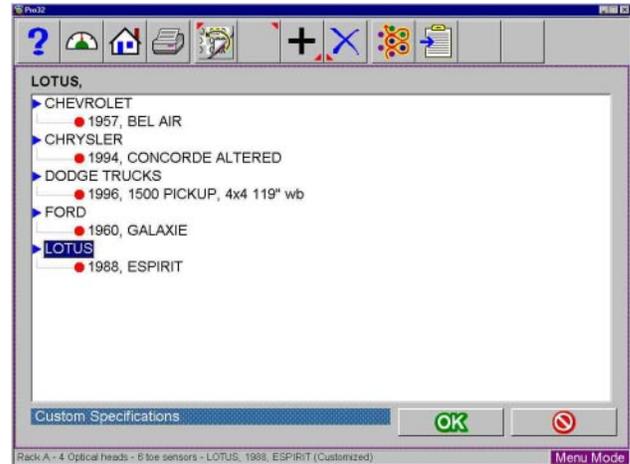


Figure 42. Custom Specifications Screen

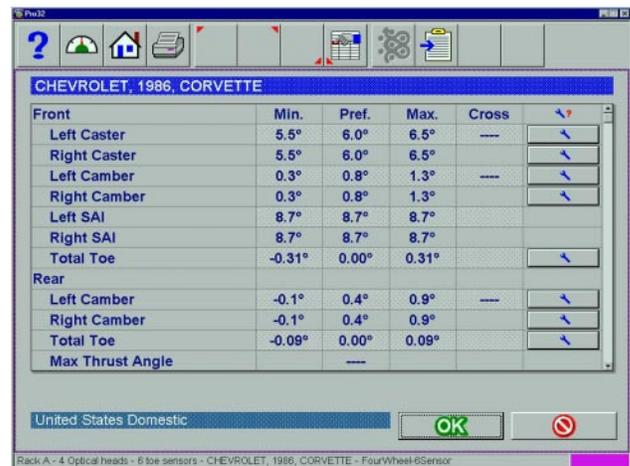


Figure 43. View Specifications Screen

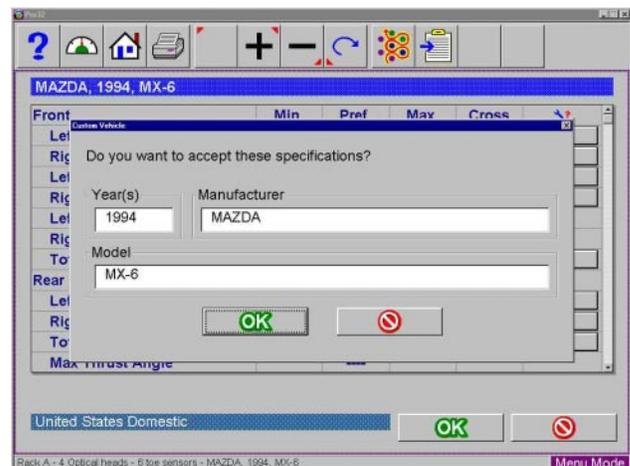


Figure 44. Identify Custom Vehicle

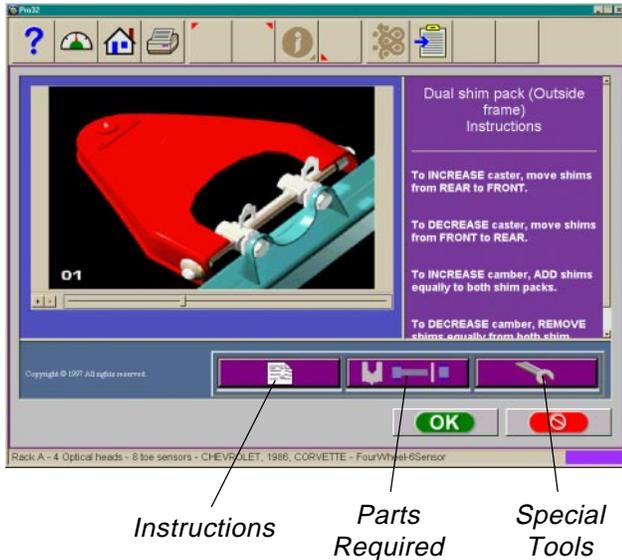


Figure 45. Adjustment Animation and Assistance

### Adjustment Animations

Illustrations of adjustments specific to the selected vehicle can be viewed by clicking on the “wrench” icon to the right of the specifications field. Animations are also accessible from the readings screens. An animation of the adjustment procedure will appear on the screen (Figure 45). Animations can be paused, stopped and restarted at the operators preference by using the controls at the immediate bottom of the animation screen. Select “OK” or “Cancel” to return the operation to the current screen.

### Additional Assistance

Included to the right of the animation window is a text box which illustrates three types of information regarding the current alignment adjust procedure. Information is requested by clicking on the icon associated with the assistance. These icons are:

- Adjustment Instructions**  
 Adjustment instructions are provided by selecting the first of three function buttons on the Animation screen.
- Parts Required**  
 The center selection displays parts required to complete the alignment process, parts such as shims, eccentrics or other aftermarket supplied parts. The displayed parts are linked to the selected shim manufacturer setup in the “Preferences” section.
- Special Tools**  
 The third icon button displays any special tools which may be required to perform the alignment properly.

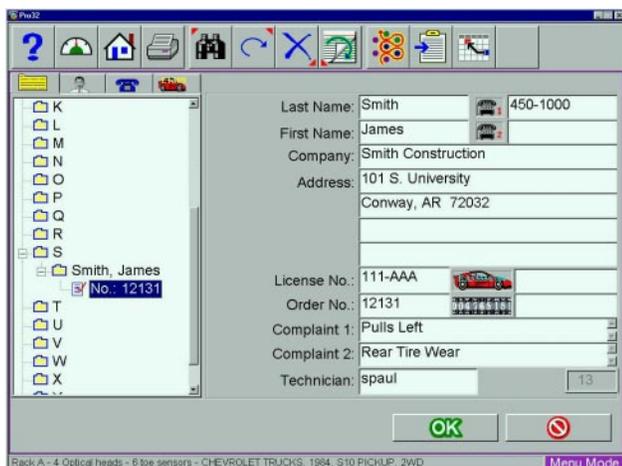


Figure 46. Customer Database Screen

### Step 5. Enter Customer Data

The EEWA-107/108 Aligner Customer Database feature allows entry of information about the customer and his vehicle. With the database this information can be saved for later recall. In addition, the aligner store this information along with the results of the wheel alignment service.

A *database* is a collection of information to be sorted and retrieved as needed for analysis. Available information includes the car owner's name, address, phone number; the vehicle make/model/year, VIN number, and mileage; plus the date of service along with before and after alignment readings. This information is stored on the computer hard drive for later retrieval. Once retrieved, the information can be reviewed and can become the starting point for a new alignment.

**Adding Customer Information**

Using the pointing device or TAB key to move around each of the text blocks, the operator enters information about the customer and his vehicle using the keyboard. Selecting OK will save the record to file for later retrieval.

**Selecting a Stored Record**

Stored or existing records can be sorted and retrieved in several different ways – drill down through data records, sort alphabetically by last name, by telephone number, and by vehicle license plate number. Once a record is visible, clicking on the plus sign expands the list to bring up a particular data set. Another way to find a record is to select the first letter of the customers name and highlight it using the pointing device. Double click with the left button when the desired record is highlighted. The complete record will be displayed with stored data.

**Recalling a Previous Alignment**

Once a particular record under the customer is chosen, the results of that previous alignment are recalled using the “Recall” button (F11) on the toolbar. The first screen that appears is the specifications of the vehicle that was aligned. Pressing OK brings up the Inspection Screen so that any inspected items can be reviewed. Pressing OK from here brings up the alignment readings in the “All Readings” format (see Figure 46a). The displayed values can be toggled from the initial to final readings using the Toggle button (F9) on the toolbar.

**Adding a New Customer**

A new record can be entered by clearing all information on the data window. Information is cleared by selecting Clear Fields on the toolbar (F7). Once the screen has been cleared, enter the new customer information as desired. If another record is desired for an existing customer, highlight his name as using the pointing device, and begin entering information at the blank screen.

**Editing an Existing Record**

An existing record can be edited by selecting the desired customer record. Once the record is displayed, move between information fields with the pointing device or TAB key. When the “I” bar is within the field to be edited, make the desired corrections. Data is saved when “OK” is entered.

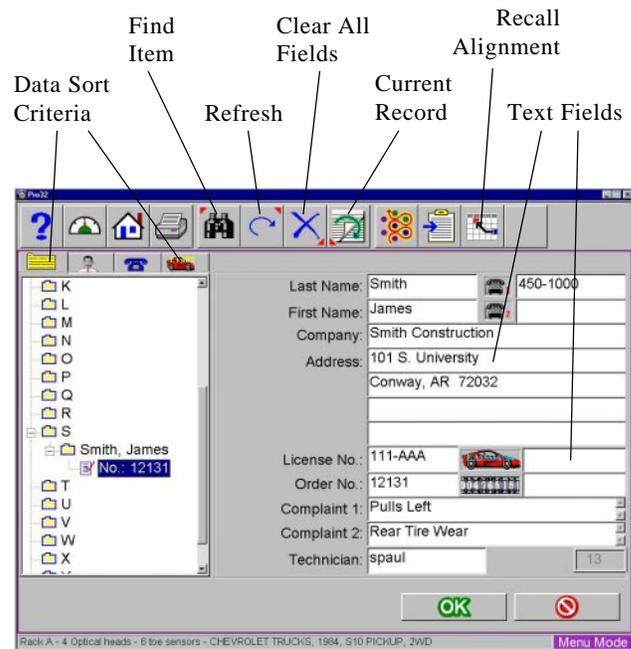


Figure 46. Customer Database Screen

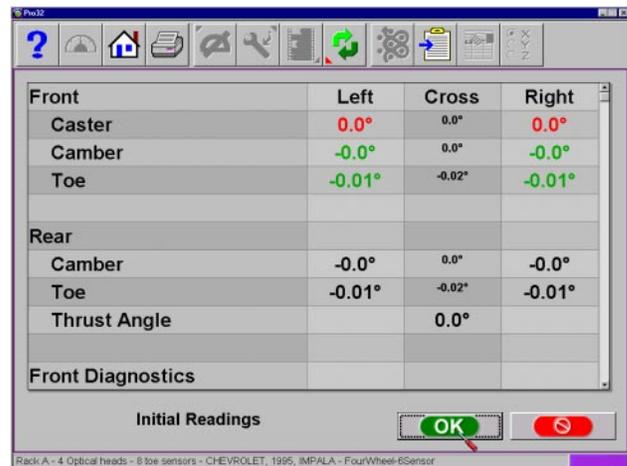


Figure 46a. Recalled Alignment Readings

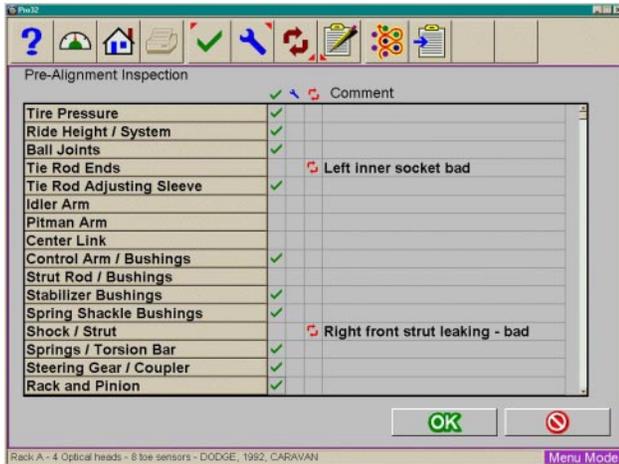


Figure 47. Pre-Alignment Inspection

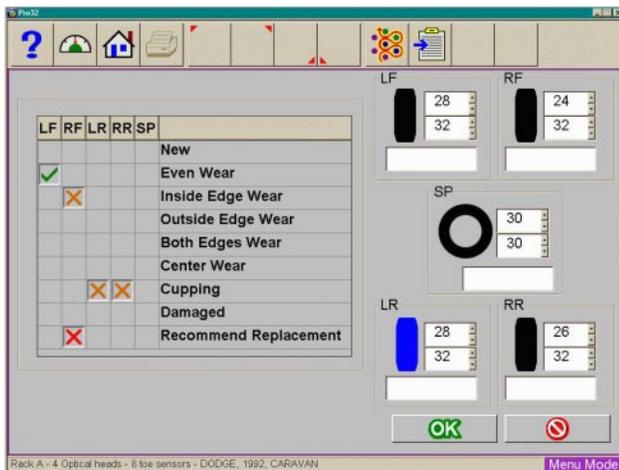


Figure 48. Tire Inspection

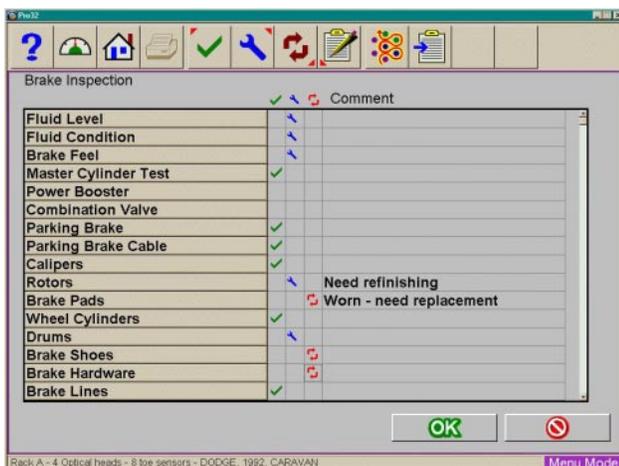


Figure 49. Brake Inspection

### Using the Database Outside the Aligner Platform

The database is stored on the hard drive in a file called AlignmentData.mdb. This database file is compatible with several common database programs such as Microsoft Access (not supplied with Pro32™). See your office computer software representative for information regarding these programs.

### Step 6. Inspection

Inspection reports are a valuable tool for the reporting of vehicle problem areas. Reports can be printed and retained for shop files or given to the customer to reinforce his comprehension of the work performed, or the work necessary before an alignment can be performed. In many cases worn or damaged components will affect the quality of the wheel alignment.

A Pro32™ procedure can contain up to six vehicle inspection reports or lists. These lists are contained within the Pro32™ process or they can be selected manually selected from the Main Alignment tab.

Areas to be inspected within each of the inspection forms are topically related. Any number of inspections can be utilized during the alignment process. The six inspection forms are:

- Pre-Alignment Inspection
- Tire Inspection
- Brake Inspection
- Under Car Inspection
- Under Hood Inspection
- Courtesy Inspection

### Using Inspection Reports

All inspection reports require the same operating procedures, with the exception of Tire Inspection. When the desired inspection report is displayed, use the pointing device to select "Checked", "Adjusted", or "Replaced" in the column to the right of the component description. A comment relating to the component or repair needed can be typed in the space provided to the right by selecting Edit Comments on the toolbar (F8). After all inspections and comments have been made, choose "OK" to save these checks to the database and to the printer buffer for later printout. Selecting "Cancel" button takes the operator to the previous screen.

### Pre-Alignment Inspection (Figure 47)

A proper alignment cannot be performed with loose or worn suspension components. The Pre-Alignment Inspection list contains a series of items to check for suspension component wear or damage.

The vertical bar on the right indicates there are additional items which can be scrolled up and checked. Selecting "OK" will save the inspections for later reference and printing. Select "Cancel" to return to the previous screen.

**Tire Inspection (Figure 50)**

Inspecting a vehicles tires is very import because they are usually a good indicator of alignment and maintenance related problems. The *Tire Inspection* report differs from the other five reports. The report contains a matrix representing the vehicles four tires plus the spare. Wear patterns can be documented by selecting the appropriately observed condition. Tire pressure as checked and corrected can be entered for each tire. Selecting "OK" will save the inspections for later reference and printing. Select "Cancel" to return to the previous screen.

**NOTE:** The following inspection reports function the same as the Pre-Alignment report as discussed on the previous page.

**Brake Inspection (Figure 49)**

The Brake Inspection list contains a series of items to check for wear or damage. Because brake drag can create a pull, it is important they are periodically inspected. Selecting "OK" will save the inspections for later reference and printing. Select "Cancel" to return to the previous screen.

**Undercar Inspection (Figure 50)**

An undercar inspection can offer many opportunities for the technician to further his services to the customer. Mufflers, catalytic convertors, U-joints, and transmission mounts are a few of many items under the vehicle that can be inspected and reported to the car owner.

**Underhood Inspection (Figure 51)**

An additional area to be considered is under the hood. A thorough vehicle inspection is a service to the customer to insure reliable and safe operation, while giving the opportunity to generate additional revenues to the repair shop.

**Courtesy Inspection (Figure 52)**

This inspection menu allows nonalignment and safety related items to be inspected as a courtesy to the vehicle's owner. Some of the items included are fuses, seat belts, jacks, mirrors, etc.



Figure 50. Undercar Inspection

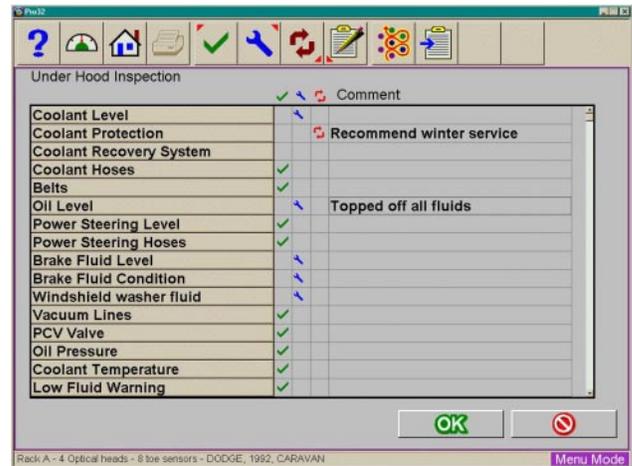


Figure 51. Underhood Inspection

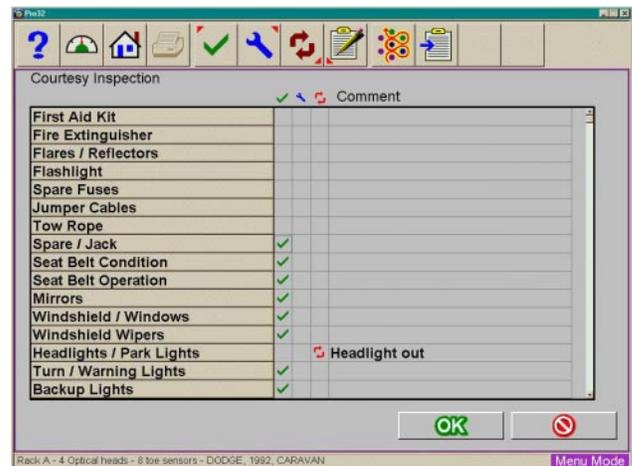
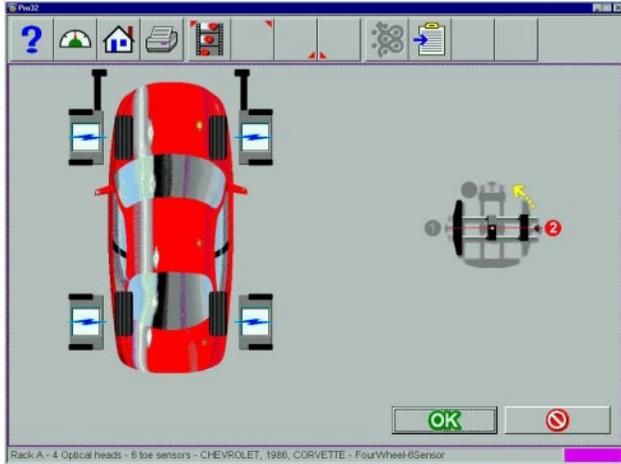
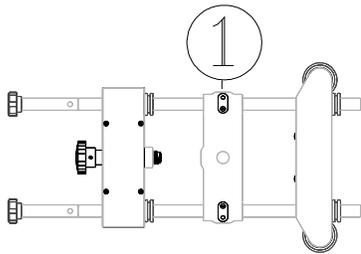


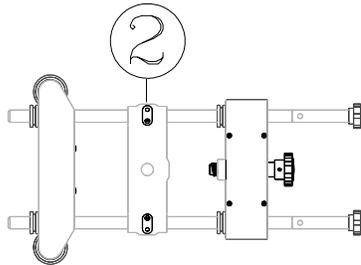
Figure 52. Courtesy Inspection



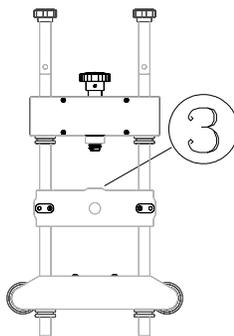
**Figure 53. Runout Compensation Screen**



**Figure 54**



**Figure 55**



**Figure 56**

## Step 7. Perform Runout Compensation

Compensating for the amount of runout of the wheel assemblies is an important factor in the alignment process. If not correctly determined, there will be errors in the displayed camber and toe angles. The EEWA-107/108 Aligner utilizes a runout procedure that calculates a true plane of the wheel assembly by measuring variations in toe and camber planes during a 360 degree rotation of the wheel.

The Runout Compensation screen is shown in *Figure 53*. To perform wheel runout, raise the vehicle wheels off the alignment rack surface using air jacks or other method to allow the wheels to rotate freely. An animation of how to perform runout is launched by selecting Animate on the toolbar (F5). Follow steps A through C carefully.

- A. Turn the wheel until the stamped-in number "1" is showing on the wheel-clamp center slide (*Figure 54*) which is at the 9 o'clock position. Hold the wheel assembly here and press the "Runout" key on the head keypad.
- B. Turn the wheel until the stamped-in number "2" is showing on the wheel-clamp center slide (180 deg) which is at the 3 o'clock position (*Figure 55*). Hold the wheel assembly here and press the "Runout" key on the head keypad.
- C. Turn the wheel until the stamped-in number "3" is showing on the wheel-clamp center slide (90 deg) which is at the 12 o'clock or straight-up position (*Figure 56*). Hold the wheel assembly here and press the "Runout" key on the head keypad.

After the first time the runout button is pressed a light will appear on the "Runout" key on the head, indicating the aligner is in the runout mode. As the runout key is pressed at position 2, the light will blink. At position 3 the light will blink and then go off, indicating the runout process is complete for that wheel. If the runout indicator light does not go out after step 3, something has gone wrong. Press the runout key until the light goes out, then repeat the complete the 1-2-3 runout steps for that wheel.

Repeat the above steps for all wheels.

### Runout Status

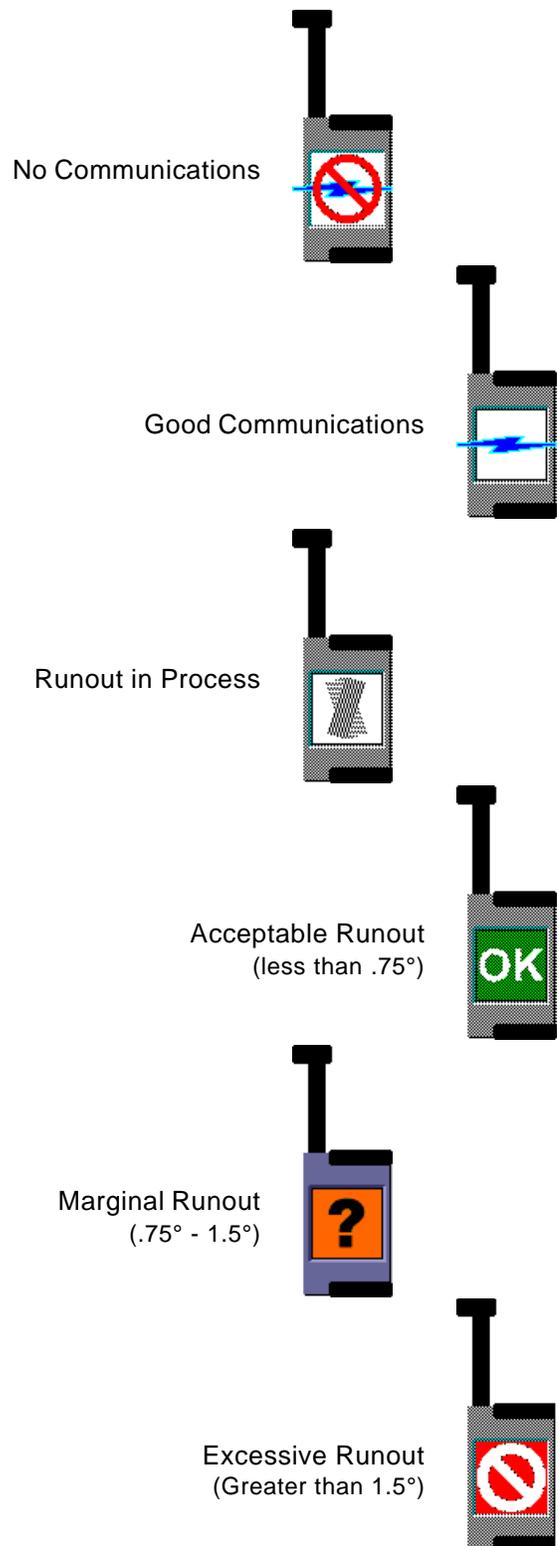
The Runout screen shows the status each wheel of the vehicle. As runout is successfully completed each wheel turns to a green color and display "OK". If a moderate amount of wheel runout is detected (.75°-1.5°), but not enough to influence the alignment results, a "?" will appear and the wheel indicator will turn yellow. It is acceptable to continue at this point. If a high amount of runout is detected (above 1.5°), a red universal "Cancel" will appear on the wheel indicator. This problem must be corrected prior to proceeding. Excessive runout can be caused by incorrect wheel clamp mounting, a bent clamp, a bent or loose wheel, or a problem inside the measuring head. *Figure 57* shows all the status indications that may be present on a wheel.

### More Information on Runout

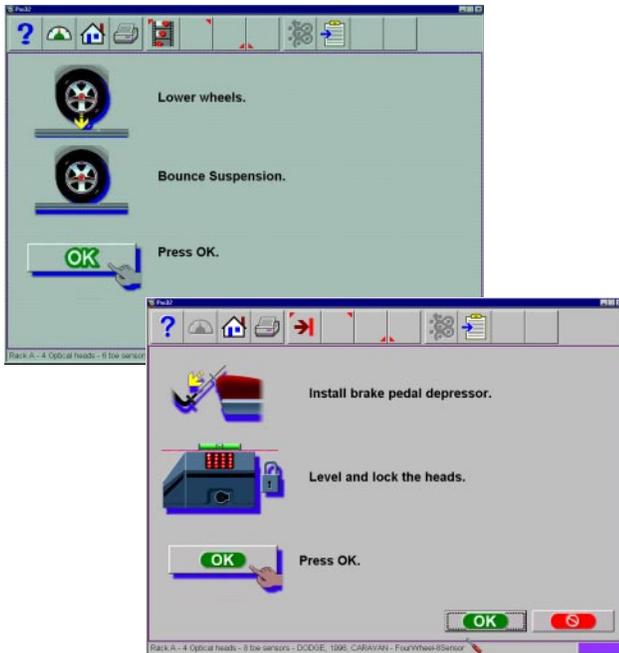
Here are some important notes regarding runout compensation on the EEWA-107/108 Aligner:

- If "two heads" has been selected in the System setup, only two wheels will be shown.
- Runout can be completed or updated at any time and from any screen in the aligner. It is not necessary to start over if runout needs to be taken again. Any time a wheel is removed from the vehicle, or the clamp is removed from the wheel, runout compensation must be repeated on that wheel only.
- The wheel clamp must remain in the straight up position (#3) at the end of the runout procedure. Do not rotate the clamp away from straight up for any reason. Be careful of many rear wheel and 4 wheel drive axles where turning one raised wheel causes another to move.
- It is not possible to "fake" runout compensation.
- Do not skip or shortcut the runout compensation process in any way. It is an important part of obtaining accurate alignment angles.

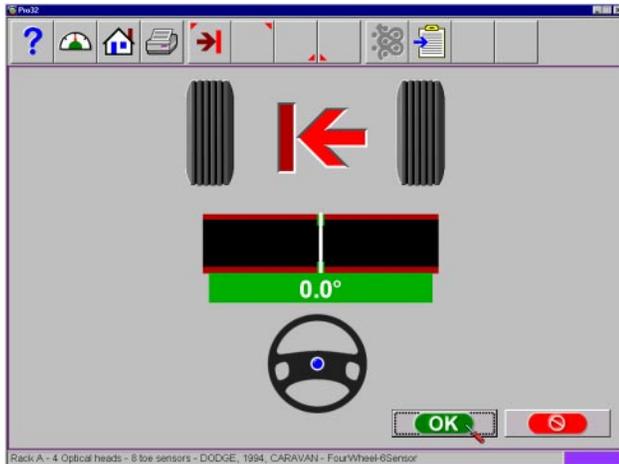
After runout compensation is completed on all the aligner is ready to measure the vehicle's wheel alignment angles, beginning with caster. Click on the OK button to proceed.



*Figure 57. Runout Status Indicators*



**Figure 58. Pre-Caster/SAI Measure Instructions**



**Figure 59. Start with Wheels Straight Ahead**

### Step 8. Prepare for Caster Measurement

Several steps must be performed after runout is complete before caster and SAI can be accurately measured.

#### **Lower Wheels and Jounce (settle) the Suspension**

The next screen that appears (*Figure 58*) instructs the technician to lower the wheels and jounce or settled the suspension so the vehicle sits at a true ride height. Slip plates should be utilized to provide the necessary side slip required to return the vehicle to its normal resting position. When lifted, a vehicle's suspension and steering components are placed in an unloaded condition. If not jounced or allowed to settle when lowered, this could skew the readings results. Click on "OK" to proceed.

#### **Install Brake Pedal Depressor**

The brake pedal depressor (*Figure 58*) is installed to prevent rolling of the wheel during the Caster/SAI swing. Wheel roll during the swing results in incorrect SAI measurements. It is suggested you repeat the swing unless it is known the vehicle is without caster or SAI problems.

#### **Level and Lock Measurement Heads**

Level the heads using the bubble vial on each measuring head. Lock the head firmly while using caution not to overtighten. Click on "OK" to proceed.

#### **Center the Steering**

If the front wheels are not facing straight ahead, the first step of the caster sweep directs the operator to steer as needed (*Figure 59*). While viewing the on the screen meter, center the steering as instructed.

## Step 9. Perform Caster Turn

The caster angle is measured by moving through a 20 degree turn of the front wheels. The software guides the operator through the steps on-screen. The caster sweep screens show a graphic of the wheels with the direction they should point, an arrow to indicate the turn direction, and a steering wheel graphic indicating the turn direction. Always follow the arrow direction and hold the wheel steady until the wheel turns green and the screen advances.

### **Automatic or Manual Caster Sweep**

Automatic caster sweep is used in most situations, using the heads' infrared optics system to accurately measure 10 degrees and then automatically progressing to the next step. If the automatic mode cannot be used for any reason, the system can be switched into the Manual caster sweep mode where turntable scales are used to determine 10 degrees and the OK button is pressed to move to the next step. The Automatic/Manual mode is selected anytime during the caster swing procedure by selecting the Tab button on the toolbar (F5). The active selected mode will be indicated in the top left of the display.

### **Turn to 10 Degrees Left**

After starting out with the front wheels facing straight ahead, the screen will change to indicate a turn to 10 degrees left (*Figure 60*). As the turning angle nears 10 degrees the wheels will change from gray to green meaning the measurement has been taken.

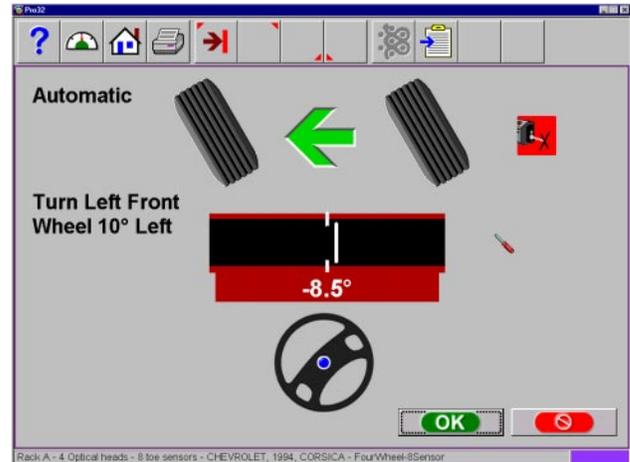
### **Turn to 10 Degrees Right**

The screen then changes to indicate a turn past straight ahead to 10 degrees right (*Figure 61*). The "wheels" will behave as above as the 10 degree angle is approached. The wheel graphics change to green as the measurement is taken.

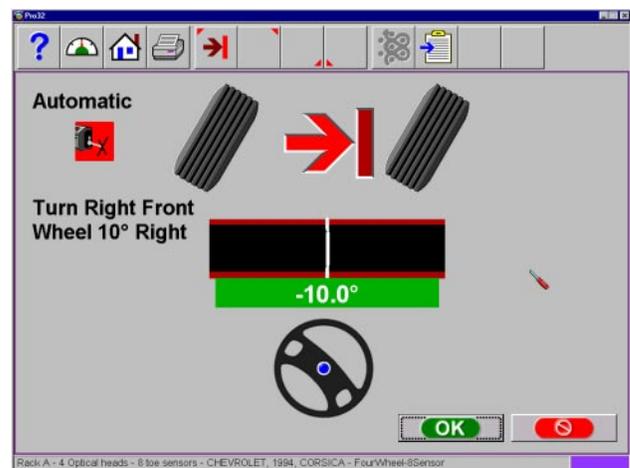
### **Turn Wheels Straight Ahead**

The screen then changes to indicate turning the wheels to the straight ahead position (*Figure 62*). Centering the steering allows the geometric centerline to be established for the rear readings which in turn will determine the thrust angle or rolling direction.

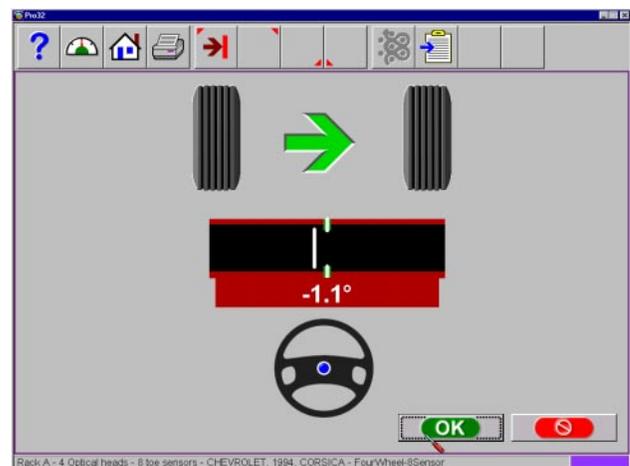
Once these steps are completed, caster is measured and the software moves to the readings screens.



*Figure 60. Turn Wheels to 10 Degrees Left*



*Figure 61. Turn Wheels to 10 Degrees Right*



*Figure 62. Turn Wheels to Straight Ahead*

### Information about Caster Accuracy

There are a number of reasons why caster measurements may vary when repeated:

- Pulling/pushing the wheel differently – these variations can be minimized by utilizing a brake pedal depressor during the caster sweep to ensure the wheels do not roll or rock during the turns. In addition, utilizing the steering wheel to make the turns minimizes the operator influence.
- Failure to reach the 10 degree mark exactly and hold steady until the measurement is taken
- Vehicle suspension / steering variations – if the vehicle has play or looseness in suspension and/or steering components, this can affect the reaction and tilt of the wheel during turns.
- Turntable / Rack condition – the condition of the turntables is critical. They must be free moving and flat with all bearing in place. Also, center the vehicle wheels on the turntables to ensure flatness during the turn.

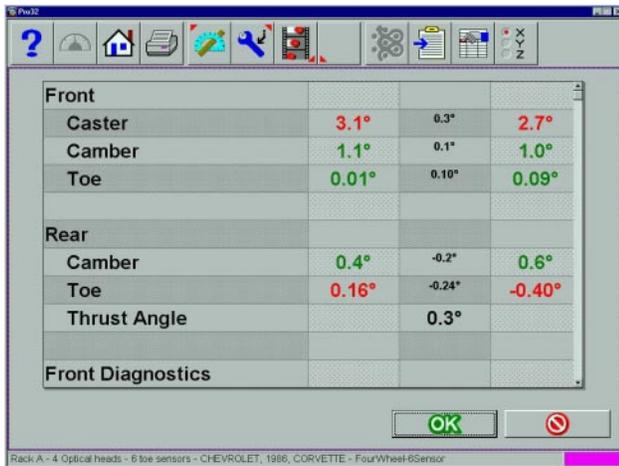


Figure 63. All Readings Screen

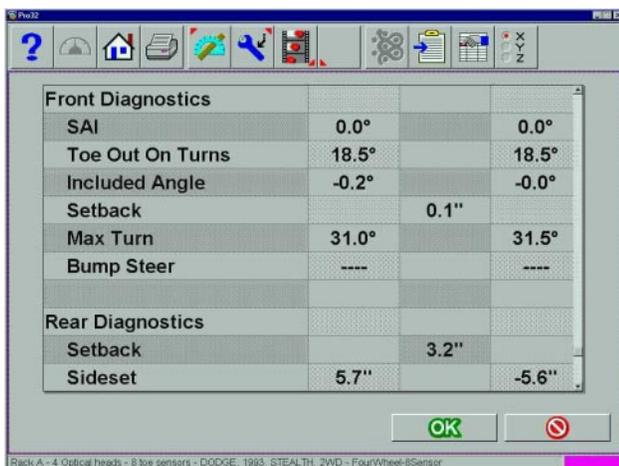


Figure 64. All Readings Diagnostics

### Step 10. All Readings

This is a screen (Figure 63) that shows both the rear and the front readings at the same time, giving the ability to evaluate the vehicle's total alignment status. If vehicle specifications have been entered, the numeric displays will be red (out of specification) or green (within specification). Front and rear camber and toe readings are live on this screen allowing for adjustments to be made.

In addition, this screen is where the vehicle's diagnostic angles, if measured, are displayed (see Figure 64). These angles are Included Angle, SAI, Toe Out on Turns, and Setback. Click on the scroll bar to the right of the screen to view the diagnostic angles for the front and rear.

Click on OK to move to the next readings screen.

### Step 11. Rear Readings Screen

After All Readings, the Rear Readings screen (Figure 65) appears. This screen displays, both in meter and numerical format, the angle measurements and information needed to determine if corrections are necessary. The display is divided into three rows: **Camber**, **Toe** and **Thrust Angle**. The columns represent the left and right side of the vehicle. The Camber and Toe meters have minimum and maximum specifications along the top, a numeric readout of live readings, and a color coding to indicate the relationship of live values to specification. Grey meters indicate no specification has been entered for this angle. Red meters indicate the angle is beyond manufacturer's specification. Green meters indicate the live values are within the specification.

#### Cross Values / Total Toe

The numeric value between the camber meters indicates cross values (side-to-side), the difference between left and right readings. This cross value is important on many vehicles for proper handling. The numeric value between the left and right toe meters indicates the rear Total Toe (the sum of individual toe).

#### Readings Toolbar

Buttons available on the Readings Screens toolbar from left to right are:

- F1 Help – displays operation assistance for the screen presently open
- F3 Home – returns the software to the opening Home Alignment tab
- F4 Print – accesses the print report menu
- F5 Measure – access to measuring additional angles
- F6 Adjust – access to assistance for the technician with angle corrections
- F7 Animate – assists the technician with illustrations of each angle adjustment
- F8 Zoom – brings any meter to full screen size to aide viewing
- F10 Login – user Login or Logout
- F11 Edit – allows editing of the vehicle selection, specifications, customer information, and inspections within the current alignment
- F12 Setup – allows alteration of any setup item on the Preferences tab

**NOTE:** If a toolbar button is “grayed out” it means the function is not available on that particular screen.

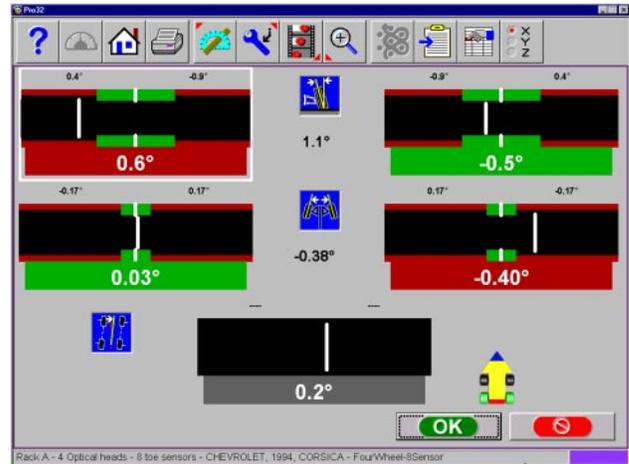
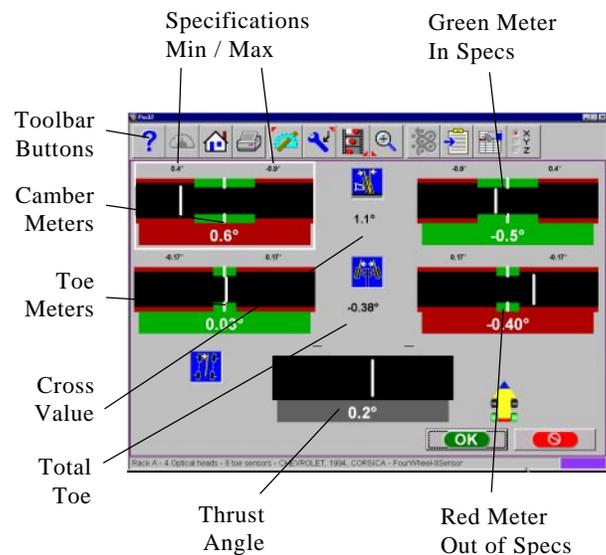


Figure 65. Rear Readings Screen





**Figure 66. Level and Lock Steering Wheel**

### Step 12. Level and Lock Steering Wheel

Before front readings are displayed it is necessary to level the steering wheel and lock it in place using the steering wheel holder (*Figure 66*). In addition, all measuring heads must be leveled and locked in place. Once these steps are completed press "OK" to move forward.

When the *Pro32™* software prompts the operator to level the steering wheel, the vehicle's thrust angle is determined. Thrust Angle is the direction of the vehicle travel determined by the total toe of the rear wheels. The thrust angle is used as a reference when adjusting the front toe so that a straight steering wheel is the end result. Toe error on many rear wheel drive vehicles cannot be corrected, creating a dog tracking effect and/or a crooked steering wheel.

### Step 13. Front Readings Screen

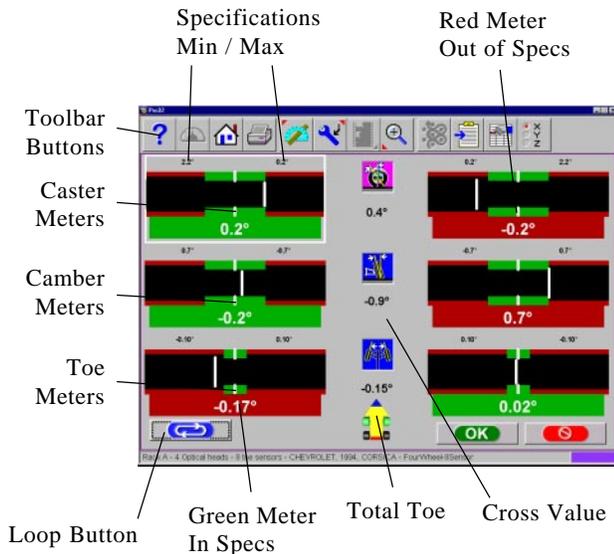
The Front Readings screen (*Figure 67*) is similar to the rear. Caster is displayed with the top meters. Note this reading is represented by an icon showing the caster reading to be "frozen", since caster is not a live reading. Camber meters are located in the middle of the screen and toe meters are at the bottom. Camber and toe are "live" displays which can be referenced while making adjustments. When measurements are within specification, the center portion of the meter is green. If red is displayed, the readings are outside of specifications. Grey meters indicate this angle has no specification.

*Cross Values / Total Toe* – the numeric value between the caster and camber meters indicates cross values (side-to-side), the difference between left and right readings. This cross value is important on many vehicles for proper handling. The numeric value between the left and right toe meters indicates the front Total Toe (the sum of individual toe).

*Toolbar* – buttons available on the Front Readings screen toolbar are the same as the Rear Readings toolbar (see *Page 61* for explanation of functions).

#### Loop Button

There are three "Readings" screens within *Pro32™* – All, Rear, and Front Readings. These three screens can be "looped" from the Front Readings screen. When the Front Readings screen is displayed, the Rear and All Readings screens are retrieved by pressing the "Loop" button located at the lower left corner of the screen.



**Figure 67. Front Readings Screen**



**Zoom**

For a full screen zoom image of any one meter move the white highlight box with the arrow keys, and then select Zoom on the toolbar F8 (Figure 68). Click on button F8 again to return to the full screen display (unzoom). Double-clicking on any meter will also zoom/unzoom them. It is possible to move around to other meters while zoomed by using the arrow keys on the keyboard and head keypads.

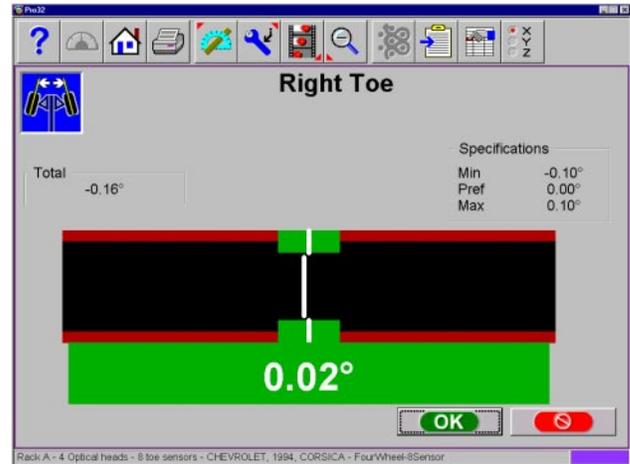


Figure 68. Zoom Meter to Full Screen



**Step 14. Print Results**

Select Print on the toolbar (F4) on either the Front or Rear Readings screen to go to the Printer Menu screen (Figure 69). The options are:



**Print Alignment Report** – prints only measured alignment angles with specifications.



**Print Inspection Report** – prints only inspection lists that have been filled out without no alignment angle information.



**Print Graphic Alignment Report** – prints the alignment angles and specifications in a graphical format.

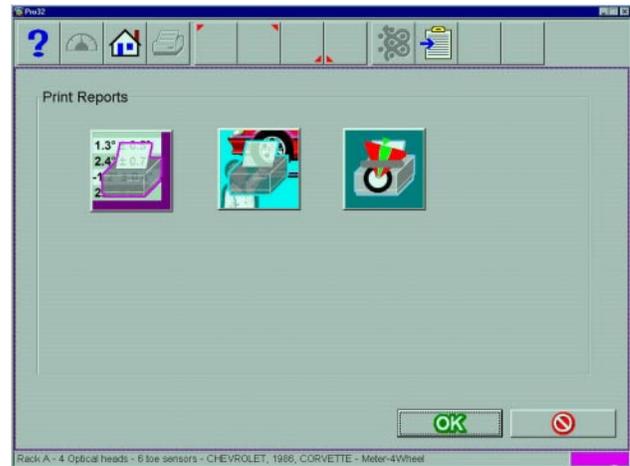


Figure 69. Print Selection Screen



Figure 70. Inspection Screen



Figure 70a. MAP Guidelines



Figure 71. Vehicle Dynamics Screen



## Inspections

Inspections are typically part of the Pro32™ process, and can also be selected from the Home Alignment tab by clicking on the Inspection icon to bring up the Inspection screen (Figure 70). In addition, Inspections can be accessed during the alignment from the readings screen by selecting the “Edit” button (F11) on the toolbar. The six possible areas of the vehicle that can be inspected and reported with Pro32™ are discussed in detail on Pages 54-55. The single icon on the right side, Vehicle Dynamics, accesses the diagnostics functions of the aligner.

## MAP

The MAP button, located on the lower left of the Inspection screen, launches vehicle inspection and repair information from MAP, which stands for Motorist Assurance Program (see Figure 70a). This information provides guidelines for the automotive service industry on how to diagnose faulty components and the proper ways to explain the needed repairs to the vehicle owner. This is a valuable tool for the industry that has been widely accepted throughout North America.



## Vehicle Dynamics

If additional assistance is required to repair or diagnose an alignment problem, the technician has several options which he can exercise. Diagnostic procedures are available automatically when programmed into a Pro32™ wizard or they can be accessed when needed during an alignment.

From the Inspection screen, click on the Vehicle Dynamics icon to bring up the Vehicle Dynamics screen (Figure 71). Two icons are available – Manual and Automatic Diagnostics.



## Manual Diagnostics

Selection of Manual Diagnostics activates a series of interactive screens in which the operator is asked a series of questions designed to assist the technician in diagnosing the vehicle's problem. When all questions have been answered, suggestions in resolving the problems are made.

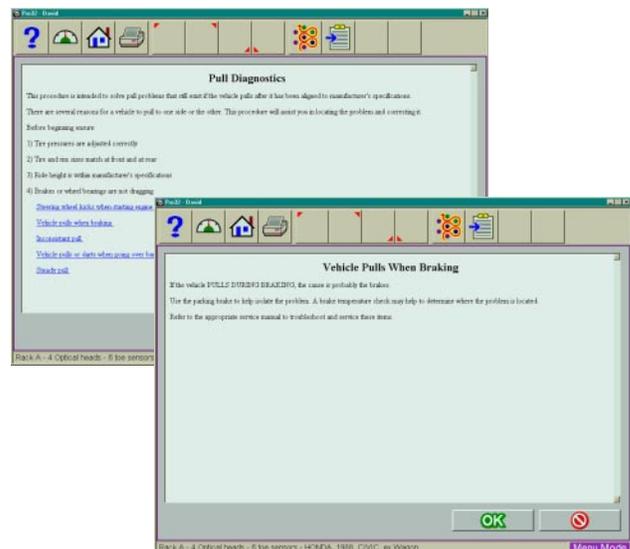
Four customer complaints are covered – *Pull*, *Unlevel Steering Wheel*, *Vibration*, and *Treadwear*. See *Figure 72* for the Vehicle Diagnostic Help menu and its selections.



**Figure 72. Manual Diagnostics Selection**

### Pull

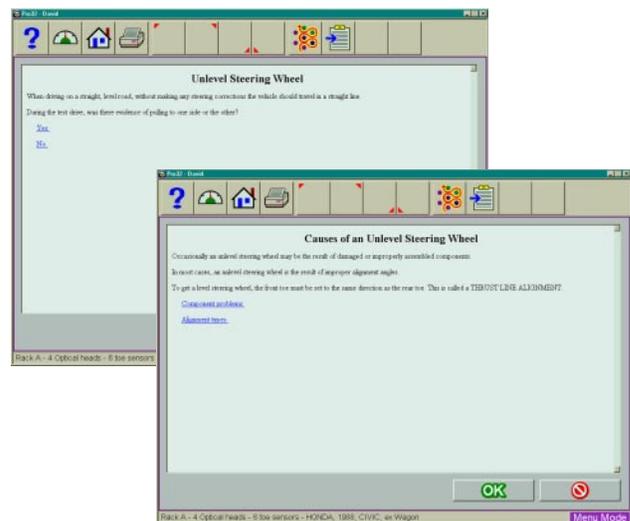
The program asks a series of questions regarding a vehicle pull (*Figure 73*). Select the most appropriate answer to move to the next step. The screen will again ask for the most correct answer. Suggestions will be made throughout to attempt to identify the problem.



**Figure 73. Pull Diagnostics**

### Unlevel Steering

The program asks a series of questions regarding an unlevel steering wheel (*Figure 74*). Select the most appropriate answer to move to the next step. The screen will again ask for the most correct answer. Suggestions will be made throughout to attempt to identify the problem.



**Figure 74. Unlevel Steering Diagnostics**

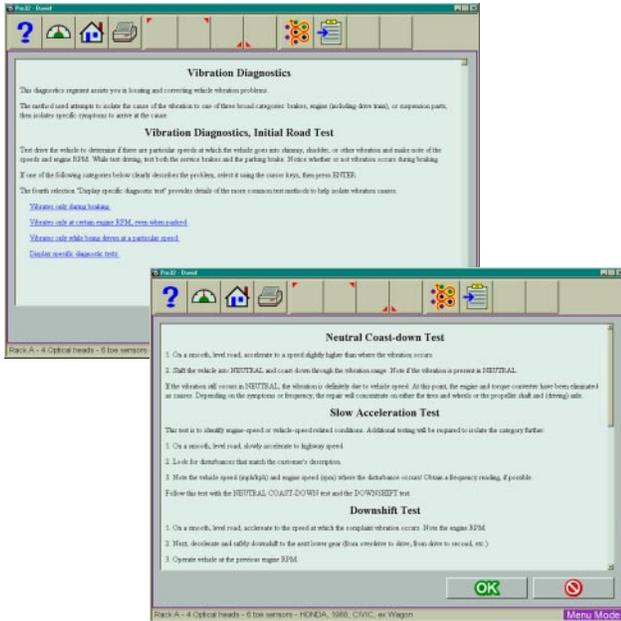


Figure 75. Vibration Diagnostics

### Vibration Diagnostics

This diagnostic segment assists in locating and correcting vehicle vibration problems. The method used attempts to isolate the cause of the vibration to one of three categories: Brakes, Engine and Drive Train. See Figure 75.

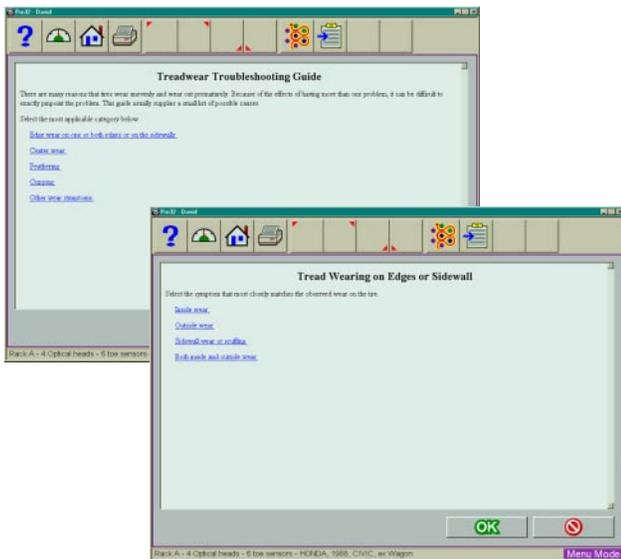


Figure 76. Treadwear Diagnostics

### Treadwear

There are many reasons why tires wear unevenly and wear out prematurely. Because the effects of having more than one problem can make it difficult to exactly pinpoint the problem, this guide will lead you through lists of possible causes. See Figure 76.



### Automatic Diagnostics

Selecting the Automatic Diagnostics icon activates a routine which utilizes the measured angles, compares them to the vehicles specifications, and then makes an automatic determination of a vehicle's potential problem. This feature is useful for educating the technician and vehicle owner on what vehicle problems are created when alignment angles are out of specifications. The screen shows the expected vehicle problem for caster, camber, and toe on the left and right wheels. See Figure 77.

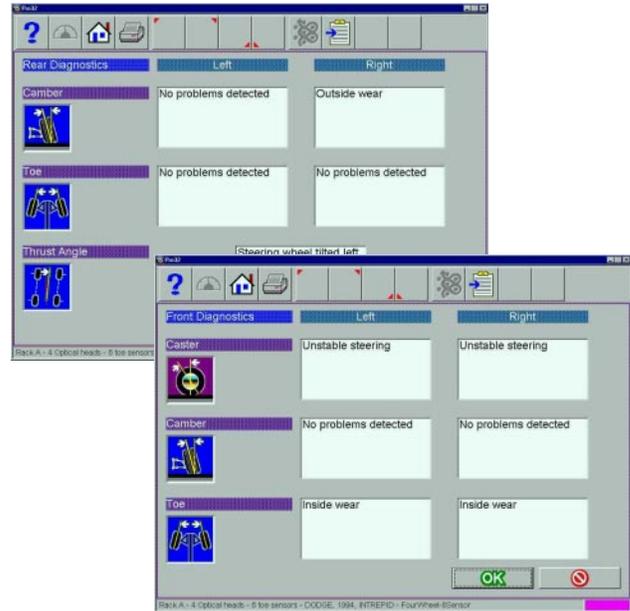


Figure 77. Front and Rear Diagnostics

### Bent Parts Diagnosis

SAI, Included Angle, and camber have been used for years to diagnose bent parts. These angles were manually charted on paper with the technician making a conclusion based on his measurements. This technique has been incorporated into the EEWA-107/108 Aligner utilizing the power of the computer system. Angles are measured and compared with vehicle specifications to determine if a problem exists. An on-screen readout informs the technician which components are most likely bent or damaged, categorized by suspension designs. See Figure 78.

**NOTE:** The operator must measure SAI and must enter specifications before an automatic evaluation can be made. If these Diagnostics screens are made part of the alignment path using a Pro32™ Wizard, it is recommended to configure the "Alignment Order" to measure Caster/SAI simultaneously instead of caster only.

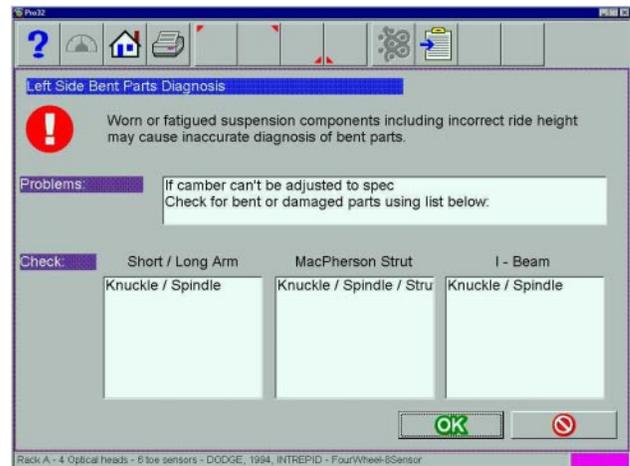


Figure 78. Bent Part Diagnostics



Figure 79. Measure Screen



Caster Only



Caster and SAI on Turntables



SAI Only Elevated



Camber at Zero Toe



Vehicle Dimensions



Toe Out On Turns



Maximum Turn Angle



Toe Curve Measurement

Figure 80. Measure Icons



## Measure

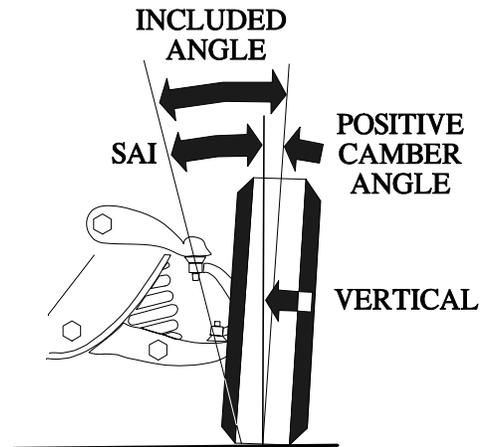
When the Measure icon is selected from the Home Alignment Screen or from the toolbar on any readings screen, a screen (Figure 79) appears that allows the operator to measure any wheel alignment angle. The icons on this screen are defined in Figure 80, and are explained in this section of the manual.

- Caster Only** – used to update the caster value by re-sweeping the wheels through the 20 degree turn. See Page 59 for details on performing caster measurement
- Caster and SAI on Turntables** – measures both the caster and steering axis inclination (SAI) angles simultaneously by sweeping the wheels through the 20 degree turn. This is done on the turntables (loaded suspension)
- SAI Only Elevated** – measure the SAI angle only, with the wheels elevated (unloaded)
- Camber at Zero Toe** – a routine that forces measurement of camber with each individual wheel in the straight ahead (zero toe) position. Recommended for vehicles with high caster values
- Vehicle Dimensions** – provides additional information about the condition of the vehicle's frame, such as setback. With the optional 8-sensor measurement package, additional information, such as trackwidth difference, is displayed
- Toe Out On Turns** – measure the difference in turn angles of the front wheels at 20 degrees (toe out on turns)
- Maximum Turn Angle** – measure the maximum angle each front wheel will turn
- Toe Curve Measurement** – measure the individual wheel toe change as the suspension goes through jounce and rebound

**Steering Axis Inclination (SAI) and Included Angle (IA)**

These angles are powerful tools in diagnosing bent or damaged suspension parts. A bent spindle, control arm, strut, frame mounts, or a cradle shift problems can be identified. SAI is measured either vehicle weight loaded on the turntables or with the front wheels elevated. Included Angle is not actually an angle defined on the vehicle – it is a mathematical formula. By definition,  $IA = SAI + CAMBER$ . Most late model vehicles have a specification for Included Angle, and a few for SAI. Compare the measured values to spec, but also compare side-to-side (cross) differences.

.....  
*TIP: Cross differences for Included Angle should not exceed 1 to 1.5 degrees for most vehicles. If a high cross value is discovered, it may be creating a pull condition. Generally, the damaged part is on the side with the lower IA reading.*  
 .....



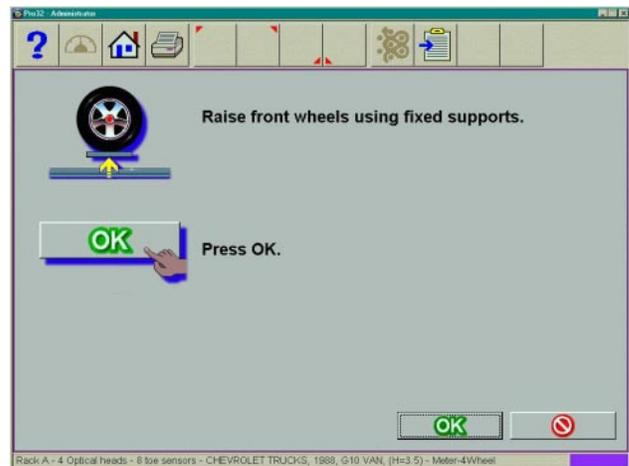
**Measuring Steering Axis Inclination (SAI) and Included Angle**

The measurement method for SAI and Included Angle is similar to the Caster measurement. The wheels are turned through a 20 degree turn and the change in wheel tilt is measured. SAI can be measured either on the turntables (loaded) or with the front wheels elevated (unloaded). The results of loaded or unloaded will be similar, but some variation may occur due to the type of vehicle suspension. When measured on the turntables, caster is also measured. For accurate results follow the on-screen instructions carefully.

1. Whether measuring SAI on the turntables or elevated, it is mandatory to lock the vehicle's brakes (*Figure 81*). Start the car to initiate the power brakes and install the brake pedal depressor between the seat and the brake pedal.
2. Level and lock the measuring heads on the wheel clamps using the locking knobs.
3. Follow the on-screen instructions. During the elevated measurement, the instruction say to raise the front wheels using rigid supports (*Figure 82*). This is typically done with a jack included with the alignment lift.



**Figure 81. Lock Brakes and Heads**



**Figure 82. Raise Wheels to Measure SAI**

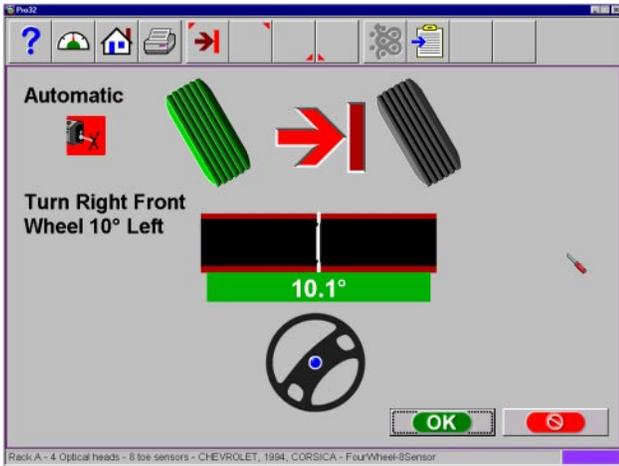


Figure 83. Measuring Caster and SAI

4. The turning sequence is identical to the process for obtaining caster values (Figure 83).
5. When measuring elevated SAI, the final instructions will be to lower the vehicle and jounce the suspension (Figure 84).
6. The SAI and Included Angle values are displayed on the All Readings screen (Figure 84a). Caster is displayed on the All Readings screen as well as the Front Readings meter screen.
7. Use SAI and Included Angle to diagnose a handling problem or a bent part that is limiting the adjustment of camber.



Figure 84. Lower Vehicle After Elevated SAI

**Note:** Not all vehicle manufacturers publish specifications for SAI or Included Angle. All available manufacturers' specifications are included in the EEWA-107/108 Aligner database.

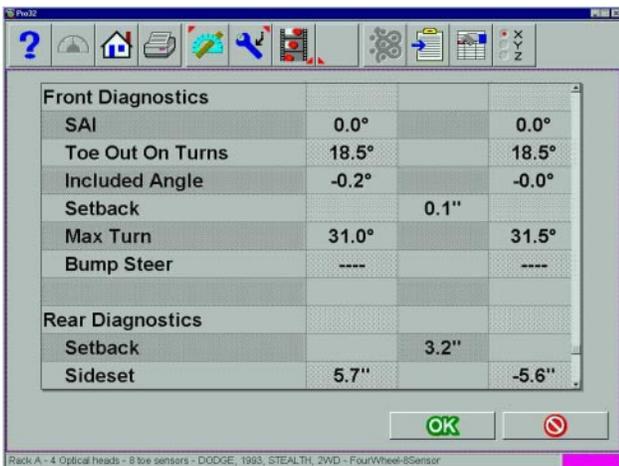


Figure 84a. SAI and IA Results Display



### Camber at Zero Toe

This routine measures camber on the left and right front wheels individually at zero toe. This is the recommended procedure for vehicles with high caster specifications, such as Mercedes-Benz.

The procedure is as follows (see *Figure 85*):

1. Select Camber at Zero Toe from Measure Screen
2. Using the on-screen meter, turn the left wheel towards the center until the meter turns green
3. Press OK to continue
4. Repeat this process for the right wheel. Click OK to continue
5. The software returns to the readings screen

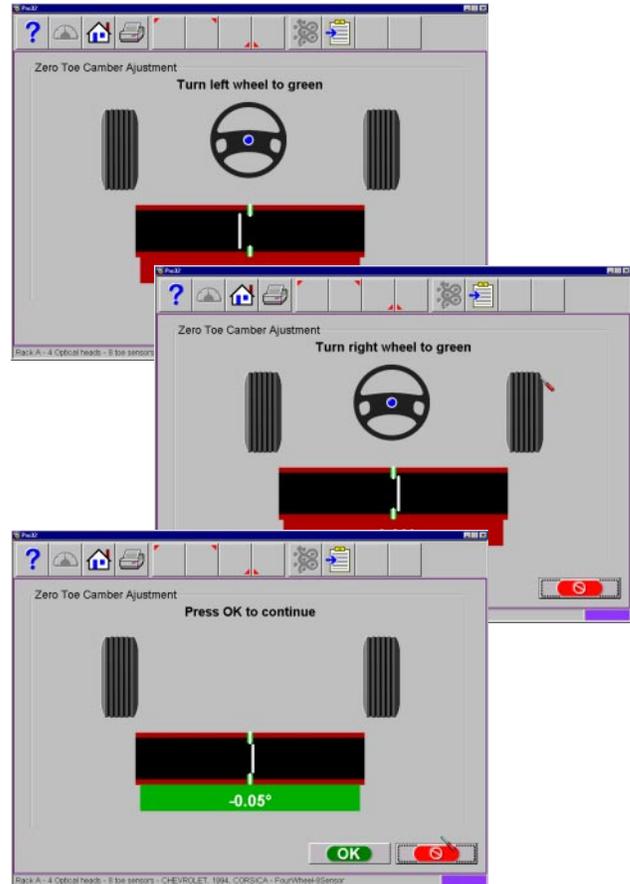


### Vehicle Dimensions / Setback

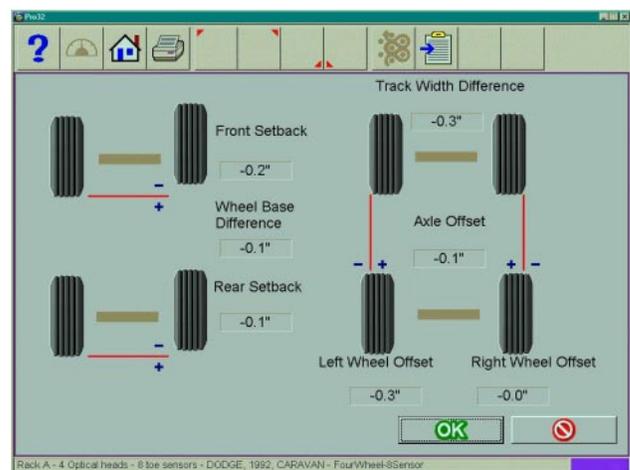
Setback and vehicle dimensions are useful measurement tools to diagnose vehicles that may have been involved in a collision. Setback occurs when one wheel on an axle is not even with the other. With the EEWA-107/108 Pro32™ 8-sensor system (optional), dimensional measurements are easy, and additional information about the vehicle's frame can be determined. These measurements are accessed from the Measure toolbar button on the Front or Rear Readings screens, or from the Measure icon on the Home Alignment tab. In addition, Vehicle Dimensions can automatically appear in the alignment path if this feature has been set up in the Pro32™ Wizard procedures. On-screen instructions must be followed carefully.

**Note:** *Rear setback measurement is not available with a 6-sensor measuring head system with the Pro32™ alignment software.*

The results of the 8-sensor vehicle dimensions measurements are displayed with a visual reference to a vehicle (*Figure 86*) depicting wheelbase difference, trackwidth difference, and front and rear setback. In addition, setback values are displayed on the All Readings screen and are printed during the alignment results printout. Vehicle dimensions and setback can be displayed in inches or millimeters, selectable in the Units setup.



**Figure 85. Camber at Zero Toe Procedure**



**Figure 86. Vehicle Dimensions Display**

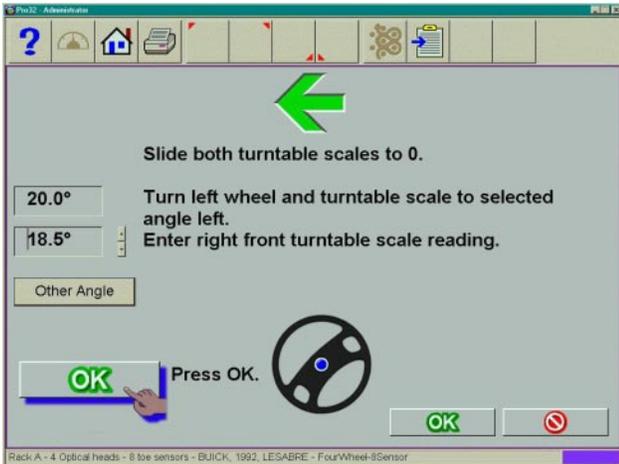


Figure 87. Measuring TOOT to the Left

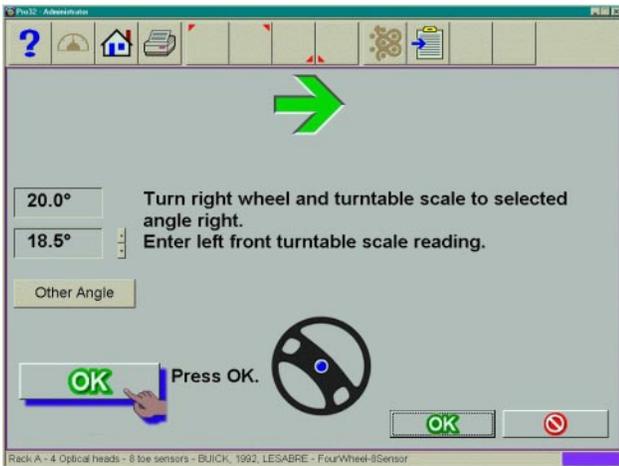


Figure 88. Measuring TOOT to the Right

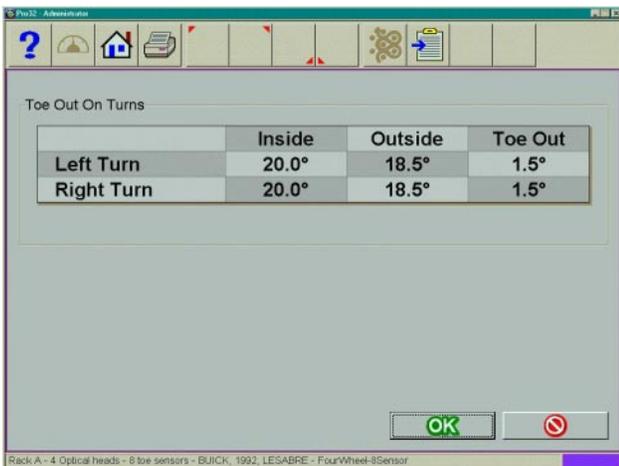


Figure 89. Toe Out On Turns Values



**Toe-Out-On-Turns (or Turning Radius)**

Toe-out-on-turns is another diagnostic measurement that is valuable in troubleshooting steering and handling problems.

**TOOT** or Turning radius, as it is commonly called, is the difference in the turning angle between the inside and the outside wheel.

TOOT is measured using the turntable scales of the alignment lift. On many vehicles, the manufacturer specifies the inside wheel to be turned 20 degrees. Other vehicles specify the wheel be turned to a different angle. This is possible with the EEWA-107/108 Aligner by clicking on the "Other Angle" button and specifying what the reference angle is.

**Note:** *The EEWA-107/108 Aligner vehicle database does not contain specifications for toe-out-on-turns. Refer to an alignment specification book or the vehicle's shop manual.*

The Toe-Out-On-Turns measurement is not automatic, unless the system is equipped with optional Electronic Turntables. Using the turntable scales, turn the inside wheel to the reference angle, then read the outside wheel turn angle and enter the information into the computer. Entry of the TOOT value is accomplished by clicking on the up or down arrow button next to the numeric window until the desired value is obtained. As an example, when a turn is made to the left, the driver side wheel is the inside wheel and the passenger side is the outside wheel (Figure 87). Repeat these steps for a right-hand turn (Figure 88). The diagnosis of a problem is always made on the outside wheel of the turn. For best results follow the on-screens carefully. Once completed, the TOOT results appear on-screen in a chart format (Figure 89) and are available for print-out. To review the TOOT values later in the alignment, go to the All Readings screen.

.....  
**TIP:** *Toe Out on Turns problems always indicate a bent or damaged steering arm, with the problem wheel being the one on the outside of the turn.*  
 .....



### Maximum Turn Angle

This routine is very similar to the Toe Out On turns feature. It allows the measurement of the "full lock" or maximum turn in each direction. It uses the turntable scales and provides the ability to enter the results in the computer for viewing and printing. Consult an alignment specification manual or shop service manual for manufacturers specifications for the maximum turn reference angle and the outside turn value. Entry of these values is accomplished by clicking on the up or down arrow button next to the numeric window until the desired value is obtained. See *Figure 90*.

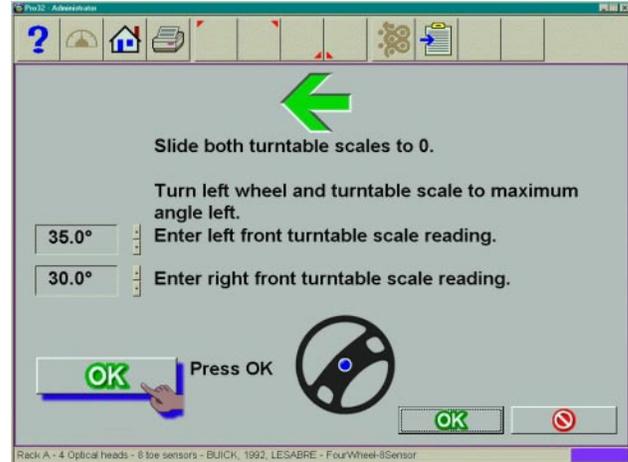


Figure 90. Maximum Turn Angle



### Toe Curve Change

This feature allows measurement of individual wheel toe change as the suspension system goes through jounce and rebound (spring compression and expansion). An excessive amount of toe change can cause premature tire wear. A large change on only one side can cause "bump steer", a dangerous condition causing the vehicle to rapidly change directions when bumps are encountered. While there are no specifications for the amount of change, it should be fairly small, and a comparison of left and right wheels can assist in diagnosing defective steering system components. Follow the on-screen instructions carefully to move the suspension through a 60mm (2.3") travel (*Figure 91*). This can be done by pulling down or pushing up the suspension. Use a ruler or tape measure to observe the proper amount of frame movement. Select OK when completed to display the results (*Figure 91a*).

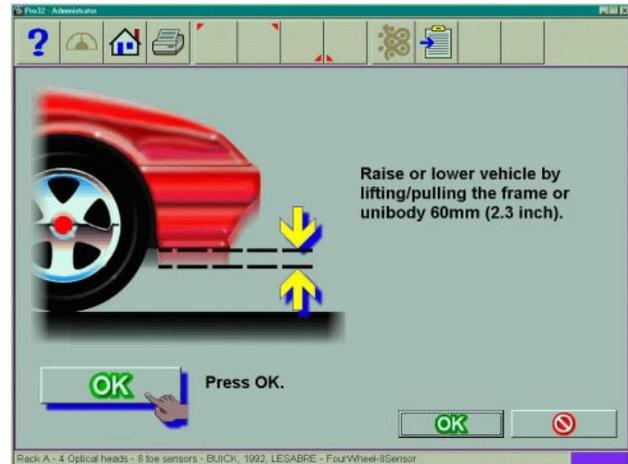


Figure 91. Create Suspension Travel

.....  
**TIP:** On cars with rack and pinion steering, a bump steer condition is usually created by worn rack mounting bushings that allow the entire rack to shift when bumps are hit. Some GM cars (80's Camaro & Firebird) have slotted idler arm mounts to allow correction of toe curve change problems.  
 .....

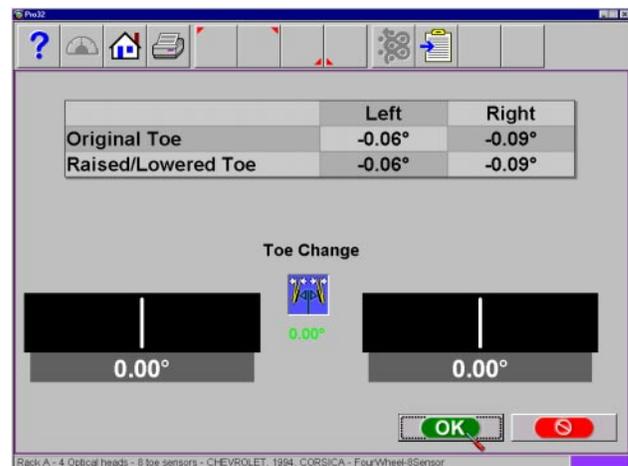


Figure 91a. Toe Curve Change Display



**Figure 92. Adjust Screen**



*Caster and/or Camber*



*Adjust A-Arms*



*EZ-Toe*



*Cradle Adjust*



*Drag Link Adjust*



*Single Tie Rod Adjust*



*Shims and Kits*



*Front Shims and Kits*

**Figure 93. Adjust Icon Description**



## Adjust

One of the most powerful features of the EEWA-107/108 Aligner is the assistance given to the alignment technician when performing adjustments on a vehicle. These features are on the Adjust screen (*Figure 92*), and are accessed through the Adjust icon, located on the Home Alignment screen, and from the Adjust button on the toolbar when alignment readings are displayed.

There are numerous features designed to improve the efficiency and effectivity of the alignment technician. Icon choices are from the Adjust screen are defined in *Figure 93*, and are explained below:

**Caster and/or Camber** – several different options available to assist with these angles, including live caster and elevated modes

**Adjust A-Arms** – for vehicles whose caster and camber adjustments are located on the suspension A-Arm, this selection allows both angles to be corrected simultaneously

**EZ Toe** – this software routine is a new and improved method of setting front toe, making it easier to obtain straight steering wheels

**Cradle Adjust** – assist with the adjustment of the engine cradle on many front wheel drive cars

**Drag Link Adjust** – assists with steer direction and straight steering wheel when performing toe adjustments on trucks with a drag link adjustment

**Single Tie Rod Adjust** – helps with vehicles having a single tie rod toe adjuster

**Shims and Kits** – many front wheel drive cars use a shim on the rear axle/spindle to adjust camber and/or toe. This program determines the proper shim to use

**Front Shims and Kits** – used on many 2 and 4 wheel drive trucks to calculate proper size and orientation of offset bushing or sleeve



**Adjust Caster and/or Camber**

When this icon chosen, another screen appears giving choices on different modes for adjusting these angles (Figure 94).

The icon chosen will depend on the type of adjustment being made and the type of vehicle suspension, and is determined by the operator. Typically, these modes are used for any adjustment type other than shims, slots, or eccentric cams located on the upper or lower a-arm.

The screen icon choices are defined in Figure 95 and explained briefly below:

**Adjust Caster and/or Camber on Turntables** – on some vehicles, the caster or camber adjustments can be made with the suspension loaded, such as cams on a McPherson strut for camber or strut rods for adjusting caster. In this mode, the wheels remain on the turntables and caster is a live reading, so the technician can monitor the adjustment to achieve the desired setting.

**Adjust Caster and/or Camber Elevated** – on some vehicles, the weight of vehicle keeps the adjustment from being made easily, such as moving the upper strut mount. In this mode, the wheels are elevated and caster is a live reading, so the technician can monitor the adjustment to achieve the desired setting.

**Adjust Front Camber Elevated** – this mode is used for adjusting camber only on the front wheels. The readings on the turntables are retained even though the wheels are elevated.

**Adjust Rear Camber Elevated** – this mode is used for adjusting camber only on the rear wheels. The readings on the turntables are retained even though the wheels are elevated.

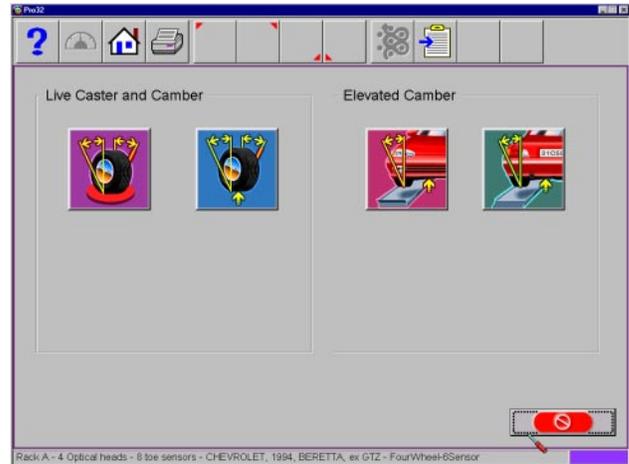


Figure 94. Adjust Caster and/or Camber



Adjust Caster and/or Camber on Turntables



Adjust Caster and/or Camber Elevated



Adjust Front Camber Elevated



Adjust Rear Camber Elevated

Figure 95. Caster/Camber Icon Description



Figure 96. Pre-Adjustment Instructions

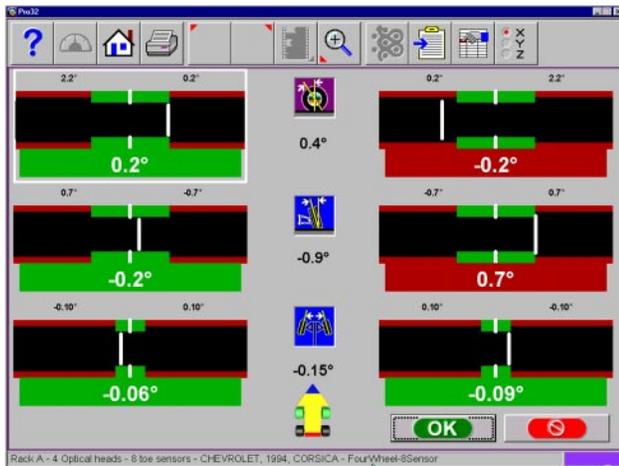


Figure 97. Live Caster/Camber Meter Screen

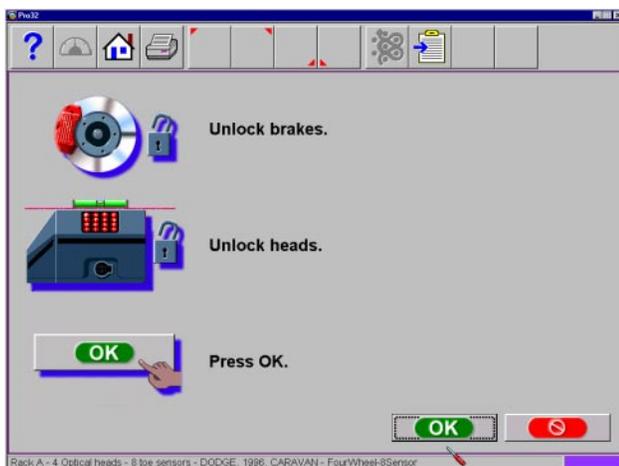


Figure 98. Instructions After Adjustments are Completed



### Adjust Caster and/or Camber on Turntables

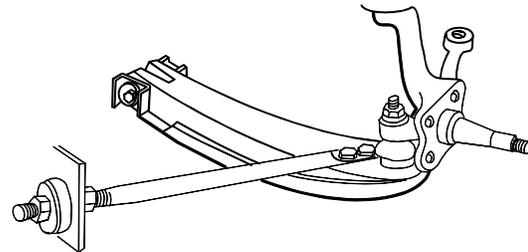
After selecting this icon, instructions appear in preparation for the adjustment (Figure 96).

- Bounce the suspension
- Install brake pedal depressor
- Level and lock the heads

#### **IMPORTANT!**

*Follow all on-screen instructions carefully. Incorrect adjustment readings are possible if these steps are ignored.*

When OK is pressed, a screen very similar to the standard Front Readings display appears (Figure 97). The major difference is the caster reading – it is live instead of frozen. Caster and camber can be adjusted while viewing this screen – for example, caster change will be shown as a strut rod is lengthened or shortened.



As the adjustments are made, the meter movements and numeric values change. The meters are color coded to show their relationship to specification. This screen is useful for vehicles with independent adjustments where one adjustment causes the other angle to change (i.e. Mercedes Benz and Lexus).

Once the adjustments are completed, press OK. Post-adjustment instructions will be displayed (Figure 98).

- Unlock the brakes
- Unlock the heads
- Press OK

The software returns to the Caster and/or Camber selection screen. Select the Cancel button to return to the meter screens.



### Adjust Caster and/or Camber Elevated

After selecting this icon, instructions appear in preparation for the adjustment (*Figure 99*).

- Bounce the suspension
- Install brake pedal depressor
- Level and lock the heads
- Press OK
- Raise front wheels using rigid supports
- Press OK

**IMPORTANT!**

*Follow all on-screen instructions carefully. Incorrect adjustment readings are possible if these steps are ignored.*

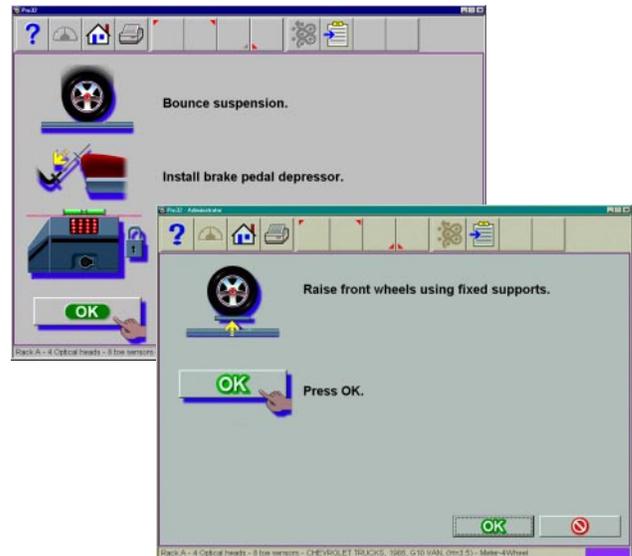
When OK is pressed, a screen very similar to the standard Front Readings display appears (*Figure 100*). The major difference is the caster reading – it is live instead of frozen.

Adjust caster and camber while viewing this screen – for example, camber and caster change will be shown as an eccentric cam is turned. As the adjustments are made, the meter movements and numeric values change. The meters are color coded to show the readings' relationship to specification.

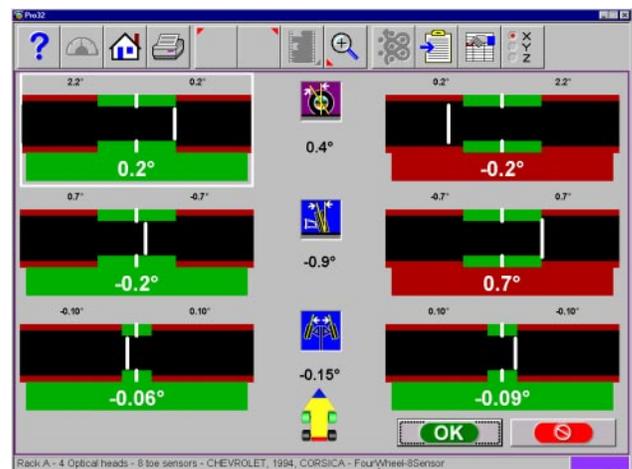
Once the adjustments are completed, press OK. Post-adjustment instructions will be displayed (*Figure 101*).

- Lower wheels. Bounce suspension
- Unlock the brakes
- Unlock the heads
- Press OK

The software returns to the Caster and/or Camber selection screen. Pressing the cancel button from there returns to the meter screens.



*Figure 99. Pre-Adjustment Instructions*



*Figure 100. Live Caster/Camber Meter Screen*



*Figure 101. Instructions After Adjustments*

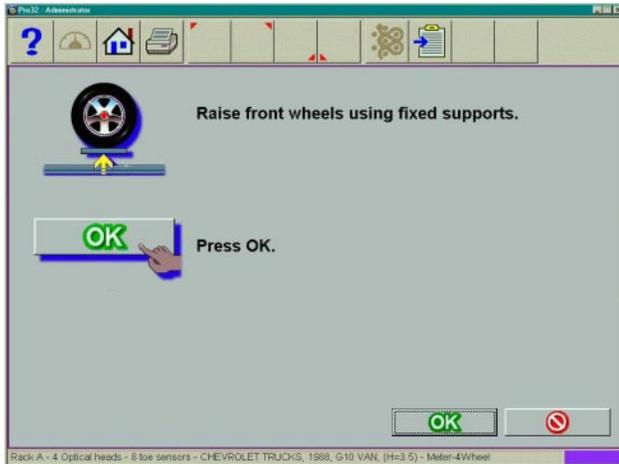


Figure 102. Pre-Adjustment Instructions

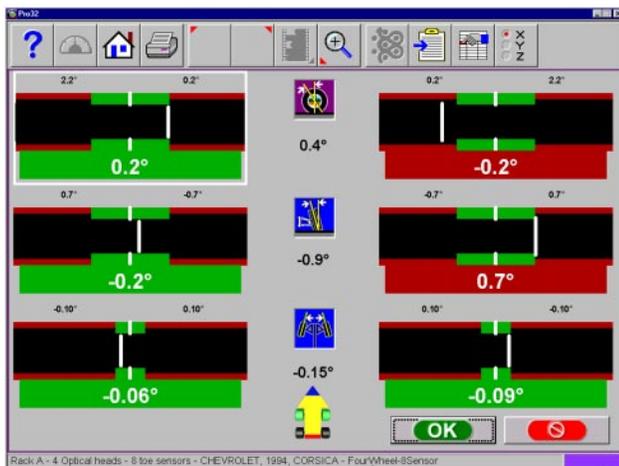


Figure 103. Live Caster/Camber Meter Screen

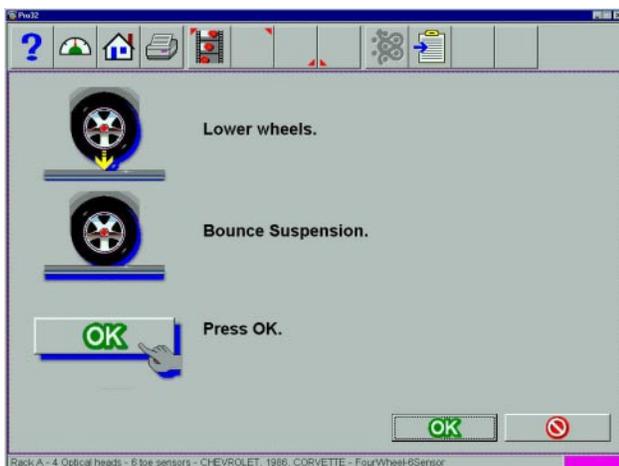


Figure 104. Instructions After Adjustments

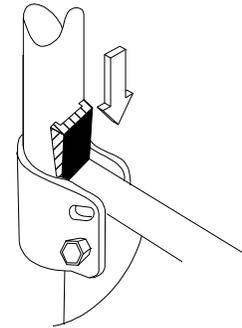


### Adjust Front Camber Elevated



### Adjust Rear Camber Elevated

For either the front or rear wheels, this feature allows the wheels to be elevated while retaining the measured camber values. This gives the ability to make accurate correction of camber without vehicle weight inhibiting the adjustment process. This would be useful for tapping down a wedge on a strut vehicle.



The adjustment screen displays live camber meters and numeric values for the left and right wheels along with live toe values (Figure 103). Make the desired adjustments while viewing the meters. When completed with the adjustment, press OK. Post-adjustment instructions are displayed (Figure 104).

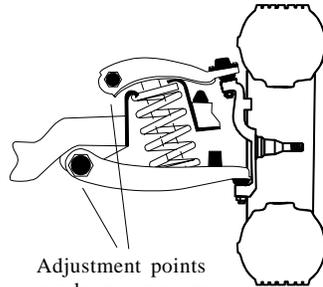
- Lower wheels
- Bounce suspension
- Press OK

The software returns to the Caster and/or Camber selection screen. Pressing the cancel button from there returns to the meter screens.



### Adjust A-Arms

Many vehicles have adjustment provisions for caster and camber located on the suspension A-Arm (control arm), either on the upper or lower arm. The adjustments may be made with shims, eccentric cams, or slots in the frame. Both angles are easily corrected to manufacturer's specification using the Adjust A-Arm icon.



Adjustment points can be on upper or lower control arm

The first step is telling the aligner the location of the adjustable A-Arm and whether the corrections will be made on the turntables or elevated. This is accomplished by pressing the proper icon on the Adjust A-Arm screen (Figure 105). The icons are:



Caster/Camber Adjustment on Upper Arm



Caster/Camber Adjustment on Lower Arm

Examine the vehicle for the location of the adjusters. It does not matter whether the a-arms have shims, slots, or cams. Once the decision is made by the technician, upper or lower, on the turntables or elevated, instructions appear apply the brake pedal depressor (important).

Next, a screen appears with a graphic of the right side a-arm along with two meters (Figure 106). These meters represent the movement of the front and rear of the a-arm, and their relationship to the desired readings. Move each side of the a-arm by adding/removing shims, loosening the bolts and sliding the arm, or turning the eccentric cams, until each meter indicator is centered in the meter – this is the desired value for both caster and camber. Press OK when this side is complete – a similar screen appears for the left side (Figure 107). When both sides are completed, press OK to return to the Adjust screen, and Cancel to go to readings.



Figure 105. Adjust A-Arm Selection Screen

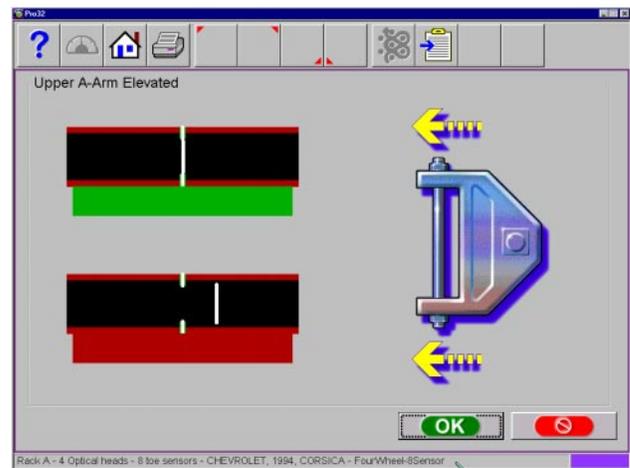


Figure 106. Left A-Arm Adjust Screen

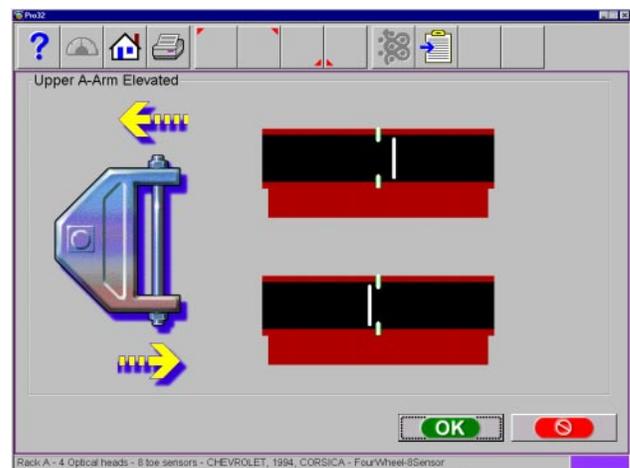
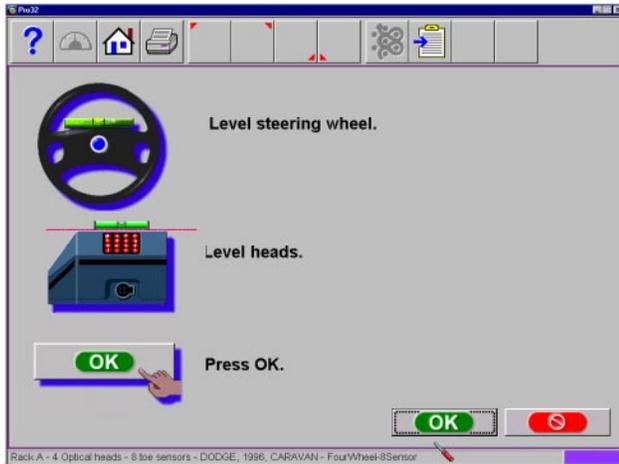
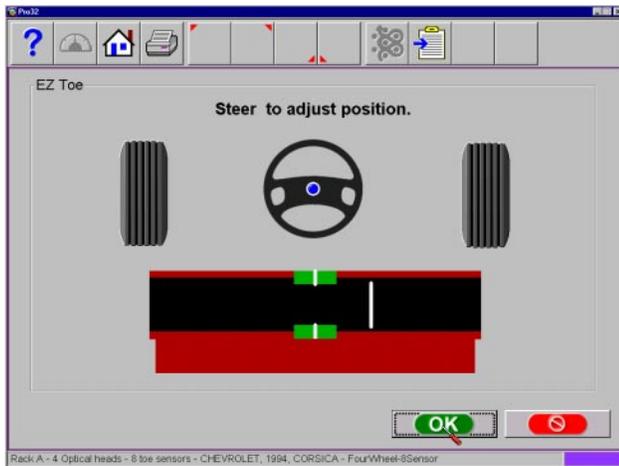


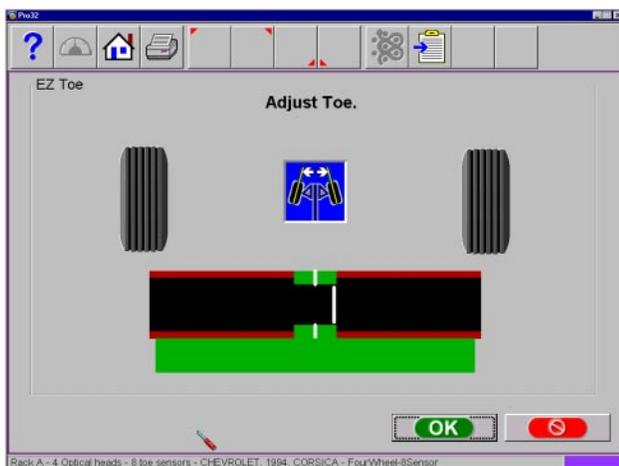
Figure 107. Right A-Arm Adjust Screen



**Figure 108. EZ Toe Preparation Screen**



**Figure 109. Steer to Adjust Position**



**Figure 110. Adjust Toe**



### **EZ Toe**

This software routine is an improved method of setting front toe, making it easier to obtain straight steering wheels. It also makes it possible to adjust toe with the wheels turned 10 degrees left or right, an aide when setting toe on cars with firewall-mounted rack and pinion units.

Use the following procedures:

1. Perform all alignment steps normally used to obtain alignment readings. Correct any misalignment in the rear as well as front caster and/or camber.

2. Select the EZ Toe icon from the Adjust screen.

**NOTE: DO NOT use the Steering Wheel Clamp during the EZ Toe procedure.**

3. Level the vehicle steering wheel and the measuring heads (Figure 108). Select OK.

4. Steer the right wheel to adjust the position until the meter is in the green (Figure 109). Select OK.

5. The next screen shows a meter indicating the amount of toe change needed for the right wheel.

6. Adjust the right tie rod until the meter needle is in the green. Select OK after completion.

7. Follow the same procedures for the left wheel.

8. Select OK once the left toe adjustment is made.

9. Return to the Front Readings screen and re-check toe and steering wheel position.



### Cradle Adjust

Cradle adjustment is a growing necessity for front wheel drive vehicles. Many front wheel drive vehicles are designed where the engine cradle also serves as the attachment point for the lower pivots of the suspension system. This assembly is bolted to the sub-frame as a unit from the bottom of the vehicle. The assembly must be properly aligned with the sub-frame to assure that front alignment is maintained.

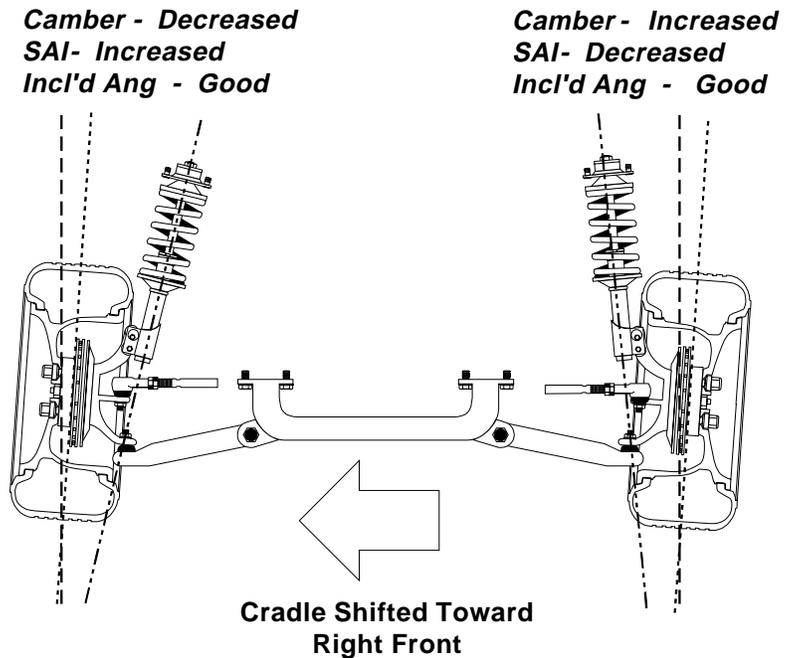
A closer look shows that the lower control arms are bolted to the engine cradle. The control arm is attached to the spindle through the lower ball joint. The strut is attached to the top of the spindle and is then attached to the body via the upper strut mount to complete the suspension steering axis.

The engine cradle can potentially move side to side, changing the camber and SAI angles. Prior to beginning a cradle adjustment, examine the left and right camber values. If one side has excessive positive camber and the other side excessive negative, this vehicle is a candidate for cradle adjustment.

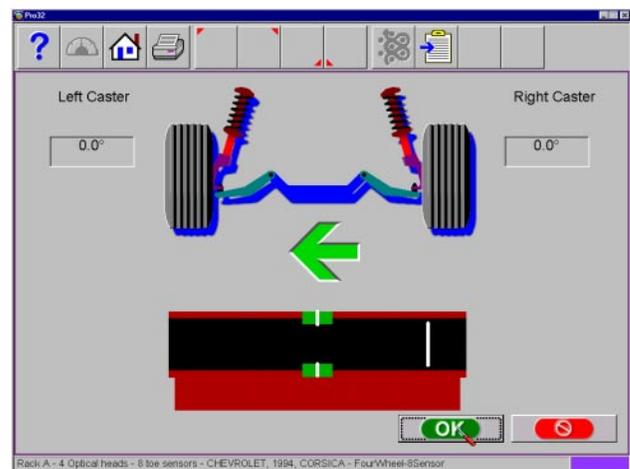
Vehicles with possible cradle misalignment include:  
 Ford Taurus / Mercury Sable, Lincoln Continental  
 GM "W" Body (Lumina, Grand Prix, Cutlass, Regal)  
 Chrysler "LH" Body (Intrepid, Vision, Concorde, LHS)  
 Honda Accord, Acura Integra, Mazda 929.

Consult the vehicle service manual for details on how to loosen the engine cradle.

To adjust a cradle using the EEWA-107/108, click on the Cradle Adjust icon on the Adjust Screen. The Cradle Adjust screen (*Figure 112*) has a graphic of the cradle with an arrow showing the direction of needed movement. A meter display determines exact placement. Loosen the cradle and slide in the direction of the arrow until the meter indicator is straight up – this is the ideal placement of the cradle. In addition, a live caster reading is shown for reference or for making a minor caster correction.



*Figure 111. Effects of Cradle Shift*



*Figure 112. Cradle Adjust Screen*

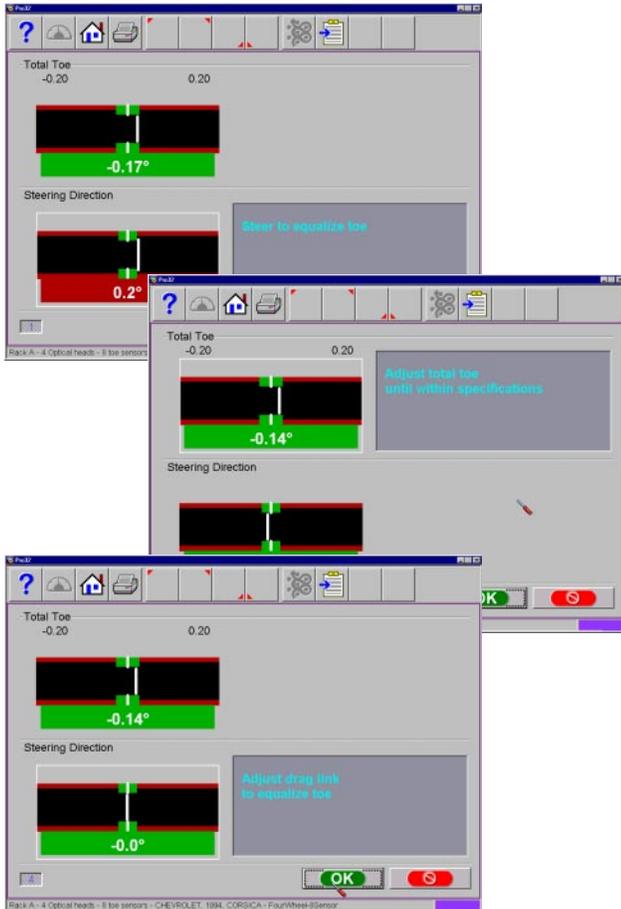


Figure 113. Drag Link Adjust Screens

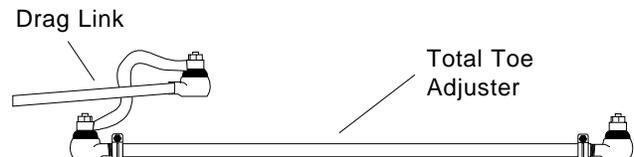


Figure 114. Single Tie Rod Adjust Screen



### Drag Link Adjust

The steering linkage on some 4-wheel drive trucks has a single total toe adjuster along with a drag link adjuster to correct the steering direction and straighten the steering wheel. The Drag Link Adjust feature allows simple and accurate adjustments to be made. From the Adjust Screen select the Drag Link Adjust icon.



The Drag Link Adjust screens (Figure 113) displays a total toe meter and a steering direction meter. To make the proper adjustments use the following steps:

1. Steer the front wheels to equalize toe by bringing the lower meter into the green area. Click OK.
2. Adjust the single tie rod to the total toe specifications while observing the upper meter. Click OK.
3. Straighten and lock the steering wheel as prompted, then click OK. Adjust the drag link sleeve until the steering direction is straight ahead, as indicated on the lower meter display.



### Single Tie Rod Adjust

Some vehicles, such as earlier Ford trucks and 80's Volkswagens, have a single tie rod adjuster for total toe, with no provision for adjusting for straight steering direction with a straight steering wheel. For these vehicles, click on the Single Tie Rod Adjust icon.

The screen that appears (Figure 114) is similar to the Drag Link Adjust screen. Use the following steps:

1. Steer the front wheels to equalize toe by bringing the lower meter into the green area. Lock the steering wheel at this position.
2. Adjust the single tie rod to the total toe specifications while observing the upper meter.
3. If a straight steering wheel does not result, yet is desired, remove the steering wheel from the steering column (see factory recommended procedures prior to removing) and replace it as needed for a straight condition.



### Shims and Kits

Many front wheel drive vehicles utilize aftermarket shims to correct rear camber and/or toe. This correction is achieved by placing the shim between the rear axle and the spindle. The EEWA-107/108 Aligner has several different aftermarket shim manufacturers' programs available, each of which must be setup prior to use during the alignment program (see *Page 35*). Consult the shim manufacturer's catalog for detail application information.

When a vehicle that utilizes rear shims is accessed from the specification database, the technician can use the EEWA-107/108 Aligner to determine the proper shim to correct a rear misalignment. From the Adjust screen choose the Shim and Kits icon.

At this point the computer will examine the live rear camber and toe readings, compare them to preferred specification, and calculate the amount of change needed. It will then recommend the shim needed to make this correction.

The first screen that appears is the Rear Shim Summary screen (*Figure 115*). All shim manufacturers included with Pro32™ are shown. The initial alignment reading, specification and the needed change will be indicated along the top chart. Below this is a listing of the available manufacturer's shim with the part number of the shim. To view more information about placement of the shim, click on the desired shim manufacturer part number to bring up an assistance screen.

The displays shown here is for Northstar (*Figure 116*) and Shimco (*Figure 117*). The screen shows the part number, a graphical presentation of proper installation orientation, and written instructions. After installation of the shims is completed press OK, follow the instructions, and press the Cancel key to move back to the Rear Readings screen.

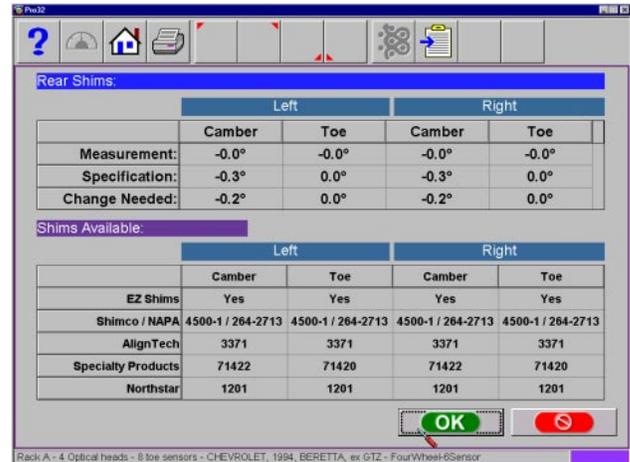


Figure 115. Rear Shim Summary Screen

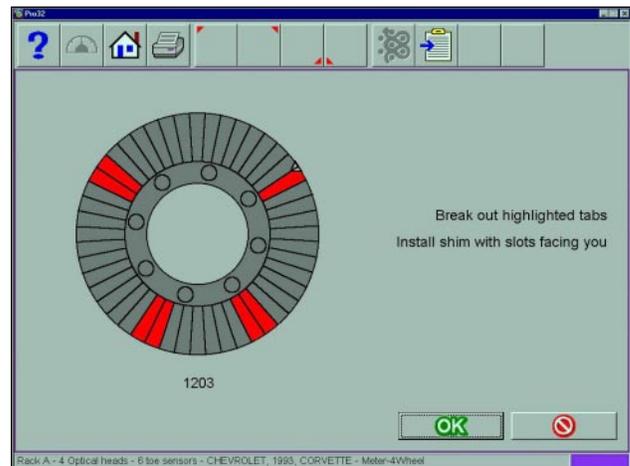


Figure 116. Northstar Screen and Instructions

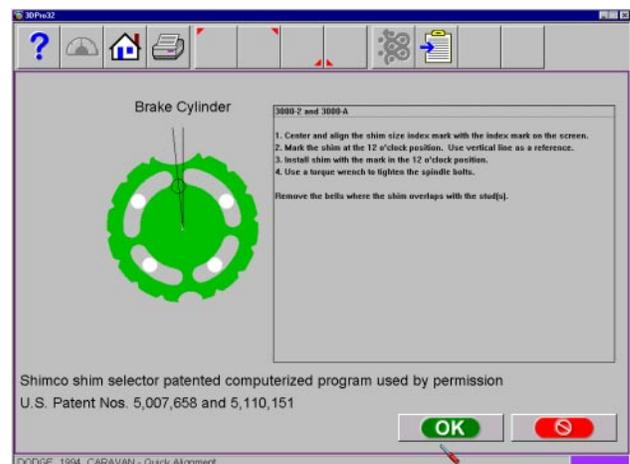


Figure 117. Shimco Screen and Instructions

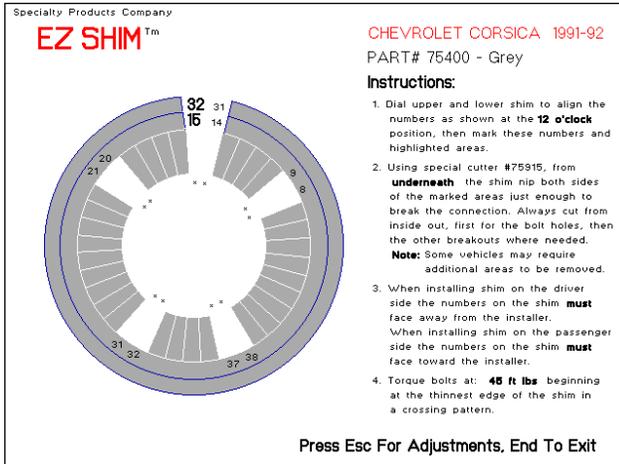


Figure 118. EZ Shim Screen and Instructions

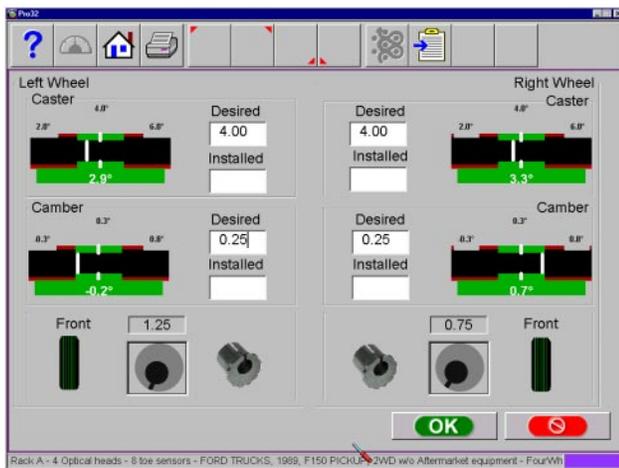


Figure 118a. EZ Shim Screen and Instructions

## EZ Shim

This type of shim is available from Specialty Products Co. When there is a “Yes” in the manufacturer’s chart next to EZ Shims, click on Yes to launch an assistance screen for properly using and installing their EZ Shim rear camber/toe angle correction product. The program automatically determines which one of the three colored shims is used for the vehicle, the amount of camber toe correction required, and the proper indexing of the shim. Once the calculation is completed, a picture of the shim is displayed with instructions for installation. On-screen instructions guide the operator through the steps.



## Front Shims and Kits

Most Ford 2-wheel drive trucks and many Ford/GM/Dodge 4-wheel drive trucks utilize offset sleeves and inserts around the upper or lower ball joints to adjust the caster and camber angles.

The program compares the current reading for caster and camber with the preferred specification, displaying the meters on-screen for reference (Figure 118a). The required sleeve/insert to correct the angles is shown below the meters, along with the orientation of the slot. Proper orientation of the slot insures the correct amount of caster and camber is obtained from the sleeve/insert.

The calculations assume the current sleeve/insert is a ZERO (no offset). If it is not, examine the slot orientation to determine if the previous installation corrected camber or caster. Enter the value of the old sleeve/insert in the box below either caster or camber, whichever most accurately reflects the orientation of the slot.

**NOTE:** Whenever there is a sleeve/insert installed that is not zero, it is difficult to determine its affect on the calculation of the new required sleeve/insert. It is a good idea to have a few zero sleeves available to install in the truck and remeasure caster to get a true initial reading.

## Toolbar Buttons

Toolbars are found on every screen within the Pro32™ software. The following legend identifies the button and refers to the pages where the button's function is described.

-  *Help – launches context-sensitive help screens.*
-  *Meters – jumps directly to the alignment meter screens. Pages 61-63.*
-  *Home – jumps directly to the Home Alignment tab. Page 48.*
-  *Print – launches the Print Report screen. Page 63.*
-  *Measure – from any readings screen, launches the Measure screen. Page 68.*
-  *Adjust – from any readings screen, launches the Adjust features. Page 74.*
-  *Animation – launches help with performing angle adjustments. Page 52.*
-  *Zoom – makes the selected meter fill the entire screen. Page 63.*
-  *Unzoom – returns from a zoomed meter to the standard meter screen. Page 63.*
-  *Custom Specifications – when selecting a vehicle, brings up any custom vehicles that have been saved. Page 51.*
-  *Restore OEM – during editing of specs, returns to OEM values. Page 51.*
-  *Plus and Minus – when editing specs, values increase or decrease. Page 51.*
-  *Delete – during custom specs, deletes the highlighted record. Page 51.*

-  *Check – during inspections, creates entry “checked”. Page 54.*
-  *Service – during inspections, indicated the item has been serviced. Page 54.*
-  *Replace – during inspections, indicated the item has been serviced. Page 54.*
-  *Add Comment – during inspections, allows entry of comments. Page 54.*
-  *Edit Inspection – allows editing of previously performed inspections*
-  *Edit – from readings screens, allows editing of vehicle, specs, customer data*
-  *Languages – allows the on-screen or print-out languages to be changed. Page 40.*
-  *Pro32™ Edit – allows selection of a different Pro32™ process. Page 39.*
-  *Login – allows login and logout of users. Page 36-37.*
-  *Edit Setup – allows changing of system setup items. Page 41.*
-  *Shop Management – if equipped, connects to the shop management system.*
-  *Information System – if equipped, calls up vehicle repair information.*

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# ***EEWA-107/108 Aligner***

## **Maintenance and Service**



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## Maintenance Tab

This screen is the hub of all EEWA-107/108 Aligner service and maintenance activities (*Figure 122*). Icon selections are:

**Calibration** – the software that enables the measuring heads to be calibrated using the optional Customer Calibration Kit

**Measurement Data** – primarily for Sun/Snap-on service personnel, this allows access to measuring sensor direct output

**Head Voltages** – used only on the cordless version of the EEWA-107/108, allows monitoring of battery voltages of the measuring heads

**Aligner Diagnostics** – a series of functions for Sun/Snap-on service personnel

**Preventative Maintenance** – a software feature that guides the equipment operator through recommended periodic aligner maintenance

### Customer Calibration (with optional kit)

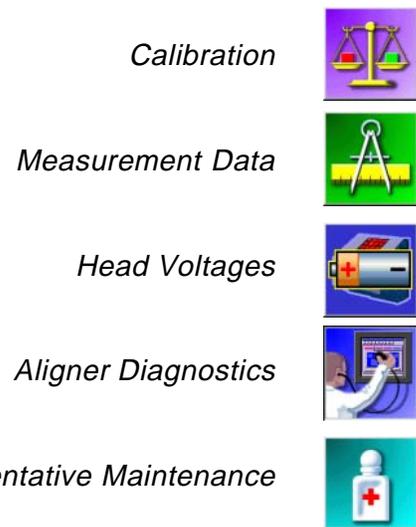
Calibration of the measuring heads requires the Customer Calibration Kit. This kit consists of a steel-tube bar approximately 5 feet long, a pair of stands with a flip indicator, and an aluminum track toe fixture (with screw/knob assemblies). Make sure these items are present before proceeding with the calibration.

There are three separate subsystems that must be calibrated – cross toe, track toe, and camber/SAI sensors. Cross toe measures the wheel angles across the front or back of the vehicle. Camber and SAI sensors measure wheel tilt angles. Cross toe and camber/SAI are performed by placing the heads on the calibration bar and stands. Each head has a toe system that measures angles from the front to rear (or vice versa) of the vehicle – this is called track toe. Track toe calibration requires the use of a vehicle and the special fixture.

Calibration of the EEWA-107/108 Aligner is designed to be fast and easy. Normal maintenance calibrations should be performed on a periodic basis. In addition, if a measuring head is dropped or bumped severely, a calibration will ensure all readings are accurate without a visit from a Sun/Snap-on Service Representative. Allow 10-15 minutes for calibration of the cross toe and camber/SAI systems on all 4 heads. Add an additional 10-15 minutes for track toe calibration on all 4 heads.



*Figure 122. Maintenance Tab Screen*



*Figure 123. Maintenance Icons*



Figure 124. Calibration Screen



Camber/SAI Calibration

Track Toe Calibration

Calibration Factors

Calibration History

Figure 125. Calibration Icons

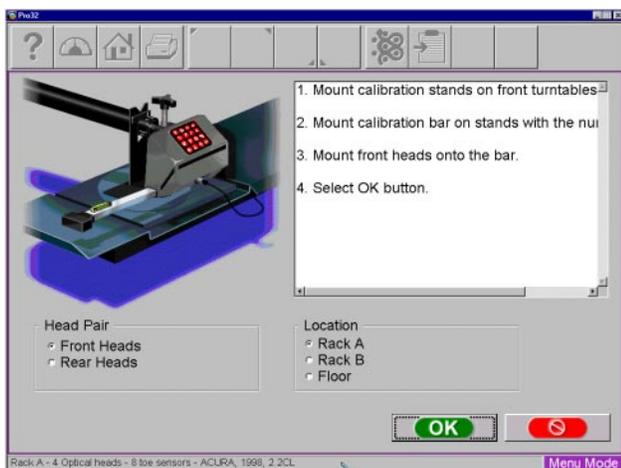


Figure 126. Camber/SAI/Cross Toe



### Step 1. Calibration Icon

Click on this icon from the Maintenance Tab screen to access the Calibration screen (Figure 124). From the Calibration screen the icon choices are:

**Camber/SAI Calibration** – calibrates camber/SAI sensors, along with cross toe sensors. Camber sensors are in all heads, while SAI and cross toe sensors are only in the front heads on 6 sensor systems and in the rear heads of 8 sensor systems.

**Track Toe Calibration** – calibrates the track toe sensors in each head. This process is performed one head at a time

**Calibration Factors** – displays the sensor calibration factors that are stored in memory and are used by the software to correct the displayed alignment values

**Calibration History** – each time a calibration is performed the date and calibration factors are stored by the software for later review

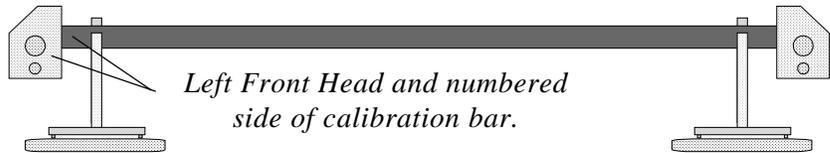


### Step 2. Camber, SAI, and Cross Toe Calibration

**NOTE:** Follow all on-screen instructions carefully to ensure quality results.

- A. Click on the Camber/SAI Calibration icon on the Calibration screen. The first screen to appear is shown in Figure 126.
- B. Select whether the front or rear heads are to be calibrated by clicking on the proper radio button. Choose the rack upon which the calibration is being performed. Up to 3 alignment surfaces can be utilized with the EEWA-107/108 Aligner, and each must be calibrated independently. In most shops, Rack A is the primary alignment surface – choices are Rack A, Rack B, or Floor.
- C. The text block describes the setup of the calibration bar and stands. The Calibration Kit includes a calibration bar, approximately 5 ft. (2m) long and two stands that sit on the alignment rack surface. When performing calibration of the front heads, place the stand on the turntables. When calibrating the rear heads, place the stands towards the rear of the rack.

The bar is placed in the upper notches of the stands as shown in *Figure 127*. Make sure the numbered end of the bar (1, 2, 3) is on the left side (when facing the aligner). Remove the heads from the wheel clamps by rotating the locking knob counterclockwise about 3 turns. Mount each head on the ends of the calibration bar shaft as shown. Leave the locking knob loose at this point.



*Left Front Head and numbered side of calibration bar.*

**Figure 127. Calibration bar and stands set up on turntables (Rear View)**

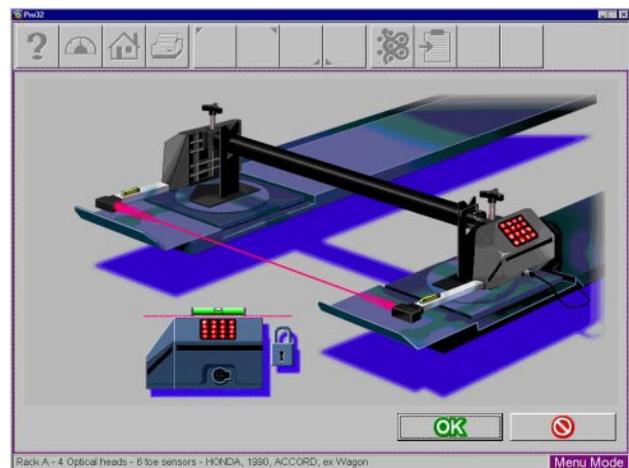
- D. The next step is to perform runout compensation of the calibration bar. This is done by rotating the bar until the #1 position is at 12:00, as shown by the flip indicator on the left stand (see *Figure 128*).

At the #1 position, press the "Runout" button on the left head only. It is not necessary to take runout on the right head. The light on the runout button will blink and the screen will change to show #2 in position. Rotate the bar until position #2 is at 12:00, and press the runout button on the left head. Repeat these steps for position #3.



**Figure 128. Position 1, 2, 3 at 12:00 for Runout**

- E. After runout of the bar is completed a screen will appear directing the operator to level and lock the heads (*Figure 129*). A red line between the cross toe sensors indicates the status of that system. An "X" in this beam indicates something is blocking the signal, and must be corrected prior to proceeding. Carefully lock the heads down while observing the levels on the heads, then press OK.



**Figure 129. Level and Lock Heads**

	New	Current	Change	Comment
Left Cross Toe	0.21	0.00	0.21	
Right Cross Toe	0.07	0.00	0.07	
Left SAI	0.00	0.00	0.00	
Right SAI	-0.02	0.00	-0.02	
Left Camber	0.12	0.00	0.12	
Right Camber	0.08	0.00	0.08	

Figure 130. Verify Calibration Factors

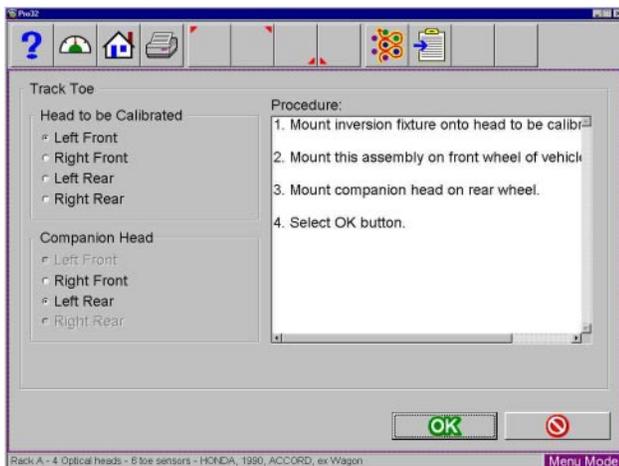


Figure 131. Track Toe Calibration Screen

## F. Verifying Calibration

After completing the runout and level/lock procedure, a screen appears to verify the new calibration factors (Figure 130). The screen has three columns of numbers. The first column "New" displays the calibration factors that were just obtained. The second column "Current" displays the calibration factors that were obtained from the previously performed calibration. The last column "Change" shows the total amount of change between the two calibrations. Should a factor exceed the usable limit, a warning will be displayed which indicates a possible problem and will recommend that a service technician be called. Clicking on the "Cancel" button will reject the new calibration factors and return to the Calibration Screen. Clicking on the "OK" button will accept the new factors and use them to perform alignments. A fourth column called "Comments" allows the operator to enter any notes about why the calibration was performed. Refer to the troubleshooting portion of this manual should the unit fail to work correctly. Use the Calibration Factors icon to see the results of the calibration at a later time. Calibration factors are used during the calculation of alignment angles. Simply put, this becomes the unit's "0" reference point.

G. Repeat these steps for the rear heads.



## Step 3. Track Toe Calibration

Track toe is used to establish the vehicle's rear toe, geometric center line, and thrust line. Track toe calibration must be done on a vehicle using the special Track Toe Fixture that is part of the Customer Calibration Kit. Place all head/clamp assemblies on the vehicle in preparation for these steps. Each head must be done independently. The head to be calibrated must reside on a front wheel with the track toe system facing the rear.

- A. Select the Track Toe icon on the Calibration Screen. The Track Toe Calibration screen appears (Figure 131).
- B. Choose the head to be calibrated by clicking on the corresponding button. The head to be calibrated must be mounted on a front wheel in order to steer when directed.

- C. Choose the companion head to be used on the rear wheel to act as a track toe signal receiver.

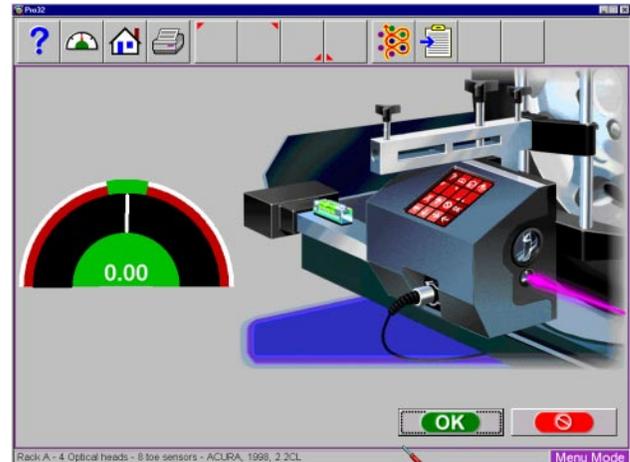
#### *Track Toe Fixture Setup*

This fixture is included with the Customer Calibration Kit. The kit includes the Track Toe Fixture (L-shaped aluminum piece with a stub shaft), 2 standard head locking knobs, and one locking knob with a longer threaded section. The two standard locking knobs are placed in the threaded holes on the top, in both ends of the fixture. Remove the head to be calibrated from the wheel clamp. Mount the track toe fixture onto the wheel clamp shaft with the larger end facing the wheel. Use the included knob to snug the fixture to the clamp shaft.

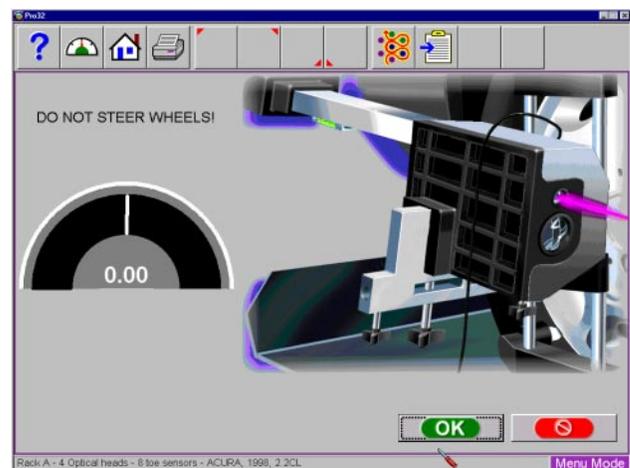
- D. Remove the tightening knob from the head to be calibrated and place the head on the shaft of the Track Toe Fixture. Using the long screw locking knob going down through the top of the fixture, tighten the head onto the fixture (*see Figure 132*).
- E. Mount the companion head on the rear wheel opposite the head being calibrated. Make sure there is a clear line of sight from the front to the rear. Level and lock the companion head.
- F. While observing the on-screen meter, steer the front wheel until the reading shown is close to zero. Click on "OK" when ready to proceed.

**IMPORTANT NOTE: DO NOT move the wheel at all after this point! DO NOT remove the head from the fixture!**

- G. The software then displays a screen asking to invert the head and Track Toe Fixture, or remount the fixture upside down (*Figure 133*). This is done by loosening the knob holding the fixture to the wheel clamp and sliding the fixture off away from the wheel, while being careful not to move the vehicle's wheel. Turn the fixture with the head still securely mounted upside down (180 degrees) until the narrow end of the fixture is facing the wheel. Remount this narrow end on the clamp shaft and tighten down the knob/screw. A correct orientation at this point will have the track toe system of the head pointing to the rear. Make sure there is a numerical reading on screen at this point. It may be necessary to point the fixture/head downwards slightly towards the companion receiver head.



**Figure 132. Mount Fixture, Steer to Zero**



**Figure 133. Invert Track Toe Fixture**



Figure 134. Verify Calibration Factors

- H. Once these steps are done, press "OK" to view the Verify Calibration screen (Figure 134) to decide whether to accept or reject the calibration of this head. If the New Factor or Change values are excessive, a warning message will appear. In most cases the calibration factors are good and it is proper to click on "OK" to finish the calibration of that head.
- I. Repeat these steps for all heads in the system. The Left Front and Right Rear heads are calibrated on the vehicle's left front wheel. The Right Front and Left Rear heads are calibrated on the vehicle's right front wheel.

This completes the customer calibration procedure.

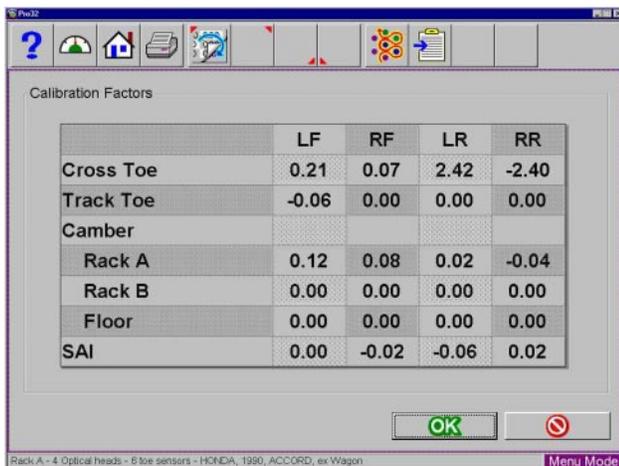


Figure 135. Calibration Factors



### Calibration Factors

The calibration factors can be viewed at any time by selecting the Calibration Factors icon from the Calibration Screen (Figure 135). These factors are referenced each time an alignment is performed. Notice there are three sets of camber factors for the three alignment surfaces.

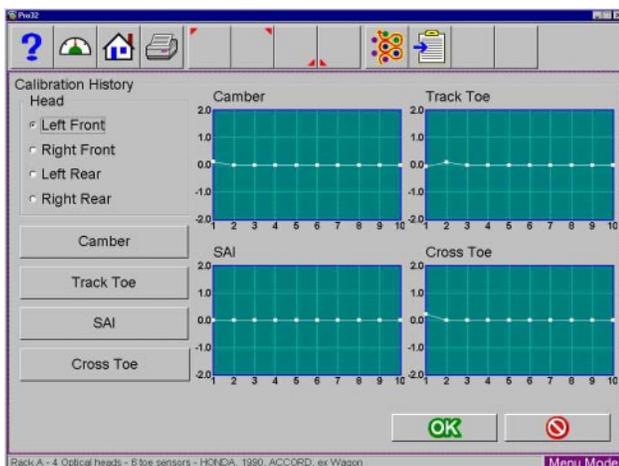


Figure 136. Calibration History Screen



### Calibration History

The past 10 calibrations of the EEWA-107/108 Aligner can be viewed by selecting the Calibration History icon on the Calibration Screen (Figure 136). It gives a graphical presentation of the calibration factors of any head selected, allowing a visual tracking of any problem areas. Selecting any of the buttons below the head selection brings up the calibration information for all 4 heads, along with dates the calibrations were performed.



## Measurement Data

These screens are primarily used by Sun/Snap-on Service personnel in diagnosing equipment problems. This information displays the direct output of the various measurement sensors used to determine the wheel alignment angles. As the operator of the equipment, it may be useful to have some knowledge of the EEWA-107/108's built-in diagnostic capabilities.

Click on the Measurement Data icon from the Maintenance tab. There are two screens to view sensor outputs:

- All Sensor Data** – shows a myriad of system information for advanced diagnostic capabilities
- Raw Values Only** – a simple display of direct output values from the measurement sensors

### Display All Sensor Data

The information available on this screen (*Figure 137*) includes:

- Displayed Values** -- the alignment angle numbers that are displayed on the Front/Rear meter screens. Calibration and runout factors are included
- Raw Values** – direct sensor outputs
- Toe Gains** – amplifier values for toe system circuits
- Runout Factors** – these values were stored when runout compensation was performed on each wheel. There is a camber and toe plane value given
- Key Data** – as a key on the main keyboard or any head keypad is pressed it will appear here.

### Raw Values Only

This screen (*Figure 138*) shows only the direct sensor outputs from each head. The values themselves have very little meaning when viewed while the heads are on a vehicle. All dashes showing for a head indicates a loss of communications. A loss of any toe signal will result in dashes appearing in the problem location.

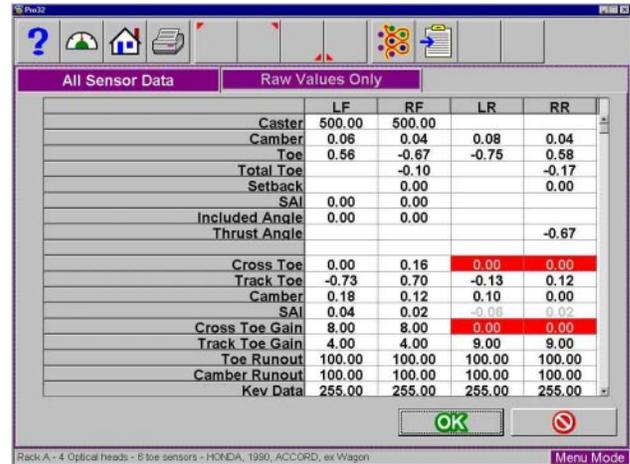


Figure 137. All Sensor Data

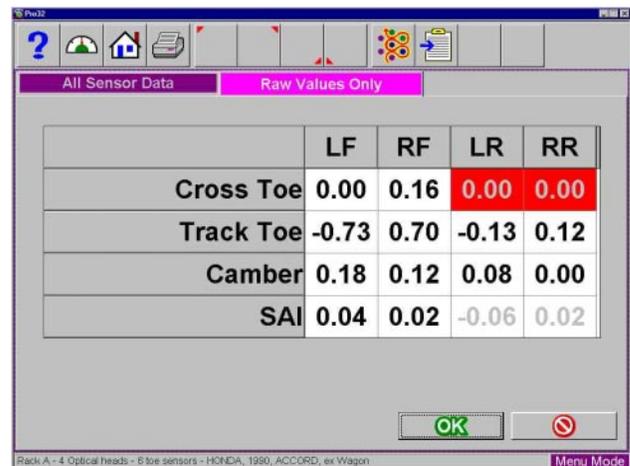
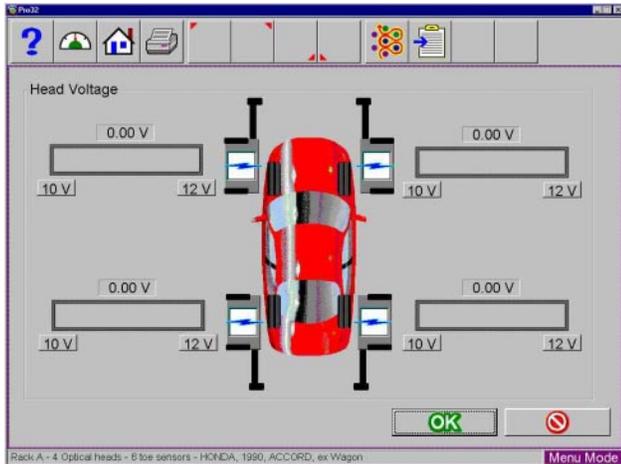


Figure 138. Raw Values Only



**Figure 139. Cordless Head Voltages**

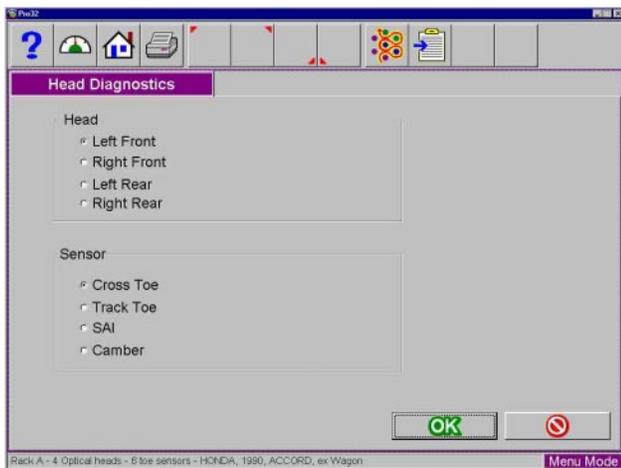


**Head Voltages**

This function is only of value for a EEWA-107/108 using cordless heads. The screen (*Figure 139*) displays the current battery voltage in each head so the operator knows when to recharge the system.



**Aligner Diagnostics**

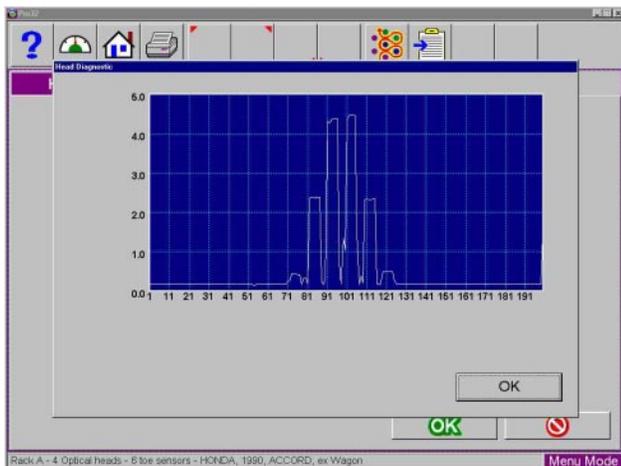


**Figure 140. Head Diagnostics Selection**

**Head Diagnostics**

This feature is used by Sun/Snap-on service personnel. The screen, shown in *Figure 140* allows selection of one of the measuring heads, along with selection of the sensor to be analyzed.

As an example, when a cross or track toe diagnostics is chosen, an oscilloscope pattern of the toe receiver is displayed (*Figure 141*). This type of display can be useful in diagnosing transmitter or receiver failures.



**Figure 141. Toe Sensor Pattern**



## Preventative Maintenance

The Pro32™ software has a Preventative Maintenance feature that insures the aligner is kept at peak operating performance. When the Preventative Maintenance icon is selected from the Maintenance Tab, a screen appears (*Figure 142*) with three tabs:

**Weekly** – items that should be addressed on a weekly basis

**Monthly** – items that should be addressed on a weekly basis

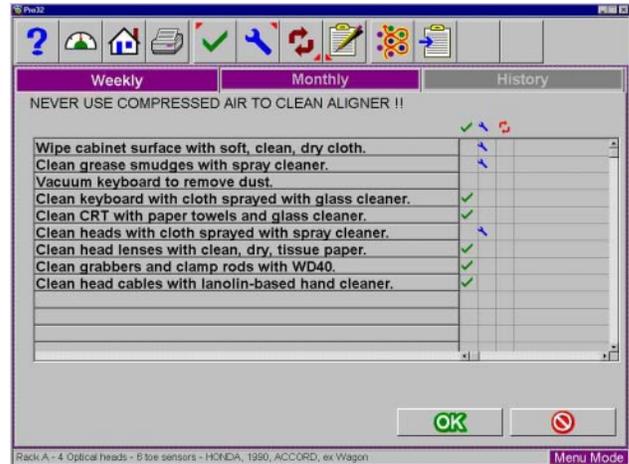
**History** – shows the dates maintenance was performed, provides selection of maintenance day

### Maintenance Checklist

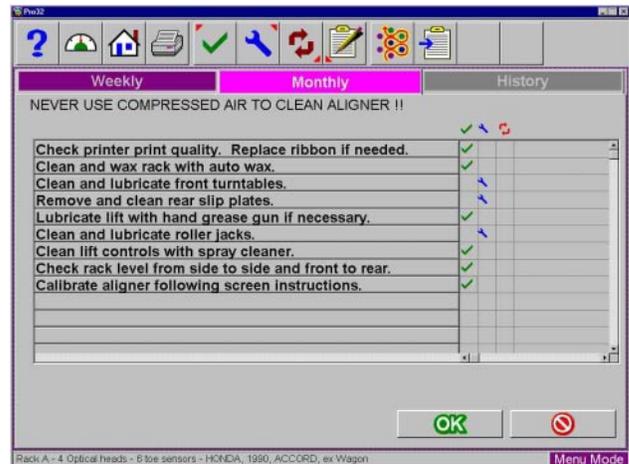
The items listed (*Figure 142*) represent the weekly chores to be performed and checks that should be made. A similar list is shown for Monthly Maintenance (*Figure 143*). The choices are Checked, Service, or Replace, depending on the operator's input. A text block is available to enter information about the item maintained.

### Maintenance History

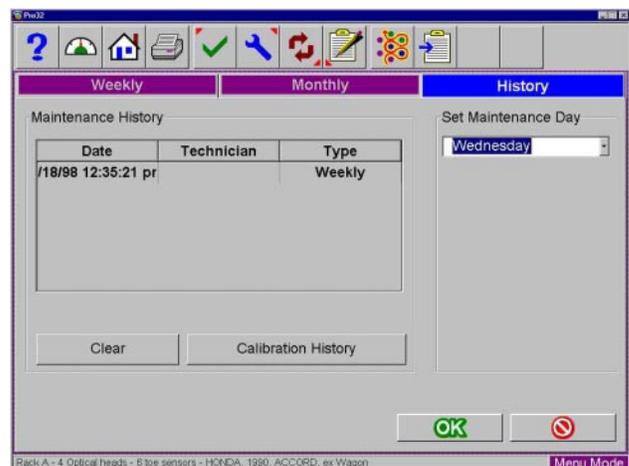
A listing of the dates, who the person was who performed the maintenance, and whether it was weekly or monthly maintenance is shown (*Figure 144*). Details of the maintenance procedure can be shown by highlighting any date, then select OK.



*Figure 142. Weekly Preventative Maintenance*



*Figure 143. Monthly Maintenance*



*Figure 144. Maintenance History*

## User Serviceable Parts

Many parts of the EEWA-107/108 Aligner can be replaced without calling for a Service Technician.

**Cable replacement (85617):** Unplug the cable from the back of the aligner and from the head. Replace with the new cable and check for proper operation.

**Printer ribbon/toner cartridge replacement:** Remove the top cover of the printer and remove the old ribbon/toner cartridge from its receptacle. Remove the protective cover from the new ribbon/cartridge and position in the receptacle. Read the Printer's owners manual for more details.

**Membrane panel replacement (88029):** Remove the four screws from the head cover. These screws are accessed through the rubber bumpers on the head cover. The membrane switch ribbon cable is attached to printed circuit board inside the head.

*DO NOT PULL ON THE HEAD COVER WHEN REMOVING. DAMAGE TO THE RIBBON CABLE CONNECTOR WILL OCCUR.*

Pinch the tabs on both sides of the cable connector and pull back gently on them. Slide the cable from the connector. *NOTE THE POSITION OF THE RIBBON CABLE WHEN REMOVING FOR EASIER INSTALLATION OF THE NEW MEMBRANE CABLE.* Peel the old membrane from the head cover. Clean the head cover thoroughly with Isopropyl Alcohol. When dry, peel backing off of the new membrane switch and place on head cover being careful not to pinch the ribbon cable as it passes through the hole in the cover. Place the ribbon cable back in the connector and push the connector's tabs back in. Reinstall the head cover and test the membrane for proper operation.

## Other Replacement Parts

88312	Keyboard w/ decals
85569	Keyboard, no decals
85633	Clamp wedge grip
85649	Clamp stub shaft
1122573	Bungie strap
85634	Clamp rod extension
83258	Head locking knob
86159	Level - black round
85617	Head interconnect cable - 33'
85616	Head interconnect cable - 65'
69804	Rack to head cable - curly
86278	Rack to head cable - straight

## Optional Items

88688	Digital Remote Display Unit
88690	Remote Controller
84196	Customer Calibration Package
84967	6" Offset Truck Adapters, Pair
86577	Extended Wheel Grabbers (Honda) Set for 4 Clamps
96	Brake Pedal Depressor
55502	Steering Wheel Holder
86815	Universal Lift Wiring Kit
72	Mechanical Turntables - Pair
042	Mechanical Turntables for Wheeltronic Lifts, Pair
82	Electronic Turntables - Pair
64222	Portable Rear Slip Plates, Pair

Sun/Snap-on would like to take this opportunity to **Thank You** for your purchase of a Sun Model EEWA-107/108 with *Pro32™* software Alignment System and sincerely hope it will bring you many years of profitable service.

## Troubleshooting Operational Problems

Symptom	Possible Cause	Suggested Repair
Unit fails to turn on.	Power Supply from wall	Check wall power supply by plugging in a known working item. Check the power cable for correct connection to machine.
	Power cable	Check cable continuity or substitute known good cable. Check all three fuses located on back.
	Blown Fuse	If fuses are blown, check for proper voltage setting, replace.  Call a qualified Technician if unit still fails to turn on.
Boot Up sequence not complete.	Program start up failure	Switch off and turn back on. If problem persists call a technician.
	Drive failure	Call for service.
No screen display.	Blown fuse	Unplug unit. Check all fuses, replace if necessary.
	Video card or CRT problem	Call for service.
Error message displayed on boot Up.	Program failure	Restart unit. See above boot-up problem. If problem persists call for technician.
	Computer hardware problem	Call for service.
Program will not advance when using remote. (not used on all machines)	Remote Batteries Dead or not installed properly.	Check batteries. (if applicable)
	Dirt on face of remote or remote sensor lens dirty or covered.	Clean remote or remote sensor lens. Call for technical support if problem persists. (if applicable)

## Troubleshooting Operational Problems

Symptom	Possible Cause	Suggested Repair
Program will not advance when using Head or console remote. (Lock Up)	Blown Fuse Program lockup Computer hardware failure	Check fuses on rear of unit Restart aligner and retry operation. Call for assistance if required. Call for service technician
Displays Head Communication Loss.	Bad Head Cable Toe PCB or computer failure	Substitute know good Head cable. Use Measurement Data Display screen. Replace bad cable. Call for service technician
Will not perform Runout.	Bad head keypad Toe PCB or computer failure	Use Measurement Data Display to read keyboard entry displays. Call for parts or for service to replace keypad. Call for service technician
Will not perform Caster Swing.	Blocked Track Toe beam Too much total toe on front wheels Unequal head heights on clamp Problem with vehicle Head component failure	Remove obstruction in toe beam path, clean lenses. Adjust total toe to straight ahead. Adjust head heights Switch to Manual Caster mode to complete, try on another car Call for service technician
Camber reading does not change and "0" Caster reading.	Broken Camber sensor Bad Toe PCB.	Call for service to replace sensor Call for service technician
Caster Adjustment reads backward from expected adjustment.	Brake pedal depressor not used or not holding brake secure. Turntables seizing	Check use of pedal depressor. Start vehicle to use power brake system. Clean, rebuild, or replace service turntables



### Troubleshooting Operational Problems

Symptom	Possible Cause	Suggested Repair
"0" SAI reading after swing and no live Caster or A-arm assistance adjustment - frozen.	Broken SAI Sensor Bad Toe PCB	Call for service technician Call for service technician
No Toe Readings.	Blocked Toe Beam  Bad LED Transmitter  Bad Toe Receiver	Remove obstruction in toe beam path, clean lenses, check for missing/cracked lenses.  Call for service technician  Call for service technician
No Printer operation	Printer unplugged or not turned on.  Printer data cable disconnected or failed.  Program not configured correctly for printer or printer DIP switches not set properly.	Check all printer power connections. Check on/off switch. Ensure Printer is "On Line" as indicated by LED.  Check connections at printer and back of computer.  Check system configuration under Security Code Word. If printer not enabled, call for codes. Check Printer setup also for proper configuration.
Machine resets or changes menus randomly.	Remote controller problem - (not used on all machines)  Computer system problem	Cover the Infrared receiver on the console with a cloth to see if the problem stops. If so call for check for alternate remote sources. Perhaps a TV or VCR is nearby. (if applicable)  Call for service technician

# APPENDIX A – PRINTOUT EXAMPLES

## 1. Alignment Report

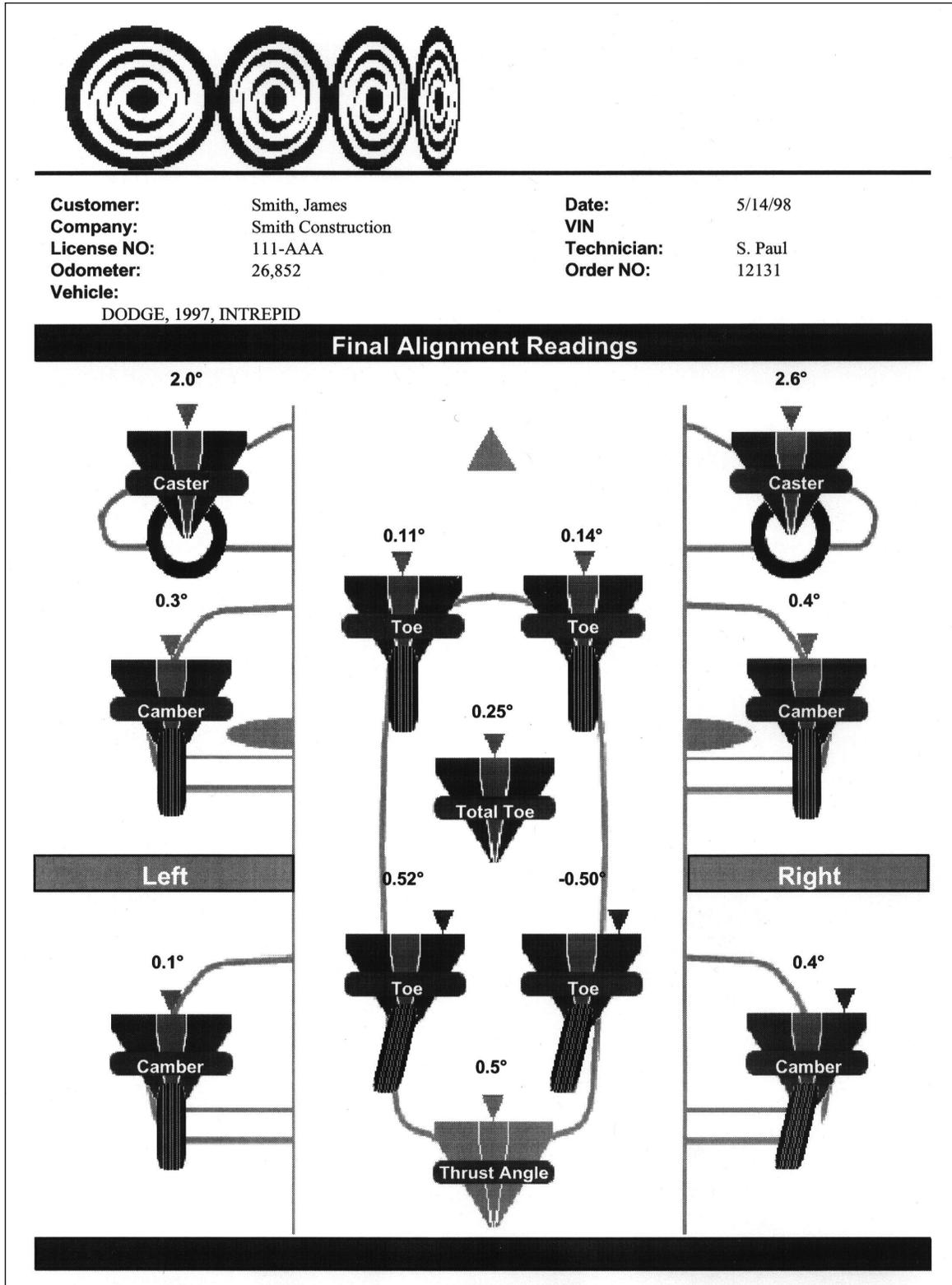
Customer: Smith, James	Date: 5/14/98
Company: Smith Construction	VIN
License NO: 111-AAA	Technician: S. Paul
Odometer: 26,852	Order NO: 12131

**VEHICLE ALIGNMENT REPORT**  
DODGE, 1997, INTREPID

Primary Angles			Initial	Specifications		Final
				Min.	Max.	
Front	Caster	Left	2.0°	2.0°	4.0°	2.0°
		Right	1.5°	2.0°	4.0°	2.6°
	Camber	Left	0.3°	-0.6°	0.6°	0.3°
		Right	1.3°	-0.6°	0.6°	0.4°
	Toe	Left	0.22°	0.00°	0.20°	0.11°
		Right	0.08°	0.00°	0.20°	0.14°
Total		0.31°	0.00°	0.40°	0.25°	
Rear	Camber	Left	0.1°	-0.6°	0.4°	0.1°
		Right	0.4°	-0.6°	0.4°	0.4°
	Toe	Left	0.52°	-0.10°	0.20°	0.52°
		Right	-0.49°	-0.10°	0.20°	-0.50°
		Total	0.03°	-0.20°	0.40°	0.03°
	Thrust Angle			0.5°	----	

Secondary Angles			Initial	Specifications		Final
				Min.	Max.	
SAI	Left		8.1°	14.0°	14.0°	8.1°
	Right		8.7°	14.0°	14.0°	8.7°
Included Angle			8.4°		----	
Track Width Diff.		Rear	----	----	----	----
Wheel Base Diff.			----			----

## 2. Graphical Alignment Report



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## Appendix C – Glossary of Alignment Terms

- \* Ackerman Principle: An alignment principle based on vehicle tread width and wheelbase upon which turning angle is computed.
- \* Active Suspension: A suspension system in which hydraulic actuators add force to the suspension system to allow compression (Jounce) and extension (Rebound).
- \* Alignment: The process of measuring and positioning all wheels attached to a common chassis.
- \* Angle: Two intersecting lines that are not parallel.
- \* Arc: Any part of a circle or a curved line.
- \* Axial Play: Vertical movement of the wheel and tire assembly when inspecting a ball-joint.
- \* Balance: This term is used to describe having equal weight distribution about the circumference of a wheel and tire assembly.
- \* Ball-Joint.: A chassis to knuckle connector consisting of a ball and a socket. This configuration allows for simultaneous angular and rotating motion.
- \* Bead: Steel wire forming an anchor for individual plies and rim attachment of a tire.
- \* Bellows: a Rubber type seal which is folded to allow for a telescopic action. Normally referred to as a bellows boot.
- \* Bias Belted: A tire construction type with overlapping plies at 90 degrees with additional belts formed around the circumference of the tire.
- \* Bias Ply: The same type of construction is used on this design as a bias belted, but without the reinforcement belt.
- \* Body Roll: The leaning of the vehicle body while cornering.
- \* Braking Control: Vehicle stability related to the reaction under all stopping conditions.
- \* Bump Steer: A directional change in steering caused by road irregularities. As the suspension moves through jounce and rebound, changes in alignment at the front or rear wheels may alter the vehicle's directed path.
- \* Bushing: A component made of metal or rubber-type material, used to isolate interconnected moving parts.
- \* Cam Bolt: A bolt and eccentric assembly which when rotated will force components to change a position.
- \* Camber: The inward or outward tilt of the wheel at the top and as viewed from the front.
- \* Camber Roll: A change in camber brought about by suspension changes while cornering.
- \* Caster: The forward or rearward tilt of the steering axis at the top and as viewed from the side.
- \* Center Bolt: A bolt that provides centering and attachment of an axle and spring assembly.
- \* Centerline Steering: A centered steering wheel while the vehicle is traveling in a straight ahead course.
- \* Chassis: All major assemblies on a vehicle including suspension, steering, drivetrain and frame; everything except the body.
- \* Circumference: The total distance around a circle.
- \* Coil Spring: Spring steel wire formed in the shape of a coil.
- \* Compliance: The ability of an object to yield elastically when a force is applied.
- \* Concentric: Two or more components sharing a common center.
- \* Conicity: The cone shape that a tire takes through its normal life when inflated and loaded.
- \* Contact Area: The total amount of tread surface that contacts the road.
- \* Control Arm: An arm that is used to attach a spindle or axle to the chassis.
- \* Cornering: The ease at which the vehicle travels a curved path.
- \* Cradle: The framework of a front wheel drive vehicle that provides the engine mounts as well as front suspension pivot points for many vehicles.
- \* Curb Weight: The overall weight of a vehicle less passengers, luggage, or load.
- \* Degree: A unit of measurement to describe an angle.
- \* Dial Indicator: An instrument used to measure and display linear displacement. Measurement is displayed on a dial face and the scale is commonly graduated in thousandths.
- \* Directional Stability: The tendency of a vehicle to maintain a directed path.
- \* Drag Link: A tube or rod used for interconnection between a pitman arm and tie-rod assemblies.
- \* Dry Park Check: Inspection of chassis and steering parts with the vehicle at normal ride height. Not in the raised position.
- \* Dynamic Balance: This normally refers to the balance condition of a wheel and tire assembly in motion.
- \* Eccentric: See cam bolt.
- \* Feather Edge Wear Pattern: An abnormal tread wear pattern whereby one side of an individual tread rib is worn more than the other.
- \* Flow Control Valve: Regulates flow output from the power steering pump. This valve is necessary because of the variations in engine RPM and a need for consistent steering ability in all ranges from idle to highway speeds.
- \* Foot Pound: A unit of measurement used to describe torque force.
- \* Four Wheel Steering: The ability of the rear wheels to aid in steering a vehicle for improved handling and driving characteristics.
- \* Frame Angle: Used to describe a non-level frame.
- \* Friction Ball Joint: Outer suspension pivot that does not support the weight of the vehicle.
- \* Front Steer Rack and Pinion: Steering system located in front of spindle centerline.
- \* Geometric Centerline: A line drawn between the midpoint of the front axle and the midpoint of the rear axle.
- \* Horizontal: Parallel or level with the plane of the horizon.
- \* Hub: The assembly that houses the bearings about which the wheel and tire assembly rotates.
- \* Hydraulic Pump: A power driven device generating constant volume and pressure.
- \* Idler Arm: An arm and lever assembly used to support and maintain a parallel position with a conventional steering system.
- \* Included Angle: The sum of the angles camber and SAI.
- \* Independent Suspension: A suspension system that provides an isolated mounting for each wheel to the chassis.
- \* Individual Toe: The angle formed by a horizontal line drawn through the plane of one wheel versus a centerline.

- \* Integral Power Assist: A power assist system where the control valve and all major hydraulic components are self-contained.
- \* Intersect: The crossing point of two lines.
- \* Jounce Travel: A suspension moving up through its travel.
- \* Kinetic Balance: The balance condition of a rotating wheel related to force generated in a vertical plane.
- \* King-Pin: A pin used to attach a spindle to an axle.
- \* Lateral Run-Out: Side-to-side movement with a rotating wheel or tire.
- \* Lead: A slight tendency for a vehicle to lead away from its directed course.
- \* Linkage: A series of rods or levers used to transmit motion or force.
- \* Load Carrying Ball Joint: Outer suspension pivot that supports the weight of the vehicle.
- \* Load Range: A system used to describe the service or weight limitations of a tire.
- \* MacPherson Strut: A suspension design where spindle, shock, and spring are all one assembly.
- \* Memory Steer: A condition where the wheels, rather than returning to straight ahead, tend to remember and seek a previous position.
- \* Millimeter: A unit of linear measurement. One millimeter is equivalent to 0.039 inches.
- \* Minute: A unit of measurement used to describe an angle. One minute is equivalent to 1/60th of one degree.
- \* Non-Integral Power Assist: A power assist system where the control valve and all major hydraulic components are not self-contained.
- \* Offset: The lateral displacement of a wheel or axle in respect to a centerline.
- \* Oscillate: A motion in two directions and at a specific frequency.
- \* Out-of-Round: A wheel and tire irregularity in which one or both are not concentric with its axis of rotation.
- \* Overinflation: Inflation pressure beyond what is recommended.
- \* Oversteer: A characteristic in which a vehicle has a tendency to turn sharper than the driver intends.
- \* Parallelogram Steering Linkage: A steering linkage design where if all pivot points are connected by lines, these lines would be parallel.
- \* Passive Suspension: A suspension system which uses springs along with shock absorbers to allow compression (Jounce) and extension (Rebound).
- \* Perpendicular: Being at right angles.
- \* Pitman Arm: A steering component that provides interconnection between the steering gear sector shaft and the steering linkage.
- \* Ply Rating: A method of rating tire strength; not necessarily indicative of the actual number of plies used.
- \* Power steering: A steering system which incorporates hydraulics to assist in the steering of the wheels.
- \* Pre-load: A predetermined amount of load or force applied during assembly to prevent unwanted play during actual operation.
- \* Pressure Relief Valve: Prevents power steering fluid pressure buildup beyond a specified point. When fluid is at the maximum desired pressure the excess is returned to the pump reservoir.
- \* Pull: The tendency for a vehicle to steer away from its directed course.
- \* Rack and Pinion Steering Gear: A steering system design that utilizes a pinion gear meshed with a rack gear to transmit steering forces to the spindles.
- \* Radial Play: Any lateral movement of the wheel and tire assembly when inspecting a ball-joint or kingpin.
- \* Radial Ply Tire: A tire construction type with alternating plies 90 degrees to the tire bead.
- \* Radius: The distance from the center to the outer edge of a circle.
- \* Rag Joint: A type of U joint constructed from a rubberized fabric type material.
- \* Rear Steer Rack and Pinion: Steering system located in front of spindle centerline.
- \* Rebound: A suspension moving down through its travel.
- \* Recirculating Ball Steering Gear: A steering gear design that is made up of a worm shaft, ball nut, and two recirculating ball circuits.
- \* Returnability: The tendency of the front wheels to return back to a straight ahead position.
- \* Road Crown: The slope of a road from its center.
- \* Road Feel: Necessary feedback transmitted from the road surface up to the steering wheel.
- \* Road Isolation: The ability of a vehicle to better separate road irregularities from the driver and passengers.
- \* Road Shock: An excessive amount of force transmitted from the road surface up to the steering wheel.
- \* Scrub Radius: The radius formed between wheel centerline and steering axis projected load points at the road surface.
- \* Setback: The angle formed between a centerline and a line perpendicular to the front axle.
- \* Shim: Thin material of fiber or metallic makeup used to take up clearance between two parts.
- \* Shimmy: A violent shake or oscillation of the front wheels transmitted up to the steering wheel.
- \* Shock Absorber: A suspension component used to dampen spring oscillation.
- \* Solid Axle Suspension: A suspension system consisting of one steel or aluminum I-beam extended the width of the vehicle.
- \* Short Arm Long Arm (SALA): An independent suspension design incorporating unequal length control arm.
- \* Spindle: A component on which a wheel and tire assembly is mounted and rotates.
- \* Stability: The tendency of a vehicle to maintain a directed course.
- \* Stabilizer Bar: A steel bar used to minimize body roll.
- \* Steering Arms: A steering component which provides interconnection between the outer tie-rod and spindle.
- \* Steering Axis Inclination: The angle formed by an imaginary line drawn through the steering axis versus vertical. Viewed from the front.
- \* Steering Gear: A mechanical device used to convert the rotary motion at the steering wheel to a lateral motion.

- \* Steering Geometry: See Alignment.
- \* Steering Knuckle: A forged assembly which typically includes: the spindle, steering arm and steering axis pivot points.
- \* Steering Shaft: A tube or rod which interconnects the steering wheel to the steering gear.
- \* Steering Wheel Play: Any abnormal play or movement that does not result in movement at the front wheels.
- \* Strut: Any support used between two parts.
- \* Suspension: An assembly used to support weight, absorb and dampen shock, help maintain tire contact, and proper wheel to chassis relationship.
- \* Suspension Height (Ride Height): The specified distance between one or more points on a vehicle to the road surface.
- \* Thrust Angle: The angle formed by thrustline and geometric centerline.
- \* Thrustline: Average rear toe added together and divided by two. The direction the rear rolls.
- \* Tie Rod Assembly: The outer most assemblies on a parallelogram steering linkage. These assemblies are attached to the drag link and steering arms.
- \* Tie Rod End: The ball and socket assembly of a tie rod.
- \* Tie Rod Sleeve: A threaded tube that provides connection and adjustment of a tie rod assembly.
- \* Tire Force Variation (Radial Force Variation): A tire irregularity in which there is a difference in radial stiffness about the circumference of the tire.
- \* Tire Wear Pattern: The design developed on the tread surface from abnormal wear.
- \* Toe: The comparison of a horizontal line drawn through both wheels of the same axle.
- \* Turning Angle: The difference in the turning angle of the front wheels in a turn.
- \* Torsion Bar: A spring steel bar used in place of a coil spring. Suspension is provided through its resistance to a twisting or torque effort.
- \* Torque Steer: The effect that acceleration or deceleration has on the steering of the front wheels.
- \* Tracking: The interrelated paths taken by the front and rear wheels.
- \* Treadwidth: The dimension as measured between the centerlines of the wheels on the same axle.
- \* Treadwear Indicators: Ridges molded between the ribs of the tread that visibly indicate a worn tire.
- \* Underinflation: Air pressure below that which is specified.
- \* Understeer: A characteristic in which a vehicle has a tendency to turn less than the driver intends.
- \* Unit Body (Uni-Body): A design that incorporates both body and frame as a unit.
- \* Vertical: Being exactly upright or plumb.
- \* Vibration: To constantly oscillate at a specific frequency.
- \* Waddle: The lateral movement of a vehicle usually caused by some type of tire or wheel imperfection.
- \* Wander: The tendency of a vehicle to drift to either side of its directed course.
- \* Wheel Base: The dimension as measured between the center of the front and rear axles.

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Snap-on Diagnostics  
420 Barclay Blvd.  
Lincolnshire, IL 60069  
(800) 225-5786

*Model EEWA-107/108 Wheel Aligner  
with Windows 95 and Pro32™ Software*

*Operator's Manual*

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