
CCD-1000

Wheel Alignment Interface

Operation Instructions

Table of Contents

About This Manual...	1	Runout	22
Chapter 1 - Introduction	3	If No Runout is Detected	24
Safety Precautions	5	If Runout is Excessive	24
Power Cord Connections	5	Prepare Vehicle After Runout	25
Wet Floors	5	Caster Swing	25
Vehicle	5	Turning Angle	28
Raising the Vehicle	5	Display-All Page	29
Getting Started	5	Toe and Caster/Camber Meters	31
Standard PC Installations:	5	Options	32
40-200 Analyzer Installations:	5	Jack & Hold	33
Features, Controls & Major Components	6	Digital Adjustment Screens	34
Remote Control Unit	6	Printout Options	35
Keyboard	6	Special Functions	36
Wheel Units	7	Customize Routines	37
Wheel Clamps	8	Set Formats	37
Vehicle Preparation	9	Set Programmed Alignment	38
Chapter 2 - Procedures	11	Set Audio Signals	39
Main Menu	13	Select Units	39
Selections	13	Set Volume	40
Alignment Modes	13	Set Color	40
Visual Inspection	14	Set Runout Mode	41
Visual Inspection Menu	14	Set Clock	41
Inspection Procedure	14	Language Selection	42
Alignment	16	Self Test	42
Procedure	16	Dealer I.D.	42
Programmed Alignment	16	Print Screen	43
Specifications	17	Customer Data	43
Procedure	17	Enter New Customer	44
Edit Specifications	19	Retest Customer	44
User Specifications	20	Optional Runout Mode	45
Select a User Specification	20	4-Point Camber-Only Mode	45
Create/Edit User Specifications	21	All Wheel Runout Procedure	46
Save User Specifications	21	Chapter 3 - Preventive Maintenance	49
To Delete User Specifications	22	Wheel Alignment Rack/Runways	51
		Rear Slip Plates	51
		Full Floating Front Turning Radius Plates	51
		Sliding Jacking Beam	51
		Components	51
		Brake Pedal Depressor	52
		Steering Wheel Holder	52

About This Manual...

Figure 1-1 details the features on each page which will allow the reader to find and understand information quickly and easily.

1 Chapter Heading - Allows the reader to locate main section headings while "thumbing through" the manual.

2 Topic Headings - Identifies major topics within the chapter.

3 Topic Subheadings - Calls attention to important concepts.

4 Illustrations - Explain important ideas or procedures.

5 Important Reader Messages:

CAUTION! When this symbol appears, the potential exists for serious injury and/or damage to the aligner. READ AND FOLLOW THE INSTRUCTIONS IN THIS TYPE OF NOTE CAREFULLY!

IMPORTANT NOTE: Information in this type of note is extremely important and may affect aligner operation and test result quality. READ THESE NOTES CAREFULLY!

NOTE: Notes contain helpful hints and tips to make operating the aligner easier.

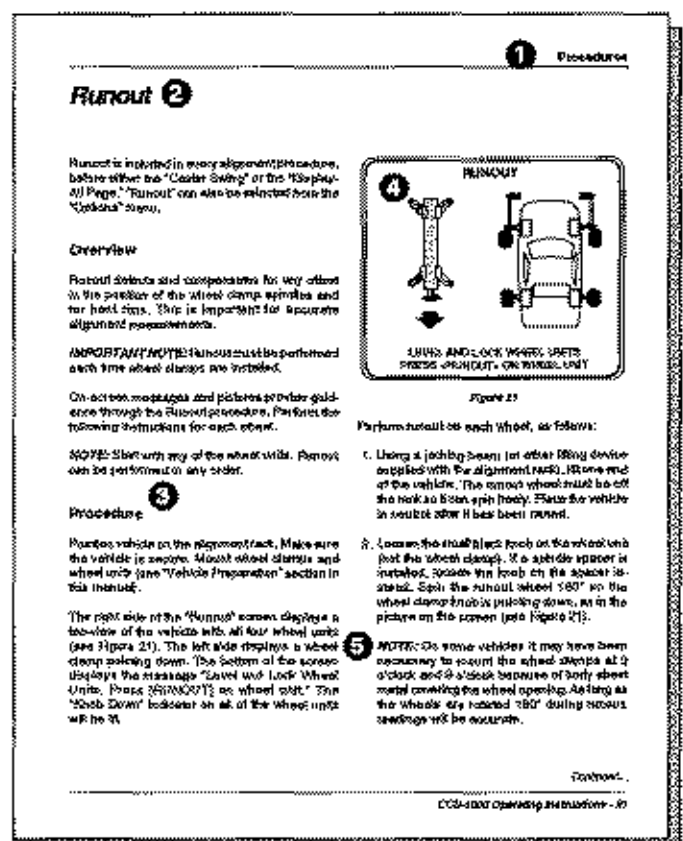


Figure 1-1

Introduction

Safety Precautions

Power Cord Connections

- The alignment machine must be plugged into a 115V, 60Hz properly grounded outlet.
- DO NOT cut the grounding prong off the AC power cord.
- If using a ground adapter, be sure the pigtail is grounded to the power receptacle.
- If an extension cord is used, use a three-wire type with the grounding circuit in good condition.

Wet Floors

- When plugging power cord into electrical outlet, avoid wet floors to prevent electrical shock.

Vehicle

- **MAKE SURE THE VEHICLE CANNOT ROLL.** Block the wheels if necessary to keep the vehicle from rolling off the rack.

Raising the Vehicle

- Use a proper jacking system provided with the rack.

Getting Started

Standard PC Installations:

1. Turn the main power switch "ON." The screen will display several self-test messages and then a "DOS prompt."
2. Type in the word "ALIGN," then press [ENTER]. The alignment program will begin.

40-200 Analyzer Installations:

1. If this module is installed in a BEAR 40-200 Analyzer, a menu screen will appear listing the alignment function as one of the choices. Select the menu item to start the program.

Review this manual to become familiar with the alignment machine. The manual is organized as follows:

- **Features, Controls and Major Components** - Describes the major features of the alignment machine. This section also provides instructions on preparing the alignment machine and the vehicle for alignment procedures.
- **Procedures** - Provides detailed instruction for and examples of alignment procedures and functions.

To begin an alignment, start at the "Main Menu" screen in the "Procedures" section of this manual.

Refer to the titles within the "Procedures" section as needed. Each title is the name of a menu selection or function.

When instructed to press a certain key, the key name will appear in uppercase letters enclosed in brackets ([]). For example: Press [ENTER] means press the "ENTER" key on the keypad.

Note: A template is provided for standard 101-key keyboards to help the operator remember the available keyboard shortcuts.

Controls

Optional Remote Control Unit (Refer to Figure 1-2)

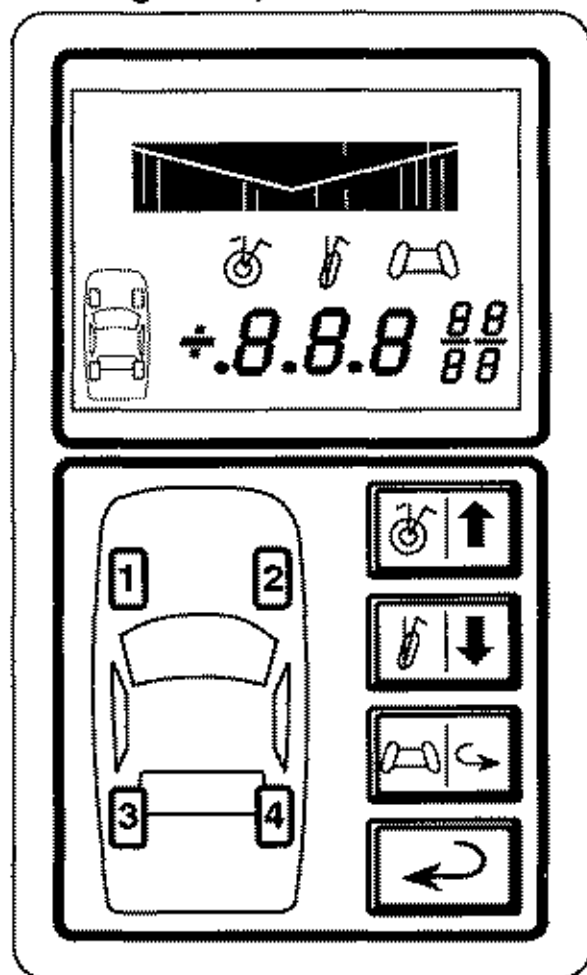


Figure 1-2

The remote display shows adjustment meters and alignment values.

Use the remote unit to:

- Make selections from the "Options" Menu;
- Enter and exit the meter screens;
- Choose wheels for display on meter screens and digital adjustment screens;
- Perform the visual inspection routines.

To Connect the Remote Unit:

See Figure 1-3. The remote unit may be plugged into any one of the five (5) wheel unit connector sockets (A) located on the back of the interface unit.

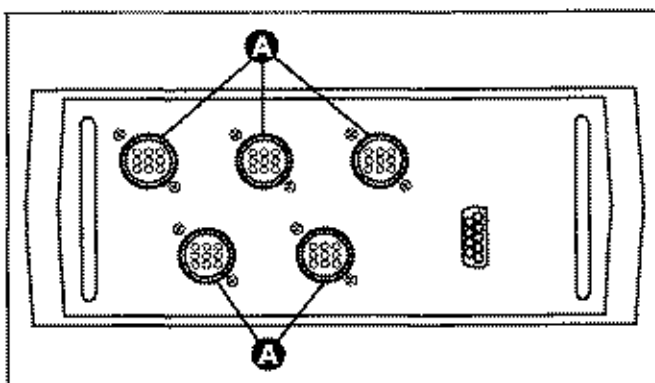


Figure 1-3

Keyboard

Program functions may be accessed using the following keyboard keys:

[F1]	-	Help
[F2]	-	Options Menu
[F3]	-	Backup
[F4]	-	Continue
[F5]	-	Text
[F6]	-	Diagnostic Drawings
[F7]	-	Camber/Caster
[F8]	-	Toe
[F9]	-	Left Front
[F10]	-	Right Front
[F11]	-	Left Rear*
[F12]	-	Right Rear**
[ESC]	-	Go To Main Menu
[ALT] + [C]	-	Clear
[Print Screen]	-	Print

* Replaced by [SHIFT] + [F9] - on keyboards with out [F11] keys.

** Replaced by [SHIFT] + [F10] - on keyboards without [F12] keys

Wheel Units (Refer to Figure 1-4)

Wheel Units contain vials and sensors which measure wheel position. During alignment, wheel units are mounted to rim clamps attached to the vehicle's wheels.

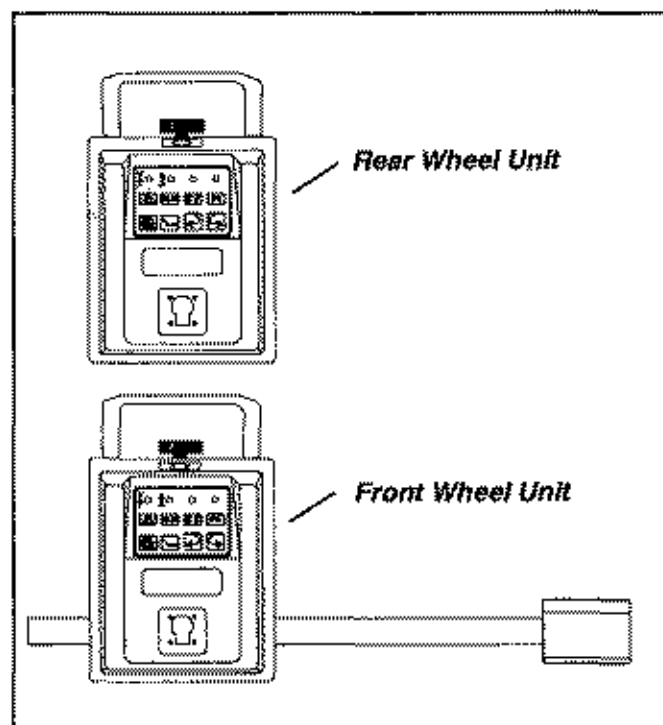


Figure 1-4

To Connect Wheel Unit Cables or In-Rack Kit:

The In-Rack Kit consists of rack-mounted wheel unit cables connected to the aligner by a single cable. The single cable may be plugged into any of the five wheel unit connector sockets located on the back of the interface unit.

Wheel Unit Keypad

The wheel unit keypad consists of eight (8) keys used for alignment control at the wheel unit (see Figure 1-5).

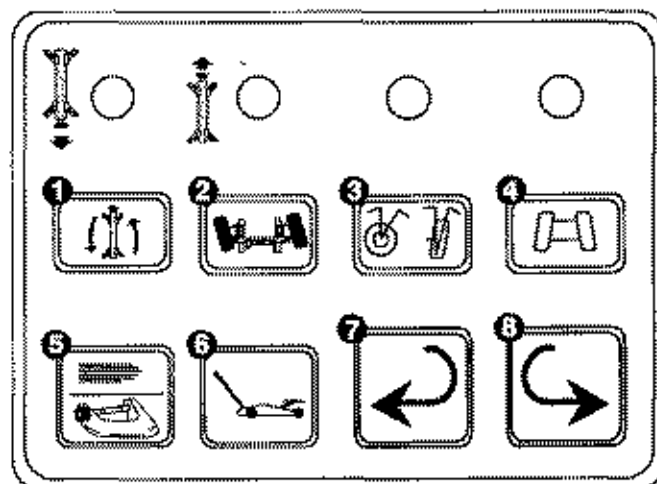


Figure 1-5

The keys function as follows:

- ❶ **RUNOUT** - Start the Runout Procedure from either the "Display-All Page" or the "Options" Menu. If the Main Menu appears on the display, the operator may also walk over to a wheel unit and press [RUNOUT] on the wheel unit keypad. Once in Runout Mode, the "RUNOUT" key is used to take measurements in the "KNOB DOWN" and "KNOB UP" positions at a given wheel unit.
- ❷ **CASTER SWING** - Start the "Caster Swing" procedure from the "Display-All Page," the Analog Meter screens or the "Options" Menu.
- ❸ **CAMBER/CASTER** - Select adjustment meters from the "Display-All Page" or from Meter screens.
- ❹ **TOE/TRACK** - Select adjustment meters from the "Display-All Page" or from meter screens.

Continued...

Wheel Unit Keypad (continued)

- ⑤ **DRAWING/TEXT** - Steps through diagnostic drawings and associated text screens when specifications are loaded. It is active from the "Display-All Page" and meter screens.
- ⑥ **JACK & HOLD** - Select to display readings when the wheels are jacked up.
- ⑦ **BACKUP** - Go back one step in the procedure currently running.
- ⑧ **CONTINUE** - Go forward to the next step in the procedure.

The "BACKUP" and "CONTINUE" keys on each wheel unit work the same way as the "BACKUP" and "CONTINUE" keys on the alignment keyboard. They are used to move backward and forward through the alignment screens.

Wheel Unit LEDs

Each wheel unit has four LEDs which display wheel status during runout.

The far left LED on the wheel unit indicates the runout status in the "KNOB DOWN" (KNOB at 6 o'clock) position. The second LED from the left indicates the runout status in the "KNOB UP" (KNOB at 12 o'clock) position. The third LED from the left indicates the runout status in the "KNOB LEFT" (KNOB at 9 o'clock) position. The far right LED indicates the runout status in the "KNOB RIGHT" (KNOB at 3 o'clock) position. When an LED is lit, the alignment program is ready to take runout readings in the corresponding rim clamp position. After readings are taken in a particular rim clamp position, another LED will illuminate to indicate the next rim clamp position. When runout has been taken for all positions, all LEDs will be lit.

See the "Runout" section for more details on wheel unit LEDs.

Wheel Clamps

Wheel clamps are four-armed clamps that attach to a vehicle's wheels (see Figure 1-6). They provide spindles (A) for hanging the wheel units. A wheel clamp spindle centers itself as the clamp is tightened on a rim. Tighten the wheel clamp by turning the clamping knob (B).

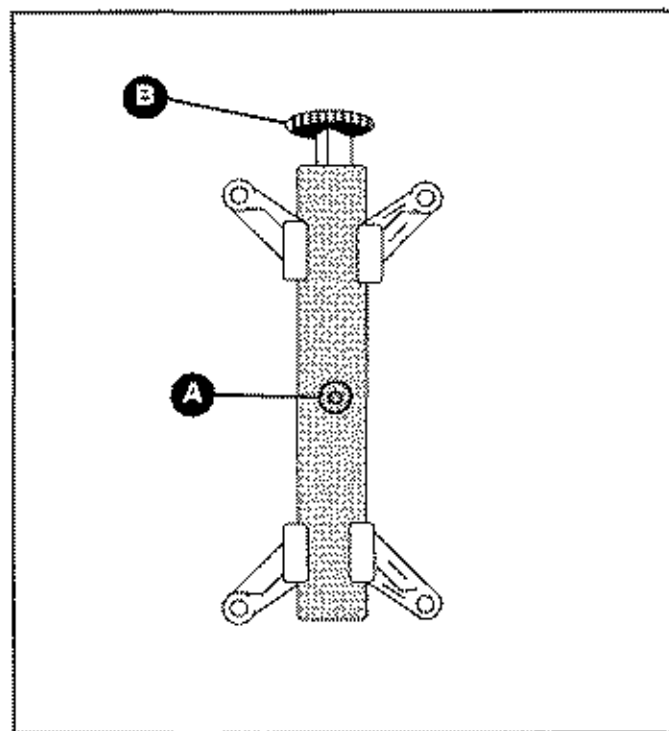


Figure 1-6

Front wheel units may also be tipped down slightly to see past some obstructions.

Vehicle Preparation

To prepare a vehicle for alignment procedures, follow these instructions carefully.

A. Put Vehicle on Rack

1. Lock turning plates into position with pointers at the zero degree mark.
2. Drive the vehicle onto the rack. Position the front wheels in line with the zero mark of the turning plates.
3. If rear toe/camber is to be adjusted, rear wheels must be on slip plates.
4. Chock the wheels or take other steps to make sure the vehicle cannot roll.

CAUTION! It is important to make sure the vehicle is securely positioned on the rack and the vehicle **CANNOT ROLL**.

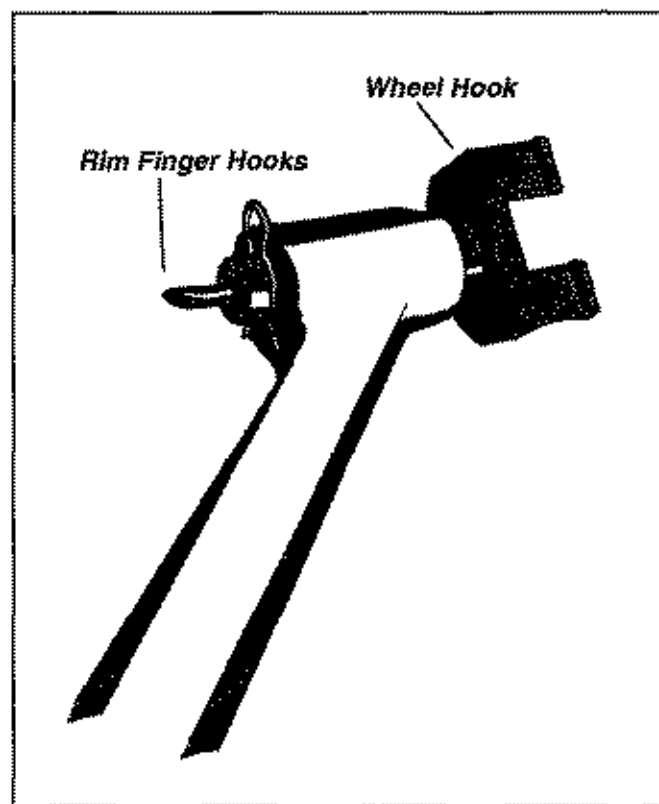


Figure 1-7

B. Select Wheel Clamp Hooks

IMPORTANT NOTE: A stud at the end of each wheel clamp arm holds hooks which attach themselves to the wheel when the clamp is installed. Select the proper type of hook to be used according to the type of wheel on the vehicle.

These studs have two different types of hooks (see Figure 1-7):

- **Wheel Hooks** - rest against the inside edge of the wheel. These hooks fit most style wheels.
- **Rim finger hooks** - grasp the outer rim of a wheel, along the edge of the tire bead. These hooks fit wheel styles which prevent the use of the wheel hooks.

1. Wheel Clamp Hook Installation

To change hooks, turn the studs around in the arms as follows:

- a. Remove the hairpin clip that retains the stud.
- b. Remove the stud from the arm and turn it around.
- c. Put the stud back in the arm and reinstall the hairpin clip.

C. Install the Wheel Clamps.

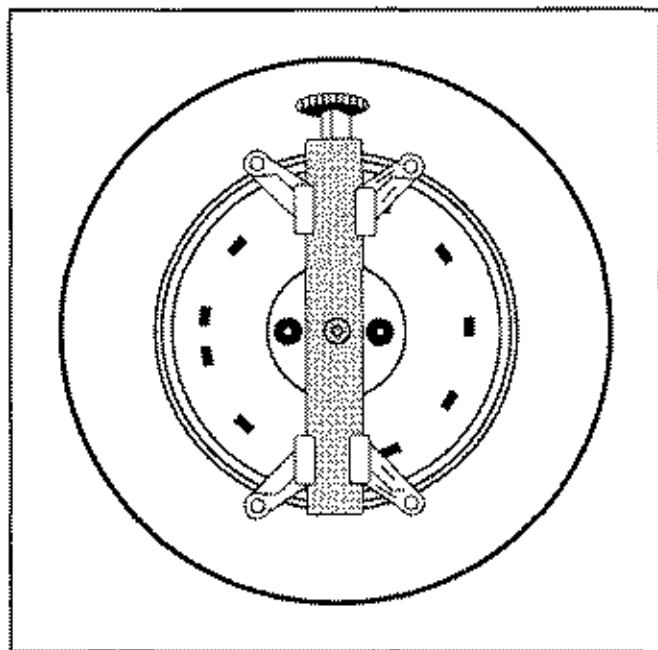


Figure 1-8

1. To attach a clamp to a wheel, position the large black knob toward the top of wheel (see Figure 1-8). Set the lower hooks against the wheel rim (or hook them around the bottom edge of the rim, depending on which hooks are used).

NOTE: On some vehicles, the body sheet metal prevents the wheel clamps from being mounted at the 12 o'clock and 6 o'clock position. If so, mount the clamps in the 3 o'clock and 9 o'clock position.

2. Turn the black knob to bring top hooks into place. Avoid wheel weights, burrs, or dents. Make sure the hooks seat properly.
3. Turn the knob tightly to secure the clamp to the wheel so it will not move.

4. Pull on the clamps to check for tightness.

The wheel clamp spindle centers itself as the clamp is tightened to the rim.

IMPORTANT NOTE: Wheel runout compensation is done electronically by the alignment machine. DO NOT adjust wheel clamps to compensate for wheel runout.

D. Install Wheel Units

Each wheel unit is designed for a specific wheel position. They are NOT interchangeable from wheel to wheel.

1. Position the wheel units so there is a line-of-sight between the left- and right-front sensors, and a line-of-sight from the front sensors to the rear sensor on each side of the vehicle.
2. Slide the wheel units onto the wheel clamp spindles.
3. Use the level vial on each wheel unit to level the unit. Tighten the black knob on the wheel unit to secure the unit on the spindle.
4. If the front wheel units' line of sight is obstructed, they may be tipped down to see past the obstruction.

Procedures

This section describes all of the alignment machine's functions and procedures. Each title within this section is the name of a function or menu selection. Refer to the titles as needed.

Main Menu

Before performing an alignment, use the Main Menu to:

- Select alignment procedures;
- Select supplementary features;
- Set the alignment mode.

Selections

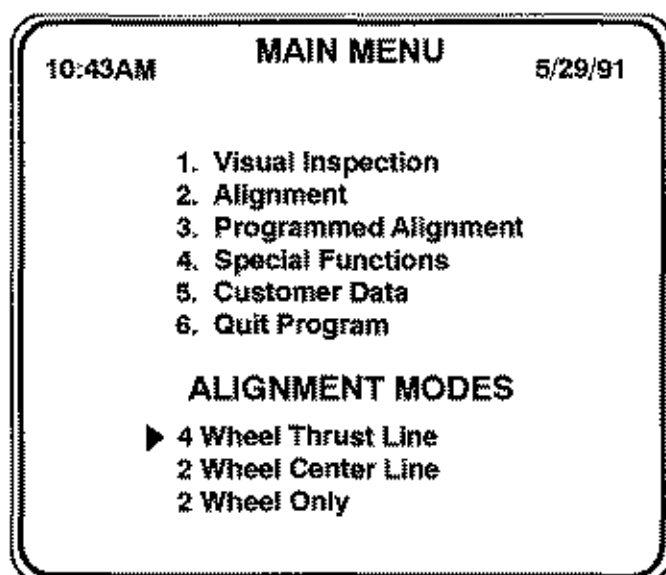


Figure 2-1

There are 6 selections at the top of the "Main Menu" screen (see Figure 2-1). Refer to the appropriate section in this manual for step-by-step instructions for each selection:

- [1] **Visual Inspection** - Includes an assortment of visual inspection routines. Results may be printed at the end of the alignment procedure or after "Visual Inspection."
- [2] **Alignment** - Begins a basic alignment sequence that includes "Runout" and a "Display-All Page" of "live" alignment readings. From the "Display-All Page," the operator has access to Toe and Camber/Caster Adjustment and the "Options" menu.
- [3] **Programmed Alignment** - Begins an alignment sequence that can be customized to include any alignment steps and supplementary features chosen by the operator. (To customize the routine, select 4, Special Functions.)
- [4] **Special Functions** - Includes support functions such as "Dealer I.D.," and "Customize Routines."
- [5] **Customer Data** - Used to enter customer information before an alignment. At the end of the alignment procedure, this information is included on the customer printout(s).
- [6] **Quit Program** - Returns to the host program.

Alignment Modes

Three alignment modes are listed at the bottom of the "Main Menu" screen. A cursor shows the current mode being used for alignment.

When the machine is turned "ON," the cursor is automatically set to the saved mode. If the mode is to be changed, it must be done from this menu before beginning an alignment procedure.

To change the mode, press the UP or DOWN arrow keys to move the cursor. The mode setting will be saved.

Visual Inspection

"Visual Inspection" can be selected directly from the Main Menu or included as part of a "Programmed Alignment" Sequence.

Overview

The visual inspection procedure guides the operator through a list of components or items to inspect. Indicate the condition of each item by entering the correct indicator codes.

Visual Inspection Menu

Select item #1, "Visual Inspection," from the Main Menu to display the "Visual Inspection" menu.

The "Visual Inspection" screen appears (see Figure 2-2).

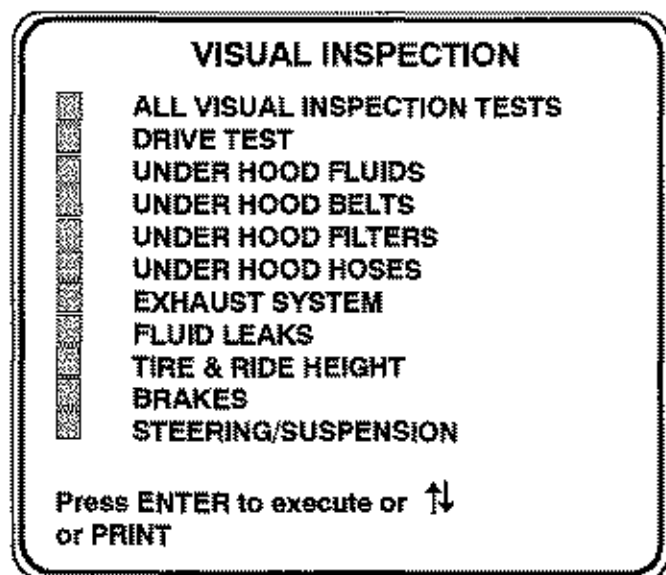


Figure 2-2

The first visual inspection screen provides a menu of inspection routines. The top selection, "All Visual Inspection Tests," includes all the other routines in the list. Individual routines may be selected by using the keyboard or the optional remote display/controller to move the cursor to the desired routine and pressing [ENTER].

Once an individual routine is finished, the program will return to the "Visual Inspection" menu. A marker indicates the routine has been performed and the cursor moves to the next routine on the list.

Inspection Procedure

Select a visual inspection routine from the menu by using the UP or DOWN arrow keys to highlight the desired routine. Then press [ENTER].

The "Inspection" screen appears (see Figure 2-3).

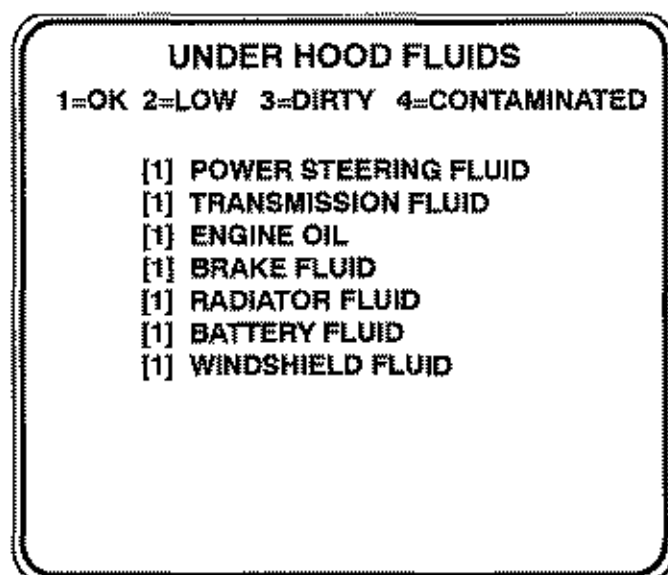


Figure 2-3

Each "Inspection" screen shows a list of items to be inspected. At the top is an index of indicator codes:

Example:

1=OK, 2=SERVICE, 3=REPLACE, or 4=NA.

NOTE: Indicator codes may differ according to the items being inspected. For some of the visual inspection procedures (for example "Steering/Suspension") the prompt "CHOOSE VEHICLE TYPE" appears. Press:

- [1] - for rear wheel drive;
- [2] - for front wheel drive;
- [3] - for four wheel drive.

Inspect the items on the list. After each item, press the number key matching the correct indicator code to record the inspection results. The cursor moves to the next item in the list.

Use the arrows keys to move through the list, to back up or to skip items. When inspection is complete, press [CONTINUE] or the DOWN arrow key to move to the next inspection screen if performing all visual inspection tests or to the "Visual Inspection" menu if performing a single inspection routine.

When "Visual Inspection" is complete, press [PRINT] to print inspection results, press [CONTINUE] to return to the Main Menu or to the next screen if in "Programmed Alignment," or edit visual inspection results by using the arrow keys to move up or down to select the desired routine and press [ENTER].

Alignment

Overview

Selection 2 from the "Main Menu" is a basic alignment measurement procedure with two general parts:

- **Runout** - An automated procedure to detect and compensate for any offset in the position of the wheel clamp spindles and rim runout. Perform runout before taking any alignment measurements.
- **Display-All Page** - A screen that shows caster values, SAI, setback values, thrust line values and live camber and toe readings.

From the "Display-All Page," the operator has access to Camber and Toe Adjustment screens, with "live" indicators to assist in adjusting values to manufacturer's specifications.

The "Display-All Page" also provides access to the "Options" menu (see "Options" section of this manual).

Technical and/or customer reports may be printed at the end of the alignment procedure.

Procedure

1. Perform "Customer Data" and "Visual Inspection" procedures, if desired.
2. From the "Main Menu," set the Alignment Mode. Use UP and DOWN arrows to move the cursor to the desired mode.
3. Select Item #2, "Alignment," from the Main Menu. The program will go on to the "Runout" screen and "Display-all Page" (see "Runout" and "Display-All Page" sections in this manual).

Programmed Alignment

Overview

Selecting Item #3, "Programmed Alignment," from the main menu allows the operator to run a "Programmed Alignment" sequence which can be customized to include any of the alignment procedures listed below.

Use the "Special Functions" menu to change the "Programmed Alignment" sequence, if necessary.

The default sequence for "Programmed Alignment" is as follows:

- Customer Data
- Visual Inspection
- Specifications
- Runout - Must be included at some point in the sequence before "Caster Swing" and/or "Display-All Page," since it is necessary for accurate alignment measurements.
- Caster Swing
- Display-All Page - Automatically occurs last in the "Programmed Alignment" sequence.

From the "Display-All Page" the operator may access Camber and Toe Meter screens, with live indicators to assist in adjusting values to specifications.

From the "Display-All Page" the operator may also access an alignment "Options" menu or go directly to an option by pressing the number of the desired option (see "Options" section of this manual).

The operator may print the customer report at the end of the alignment procedure.

Specifications

The "Specifications" feature may be included as part of the "Programmed Alignment" sequence or selected from the "Options" menu.

Overview

The alignment machine's computer automatically compares stored specifications to actual readings during alignment procedures. Adjustment screens and the "Display-All Page" highlight out-of-specification values.

The "Specifications" menu offers four selections:

1. Car Specifications
2. Truck Specifications
3. Edit Specifications
4. User Specifications

Selecting "Car Specifications" or "Truck Specifications" allows the operator to select specifications by entering make, year and model.

Selecting "Edit Specifications" allows the operator to view and edit specifications that have already been selected.

Selecting "User Specifications" allows the operator to select, edit, save and delete customized specifications. For example, the operator might want to enter the specifications for a twenty-year-old car that is not covered by the standard machine specifications.

The computer processes "User Specifications" in the same manner as Manufacturer Specifications. The computer automatically compares the user specifications to the actual vehicle readings taken during alignment procedures. Out-of-specification readings will be highlighted on the "Adjustment Screens" and the "Display-All Page."

Procedure

The "Specifications" screen will appear if "Specifications" is included in the "Programmed Alignment" sequence. If "Specifications" is not included in the "Programmed Alignment" sequence, "Specifications" may be entered by selecting Item #7, "Specifications," from the "Options" Menu.

The "Specifications" screen appears (see Figure 2-4).

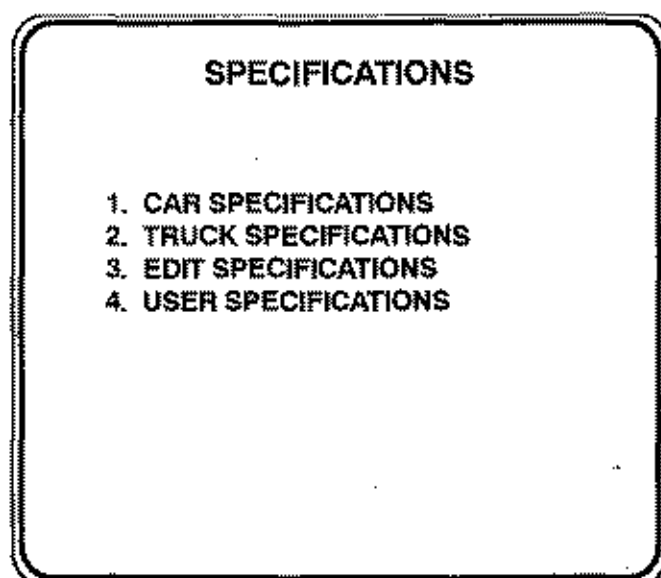


Figure 2-4

Press [1] "Car Specifications" or [2] "Truck Specifications" to select specifications for the desired vehicle.

Continued...

Specifications (continued)

The "Select Vehicle Make" screen appears on the display screen (see Figure 2-5).



Figure 2-5

Vehicle makes are listed in alphabetical order. To select a make, use the [PgUp] and [PgDn] keys to move forward or back one full screen of makes. Use the UP and DOWN arrow keys to move the highlight bar to the desired selection. Then press [ENTER];

OR

Type in the first letter of the vehicle make desired. The highlight bar moves to the first name in the list beginning with that letter. Use the arrow keys to move to the vehicle make. Then press [ENTER].

The "Enter Vehicle Year" screen appears. Type in the vehicle year and press [ENTER].

The next screen is "Select Vehicle Model." To select vehicle model, use the [PgUp] and [PgDn] keys to move forward or back one full screen of models. Use the UP and DOWN arrow keys to move the highlight bar to the desired selection. Then press [ENTER].

OR

Type in the first letter or number of the vehicle model desired. The highlight bar moves to the first name in the list beginning with that letter or number. Use the arrow keys to move to the vehicle make. Then press [ENTER].

Some of the specifications are based on certain ride height measurements and/or load weight position. If load weight is a factor, the proper load weight will be displayed on the screen (see Figure 2-6). If the amount of gas in the fuel tank is a factor a gas gauge will be displayed on the screen (see Figure 2-6).

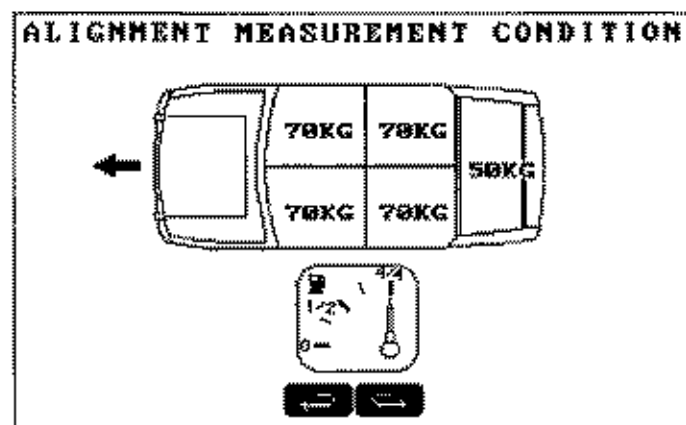


Figure 2-6

Press [CONTINUE]. If the specification is based on a certain ride height measurement, one of two screens will appear. The user will be shown the ride height measurement to set (see figure 2-7) or else where to take the ride height measurements (see Figure 2-8).

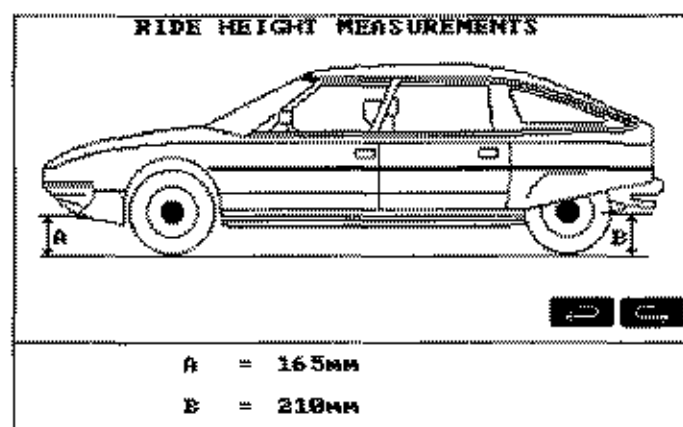


Figure 2-7

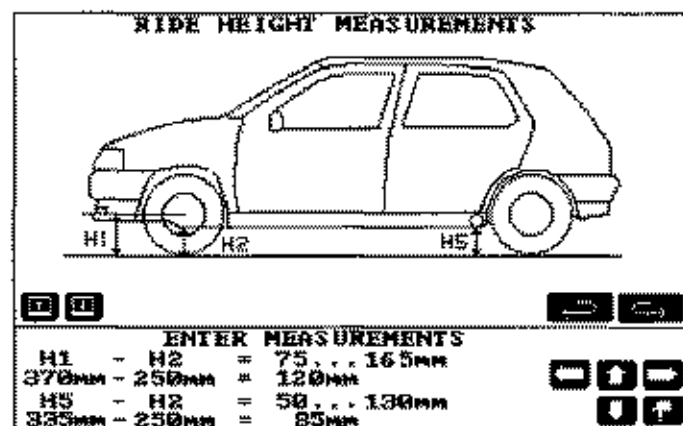


Figure 2-8

To move between the data input fields use the up and down arrow keys. If the Page up/Page down keys are displayed, there are more detailed ride height drawings that can be displayed. When the calculated ride height values are within the specified range press [CONTINUE].

The specifications are loaded into the computer and the program continues to the next function in the "Programmed Alignment" sequence.

Edit Specifications

To edit specifications already entered into the computer, select Item #3, "Edit Specifications." The "Edit Specifications" screen appears (see Figure 2-9).

Max.	Preferred	Min.
LEFT FRONT CAMBER		
<input type="text" value="+1.00°"/>	0.00°	-1.00°
RIGHT FRONT CAMBER		
+1.00°	0.00°	-1.00°
CAMBER - SIDE TO SIDE		0.50°

Figure 2-9

Use keys as follows:

- Press RIGHT and LEFT arrows to move cursor within a number.
- Type over numbers to change them.

Continued . . .

Specifications (Continued)

- Press [BACKSPACE] to delete the character behind the cursor.
- Press [ENTER] to move to the next value on screen.
- Press [BACKUP] to move back one value.
- Press [CONTINUE] to skip to the next screen.
- Press [ENTER] after completing the last line of a screen.

On the second-to-last screen a list of questions with "YES" or "NO" answers appears. To change any of these, press [0] for "NO," [1] for "YES."

The "Suspension Type" screen appears. Indicate suspension type by using the arrow keys to move the cursor to the correct type. Then press [ENTER].

The final "Edit Specifications" screen appears. Edit desired specifications and press [ENTER]. The program continues to the next function in the "Programmed Alignment" sequence.

User Specifications

Select Item #4, "User Specifications," from the "Specification" menu. The "User Specifications" menu will appear (see Figure 2-10).

There are four choices:

1. Select User Specifications.
2. Create/Edit Specifications.
3. Save User Specifications.
4. Delete User Specifications.

USER SPECIFICATIONS

1. SELECT USER SPECIFICATIONS
2. CREATE/EDIT SPECIFICATIONS
3. SAVE SPECIFICATIONS
4. DELETE SPECIFICATIONS

Figure 2-10

Select a User Specification

Select Item #1, "Select User Specification," from the "User Specifications" menu. A list of previously entered specifications appears on the screen, sorted into alphabetical order.

NOTE: If no user specifications have been entered, the computer will emit a warning tone and a message will appear.

To select a specification from the list, use the [PgUp] and [PgDn] keys to move forward or back one full screen of specifications. Use the UP and DOWN arrow keys to move the highlight bar to the desired selection. Then press [ENTER].

OR

Type in the first letter of the user specification desired. The highlight bar moves to the first name in the list beginning with that letter. Then press [ENTER].

NOTE: If no user specification begins with the letter entered, the computer emits a warning tone.

Once entered, the desired User Specification name will appear at the bottom of the "Specifications" menu screen.

Create/Edit User Specifications

Select Item #2, "Create/Edit User Specifications," from the "User Specifications" menu.

To create new specifications, type over existing specifications.

To edit specifications already entered into the computer, change the desired specifications.

Use keys as follows to enter specifications:

- Press RIGHT and LEFT arrows to move cursor within a number.
- Type over numbers to change them.
- Press [BACKSPACE] to delete the character behind the cursor.
- Press [ENTER] to move to the next value on screen.
- Press [BACKUP] to move back one value.
- Press [CONTINUE] to skip to the next screen.
- Press [ENTER] after completing the last line of a screen.

The "User Specifications" menu will appear after the final "Create/Edit Specifications" screen is completed. Press [CONTINUE] to proceed with the alignment without saving the specifications. Select Item #3, "Save Specifications," from the "User Specifications" menu to save specifications to disk.

Save User Specifications

Select Item #3, "Save User Specifications," from the "User Specifications" menu. The "Save User Specifications" screen appears. Type in the information requested, following the prompts on the screen. Press [ENTER] after completing each line.

NOTE: The only required information is the name and the start year. The other lines may be left blank. If no name or start year is entered, the screen displays the message "Warning! Name must be entered. Press Continue or Backup." Press [CONTINUE] to enter name and start year, or press [BACKUP] to return to the "User Specifications" menu.

After completing the last line, press [ENTER]. The message "Please wait writing to disk" appears while the computer saves the specifications to disk. The "User Specification" menu appears. Press [CONTINUE] to begin an alignment, edit another specification or to save the specification under a different name.

The CCD-1000 can store up to 100 user specifications. The program will display a message if the computer's memory is full. To store a new specification, the operator must delete a previously entered specification.

Runout

To Delete User Specifications

Select Item #4, "Delete User Specifications," from the "User Specifications" menu. The "Delete User Specifications" screen appears.

To select a user specification to delete from the list, use the [PgUp] and [PgDn] keys to move forward or back one full screen. Use the UP and DOWN arrow keys to move the highlight bar to the desired selection. Then press [ENTER];

OR

Type in the first letter of the user specification to delete. The highlight bar moves to the first name in the list beginning with that letter. Then press [ENTER].

NOTE: If no user specification begins with the letter entered, the computer will emit a warning tone.

The screen displays the message, "Are you sure? You are deleting this specification. Press [CONTINUE] or [BACKUP]." Press [CONTINUE] to confirm the choice and delete the specification or press [BACKUP] to return to the "User Specifications" menu.

If the choice is confirmed, the message "Please wait writing to disk" appears.

The "Delete User Specifications" screen then appears, displaying the list of user specifications without the deleted specification.

Press [CONTINUE] to go on to the next procedure.

Print Specifications

To print the specifications, press the [PRINT] key at the "Specifications" menu.

Runout is included in every alignment procedure, before either the "Caster Swing" or the "Display-All Page." "Runout" can also be selected from the "Options" menu.

Overview

Runout detects and compensates for any offset in the position of the wheel clamp spindles and for bent rims. This is important for accurate alignment measurements.

IMPORTANT NOTE: Runout must be performed each time wheel clamps are installed.

On-screen messages and pictures provide guidance through the Runout procedure. Perform the following instructions for each wheel.

NOTE: Start with any of the wheel units. Runout can be performed in any order.

Procedure

Position vehicle on the alignment rack. Make sure the vehicle is secure. Mount wheel clamps and wheel units (see "Vehicle Preparation" section in this manual).

The right side of the "Runout" screen displays a top-view of the vehicle with all four wheel units (see Figure 2-11). The left side displays a wheel clamp pointing down. The bottom of the screen displays the message "Level and Lock Wheel Units. Press [RUNOUT] on wheel unit." The "Knob Down" indicator on all of the wheel units will be lit.

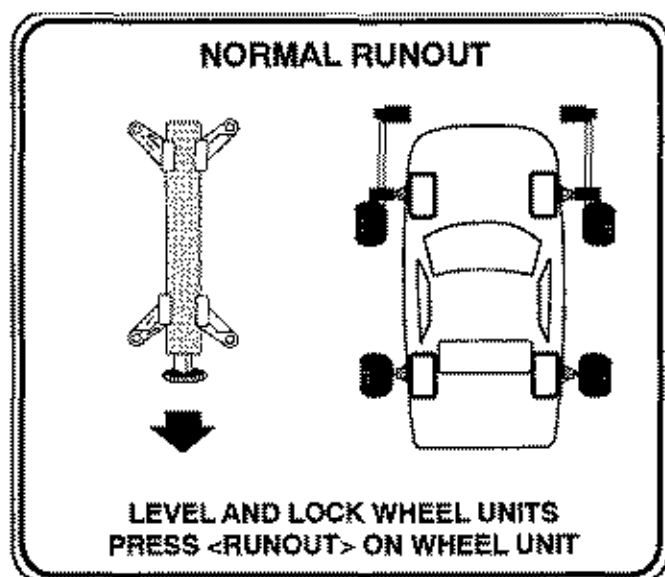


Figure 2-11

Perform runout on each wheel, as follows:

1. Using a jacking beam (or other lifting device supplied with the alignment rack), lift one end of the vehicle. The runout wheel must be off the rack so it can spin freely. Place the vehicle in neutral after it has been raised.
2. Loosen the small black knob on the wheel unit (not the wheel clamp). Spin the runout wheel 180° so the wheel clamp knob is pointing down, as in the picture on the screen (see Figure 2-11).

NOTE: On some vehicles it may have been necessary to mount the wheel clamps at 3 o'clock and 9 o'clock because of body sheet metal covering the wheel opening. As long as the wheels are rotated 180° during runout, readings will be accurate.

IMPORTANT NOTES:

- On some vehicles, the wheel on the other side may tend to spin. If necessary, block it to prevent it from spinning.
- On some four-wheel drive vehicles, both the left and right side wheels rotate simultaneously. To perform Runout on these vehicles follow the steps A. through C. below or see "Optional Runout Mode."

- A. Unlock the wheel unit on the opposite side from where you will start. If you start with the passenger side, unlock the wheel unit on the driver's side.
 - B. Perform Runout on the passenger side wheel. Then unlock the wheel unit on the passenger side.
 - C. Lock and level the wheel unit on the driver's side, and perform Runout on the driver's side. When both sides have Runout completed, level and lock both wheel units.
3. While the clamp is turned down, use the level vial to level the wheel unit. Tighten knob with moderate pressure to steady unit.
 4. Press [RUNOUT] on the wheel unit or the corresponding wheel button on the keypad. An arrow appears at the corresponding wheel unit on screen. Wait while runout readings are taken. A tone sounds at the console and the "knob down" indicators on the undone wheels will go out.

NOTE: Do not move the wheel or wheel unit while runout readings are being taken.

5. After initial readings are taken, the on-screen wheel clamp flips over and the wheel clamp knob points up. Note that the "knob up" indicator on the wheel unit will be lit and half of the on-screen wheel turns green to show that runout on that wheel is half complete.

Runout (continued)

6. Turn the clamp back 180° to the top and repeat steps 1 - 4 on the same wheel. After runout for that wheel is complete, the corresponding on-screen wheel turns completely green and both indicators on the wheel unit stay lit.

Perform steps 1 - 6 on all wheel units (or just the front two if in "2-wheel only" mode).

After completing "Runout," install a pedal depressor.

⚠ WARNING! DO NOT LOWER THE VEHICLE WITHOUT LOCKING THE BRAKES FIRST (USE PEDAL DEPRESSOR AND/OR PARKING BRAKE) TO PREVENT THE VEHICLE FROM ROLLING! FAILURE TO FOLLOW THIS PROCEDURE COULD RESULT IN PROPERTY DAMAGE, INJURY OR DEATH!

If No Runout Is Detected

If the change in measured readings is too small for any wheel, the alignment machine will mark that wheel for checking. That particular wheel will appear highlighted in white on the display screen and the message "NO RUNOUT DETECTED ON WHITE TIRES" will be displayed. This warning reminds the operator to perform runout on all wheels.

Press [BACKUP] and repeat the runout procedure for the indicated wheel(s).

Press [CONTINUE] to return to the "Runout Complete" screen after runout is complete on all wheels.

If Runout Is Excessive

If excessive runout is detected, the message, "EXCESSIVE RUNOUT ON YELLOW TIRES" may appear and one or more tires will be highlighted in yellow on the screen.

Excessive runout often indicates a bent wheel rim or a wheel spindle that is out of line. These problems can lead to handling difficulties not caused by alignment.

If runout is excessive on a wheel, do the following:

1. Check the wheel clamp. Make sure it is not loose and all four of the wheel hooks are gripping the wheel.
2. Spin the tire to check the wheel and rim. If repairs are required, press [BACKUP] to abort the alignment procedure. Perform alignment only after other handling-related problems are diagnosed and repaired.
3. To proceed with alignment, press [CONTINUE].

The last runout measurements taken are stored. Repeat the runout procedure on any wheel where the clamp has been removed or re-connected after repairs or adjustments have been made. Press [CONTINUE] to skip the other wheels and use the values stored in memory.

Caster Swing

Prepare Vehicle After Runout

After runout is complete, the screen displays the message "RUNOUT COMPLETE" followed by instructions for settling the vehicle on the rack:

1. Straighten wheels - point front wheels straight ahead.
2. Apply brake pedal depressor:

IMPORTANT NOTE: The Pedal Depressor **MUST** be installed to ensure accurate readings. If the vehicle has power brakes, follow these steps:

- a. On vehicles with standard transmission, place the vehicle in NEUTRAL and **MAKE SURE THE VEHICLE CANNOT ROLL**. Start the engine and set the pedal depressor. Then turn the engine "OFF."
 - b. On vehicles with automatic transmission, place the vehicle in PARK and **MAKE SURE THE VEHICLE CANNOT ROLL**. Start the engine and set the pedal depressor. Then turn the engine "OFF."
3. Lower the vehicle - lower all wheels onto the rack.
 4. Remove turning radius plate pins.
 5. Settle vehicle - push up and pull down on the bumper with moderate pressure to settle the vehicle into place on the rack.
 6. Level and lock the wheel units - After settling the vehicle, level the wheel units on the wheel clamp spindle and tighten the knob to lock them into place.

Press [CONTINUE] after preparing vehicle.

Most often, "Caster Swing" is done as part of the "Programmed Alignment" sequence. It can also be selected from the "Options" menu or selected by pressing the caster swing key on a wheel unit.

Overview

Caster swing is a procedure to measure caster, included angle and SAI (Steering Axis Inclination). Caster swing must be repeated each time an adjustment is made and the screen values are updated. In an automated sequence, the operator turns the wheels to specified points while the computer takes measurements and performs calculations.

After a caster swing is performed, caster and SAI values will be displayed on the "Display-All Page," along with camber and toe.

Procedure

Before the caster swing begins, the following reminders are displayed on screen (see Figure 2-12).

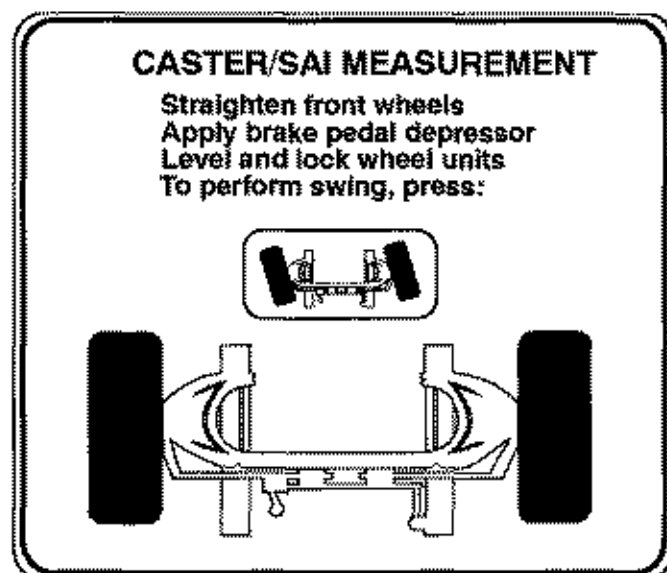


Figure 2-12

Continued...

Caster Swing (continued)

NOTE: Turning plate pins must be removed and vehicle must be lowered and settled on the rack before taking these steps.

1. Straighten front wheels - if necessary, put the front wheels in a straight ahead position.
2. Apply brake pedal depressor - the Pedal Depressor **MUST** be installed to ensure accurate readings. If the vehicle has power brakes, follow these steps:
 - a. On vehicles with standard transmission, place the vehicle in NEUTRAL and **MAKE SURE THE VEHICLE CANNOT ROLL**. Start the engine and set the pedal depressor. Then turn the engine "OFF."
 - b. On vehicles with automatic transmission, place the vehicle in PARK and **MAKE SURE THE VEHICLE CANNOT ROLL**. Start the engine and set the pedal depressor. Then turn the engine "OFF."
3. Level and lock the wheel units - If necessary, level the wheel units on the wheel clamp spindles and tighten the knob to lock them into place.

When the vehicle is prepared, press the Caster Swing key on any wheel unit to start the caster swing procedure.

A caster swing meter appears at the top of the "Caster Swing" screen. A pointer below the meter represents the position of the wheels. The pointer moves in the same direction as the wheels when the wheels are turned. There are three white range bars: one at the center of the meter, one at left, and one at right. A picture at the bottom of the screen shows two wheels turned either to the left, to the right, or straight ahead to indicate the direction the wheels should be turned.

1. Turn the steering wheel to the left until the arrow moves into the center of the white range bar on the left side of the meter (see Figure 2-13). When the arrow moves into the acceptable range, the screen displays the message "WAIT" while the alignment machine takes readings.

IMPORTANT NOTE: DO NOT move the wheels while the screen displays the message "WAIT" during any of the Caster Swing readings. Moving the wheels will cause inaccurate readings.

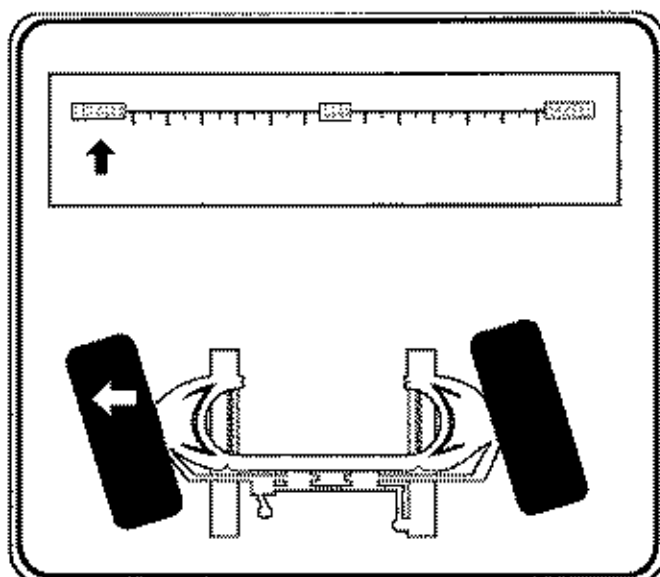


Figure 2-13

Caster Swing

Prepare Vehicle After Runout

After runout is complete, the screen displays the message "RUNOUT COMPLETE" followed by instructions for settling the vehicle on the rack:

1. Straighten wheels - point front wheels straight ahead.
2. Apply brake pedal depressor:

IMPORTANT NOTE: The Pedal Depressor **MUST** be installed to ensure accurate readings. If the vehicle has power brakes, follow these steps:

- a. On vehicles with standard transmission, place the vehicle in NEUTRAL and **MAKE SURE THE VEHICLE CANNOT ROLL**. Start the engine and set the pedal depressor. Then turn the engine "OFF."
 - b. On vehicles with automatic transmission, place the vehicle in PARK and **MAKE SURE THE VEHICLE CANNOT ROLL**. Start the engine and set the pedal depressor. Then turn the engine "OFF."
3. Lower the vehicle - lower all wheels onto the rack.
 4. Remove turning radius plate pins.
 5. Settle vehicle - push up and pull down on the bumper with moderate pressure to settle the vehicle into place on the rack.
 6. Level and lock the wheel units - After settling the vehicle, level the wheel units on the wheel clamp spindle and tighten the knob to lock them into place.

Press [CONTINUE] after preparing vehicle.

Most often, "Caster Swing" is done as part of the "Programmed Alignment" sequence. It can also be selected from the "Options" menu or selected by pressing the caster swing key on a wheel unit.

Overview

Caster swing is a procedure to measure caster, included angle and SAI (Steering Axis Inclination). Caster swing must be repeated each time an adjustment is made and the screen values are updated. In an automated sequence, the operator turns the wheels to specified points while the computer takes measurements and performs calculations.

After a caster swing is performed, caster and SAI values will be displayed on the "Display-All Page," along with camber and toe.

Procedure

Before the caster swing begins, the following reminders are displayed on screen (see Figure 2-12).

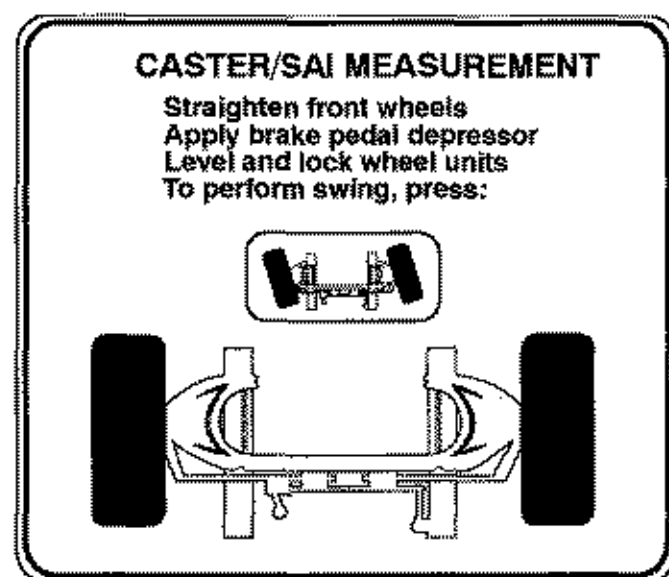


Figure 2-12

Continued...

Caster Swing (continued)

NOTE: Turning plate pins must be removed and vehicle must be lowered and settled on the rack before taking these steps.

1. Straighten front wheels - if necessary, put the front wheels in a straight ahead position.
2. Apply brake pedal depressor - the Pedal Depressor **MUST** be installed to ensure accurate readings. If the vehicle has power brakes, follow these steps:
 - a. On vehicles with standard transmission, place the vehicle in NEUTRAL and **MAKE SURE THE VEHICLE CANNOT ROLL.** Start the engine and set the pedal depressor. Then turn the engine "OFF."
 - b. On vehicles with automatic transmission, place the vehicle in PARK and **MAKE SURE THE VEHICLE CANNOT ROLL.** Start the engine and set the pedal depressor. Then turn the engine "OFF."
3. Level and lock the wheel units - If necessary, level the wheel units on the wheel clamp spindles and tighten the knob to lock them into place.

When the vehicle is prepared, press the Caster Swing key on any wheel unit to start the caster swing procedure.

A caster swing meter appears at the top of the "Caster Swing" screen. A pointer below the meter represents the position of the wheels. The pointer moves in the same direction as the wheels when the wheels are turned. There are three white range bars: one at the center of the meter, one at left, and one at right. A picture at the bottom of the screen shows two wheels turned either to the left, to the right, or straight ahead to indicate the direction the wheels should be turned.

1. Turn the steering wheel to the left until the arrow moves into the center of the white range bar on the left side of the meter (see Figure 2-13). When the arrow moves into the acceptable range, the screen displays the message "WAIT" while the alignment machine takes readings.

IMPORTANT NOTE: DO NOT move the wheels while the screen displays the message "WAIT" during any of the Caster Swing readings. Moving the wheels will cause inaccurate readings.

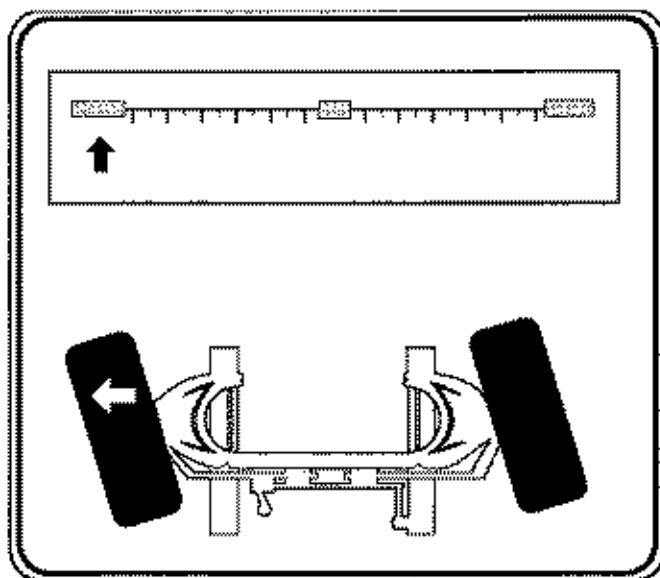


Figure 2-13

- Turn the steering wheel to the right until the arrow is centered in the range bar on the right side of the meter (see Figure 2-14). Wait while the alignment machine takes readings.

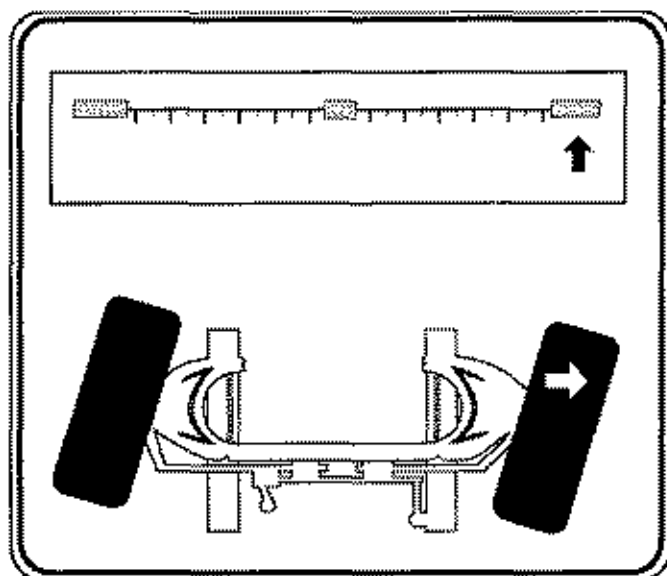


Figure 2-14

- An arrow then appears on the left wheel of the picture at the bottom of the screen, indicating the left wheel should be centered. Turn the steering wheel to the left until the arrow under the meter enters the center range bar. When the arrow moves into the acceptable range, a close-up view of the arrow and range bar appears directly below the caster swing meter (see Figure 2-15). Turn the wheel until the arrow in the lower meter is within the highlighted range. Wait while the computer takes readings.

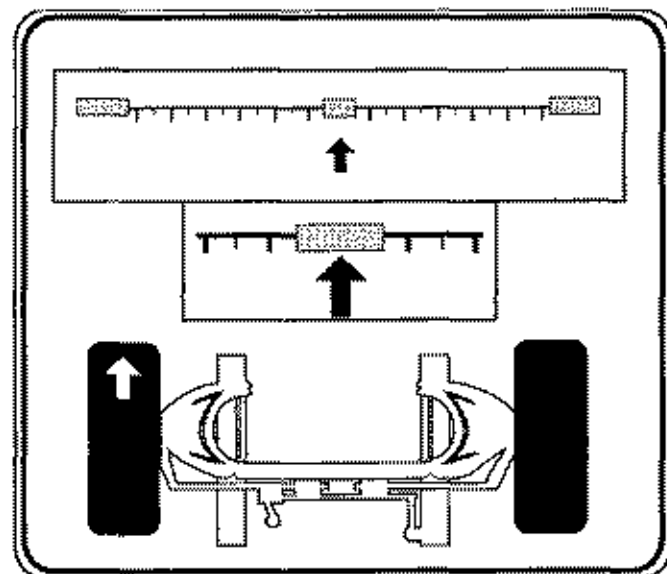


Figure 2-15

- An arrow then appears on the right wheel of the picture at the bottom of the screen, indicating the right wheel should now be centered. Turn the steering wheel until the arrow under the meter enters the center range bar. When the arrow moves into the acceptable range, a close-up view of the arrow and range bar appears directly below the caster swing meter. Turn the wheel until the arrow in the lower meter is within the highlighted range. Wait while the computer takes readings.

The caster swing is complete.

NOTE: The warning message "BEAM BLOCKED" may appear during a caster swing. This indicates a beam between wheel units is obstructed or the wheels have been turned too far. A picture on screen will show which beam is blocked. Hold wheels still and remove obstruction (if any) or turn the wheels back into the optical range of the wheel units.

Turning Angle

NOTE: On vehicles with low front air dams or extended ground effect panels, it may be difficult to complete the caster swing because of beam blocks. To compensate for this problem, the CCD wheel units have been designed so they can be tipped during caster swing and still measure caster correctly. Perform the caster swing as follows.

BEFORE entering the caster swing module:

1. Loosen the small black knob on the left front wheel unit.
2. Tip the left front unit down so that the head of the wheel drops approximately 2 inches. Re-tighten black knob.
3. Loosen the small black knob on the right front wheel unit.
4. Tip the right front unit down so that the head of the wheel unit drops approximately 2 inches (approximately the same amount as the LF is tipped). Re-tighten black knob.
5. Enter the caster swing screen by pressing the **CASTER SWING KEY** on the wheel unit keypad, or by pressing 1 from the display all page.
6. Perform the caster swing.
7. After the swing **LEAVE THE WHEEL UNITS TIPPED**. Do not re-level the heads. If the heads are re-leveled the machine will not read caster correctly.

If there is still interference during the caster swing repeat the procedure increasing the drop on the head of the wheel unit until they clear the front of the car.

"Turning Angle" is most often included as part of the "Programmed Alignment" sequence. It can also be selected from the "Options" menu.

Procedure

Make sure both turning plate markers begin at 0°.

The screen displays a message prompting the operator to turn the left front wheel in to an angle established by vehicle specifications (see Figure 2-16).

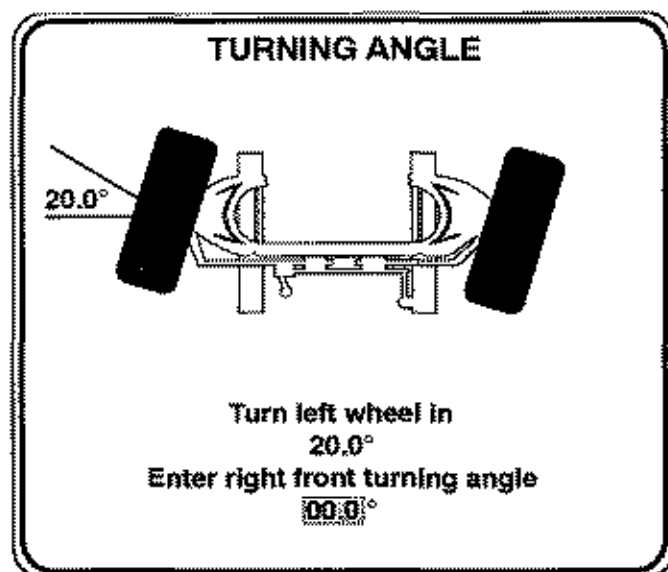


Figure 2-16

NOTE: On some vehicles, "Turning Angle" measurements will begin by turning the right wheel in first. The screen will display a message prompting the operator to turn the right wheel in first, if necessary.

Display-All Page

Overview

Turn the steering wheel until the left wheel is turned in to the correct angle. Check the turning angle of the right wheel and enter the angle into the computer. Then press [ENTER].

The screen then displays a message prompting the operator to turn the right front wheel in to an angle established by vehicle specifications. Turn the steering wheel until the right wheel is turned in to the correct angle. Check the turning angle of the left wheel and enter the angle into the computer. Press [ENTER] to proceed to the next routine.

At the end of an alignment procedure, the print-out will show turning angle specifications along with the values entered.

The "Display-All Page" shows "live" camber, toe, and total toe readings. If a caster swing has been done, the "Display-All Page" shows caster and SAI (see Figure 2-17).

LEFT FRONT	ANGLE	RIGHT FRONT
+0.84°	CAMBER	+0.62°
+1.14°	CASTER	+1.04°
+0.06°	TOE	+0.02°
	+0.08°	
+12.00°	SAI	+12.00°
+0.15°	SETBACK	
	THRUST LINE	+0.12°
LEFT REAR	ANGLE	RIGHT REAR
+0.50°	CAMBER	+0.47°
+0.03°	TOE	+0.04°
	+0.07°	

Figure 2-17

The "Display-All Page" also shows setback and thrust line on the side of the vehicle they are on.

Example: Setback on the left front wheel will be shown as a left side setback value; a thrust line to the right of center will be shown as a right side thrust line value, etc.

NOTE: Caster and SAI values are not "live." After alignment adjustments are made, caster swing must be repeated to update these values on the screen.

Continued...

Display-All (Continued)

To perform a caster swing from the "Display-All Page," press: [1] to go directly to the Caster Swing screen; or [*] to display the "Options" menu and select Item #1, "Caster Swing;" or press the caster key on a wheel unit.

If specifications were entered, values that are out-of-specification appear in red (highlighted on monochrome systems).

To make the customer report display "before adjustment" and "after adjustment" readings, press [*] and select Item #5, "Store Readings" from the "Options" menu; or press [5] from the "Display-all Page," BEFORE MAKING ANY ADJUSTMENTS.

Display-All Features

The "Display-All Page" provides access to these major features:

- **Toe and Caster/Camber Adjustment Meters** - provides "live" updates of Toe and Caster/ Camber values. Use the caster/camber keys to select meters (see "Toe, Caster/ Camber Meters").
- **Options Menu** - Provides a range of alignment options including "Specifications," "Runout," and "Caster Swing." Press the [*] to display the "Options" menu (see "Options").

- **Adjustment Drawings and Text** - From the "Display-All Page" or Meter screens, press [DRAWINGS] on the keypad to display drawings of alignment adjustment procedures for the current vehicle, if drawings are available. Press [TEXT] to display an explanation of alignment adjustments, if text is available. Press [BACKUP] to return to the "Options Menu".

- **Digital Adjustment Screens** - Displays specifications and "live" camber and caster readings (see "Options" section).

Toe and Caster/Camber Meters

The [TOE] and [CASTER/CAMBER] keys - on the console, optional remote unit, and wheel units - provide access to "live" meter screens. Use these screens to see the effects of adjustments to the vehicle as they are being made.

The "Caster Adjustment" meter is available only after caster swing has been performed. (The Caster meter shows changes in caster as adjustments are made. However, a caster swing must be performed after making adjustments in order to update caster values on the "Display-All Page".)

Operating Toe and Caster/Camber Meter Keys

1. Press [TOE] to display toe meters. Then press one of the front wheel keys on the keypad to display the "front, right and left toe" meter screen (see Figure 2-18). Press a rear wheel key to display toe and camber meter for that wheel (see Figure 2-19).
2. Press [CASTER/CAMBER] to display caster/camber meters. Press a front wheel key on the keypad to display caster/camber meters for that wheel (see Figure 2-20). Press a rear wheel key to display toe and camber meters for that wheel (see Figure 2-19).

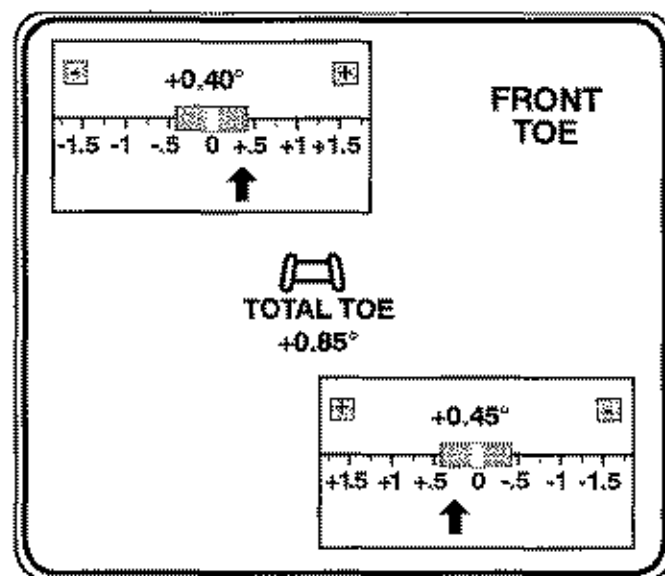


Figure 2-18

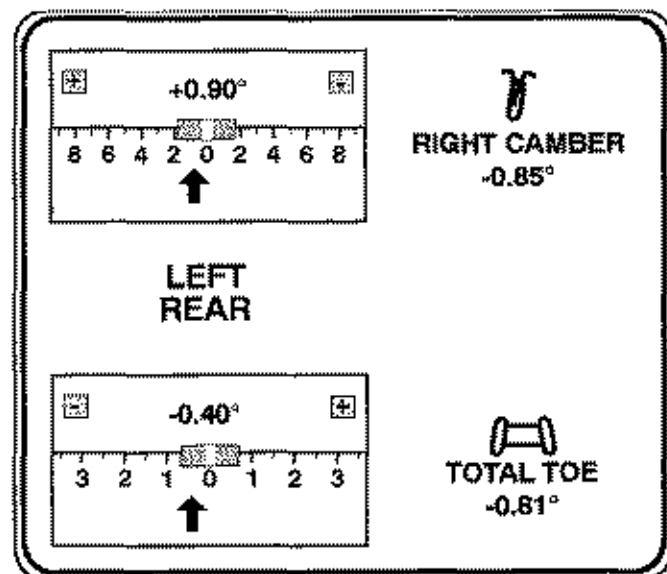


Figure 2-19

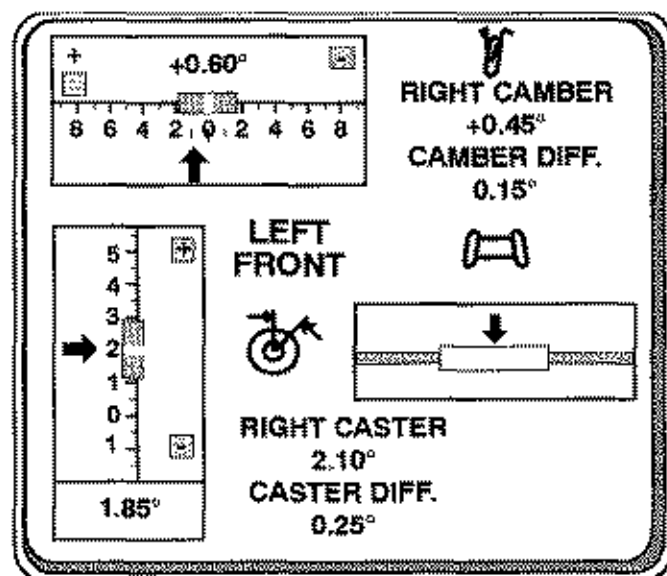


Figure 2-20

Options

NOTE: Caster adjustment meter will be displayed only if caster swing has been performed.

3. Press [*] from any meter screen to display the "Options" menu, with Jack and Hold selection available. See "Options" section of this manual for details.

Reading the Meters:

On all the meter screens, an arrow indicates the position of the tire. Bars show the specification range.

Front Camber/Caster Meters - The numeric value of the current setting is displayed below each meter. To the side of the meters, the caster or camber value for the opposite wheel is displayed. Also shown is "maximum difference," the difference between left and right wheels.

Wheels must be straight ahead for accurate caster/camber readings. In the lower right hand of the screen is a toe meter with a range bar. Turn the wheels until the arrow is positioned over the range bar for accurate readings.

Front Toe Meters - A number for total toe (the sum of both toe readings) is shown on screen.

Rear Camber/Toe Meters - Each meter shows camber and toe for one of the rear wheels. Numbers for camber and for total toe are displayed next to the meter.

To display the "Options" menu, press [*] from the "Display-All Page," or from any adjustment meter screen.

From the "Display-All Page" or an adjustment meter screen, the operator can choose an option without displaying the "Options" menu by typing in the correct number for the desired selection. That selection will be activated without displaying the entire "Options" menu on the screen.

Use the optional remote keypad, wheel unit keys, or the console keypad to make selections from "Options" menu.

Overview

The "Options" menu contains the features listed below (see Figure 2-21). All of these features, except for "Store Readings," "Digital Adjustment Screens," and "Jack and Hold," can also be selected from other menus.

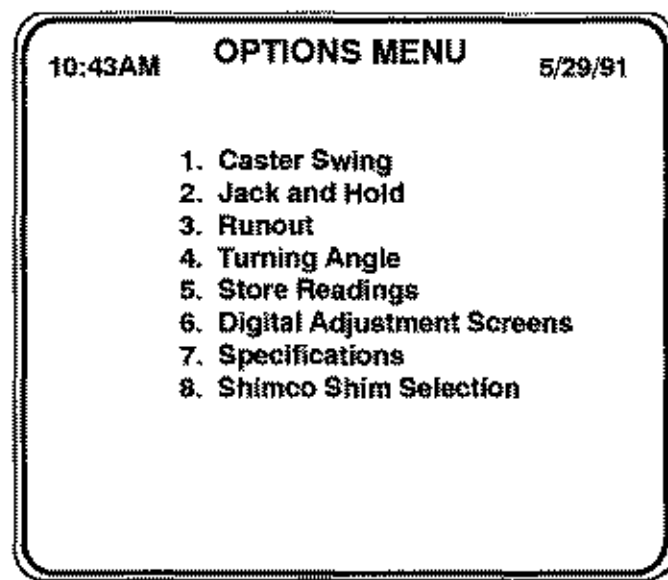


Figure 2-21

"Store Readings," "Digital Adjustment Screens," and "Jack and Hold" are explained in the following pages. Other features are explained in their own sections in this manual.

1. **Caster Swing** - See "Caster Swing" section of this manual.
2. **Jack and Hold** - This feature allows caster and camber adjustments to be made while the vehicle is in the air and still have "live" camber and caster readings on screen. Toe cannot be read during Jack and Hold (See the following "Jack & Hold" section).
3. **Runout** - See "Runout" section of this manual.
4. **Turning Angle** - See "Turning Angle" section of this manual.
5. **Store Readings** - Press [5] to store the current readings from the "Display-All Page" before making adjustments.
6. **Digital Adjustments Screens** - Displays specifications and "live" camber, caster and toe readings for each wheel. These are digital versions of the meter screens (See the following "Digital Adjustments Screens" section).
7. **Specifications** - See "Specifications" section of this manual.
8. **Shimco Shim Selection** - Program to display proper Shimco shims for adjustments.

NOTE: Available only for US vehicle specifications. Menu item will be displayed on menu if available.

Options - Jack & Hold

While the vehicle is still at rest on the rack, press [*] from the Display-All screen or a meter screen to display the "Options" menu. Then select Item #2, "Jack and Hold," from the "Options" menu. Or press [2] from a meter screen or the jack and hold key on a wheel unit.

When [2] is pressed, the computer stores the current readings as offset points.

Follow the screen prompt and jack up the wheels to be adjusted (see Figure 2-22).

CAUTION! Make sure the vehicle is securely jacked so it will not move.

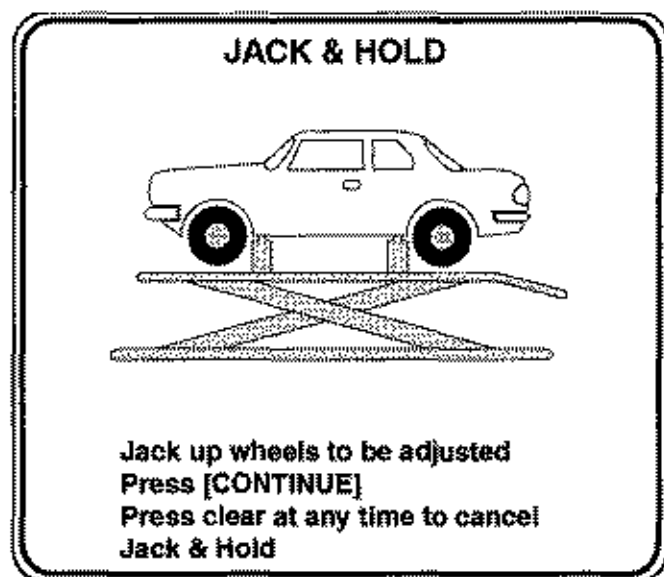


Figure 2-22

When vehicle is securely jacked, press [CONTINUE]. The current values are reset to the off-set values that were stored when [2] was pressed.

The meter screen appears. A picture of a floor jack is now on screen. This indicates Jack and Hold is active (see Figure 2-23).

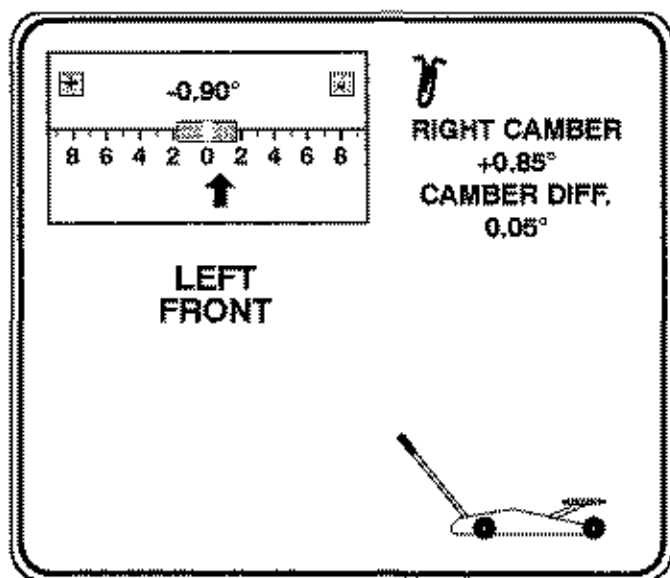


Figure 2-23

As any adjustments are made, "live" alignment readings are displayed - readings that reflect adjustment changes as if the vehicle were still sitting on the rack.

NOTE: Toe cannot be read during Jack and Hold.

When finished making adjustments, lower the car and press [CLEAR] OR [JACK & HOLD] at a wheel unit to cancel Jack and Hold. Run another caster swing to update the "Display-All Page."

Options - Digital Adjustment Screens

Select Item #6, "Digital Adjustment Screens," from the "Options" menu. Use meter keys and corresponding wheel keys to display screens for each wheel.

Screen Descriptions

Front Camber/Caster Screen (see Figure 2-24)

- Shows actual Caster and Camber values, displayed below the respective specifications. Specifications include maximum, preferred, and minimum values. Also included is "Side to Side," the maximum variation allowed between the left and right wheel values.

At the bottom of the screen is a Toe meter. The arrow in the Toe meter must be within the specified range, indicating the wheel is straight ahead or 0° toe, for the most accurate caster and camber measurements.

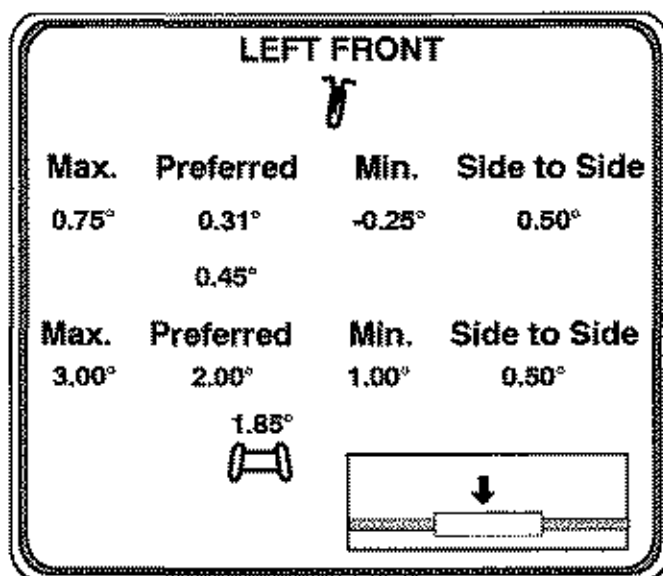


Figure 2-24

Front Toe Screen (see Figure 2-25) - Shows actual right and left toe values displayed below specifications for individual toe.

Individual toe specifications include maximum, preferred, minimum. Individual toe specifications are half of the total toe specifications.

Total toe and total toe specifications are displayed at the bottom of the screen.

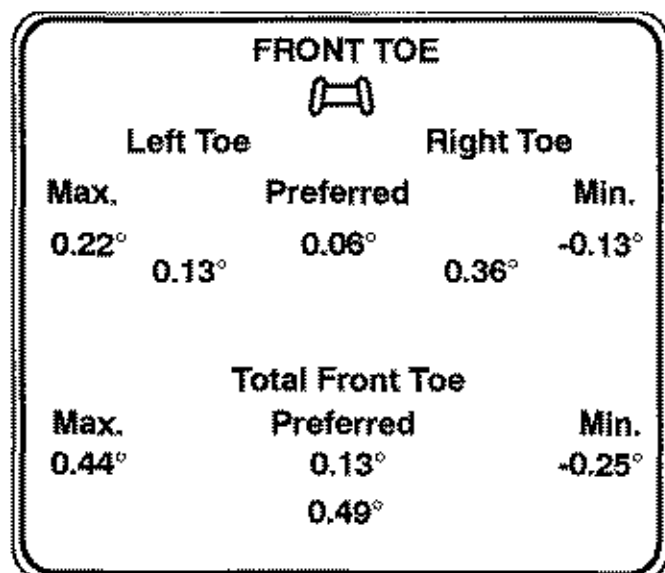


Figure 2-25

Rear Wheel Screens (see Figure 2-26) - Show camber and toe for the right or left rear wheels. Specifications include maximum, preferred, and minimum. To the far right, the camber value of the opposite wheel is displayed, and the total toe specification is displayed.

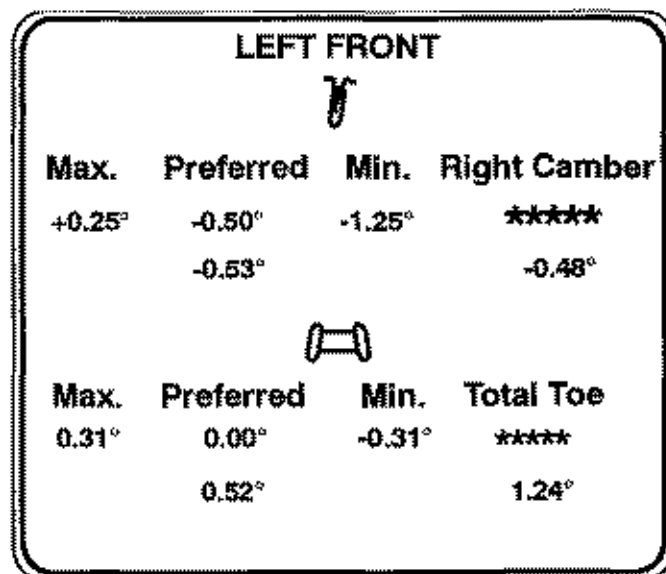


Figure 2-26

Printout Options

From the "Display-All Page," press [PRINT] to get the Print Report menu. The "Printed Report Options" screen appears (see Figure 2-27).

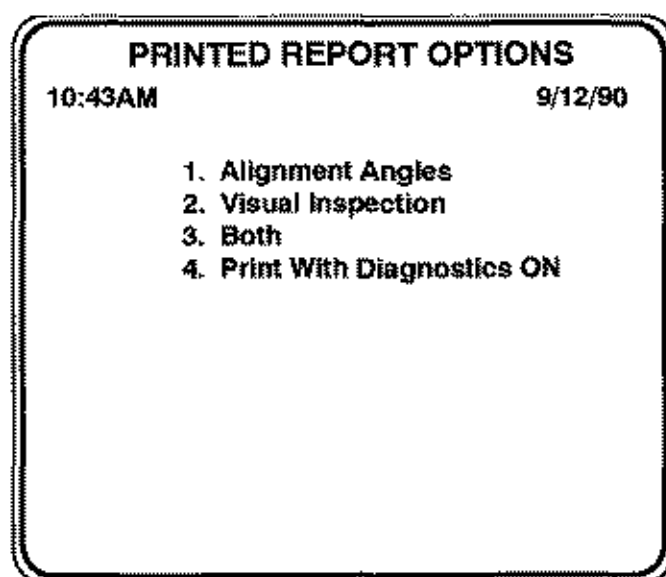


Figure 2-27

Special Functions

Overview

NOTE: An enhanced appearance printout is available by pressing [SHIFT], [8] on the IBM keyboards. This keystroke is used as a toggle between the two print modes.

The "Printed Report Options" menu includes the following:

1. **Alignment Angles** - Prints a report which includes alignment values (including caster if caster swing was performed) and specifications if they were entered.
2. **Visual Inspection** - Prints the results of the visual inspection.
3. **Both** - Prints alignment angles and visual inspection.
4. **Print With Diagnostics ON (or OFF)** - This is a toggle switch. Press [4] to turn diagnostics "ON" or "OFF." When diagnostics are turned "ON," the printed alignment report will include diagnostic messages based on the machine's comparison of the values on the summary screen with the specifications entered.

Select Item #4, "Special Functions," from the "Main Menu" to display the special functions menu (see Figure 2-28).

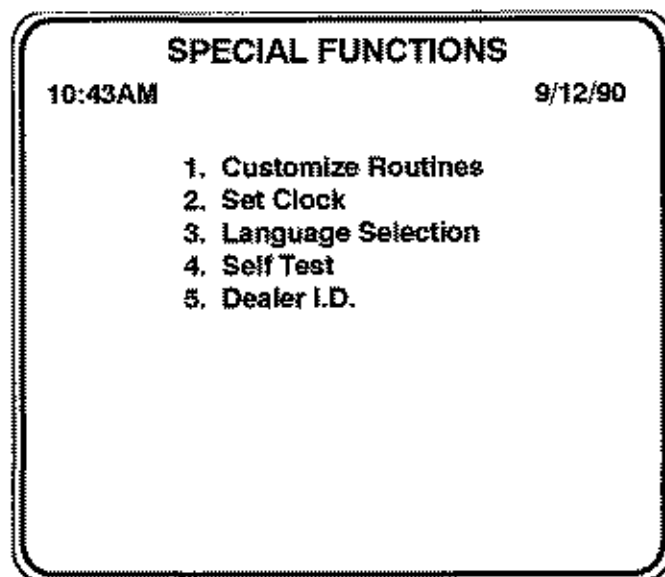


Figure 2-28

The menu consists of the following:

1. **Customize Routines** - Leads to a customizable submenu of features, including: Formats (time & date, currency symbol, etc.); "Programmed Alignment" (the customized sequence to be run when Item #4, "Programmed Alignment," is selected from the Main Menu); Audio Signals; Colors; and Units for toe and caster/camber.
2. **Set Clock** - Sets the computer's time and date. This information is saved in battery-backed memory and should only have to be reset for a daylight savings time change, or if the non user-serviceable battery fails.
3. **Language Selection** - Changes the language of the screen messages and printouts. Shows which languages are available on the machine.

4. **Self Test** - Provides computer system information, such as amount of RAM memory, program versions, etc.
 5. **Dealer I.D.** - Allows the shop's name, address, city, phone number, and an advertising message to be entered. This information appears at the top of printed customer reports. The shop's name appears on the logo screen.
- All information entered in the Special Functions menu is stored as it is entered.
- ### Special Functions - Customize Routines
- Select Item #1, "Customize Routines," from the "Special Functions" menu. The "Customize Routines" screen appears (see Figure 2-29).
2. **Set Programmed Alignment** - Sets "Programmed Alignment" sequence.
 3. **Set Audio Signals** - Changes pitch and tone of audio signals.
 4. **Select Units** - Sets units of measure in which caster/camber and toe appear. Press [ENTER] after making a selection to store units.
 5. **Set Volume** - Sets volume level for audio signals.
 6. **Set Color** - Sets screen colors for background, text, title and warnings.
 7. **Set Runout Mode** - Selects the runout procedure.

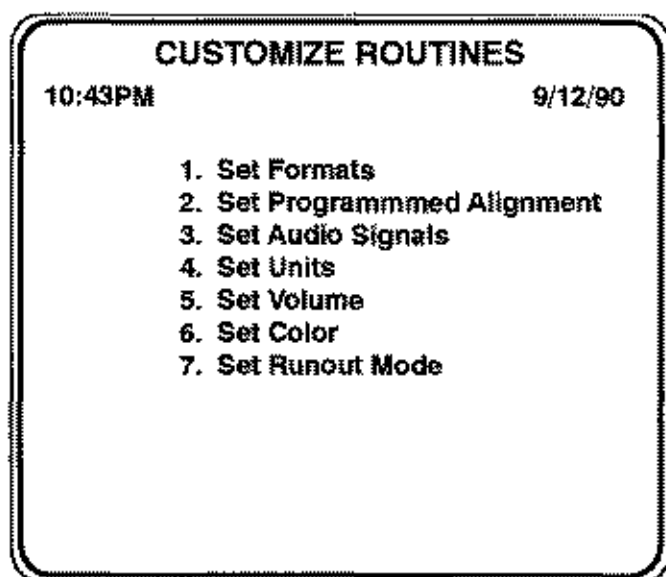


Figure 2-29

"Customize Routines" provides the following submenu:

1. **Set Formats** - Set date, currency symbol, decimal and thousands separators, toe definition, paper size and ride height units.

Set Formats

Select Item #1, "Set Formats," from the "Customize Routines" menu. The "Set Formats" screen appears (see Figure 2-30).

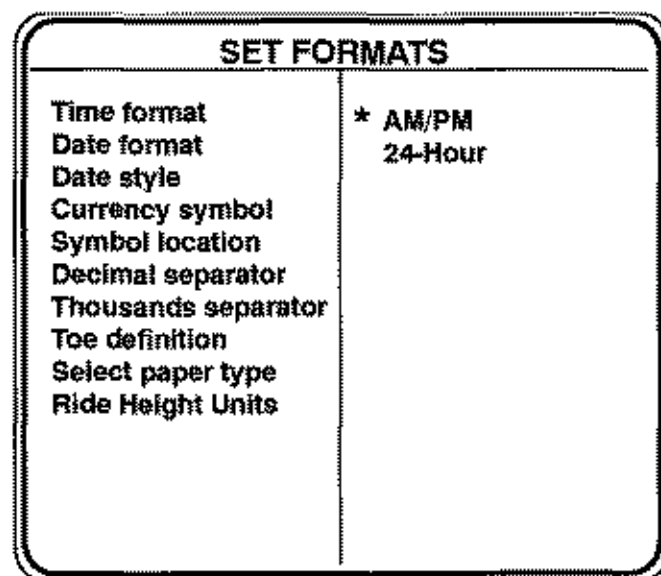


Figure 2-30

Continued...

The left column lists changeable formats: date, currency symbol, decimal and thousands separators, and toe definition, and paper size. The right column displays settings for the selected format.

Use the UP and DOWN arrow keys to move the cursor to the desired format in the left column.

Press the RIGHT arrow key to select the format. The cursor moves to the right column where settings for the selected format are displayed. The current setting is marked with a *.

Use the UP and DOWN arrow keys to move the cursor to the desired setting.

Press the LEFT arrow key to select the setting. The cursor moves back to the left column to allow more format changes.

OR

Press [ENTER] or [CONTINUE] to select the setting and return directly to the "Customize Routines" menu.

Set Programmed Alignment

Select Item #2, "Set Programmed Alignment," from the "Customize Routines" menu. The "Set Programmed Alignment" screen appears (see Figure 2-31).

SET PROGRAMMED ALIGNMENT	
MODULE TO SELECT FROM	ORDER OF MODULES CHOSEN
1) Customer Data	Visual Inspection
2) Visual Inspection	Specifications
3) Specifications	Turning Angle
4) Runout	Runout
5) Caster Swing	Caster Swing
6) Turning Angle	Customer Data
	Display All
Press enter to save procedure	
Press * to use default procedure	
Press clear to start over	

Figure 2-31

The left side of the screen shows a numbered list of procedures which can be included in the "Programmed Alignment" sequence.

The right side shows the sequence currently programmed. The default sequence is:

- Customer Data;
- Visual Inspection;
- Specifications;
- Runout;
- Caster Swing;
- Display-All Page.

Press [*] on the keypad to use the default sequence. The default procedure is automatically saved and the program returns to the "Customize Routines" menu.

To change the sequence, press [CLEAR] to delete the current order. Use the keypad to enter procedure numbers in the desired order.

The restrictions on any sequence programmed are:

- "Runout" must appear before "Caster Swing" and/or "Display-All Page" in any sequence.
- The "Display-All Page" will automatically be inserted last in any sequence.

Press [ENTER] to save procedure. The program returns to the "Customize Routines" menu.

Set Audio Signals

The machine has two sounds: the "key pressed" beep and the error sound that indicates a command was not accepted. Either of these sounds can be changed through this selection.

Select Item #3, "Set Audio Signals," from the "Customize Routines" menu. The "Set Audio Signals" screen appears (see Figure 2-32).

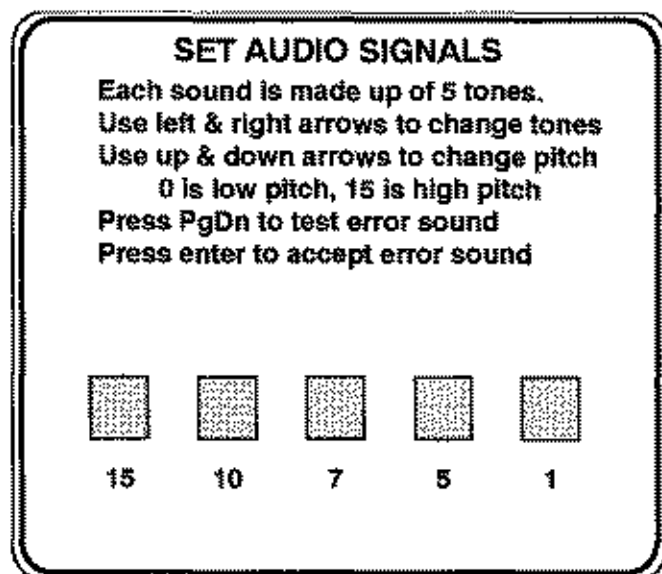


Figure 2-32

Use the LEFT and RIGHT arrow keys to select the audio signal to be changed. Press [PgDn] to play the selected sound.

Follow the on-screen instructions for changing the audio signals.

After setting audio signals, press [ENTER] to return to the "Customize Routines" menu.

Select Units

Select Item #4, "Select Units," from the "Customize Routines" menu. The "Select Units" screen appears (see Figure 2-33).

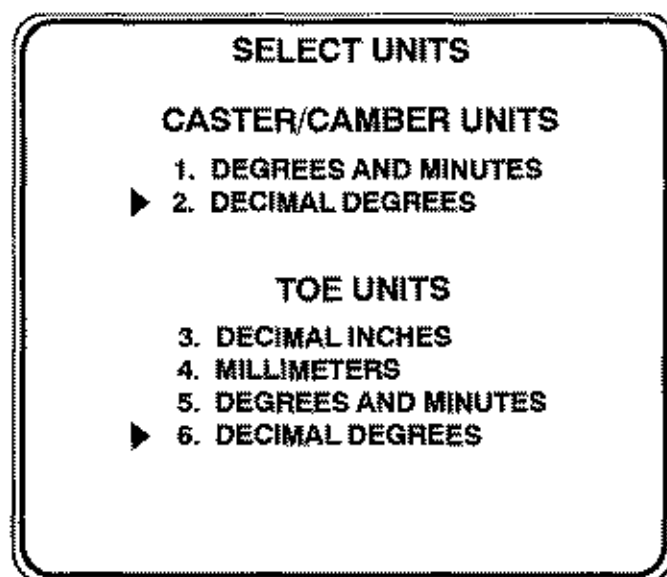


Figure 2-33

The screen displays caster/camber units and toe units. These are the units that the caster/camber and toe values will be displayed and printed in.

Select desired units for caster/camber and toe by using the keypad to type in the corresponding numbers. Then press [ENTER]. The program returns to the "Customize Routines" menu.

Press [ENTER] to return to the "Special Functions" menu.

Set Volume

Select Item #5, "Set Volume," from the "Customize Routines" menu. The "Set Volume" screen appears (see Figure 2-34).

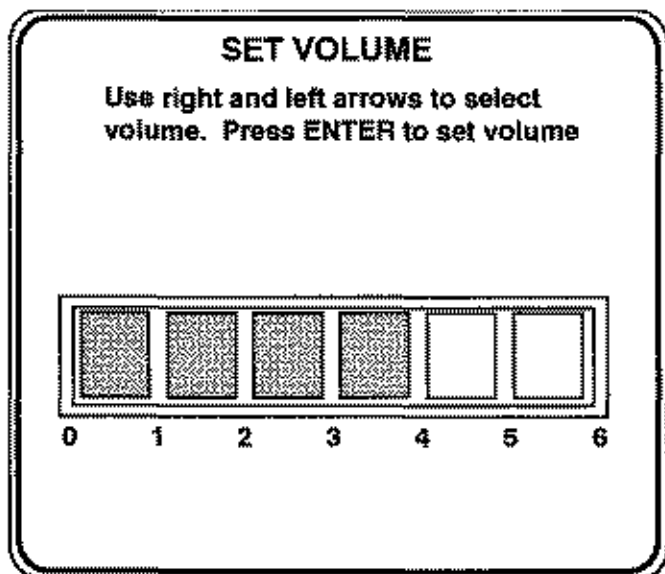


Figure 2-34

Use the LEFT and RIGHT arrow keys to select the volume level. Then press [ENTER] to set the volume.

Set Color

Select Item #6, "Set Color," from the "Customize Routines" menu. The "Set Color" screen appears (see Figure 2-35).

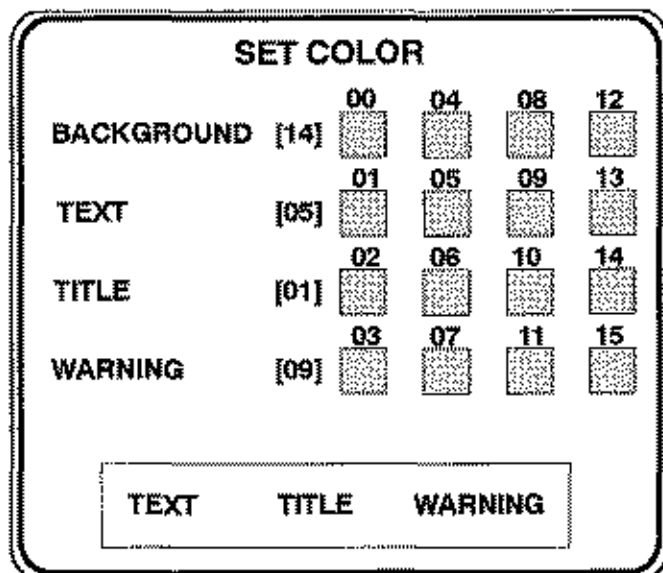


Figure 2-35

Use the keypad to select colors for background, text, title and warning messages by typing in the number of the desired color and pressing [ENTER].

Use the arrow keys to move the cursor backward and forward, or to skip to the next color.

After setting the last color, the new color selections are displayed at the bottom of the screen.

NOTE: Some colors are reserved and cannot be changed.

Press [ENTER] to save color changes and return to the "Customize Routines" menu.

Set Runout Mode

Select Item # 7, "Set Runout Mode" from the "Customized Routines" menu. The "Set Runout Mode" menu appears (See Figure 2-36).

Three runout modes are listed on the "Set Runout Mode" screen. A cursor shows the current mode being used for runout.

"Normal Runout" is the preferred setting. It gives the most accurate alignment results. "4 Point Runout" and "All Wheel Runout" are options for racks where standard runout is impossible. See the section entitled "Optional Runout Modes" for more detail on these procedures.

To change the selection use the UP and DOWN arrow keys. Press [ENTER] to save the selection and return to the "Customized Routines" menu.

Figure 2-36

Special Functions - Set Clock

Select Item #2, "Set Clock," from the "Special Functions" menu. The "Enter Clock Data" screen appears (see Figure 2-37).

Figure 2-37

Use keys as follows to enter year, month, date, hour, and minute:

- Type numbers at the cursor.
- Press [BACKSPACE] to delete, if desired.
- Use RIGHT and LEFT arrows to move cursor within a line; type over errors to correct them.
- Press [ENTER] to move to the next line on screen.
- Use UP and DOWN arrows to move from line to line.

On the last line, enter [1] to indicate AM, [2] to indicate PM, or [3] to indicate 24-hour format.

Press [CONTINUE] (or [ENTER] from the last line of the screen) to save input and return to menu.

Special Functions - Language Selection

Select Item #3, "Language Selection," from the "Special Functions" menu. The "Language Selection" screen appears.

The screen displays a list of the languages available. Use the arrow keys to move the cursor to the language desired and press [ENTER].

Special Functions - Self Test

Select Item #4, "Self Test," from the "Special Functions" menu. The "Self Test" screen appears.

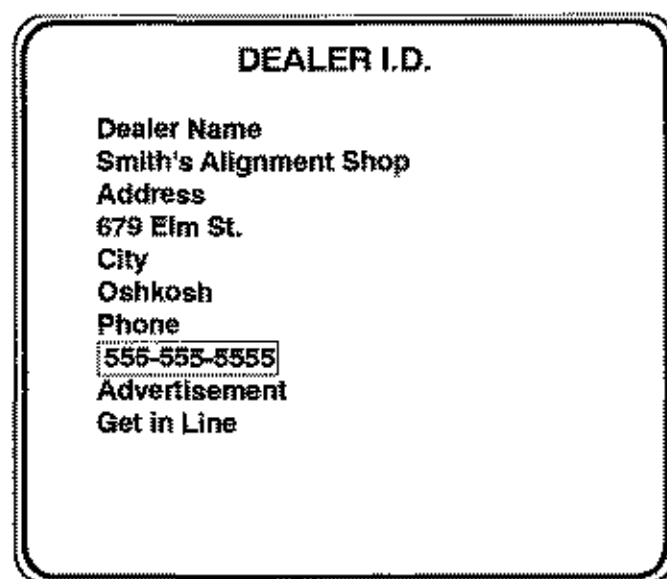
The screen displays the following information:

- Amount of system board RAM;
- Display Card;
- Number of RS232 ports;
- Printer status - OK or Error;
- Disk I.D. version;
- Wheel unit and system PROM versions;
- Remote EPROM version;
- Last calibration date.

After the above information is displayed, the computer writes blocks of color to the screen. Press [BACKUP] or [CONTINUE] at any time to return to the "Special Functions" menu.

Special Functions - Dealer I.D.

Select Item #5, "Dealer I.D.," from the "Special Functions" menu. The "Dealer I.D." screen appears (see Figure 2-38).



DEALER I.D.

Dealer Name
Smith's Alignment Shop

Address
679 Elm St.

City
Oshkosh

Phone
555-555-5555

Advertisement
Get in Line

Figure 2-38

Use keys as follows to enter Dealer I.D.:

- Type information at the cursor.
- Press [BACKSPACE] to delete letters.
- Use RIGHT and LEFT arrows to move cursor within a line; type over errors to correct them.
- Press [ENTER] to move to the next line on the screen.
- Use UP and DOWN arrows to move from line to line.

Press [CONTINUE] (or [ENTER] from the last line of the screen) to save input and return to menu.

Customer Data

Special Functions---Print Screen

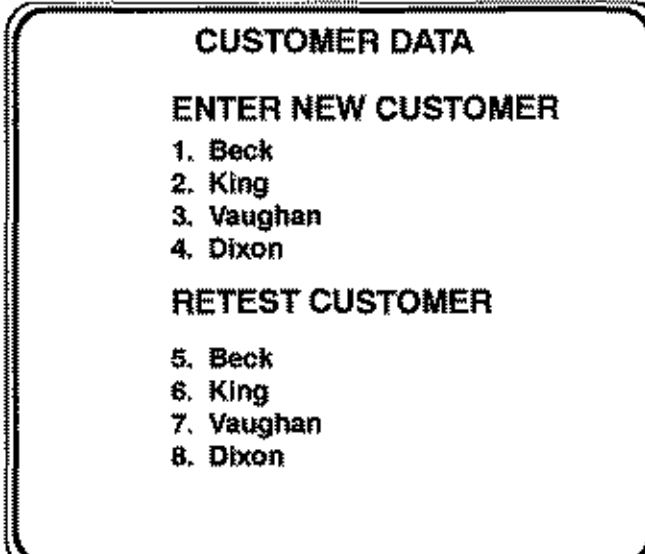
A feature is available to allow the operator to print the CRT display. To print a ride height drawing or SHIMCO data screen as it appears on the CRT, the operator must:

- On 83 and 84-key keyboards - press and hold [SHIFT] while pressing [PRTSC].
- On 101-key keyboards press [PRINT SCREEN].

Select "Customer Data" from the Main Menu or include it as part of the "Programmed Alignment" sequence.

Overview

"Customer Data" is general information about the customer and vehicle. This data is included on customer printout(s) after the alignment procedure. The computer stores up to four sets of customer data along with any alignment specifications and visual inspection information associated with each customer's vehicle (see Figure 2-39).



CUSTOMER DATA

ENTER NEW CUSTOMER

1. Beck
2. King
3. Vaughan
4. Dixon

RETEST CUSTOMER

5. Beck
6. King
7. Vaughan
8. Dixon

Figure 2-39

Enter, retrieve, and clear customer data through the "Customer Data" screen.

Procedure

Select Item #5, "Customer Data," from the Main Menu to display the "Customer Data" screen.

Enter New Customer

To enter a new customer, enter a number from 1 - 4. Use the typewriter keyboard to enter the customer data. Press [ENTER] after each line to move to the next entry. Use the arrow keys to move around the screen.

NOTE: If a customer is already listed for the "new customer number" selected, follow the screen prompt and press [CLEAR] to clear the old information, or [CONTINUE] to edit the old information.

Press [ENTER] when the last line is complete. The program returns to the Main Menu. The customer's name and vehicle shown at the bottom of the Main Menu screen is the active customer. Any vehicle specifications and visual inspection information entered while a customer is active will be stored under that customer's name.

Retest Customer

To retrieve previous customer data under numbers 5 through 8, return to the "Customer Data" screen. The customer name now appears after the number selected on the top half of the screen. The name also appears under a corresponding re-test number on the lower half of the screen.

To re-test a customer's vehicle, select the re-test number. The program returns to the Main Menu and the selected customer's name and vehicle appear at the bottom of the screen.

To run an alignment without specifying the customer, select Item #3, "Alignment," from the Main Menu to go directly to an alignment procedure.

Optional Runout Modes

4-Point Camber-Only Mode

Overview

Some racks create beam block problems for wheel units, making standard runout procedures impossible.

4-Point Camber-Only Runout overcomes this problem by using the camber vials inside the wheel units to measure runout.

The major difference in the runout procedure is that the readings are taken at four positions on each wheel.

Important Note: Always turn the wheel being tested *counterclockwise*!

Procedure

1. Follow the instructions under "Set Runout Mode" in the "Customize Routines" section.
 2. Prepare the vehicle. Refer to the "Procedure" section under "Runout Procedure."
 3. The screen shown in Figure 2-40 appears.
- A. Level and lock the first wheel clamp so that the lock knob is at the 9 o'clock position. The third LED from the left on the first wheel unit will light.
 - B. Press RUNOUT on the wheel unit. Wait while readings are taken. After the tone sounds, unlock the wheel unit, follow the screen prompt and turn the wheel so that the clamp lock knob is pointing down (6 o'clock position). Repeat the procedure, turning the wheel clamp so that the lock knob is at the 3 o'clock and finally the 12 o'clock position. When Runout is completed for each wheel, all four LEDs on the wheel unit will be lit.
 - C. Repeat Steps A and B for the three remaining wheels.
 - D. Follow the steps in the "Prepare the Vehicle After Runout" section under "Runout" to complete the procedure.

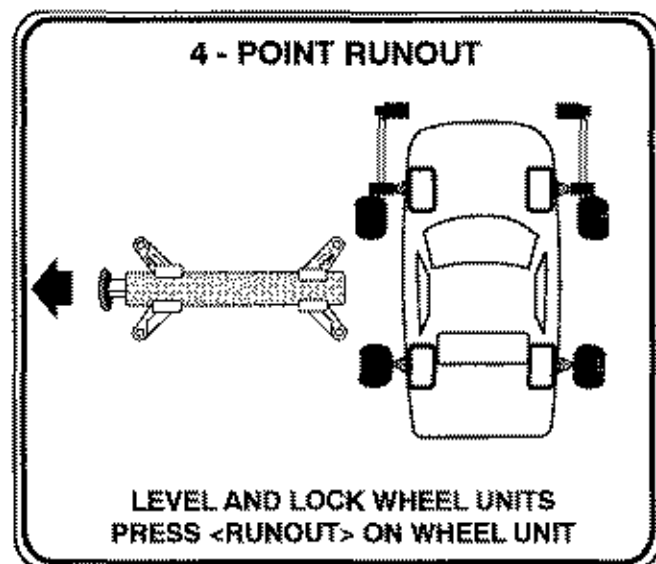


Figure 2-40

All Wheel Runout Procedure

Overview

Select this procedure when the vehicle cannot be jacked up so that the wheels can spin freely.

Procedure

1. Follow the instructions under "Set Runout Mode" in the "Customize Routines" section.
2. Prepare the vehicle. Refer to the "Procedure" section under "Runout Procedure."

IMPORTANT NOTE: Make sure that all four wheel clamps are installed with the lock knob down.

3. The screen shown in Figure 2-41 appears.

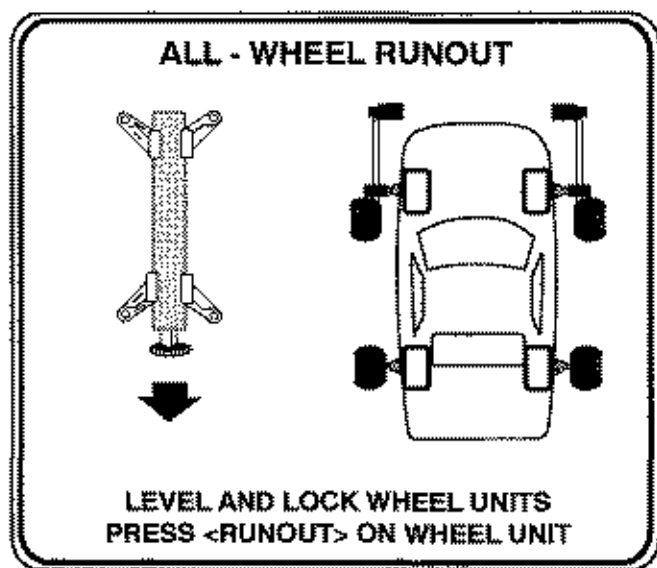


Figure 2-41

- A. The "Knob Down" indicator LED will light on all four wheel units.
- B. Press RUNOUT on any wheel unit.
- C. Wait while the readings are taken. After the tone sounds, position all four wheels so that all four wheel clamp lock knobs are up. The screen shown in Figure 2-42 will appear. Level and lock all four wheel units and then press RUNOUT again.

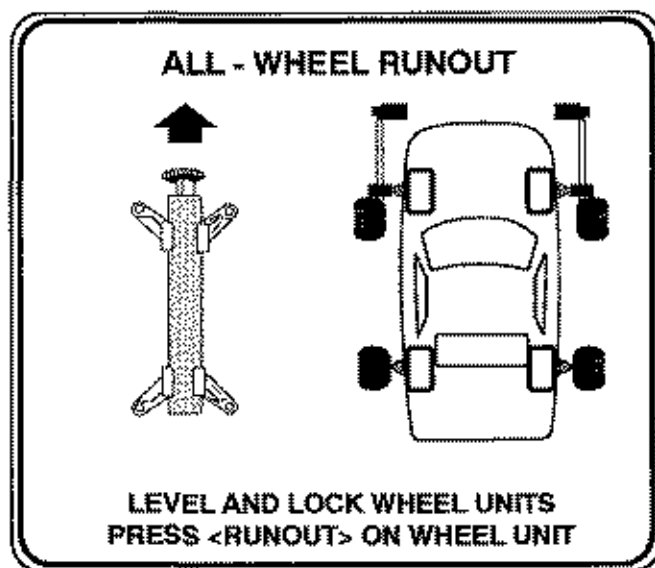


Figure 2-42

Preventive Maintenance

Wheel Alignment Rack/Runways

- Runways must remain level side-to-side and front-to-rear when resting on safety legs at working height.
 - Side to side tolerance front = $\pm 1/16"$. Measure from center of Turning Radius Plate on left to center of Turning Radius Plate on right.
 - Side-to-side tolerance rear = $\pm 1/16"$. Measure from center of rear slip plate on left to center of slip plate on right.
 - Front-to-rear tolerance = $\pm 1/4"$. Measure from center of left-front Turning Radius Plate to center of left-rear slip plate. Then repeat front-to-rear measurement on right side.
- Check rack for available lubrication areas. Lubricate once every six (6) months.

Rear Slip Plates and Full Floating Front Turning Radius Plates

- Plates must be disassembled once every six (6) months and bearing race cleaned.

NOTE: After bearing race is cleaned, only a dry spray lubricant such as silicone or graphite should be used on the bearings. Grease or oil should never be used as it will hold dirt/grit and act as an abrasive.

Full Floating Turning Radius Plates in good working condition will swivel when light hand pressure is applied.

- Use air hose to blow dirt/grit and water from bearings each day.
- Always place pins in Turning Radius Plates before front wheels of vehicle drive on or off plates.

Sliding Jacking Beam

- Clean oil and grease from jack pads/flip pads and slide bars each working day.
- Clean and lubricate outer surface of the roller rails (located on bottom area of Jacking Beam) once a month.
- Clean rack runway tracks where roller rails make contact once a month.

Components

- Clear Toe/Track Lens on Wheel Units** - Clean once a week with window cleaner and soft cloth.
- Remote Keypad** - Clean once a week with spray type household cleaner and soft cloth. Do not use a harsh cleaning agent.
- Wheel Unit Keypad** - Clean once a week with spray type household cleaner and soft cloth. Do not use a harsh cleaning agent.
- All Electrical Cables** - Clean once a week with industrial hand cleaner and shop towel. Also, inspect cables and connectors for damage.
- Wheel Clamps**
 - Screw Thread - Clean and lubricate with light oil once a month.
 - Spindle - Clean and lubricate with light oil once a month.
 - Center Sliding Bar - Clean and lubricate with light oil once a month.
 - Hook Adapter (Claw foot) - Check Hook Adapter screw daily (four on each Wheel Clamp) for tightness. If loose, tighten screw with large flat blade screwdriver.

Continued...

Brake Pedal Depressor

1. Must be inspected for proper working condition before each use.

Steering Wheel Holder

1. Must be inspected for proper working condition before each use.