

60-801

ALIGNMENT HEAD

ASSEMBLY INSTRUCTIONS

Before you begin, assemble the alignment cabinet or the overhead mount on which you will mount your machine.

These instructions tell you how to unpack and assemble the head for your alignment machine, in five steps:

- I. Wheel Units
- II. Printer
- III. Calibration Bar Brackets
- IV. Calibration Bar
- V. Power Cord / Program Disk / Banners

I. WHEEL UNITS

The wheel units are packed in a separate box. Remove them from the box and hang them on wheel unit brackets on the side of the alignment cabinet or overhead mount. (For bracket installation, see instructions that came with your cabinet or overhead mount.)

Route the wheel unit cables as follows:

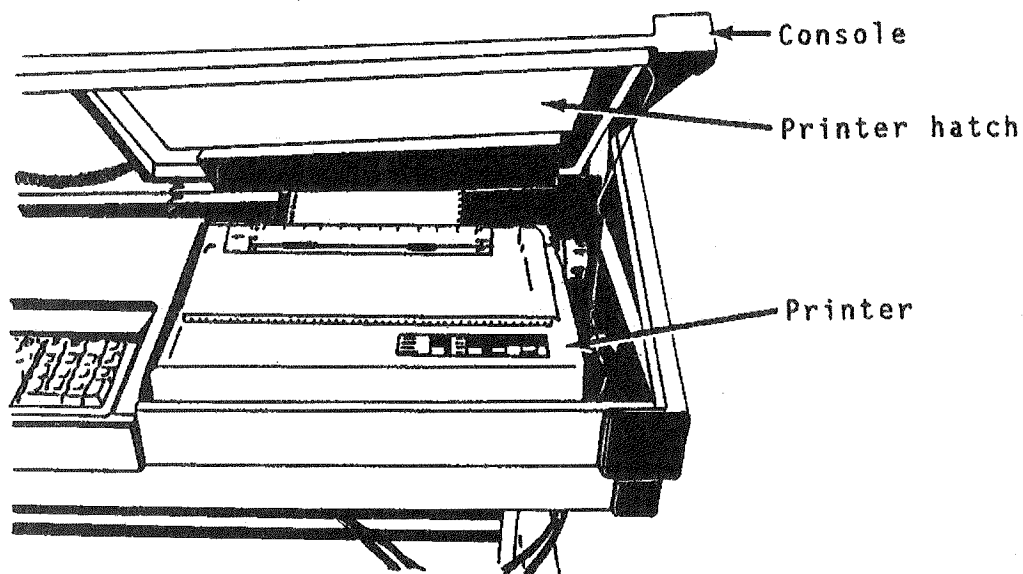
1. Lift the front console cover and put the support bar in place to keep it open.
2. Underneath, wheel unit cables are coiled up in the rear corners of the access space. In the front corners, opposite the cables, are grommetted holes that lead to the outside of the cabinet. Uncoil the cables and draw them through the holes on their respective sides. You should have two cables going through each hole: a long one and a short one.
3. Attach the long cables to the rear wheel units on their corresponding sides. Attach the short cables to the front wheel units.

Leave access cover open for installing the printer.

II. PRINTER

The access cover on the alignment machine should still be open. The power must be shut OFF. Install printer as follows:

1. Unpack the printer from its carton. Adjust print gap and mount the platen knob according to instructions in the printer manual.
2. Set the printer dipswitches: Dipswitch number 6 must be OFF. All the rest ON. (Printer manual shows location of dipswitches.)
3. Plug the female end of the printer power cord into the back of printer. Set printer on the shelf in the access space, just beneath the printer hatch in the console.
4. Feed the power cord back through the access space. Go to the rear of the machine. In the roof of the access space at the rear, there is an electrical outlet. Plug the printer power cord into this outlet.
5. Return to front of the machine. A printer cable runs along the edge inside the access space next to the printer shelf. Plug this cable into the printer and snap the connector into place.
6. Stack the fan-fold paper behind the printer. Feed it underneath the printer power cord and into the back slot on the printer. See printer manual for complete instructions on feeding paper.
7. Turn printer power switch ON. Close the access space cover. Save the printer manual in the cabinet for reference.



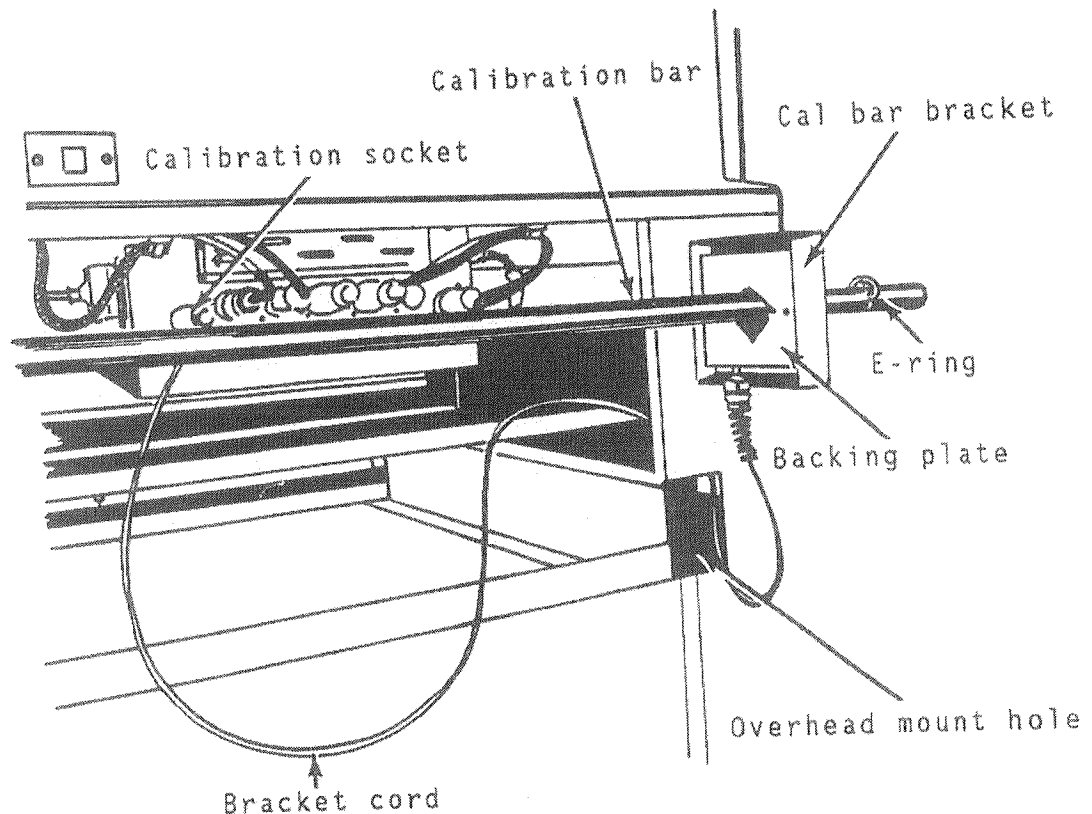
III. CALIBRATION BAR BRACKETS

The cal bar brackets are red square pieces of metal with diamond-shaped holes cut into them. They hold the calibration bar onto the back of the alignment machine for cal bar "runout".

Using 4 small screws, flatwashers, lockwashers, and nuts, install cal bar brackets as follows:

1. On back of the alignment machine head, at each side, there are vertical sets of two holes. In the holes on the right side, install the cal bar bracket with the cord. Position this bracket with open edge facing in and cord side down.
2. Plug the cord into the calibration socket, next to wheel unit sockets in the access space. If the head is mounted on a roll-around stand, route the cord through the overhead mount hole, as shown in the picture below. Tuck the excess cord into the access space and out of the way.
3. Attach the other cal bar bracket at the holes on the left hand side, with open edge facing in.

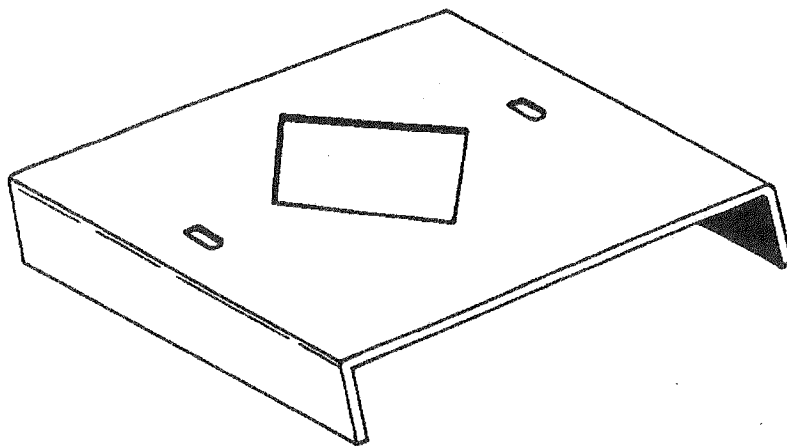
There is a backing plate for the right side cal bar bracket. Do not install this plate yet.



IV. CALIBRATION BAR

1. The calibration bar is packed in a separate box. Unpack it.
2. Locate the red metal backing plate for the cal bar bracket. Notice the metal pin near one end of the cal bar. Slide the backing plate over the end of the cal bar opposite the pin end, with the flanges facing in towards the pin. Slide the plate all the way down to the pin.
3. Install the cal bar in the brackets so the pin goes into the contact clips in the bracket on the right side.
4. Slide the backing plate into place against the right-side bracket. The flanges should be pointing in towards the bracket. Match the holes in the plate with the holes in the bracket. Use two phillips-head sheet metal screws to hold the plate into place.
5. Locate the two large E-rings which go around the cal bar. Clip these E-rings into the slots in the cal bar. The E-rings serve as stops for wheel units when they are installed on the cal bar.

When you want to remove the calibration bar from the brackets, all you have to do is remove the two phillips screws and slide the bar out.



Backing plate for cal bar bracket

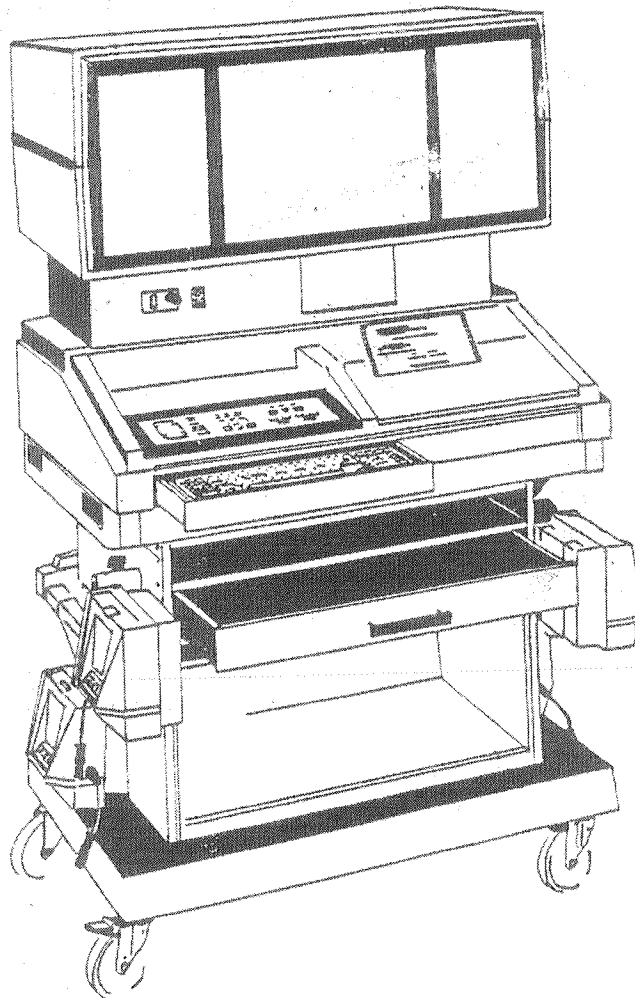
V. POWER CORD / PROGRAM DISK / BANNERS

Plug the female end of the **power cord** into the back of the computer.

Install the **program disk** as follows:

1. Remove protection card from the disk drive. Insert disk into drive slot, with the arrow on the disk pointing in and the arrow side of the disk up.
2. Press the eject button on the drive when you want to remove the disk. When storing the disk, keep it away from magnetic fields of any kind, including telephone bells, audio speakers, etc.

Finally, some wheel service **banners** are included with your alignment machine. Hang these in a prominent place in order to get the most marketing value out of your machine.



BEAR® 

Operating
Instructions

DESCRIPTIONS
VEHICLE PREPARATION
PROCEDURES

4
11
15

SAFETY

POWER CORD CONNECTIONS

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

WET FLOORS

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

FUSES

- * **DO NOT** install fuses of a higher ampere rating than specified on fuse holders.

VEHICLE

- * Be sure that the vehicle cannot roll. Support vehicle as needed with car stands or equivalent secure blocking.

RAISING THE VEHICLE

- * Use proper jacking system provided with rack.

TABLE OF CONTENTS

S A F E T Y	2
GETTING STARTED / USING THIS MANUAL	4
D E S C R I P T I O N S	5
FRONT VIEW	5
KEYPAD	6
TYPEWRITER KEYBOARD	8
REMOTE CONTROL UNIT	8
WHEEL UNITS	9
WHEEL CLAMPS	10
V E H I C L E P R E P A R A T I O N	11
PUT VEHICLE ON THE RACK	11
INSTALL WHEEL CLAMPS	12
INSTALL WHEEL UNITS	14
P R O C E D U R E S	15
MAIN MENU	15
ALIGNMENT	17
PROGRAMMED ALIGNMENT	18
CUSTOMER DATA	19
VISUAL INSPECTION	21
SPECIFICATIONS	23
RUNOUT	25
CASTER SWING	29
TURNING ANGLE	33
DISPLAY-ALL PAGE	34
TOE, CASTER/CAMBER METERS	36
OPTIONS MENU	38
DIGITAL ADJUSTMENT SCREENS	40
JACK AND HOLD	41
PRINTOUT OPTIONS	42
SPECIAL FUNCTIONS MENU	43

GETTING STARTED / USING THIS MANUAL

1. Insert program disk in the disk drive. (There is an arrow stamped on the disk casing. Insert disk with the arrow pointing in the drive and the arrow edge up. The drive won't take the disk any other way).

2. Turn the main power switch ON. The screen says "Executing Self Test." The disk drive light goes on as the computer loads the program from the disk. In a short time, the title page comes on screen.

3. Press any key to see the main menu.

4. Look over this manual to become familiar with the alignment machine. The manual is organized as follow:

- DESCRIPTIONS section describes the hardware: keypad, wheel clamps, wheel units, etc.

- VEHICLE PREPARATION section shows how to connect wheel clamps and wheel units, and prepare vehicle for alignment.

- PROCEDURES section describes all the alignment procedures and functions.

5. When you are ready to begin an alignment, start at the "Main Menu" page 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.

V. POWER CORD / PROGRAM DISK / BANNERS

Plug the female end of the power cord into the back of the computer.

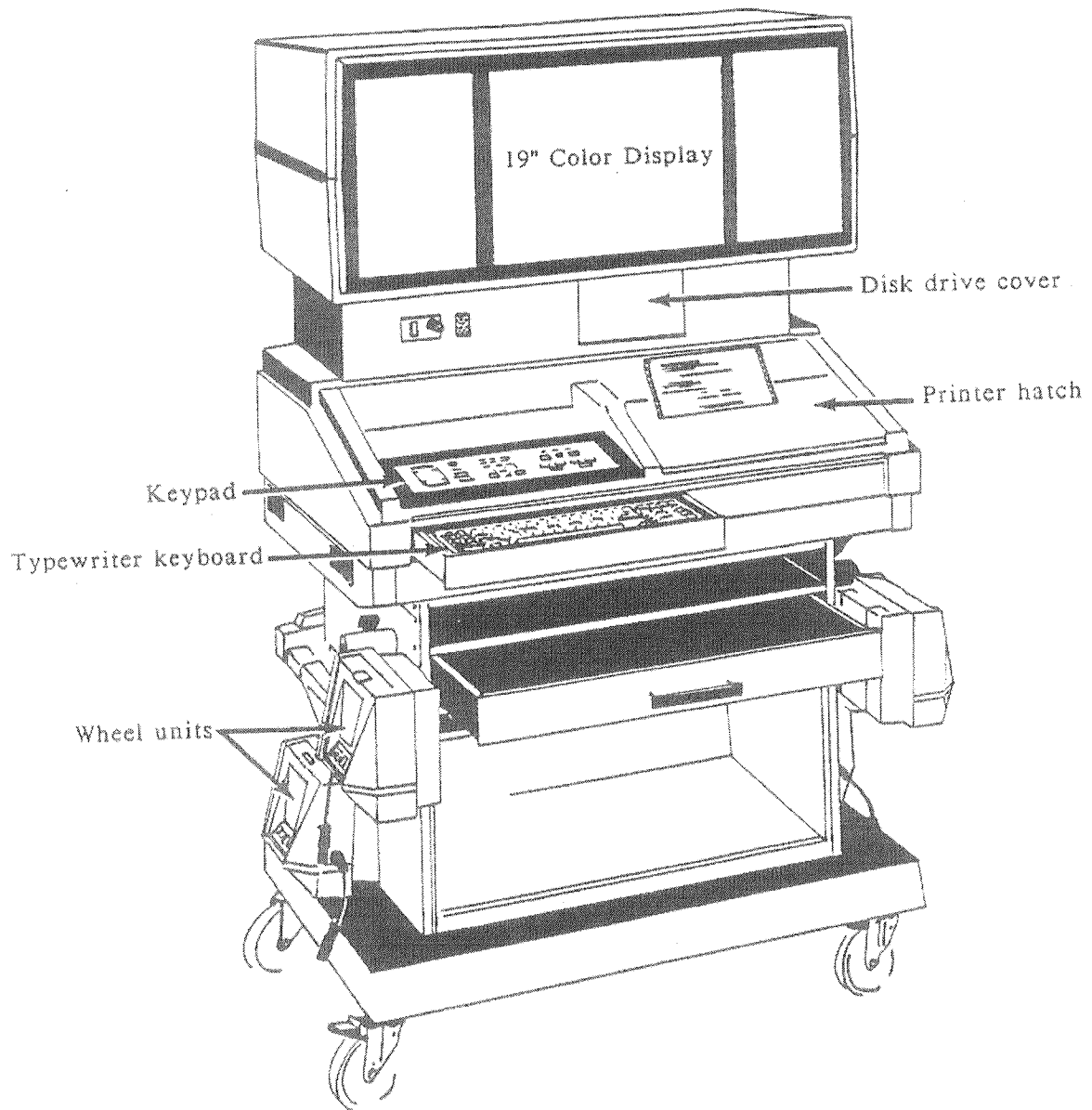
Install the program disk as follows:

1. Remove protection card from the disk drive. Insert disk into drive slot, with the arrow on the disk pointing in and the arrow side of the disk up.
2. Press the eject button on the drive when you want to remove the disk. When storing the disk, keep it away from magnetic fields of any kind, including telephone bells, audio speakers, etc.

Finally, some wheel service banners are included with your alignment machine. Hang these in a prominent place in order to get the most marketing value out of your machine.

DESCRIPTIONS

FRONT VIEW



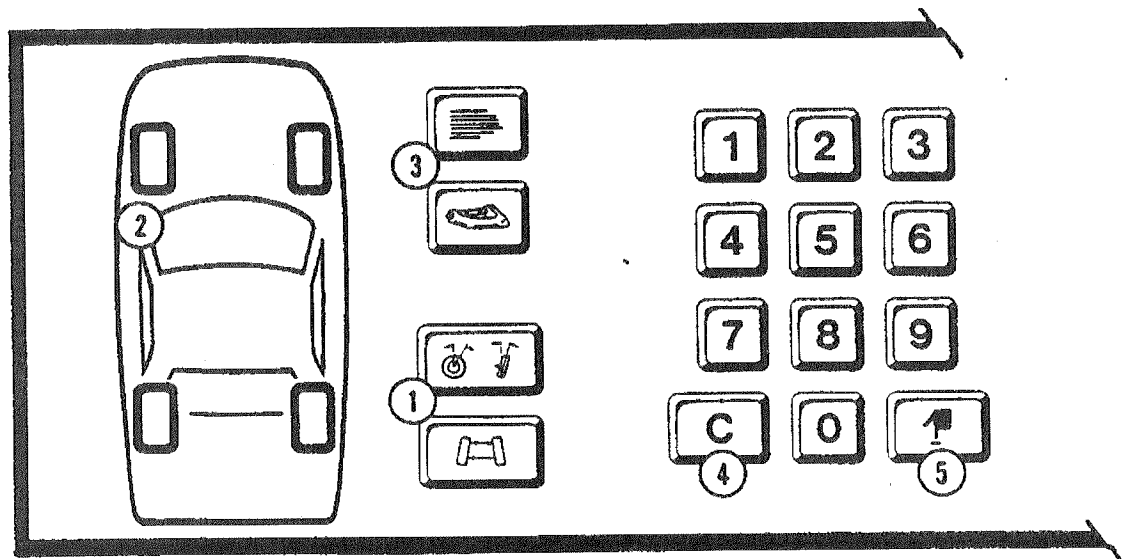
KEYPAD

When you press a key that is active, the computer gives a short, sharp beep to indicate that the keystroke was accepted. When a key is not active, the computer gives a low warning tone if that key is pressed.

The keys function as follows:

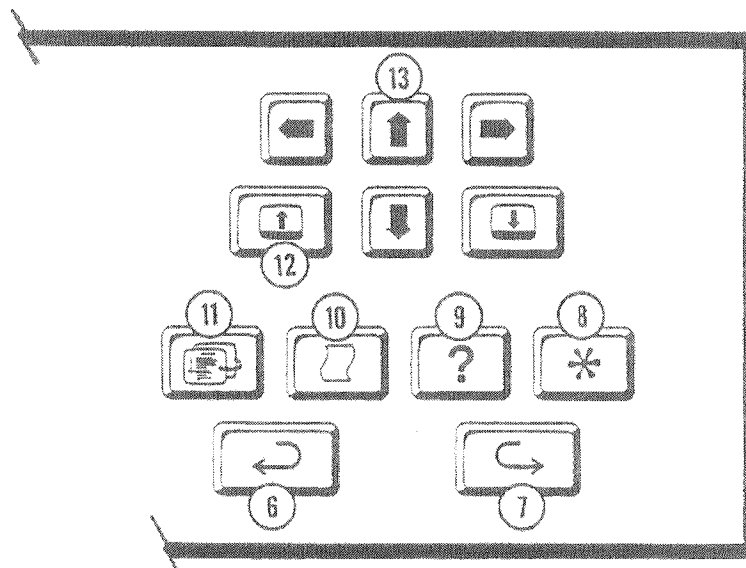
- 1) **METER** keys - Used to select meter screens and digital adjustment screens.
- 2) **WHEEL** keys - Used to specify a wheel, while meter screens and digital adjustment screens are displayed.
- 3) **TEXT** and **DRAWING** keys - Call adjustment instructions and drawings to the screen. (See "Drawings".) These keys are only active if specifications have been selected.
- 4) **CLEAR** - Clears information from screen, or from memory file.
- 5) **ENTER** - Sends information to the computer after it is typed on screen.

CONTINUED . . .



KEYPAD (continued)

- 6) BACKUP - Returns to a preceding step during a routine. Also moves the cursor back a space on data entry screens.
- 7) CONTINUE - Continues a routine after you have taken a required step.
- 8) OPTIONS ("STAR" key) - Selects the "Options" menu from the display-all page.
- 9) HELP - Identifies the function keys.
- 10) PRINT REPORT key - Calls a report menu to the screen. From there you can print reports. This key is only active on Visual Inspection and Alignment screens.
- 11) MAIN MENU key - Returns you directly to the main menu from wherever you are in the program.
- 12) PAGE UP / PAGE DOWN keys - Advance to the next screen or back up to the preceding screen.
- 13) ARROWS - Move cursor around screen.



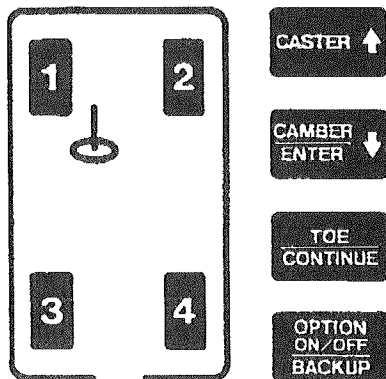
TYPEWRITER KEYBOARD

The typewriter keyboard is in a drawer below the keypad. This is a standard personal computer keyboard. You use it to type in customer data. It can also be used to access the computer for other applications.

REMOTE CONTROL UNIT

The keys on the remote control unit work the same as their namesakes on the console keypad. However, as you can see, the layout of the remote keypad is a bit different, and some of the remote keys serve dual purposes.

The remote display shows adjustment meters and alignment values.



You can use the remote unit to

- begin caster swing
- 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 steering/suspension inspection routines

To Connect the Remote Unit

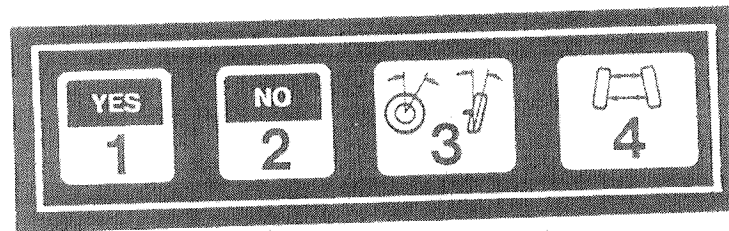
Plug it into any one of the 5 wheel unit connector sockets in the rear access space of the alignment machine.

WHEEL UNITS

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

Wheel Unit Keypads

There are four keys on each wheel unit. The keys serve dual purposes: they are the numbers 1 - 4, and they are YES, NO, Caster/Camber, and Toe meter keys. The numbers are for making selections from options menu. YES/NO keys are for runout and jack and hold. Meter keys are for selecting adjustment meters.



To Connect Wheel Unit Cables

The alignment machine comes with long wheel unit cables already connected to wheel unit sockets in the back. You connect the other end of these cables to the wheel units.

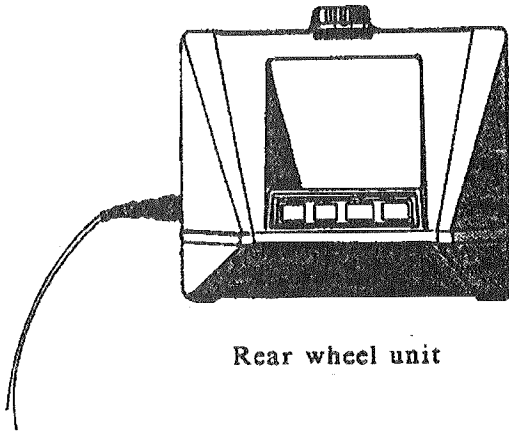
The wheel units and sockets are interchangeable; that is, any wheel unit can be connected to any socket (since the wheel units identify themselves to the computer anyway). However, you want to be sure to connect the rear wheel units to the longer cables, so they can reach the rear of a vehicle on the rack.

WHEEL CLAMPS

Wheel clamps are four-armed clamps that attach to a vehicle's wheels. They provide spindles for hanging the wheel units.

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

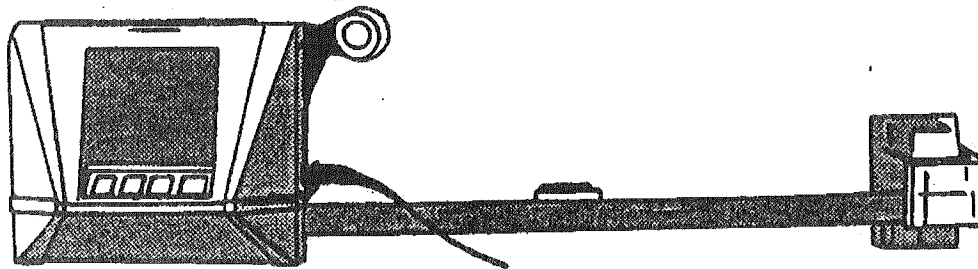
Spindle spacers are included for use with vehicles that have air dams or fairings - or anything else which would obstruct line of sight between front wheel units. The spacers go on the wheel clamps spindles and drop the wheel units down below the obstruction.



Rear wheel unit

To Connect Wheel Clamps and Wheel Units to Vehicle

For instructions on how to connect wheel clamps (and spindle spacers) and wheel units to a vehicle, see VEHICLE PREPARATION, starting next page.



Front wheel unit

VEHICLE PREPARATION

Follow these instructions to prepare vehicle for alignment.

PUT VEHICLE ON THE RACK

1. Before you put a vehicle on the rack, make sure turning plates are locked into position, with the pointers at the zero degree mark.
2. Drive vehicle onto rack. Position the front wheel axles in line with the zero mark of the turning plates.
3. Rear wheels must be on slip plates if rear toe/camber are to be adjusted.
4. Chock the wheels or take other steps to **MAKE SURE THE VEHICLE CANNOT ROLL.**

INSTALL WHEEL CLAMPS

First Select the Hooks

In the ends of each wheel clamp arm, a stud holds hooks which grab onto the wheel when you install the clamp.

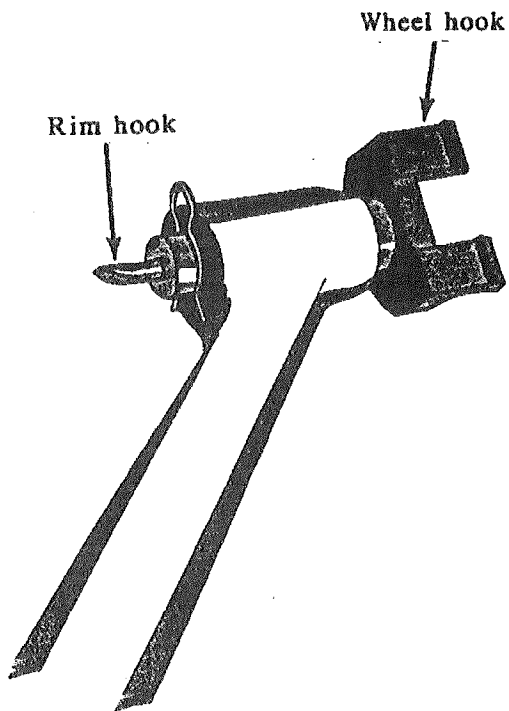
As the picture at left shows, these studs have two different types of hooks: wheel hooks, and rim hooks. Select the type of hook you want to use, depending on the type of wheel you're working with:

- The Wheel hooks rest against the inside edge of the wheel. These fit most style wheels.

- The Rim Hooks grasp around the outer rim of a wheel, along the edge of the tire bead. These fit wheel styles which would prevent the use of the wheel hooks.

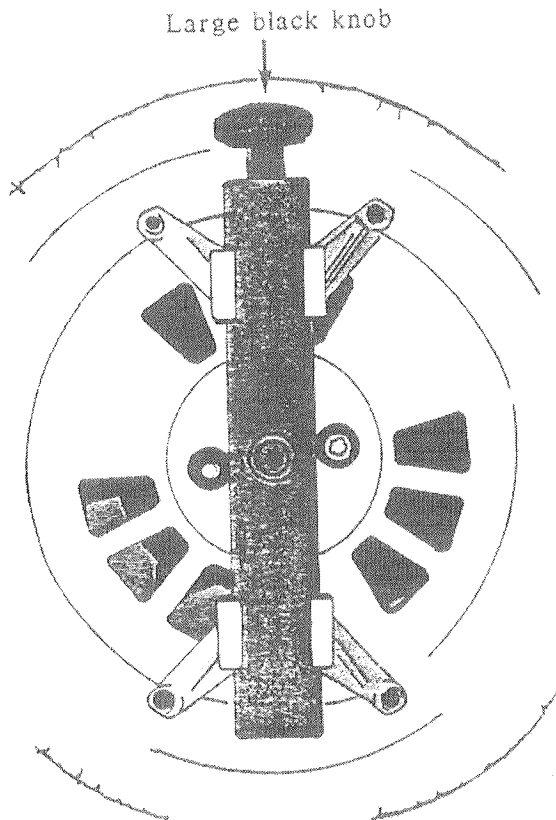
To change hooks, simply turn the studs around in the arms, as follows:

1. Remove the hairpin clip that retains the stud.
2. Remove the stud from the arm and turn it around.
3. Put the stud back in the arm and return the hairpin clip into place.



CONTINUED . . .

INSTALL WHEEL CLAMPS (continued)



Install the Clamps

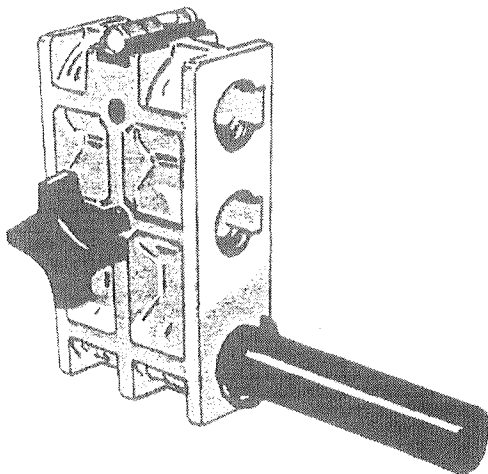
1. To attach a clamp to a wheel, hold the large black knob toward the top of wheel. Set the lower hooks against the wheel rim (or hook them around the bottom edge of the rim, depending on which hooks you're using).
2. Turn the black knob to bring top hooks into place. Avoid wheel weights, burs, or dents, and make sure the hooks seat properly.
3. When hooks are seated, turn the knob tightly to secure the clamp to the wheel so that it won't move. (Rim hooks may look fragile, but they are in fact very strong and can take a lot of pressure.)
4. Pull on the clamps to check for tightness.

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

NOTE: Wheel runout compensation is done electronically during a step in the operating procedure. It is not done by adjusting wheel clamps (as is the case on other alignment systems).

Install Spindle Spacers if Necessary

Spindle spacers are included for use with vehicles that have air dams or fairings -- or anything else that would obstruct line of sight between front wheel units. The spacers drop the wheel units down below the obstruction. If you use one spacer, you must use all four at the same setting, so that all wheel units are at the same level.



Here's how to install a spacer:

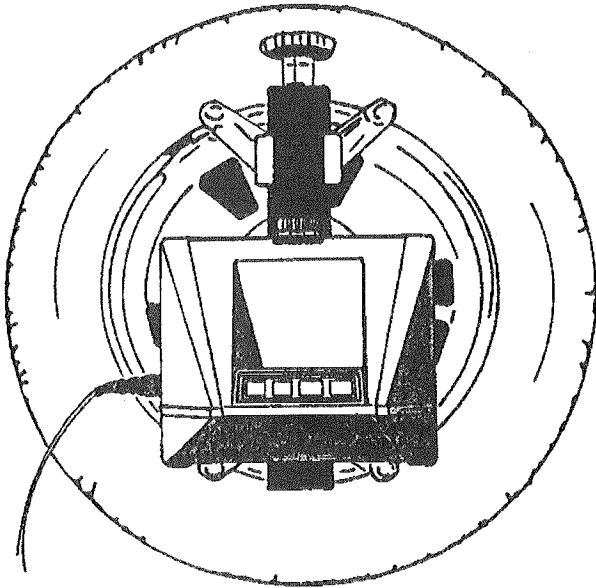
1. After installing a wheel clamp, put the spindle spacer over the wheel clamp spindle. Use whichever hole you need to drop it down far enough, and screw black knob into corresponding side hole on the spacer.
2. Level and tighten.

The spacer now serves in place of the wheel clamp spindle.

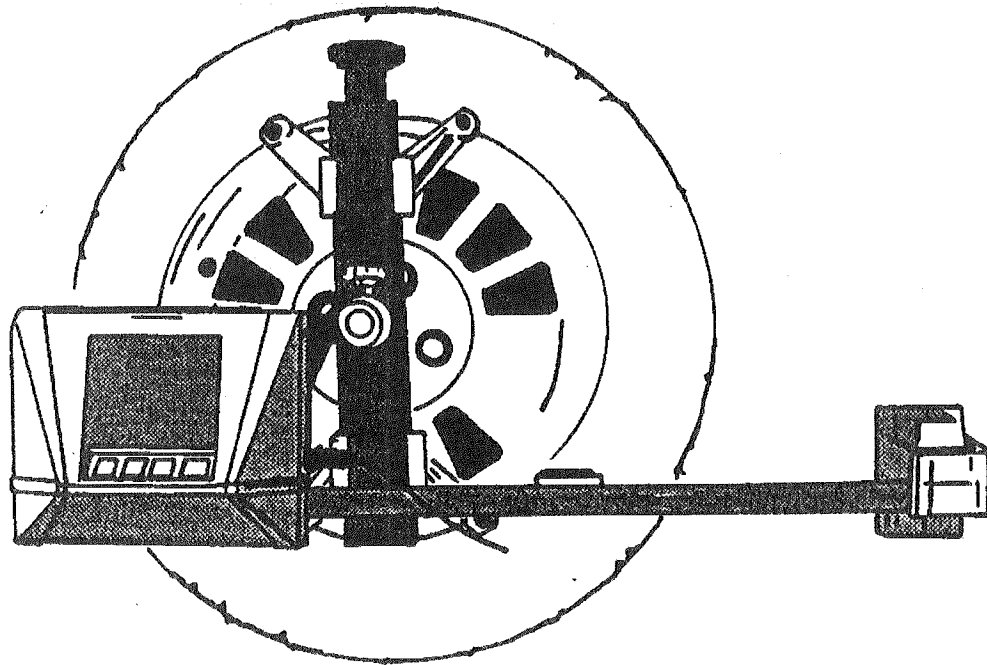
INSTALL WHEEL UNITS

Each wheel unit is designed for a specific wheel position, and they are not interchangeable from wheel to wheel.

To determine which unit goes to which wheel, just look at the position of the infrared light sensors. There should be a line-of-sight between the two front sensors, and from front to rear on each side of the vehicle.



Rear wheel unit



Front wheel unit

PROCEDURES

This PROCEDURES section describes all of your 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

Through the main menu you select alignment procedures and supplementary features. You also set the alignment mode here before performing an alignment. Here's how it works:

Selections

There are 5 selections at the top of the main menu screen. Here is a summary of the selections. Make a selection and refer to the appropriate section in this manual for step-by-step instructions:

1. Customer Data - Used to enter customer information before an alignment. At the end of alignment, this information is included on the customer printout(s).
2. Visual Inspection - Includes an assortment of visual inspection routines. Results are reported on the printout at the end of alignment.
3. Alignment - Begins a basic alignment sequence that includes Runout and a display-all page of 'live' alignment readings. From the Display-All Page, you have access to toe and camber adjustment screens, and to the "Options" menu.
4. Programmed Alignment - Begins an alignment sequence that can be customized to include any alignment steps and supplementary features you choose. (To customize the routine, select 5, Special Functions.) Most shops set this up as their standard, comprehensive alignment procedure.
5. Special Functions - Includes a host of support functions such as "Dealer I.D.", "Customize Routines", and "Typewriter".

CONTINUED . . .

MAIN MENU (continued)

Alignment Modes

At the bottom of the screen are listed the 3 alignment modes. A pointer shows which mode is current. This is the mode that will be used when you do an alignment.

To change the mode, press up or down arrow to move the pointer.

When the machine is turned on, the pointer is automatically set at "4 Wheel thrust line". This is the most commonly used mode. If you wish to change it, you must do so from this screen, before you press [3] or [4] to begin an alignment.

ALIGNMENT

Overview

Selection 3 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. This must be done before any alignment measurements are taken.
- Display-All Page: A screen that shows caster values, SAI, setback and thrust line values, and live camber and toe readings.

From the display-all page you have access to camber and toe adjustment screens, with live indicators that make it easy to adjust values to spec.

From the display-all page you also have access to an alignment "Options" menu. The Options menu includes "Enter Specs" and "Caster Swing", along with other procedure options.

At the end of the alignment procedure, you can print out technical and/or customer reports.

Procedure

1. If you wish, first perform Customer Data and Visual Inspection procedures.
2. From the main menu, set the alignment mode. (Use up and down arrows to move the pointer to the mode you want.)
3. Select "3) Alignment" from the main menu. See "Runout" and "Display-All Page" sections in this manual.

PROGRAMMED ALIGNMENT

Overview

The Programmed Alignment sequence can be customized to include any of the alignment procedures listed below, in almost any order. Each of these procedures is fully explained in its own section of this manual.

You can change the Programmed Alignment sequence by going through the Special Functions menu (see "Special Functions").

As it stands, 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
- [Turning Angle] - Not included in the default routine.
- Display-All Page - Automatically occurs last in the programmed alignment sequence.

From the display-all page you have access to camber and toe meter screens, with live indicators that make it easy to adjust values to specs.

From the display-all page you also have access to an alignment "Options" menu. The Options menu includes "Enter Specs" and "Caster Swing", along with other procedure options.

At the end of the alignment procedure, you can print technical and/or customer reports.

CUSTOMER DATA

Customer Data can be selected directly from the main menu. Or it can be included 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 alignment. The computer stores up to 4 sets of customer data, along with any alignment specs and visual inspection information associated with each customer's vehicle.

You enter, retrieve, and clear customer data through the Customer Data screen. Here's how it works:

Procedure

ENTER NEW CUSTOMER DATA under numbers 1 through 4:

Press a number from 1 - 4 to enter new customer. Use the keypad to type information: Name; Vehicle; Plate #; Mileage; Work Order; Symptoms. Press ENTER when one line is complete to move to the next. Use BACKUP and arrow keys to move around screen.

NOTE: If there is a customer already listed at the "new customer number" you select, a screen message tells you to press CLEAR to clear the old information under that number. Or you can just press ENTER and edit the old information.

ENTER last line and return to the main menu. Notice that the customer's name and vehicle are now shown at the bottom of the main menu screen. This is the active customer. Any vehicle specs and visual inspection information entered while a customer is active will be stored under that customer's name.

CONTINUED . . .

CUSTOMER DATA (continued)

RETRIEVE PREVIOUS CUSTOMER DATA under numbers 5 through 8:

When you return to Customer Data screen, you'll see the customer name now appears after the number you selected on the top half of the screen. It also appears under a corresponding retest number on the lower half of the screen.

If you wish to retest a customer, just select the retest number. The computer retrieves any information stored under that name, including customer data, vehicle specs, and visual inspection information. You then automatically go to the next step in your alignment procedure.

CLEAR CUSTOMER DATA by pressing 9.

It is necessary to clear the active customer data if you wish to run an alignment without specifying the customer. To do this, select Customer Data from the main menu and press "9", No Customer. When you return to the main menu, you'll see "No Customer" at bottom of screen.

NOTE: When "No Customer" is active, and you return to the main menu after reading alignment values, a message on screen says:

"Current values have not been printed.
Press Clear to begin new customer."

At this point you press CLEAR to throw the alignment data out. Or press any other key to keep the same data in memory, in which case you should print it now.

All customer data is stored in battery-backed memory when the machine is reset or shut OFF.

VISUAL INSPECTION

Visual Inspection can be selected directly from the main menu. Or it can be included as part of Programmed Alignment sequence.

Overview

The visual inspection procedure guides you through a list of components or items to inspect. You indicate the condition of each item by entering your choice of indicator codes, such as 1 - OK, 2 - SERVICE or 3-REPLACE. The results of this inspection are stored in memory and reported on the printout at the end of alignment.

Visual inspection results are also stored under the customer's name in "Customer Data", so when you retest a customer, the inspection results you've already entered for that customer are retrieved.

Visual Inspection Menu

The first visual inspection screen gives you a menu of inspection routines. The top selection, "All Visual Inspection Tests," includes all the other routines in list. Or you can select individual routines by moving the cursor with arrow keys to the desired routine and pressing ENTER.

After you finish an individual routine, you return to the visual inspection menu. A marker indicates that you have performed the routine, and the cursor is at the next routine in the list.

CONTINUED . . .

VISUAL INSPECTION (continued)

Inspection Procedure

Select a visual inspection routine from the menu.

You can use the remote keypad to perform inspection routine at the vehicle.

For some of the visual inspection procedures (notably, "Steering/Suspension"), screen first prompts CHOOSE VEHICLE TYPE. Press 1 for rear wheel drive, 2 for front wheel drive, 3 for four wheel drive. Inspection screen appears.

Each inspection screen shows a list of items to be inspected. At the top is an index of indicator codes -- for example, 1=OK, 2=SERVICE, 3=REPLACE, or 4=NA. The indicator codes may be different on different screens, according to the items being inspected.

Inspect the items on the vehicle in the order they appear on the list. After each item, press an indicator code to record the result of your inspection. The cursor then moves to the next item in the list.

Use the arrows keys to move through the list, to backup or skip items. When your inspection is complete, press CONTINUE to move to the next screen in the procedure. At the end of the procedure, CONTINUE to return to visual inspection menu.

When visual inspection is complete, you can press PRINT to print inspection results. Or press CONTINUE to return to the main menu.

SPECIFICATIONS

The "Specifications" feature can be included as part of the Programmed Alignment sequence. Or it can be selected from the "Options" menu.

Overview

The computer automatically compares specifications to actual readings during alignment procedures. Adjustment screens and the display-all page can thus tell you when values are out of spec.

Procedure

The specifications menu offers you three selections. The first two allow you to select specs by entering make, model and year:

1. Domestic Passenger Cars -- Import Passenger Cars and Light Trucks
2. Domestic Light Trucks

The third selection allows you to view and edit specifications that have already been selected, or enter your own:

3. Edit Specifications

Press 1 or 2 to select specifications.

Screen says SELECT VEHICLE MAKE. Vehicle makes are listed in alphabetical order. To select, you must move the highlight bar to the selection you want, then press ENTER. Take these steps:

- Type in the first letter of the make you are looking for. The highlight bar moves to "make's" which begin with that letter.
- Use arrow keys to move from there to the vehicle make. Then press ENTER.

The next screen says SELECT VEHICLE MODEL. Use the same steps as for make. Press ENTER. The specs for the vehicle you selected are now entered into the computer. You return to the first specifications page.

Press CONTINUE to proceed. Or press 2 to edit specs.

SPECIFICATIONS (continued)

Select 2 to edit specifications.

Here you can view and edit specs that have already been selected. Or you can input your own. There are 3 pages of specifications.

To edit numeric specs, use keys as follows:

- Type over numbers to change them.
- BACKSPACE to delete the character behind the cursor, if desired.
- Press right and left arrows to move cursor within a number.
- Press ENTER to move to the next value on screen.
- Press CONTINUE to move to next page (or ENTER from the last line of a page).

On the last page, there is a list of questions with YES or NO answers. To change any of these, press 0 for YES or 1 for NO.

Also, if required, indicate suspension type by moving indicator to the correct type and pressing ENTER.

Press CONTINUE from the last page to return to the first specifications page.

Press CONTINUE again to go to next procedure.

RUNOUT

Runout is automatically included in any alignment procedure, before either the Caster Swing or the Display-All page. You can also select runout from the "Options" menu.

Overview

Runout detects and compensates for any offset in the position of the wheel clamp spindles. This is important for accurate alignment measurements. Every time you connect wheel clamps you must perform runout before proceeding.

Messages and pictures on screen guide you through runout procedure. For each wheel, follow the instructions on the next page. You can start on any of the wheel units and do them in any order.

RUNOUT (continued)

Runout Procedure

The top of the runout screen says CONNECT ALL WHEEL UNITS. (Or if machine is in the 2-wheel only mode it says CONNECT BOTH FRONT WHEEL UNITS.)

If you have not already done so, position vehicle on the alignment rack and mount wheel clamps and wheel units. (See VEHICLE PREPARATION for detailed instructions.)

Screen message says ENTER "YES" ON APPROPRIATE WHEEL UNITS. Screen picture shows a top view of vehicle with all four wheel units. Next to it is a picture of a wheel clamp pointing down. Perform runout on each wheel, as follows:

- 1) Using a jacking beam (or whatever lifting device is supplied with your alignment rack), lift one end of the vehicle. The runout wheel must be off the rack so it can spin freely.
- 2) Loosen the small black knob on the wheel unit (not the wheel clamp). (Or if you're using a spindle spacer loosen the knob on the spacer.) Then spin the runout wheel 180° so the wheel clamp knob is pointing down, as in the picture on screen.

NOTE: On some vehicles, the wheel on the other side may tend to spin. If necessary, block it to prevent it from spinning.

- 3) While the clamp is turned down, level the wheel unit, using the bubble level. Steady the unit by tightening knob with moderate pressure.
- 4) Press YES key on the wheel unit. An arrow appears at the corresponding wheel unit on screen. Wait while runout readings are taken. A tone sounds and the screen shows a light beam appear at the appropriate points.

DO NOT MOVE THE WHEEL OR WHEEL UNIT WHILE RUNOUT READINGS ARE BEING TAKEN.

CONTINUED . . .

RUNOUT (continued)

- 5) After initial readings are taken, the wheel clamp on screen flips over and points upwards. The wheel lights up (green) halfway to show that runout on this wheel is half complete.
- 6) Turn the clamp back 180° to the top and repeat steps 1 - 4 on the same wheel. After runout for this wheel is complete, the corresponding wheel on screen lights up completely green.

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

If Runout is Excessive

After runout is done on all wheels, screen may say EXCESSIVE RUNOUT ON YELLOW TIRES. One or more tires will be lit yellow on 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 that are not caused by alignment. The purpose of the message is to alert you to these possibilities.

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

- Spin the tire to check the wheel and rim. If repairs are required, press BACKSPACE to abort the alignment procedure. Perform alignment only AFTER other handling-related problems are diagnosed and repaired.
- If you wish to go ahead with the alignment, press CONTINUE.

CONTINUED . . .

RUNOUT (continued)

The last runout measurements taken are stored in memory. If you want to re-measure a vehicle and you've removed and re-connected, let's say, only one clamp (to replace a tire or whatever), you only have to redo runout for that one wheel. Press CONTINUE to skip the other wheels and use the values stored in memory. Remember, though, each time you connect or reconnect a wheel clamp you must perform runout.

Prepare Vehicle After Runout is Complete

After runout is complete, screen says RUNOUT COMPLETE and shows instructions for settling the vehicle on the rack:

STRAIGHTEN WHEELS -

Point front wheels straight ahead.

APPLY BRAKE PEDAL DEPRESSOR -

This step is important. You must install pedal depressor. Otherwise, readings will not be accurate. If vehicle has power brakes, set pedal depressor while engine is running; then turn engine off.

LOWER THE VEHICLE -

Lower all wheels down on the rack.

REMOVE TURNING RADIUS PLATE PINS

Remove lock pins from turning radius plates.

SETTLE VEHICLE -

Push up and pull down on the bumper with moderate pressure to settle the vehicle into place on the rack.

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 [1] TO CONTINUE -

After you have taken all these steps, press 1 to continue.

CASTER SWING

Most often, Caster Swing is done as part of the Programmed Alignment sequence. It can also be selected from the "Options" menu.

Overview

Caster swing is a procedure to measure caster, included angle, and SAI (Steering Axis Inclination). In an automated sequence, you turn 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 shown on the Display-All page, along with camber and toe.

Because of the nature of alignment, you must perform a caster swing in order to measure caster, included angle, and SAI. And each time you want to update these values on screen (for example, after an adjustment is made) you must repeat the caster swing.

CASTER SWING (continued)

Procedure

Before the Caster Swing begins, the following reminders are displayed on screen. (Turning plate pins must already be removed and vehicle must be lowered and settled on the rack before you take these steps.)

STRAIGHTEN FRONT WHEELS -

If you have not already done so, put the front wheels in a straight ahead position.

APPLY BRAKE PEDAL DEPRESSOR -

If you have not already done so, you must install brake pedal depressor. Otherwise, readings will not be accurate. If vehicle has power brakes, set pedal depressor while engine is running; then turn engine off.

LEVEL AND LOCK THE WHEEL UNITS -

If you have not already done so, level the wheel units on the wheel clamp spindle and tighten the knob to lock them into place.

PRESS [1] TO PERFORM SWING -

When vehicle is prepared, press [1] to start the caster swing procedure.

PRESS [2] TO TOGGLE METER RANGE [Optional] -

During the caster swing, you will be directed to turn each wheel in and out to a specified point. This point is 7 degrees to each side of zero toe (for a total 14 degree swing). However, you can change the swing to 4 degrees on each side (for a total 8 degree swing).

To do this, press 2 before pressing 1 to proceed. Press 2 again if you wish to toggle it back.

NOTE: If caster spec is above 8 degrees, the swing will automatically be 4 degrees.

CASTER SWING (continued)

Caster Swing Procedure

A meter is at the top of the caster swing screen. In this meter, a red pointer represents the position of the wheels. And there are three white range bars: one at the center, one at left, and one at right.

A picture at bottom shows two wheels turned either to the left, right, or straight ahead. Turn the vehicle wheels in the same direction as the picture.

As you turn the wheels, the pointer moves. Bring the pointer into the range bar that is in the direction of the picture: either left, center, or right.

For example, lets say the first picture points to the left. Move the wheels so the arrow moves to the white range bar on the LEFT side of the meter.

When the pointer goes within range, it turns white and the screen says WAIT. The computer is taking readings. DO NOT MOVE THE WHEELS WHILE THE SCREEN SAYS "WAIT".

After readings are taken, WAIT sign disappears and the wheel picture shows the direction to turn the wheels for the next reading.

You will be prompted to do this four times: to the left, right, center right, and center left. Then the caster swing is complete.

CASTER SWING (continued)

Caster Swing Warning Messages

The following warning messages may appear in windows on the caster swing screen:

**** WARNING - SIGNAL LOST **** -- the wheel was turned too fast or too far for the sensors to follow. Hold wheels still. When message disappears, begin again.

BEAM BLOCKED -- a beam between wheel units is obstructed, or the sensors have lost track of each other. The picture on screen will show which beam is blocked. Hold wheels still and remove obstruction (if any).

TURNING ANGLE

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 zero degrees. The screen first prompts you to turn a wheel to a specified point (depending on vehicle specs). Turn the wheels as required, then check the angle as required and enter it into the computer.

For example, screen may say TURN LEFT WHEEL OUT 20.0 DEGREES. Turn the left wheel out to twenty degrees and check the angle of the right wheel. Then enter the right front turning angle.

Screen then prompts a similar message for the other wheel. Turn wheels and enter value as required.

Press CONTINUE to proceed to next routine.

At the end of alignment procedure, printout will show turning angle specifications along with the values you entered here.

DISPLAY-ALL PAGE

Overview

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.

It also shows setback and thrust line on the side of the vehicle they are on. For 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, SAI, and included angle values are not "live": after you make alignment adjustments, you must repeat the caster swing to update these values on screen.

To do a caster swing from the display-all page, press * and select Caster Swing from the Options menu (or just press 1 from display-all page).

If specifications were entered, values that are out-of-spec appear in red. Values within spec are green.

DISPLAY-ALL PAGE (continued)

Features Available from the Display-All Page

From the Display-All page you have access to these major features:

- Toe and Caster/Camber Adjustment Meters -- give you "live" updates of Toe and Caster/ Camber values. Use the caster/ camber keys to select meters. See "Toe, Caster/ Camber Meters".
- Options Menu -- gives you a range of alignment options you can perform from here, including Specifications, Runout, and Caster Swing. Press the * key to see options menu.
- Adjustment Drawings and Text -- Press "Drawings" key on the console to see drawings of alignment adjustment procedures for this vehicle, if drawings are available. Press text key to see explanation of alignment adjustments, if text is applicable.

BEFORE MAKING ANY ADJUSTMENTS press * and select "5) Store Readings" from the options menu if you will want your customer report to display "before adjustment" and "after adjustment" readings.

TOE, CASTER/CAMBER METERS

Overview

The toe, caster/camber keys (on the console, remote unit, and wheel units) give you access to "live" meter screens. Use these screens to see the effects of adjustments as you make them.

The caster meter is available only after Caster Swing has been done. (The caster meter shows changes in caster as adjustments are made. Still, you must perform a caster swing after making adjustments in order to update caster values on the display-all page.)

To Operate Toe, Caster/Camber Meter Keys

Press the toe key to enter toe mode -

In toe mode, press one of the front wheel keys to display "front right and left toe" meter screen. Press a rear wheel key to see toe and camber meter for that wheel.

Press the caster/ camber key to enter the caster/ camber mode -

In this mode, press a front wheel key to see caster/ camber meters for that wheel. (Caster meter will be displayed only of caster swing has been performed.) Press a rear wheel key to see toe and camber meter for that wheel.

Press "*" key from any meter screen to display Options menu, with Jack and Hold selection available. (See "Options" section of this manual for details.)

CONTINUED . . .

TOE, CASTER/CAMBER METERS (continued)

To Read the Meters:

On all the meter screens, an arrow indicates the position of the tire. Brackets show the range of specifications (if specs have been entered). When the arrow is within specs range, it will be green. If it is not within range, it will be red.

FRONT CAMBER/CASTER METERS - The numeric value of the current setting is displayed below each meter. To the side of the meters, you'll see the caster or camber value for the opposite wheel. Also shown is "maximum difference", the difference between left and right. If this difference exceeds specs, the number is red.

Wheels must be straight ahead for accurate caster/camber readings. If "toe straight ahead" arrow is green, then the wheels are straight enough for accuracy. If "toe straight ahead" arrow is red, the wheels must be straightened out.

In the lower right hand of the screen is a toe meter. Toe meter must be within the green range. This indicates that the wheel is straight ahead. This is the condition under which caster and camber measurements are most accurate.

FRONT TOE METERS - A number for total toe (the sum of both toe readings) is shown on screen. If total toe is out of spec, the number is red.

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. If a number is out of spec, it will be highlighted.

OPTIONS MENU

To see the Options menu, press * key from the display-all page, or from an adjustment meter screen. The menu appears on screen, and you can make your selection from there.

If you already know the menu selections by heart, you don't have to press the * key and go through the menu screen. Just press the number of the selection you want, from the display-all page or a meter screen, and that selection will be activated.

You can use the remote keypad or wheel unit keys, in addition to the console keypad, to make selections from options menu.

CONTINUED . . .

OPTIONS MENU (continued)

Overview

The options menu contains the features listed below. All of these features, except for "Store Readings", "Digital Adjustment Screens", and "Jack and Hold", can be selected from another menu. These features are made available through the options menu as well. This way, you can have access to them from meter screens and display-all page.

"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
- 2) Specifications
- 3) Runout
- 4) Turning Angle
- 5) Store Readings - Press this to store the current readings from the display-all page. Do this before you make adjustments. Then, when you print customer report, two reports will be printed: one for "before adjustment" and one for "after adjustment" values.
- 6) Typewriter - Same as the typewriter feature under Special Functions. See "Special Functions" section of this manual.
- 7) Digital Adjustments Screens - For each wheel, show live readings of camber, caster and toe along with specs. These are digital versions of the meter screens.
- 8) Jack and Hold - This selection is available only when you select Options menu from a meter screen. "Jack and Hold" allows you to make caster and camber adjustments while the vehicle is jacked in the air. See next page.

OPTIONS - DIGITAL ADJUSTMENT SCREENS

Digital Adjustment Screens are available from the Options menu.

Select 7 from the Options menu. The right front caster/camber screen is displayed first. Use meter keys and wheel keys to select screens for any of the other wheels.

Descriptions of Digital Adjustment Screens

FRONT CASTER/CAMBER screens show...

Caster and Camber values, displayed below the respective specifications.

Specifications include maximum, preferred, and minimum values. Also include "Side to Side", which is the maximum variation allowed between the left and right wheel values.

At bottom of screen is a toe meter. Toe meter must be within the green range. This indicates that the wheel is straight ahead. This is the condition under which caster and camber measurements are most accurate.

FRONT TOE screen shows...

Right and left toe values, displayed below specifications for individual toe.

Individual toe specifications include maximum, preferred, minimum. Individual toe specs are half of the total toe specs (rounded off to the hundredths).

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

REAR wheel screens show...

Rear camber and toe for the right or left wheel.

Specifications include maximum, preferred, and minimum. To the far right, the camber value of the opposite wheel is displayed, and the total toe spec is displayed.

OPTIONS - JACK AND HOLD

"Jack and Hold" is available as a selection from the Options menu, only through meter screens. It is not available when Options menu is selected from display-all page.

Overview

The Jack and Hold feature allows you to make caster and camber adjustments while the vehicle is in the air and still have "live" camber and caster readings on screen.

You cannot read toe during jack and hold.

Procedure

While the vehicle is still at rest on the rack, press "*" from a meter screen to get the options menu. Then select 7 from Options menu. (Or just press 7 from a meter screen.)

When you select 7, the computer stores the current readings as offset points.

As the screen says, jack up the wheels to be adjusted. Make sure the vehicle is securely jacked so it won't move. Then press 1. The current values are reset to the offset values that were stored when you pressed 7.

The meter screen reappears. Notice the picture of the floor jack on screen; this indicates jack and hold is active.

As you make any adjustments, you'll see "live" alignment readings -- readings that reflect adjustment changes as if the vehicle were still sitting on the rack.

When you are finished making adjustments, press CLEAR to cancel jack and hold. Run another caster swing to update the display-all page.

PRINTOUT OPTIONS

From the Display-All Page, press PRINT to get this Print Report menu:

- 1) **ALIGNMENT ANGLES** - Prints a report which includes alignment values (including caster if you performed the caster swing) and specifications, if you entered them.
- 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 it to turn diagnostics ON or OFF. When diagnostics are turned ON, the alignment report you print will include diagnostic messages based on the machine's comparison of the values on the summary screen with the specifications you've entered. Try it.

SPECIAL FUNCTIONS MENU

Summary of Special Functions Menu

Select 5, Special Functions, from the main menu. The special functions menu consists of the following:

1. Language Selection - Changes the language of the screen messages. Shows which languages are available on your machine.
2. Dealer I.D. - Allows you to enter your shop's name, address, phone, and an advertising message. This information will appear at the top of customer reports.
3. Set Clock - Sets time and date in the computer.
4. Customize Routines - Leads to a submenu of features that you can customize, including: Formats (time & date, currency symbol, etc.); Programmed Alignment (the customized sequence to be run when you select 4 from the main menu); Audio Signals; Colors; and Units for toe and caster/camber.
5. Calibration Check - Allows you to check the calibration of the front toe boxes.
6. Self Test - Provides computer system information, such as amount of RAM memory, program versions, etc.
7. Typewriter - Used to type messages on screen and print them.

All information you enter here is stored in battery-backed memory when the machine is shut off.

Typewriter messages are not saved when machine is shut off.

SPECIAL FUNCTIONS - LANGUAGE SELECTION

Overview

This function changes the language used for screen displays and printouts.

Procedure

Select 1. The screen shows a list of the languages available. Move the cursor to the language you want and press ENTER.

SPECIAL FUNCTIONS - DEALER I.D.

Overview

Dealer I.D. allows you to enter your shop's name, address, city, phone number, and an advertising message. This information will appear at the top of the printed customer reports, and on the logo screen.

Procedure

Select 2. Use keys as follows to enter dealer i.d:

- Type information at the cursor.
- BACKSPACE to delete, if desired.
- Press right and left arrows to move cursor within a line, and type right over errors to correct them.
- Press ENTER to move to the next line on screen.
- Use up and down arrows to move back and forth from line to line.

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

SPECIAL FUNCTIONS - SET CLOCK

Overview

"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 batteries fail.

Procedure

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

- Type numbers at the cursor.
- BACKSPACE to delete, if desired.
- Press right and left arrows to move cursor within a line, and type right over errors to correct them.
- Press ENTER to move to the next line on screen.
- Use up and down arrows to move back and forth from line to line.

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

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

SPECIAL FUNCTIONS - CUSTOMIZE ROUTINES

Summary of "Customize Routines" Menu

"Customize Routines" gives you the following submenu:

1. Set Formats - Set date, currency symbol, decimal and thousands separators, and toe definition.
2. Set Programmed Alignment - Sets the programmed alignment sequence.
3. Set Audio Signals - Changes the pitch and tone of audio signals.
4. Set Color - Sets screen colors for background, text, title and warnings.
5. Select Units - Sets the units in which caster/camber and toe appear.

1. Set Formats

Press 1.

Use down and up arrows to move indicator to the format you want to set. Then press right arrow to move to the right side of the screen, where your choices for each format appear. From there move down or up to the selection you want. Then press left arrow to mark that selection and return to the left side of the screen.

Press ENTER or CONTINUE to save data and return to Customize Routines menu.

SPECIAL FUNCTIONS - CUSTOMIZE ROUTINES (continued)

2. Set Programmed Alignment

Use this selection to customize the "Programmed Alignment" sequence.

Press 2. The left side of the screen shows a numbered list of procedures that you can include in the programmed alignment sequence.

The right side shows the sequence that is currently programmed. The default sequence is: customer data, visual inspection, specifications, runout, caster swing, and display-all page, in that order.

To change the sequence, press CLEAR. Then press the procedure numbers, in the order you want them to appear.

There are these restrictions on any sequence you program:

- Runout must appear before caster swing and/or display-all page in any sequence.
- Display-All Page will automatically be inserted last in any sequence.

3. Set Audio Signals

The machine has two sounds: the keystroke beep, and the lower warning tone that indicates a command was not accepted. You can change either of these sounds through this selection.

Press 3. Move cursor to the sound you want to change, and press ENTER.

You can change the tone and the pitch of each sound. The screen displays instructions on how to do it.

SPECIAL FUNCTIONS - CUSTOMIZE ROUTINES (continued)

4. Set Color

Press 4. The colors available are shown on screen under their numbers.

Select a color for background, text, title, and warning, respectively.

Bottom of screen will show the text title and warning colors against the background color you selected.

5. Select Units

Select the units you want for caster/camber and toe. These are the units that the values will be displayed and printed in.

SPECIAL FUNCTIONS - CALIBRATION CHECK

Overview

The calibration check sets toe to zero in the front wheel units.

Perform a calibration check once a week as part of regular maintenance. Also perform it any time the wheel units have been dropped or handled roughly, to ensure that they stay within calibration.

Procedure

Press 5 from the special functions menu. Take the following steps:

1. Press TOE key on the console keypad.
2. Install front wheel units on the calibration bar, as the screen prompts. Level and lock the wheel units. Then press YES on a wheel unit.
3. Screen prompts you to rotate calibration bar. Loosen wheel units before rotating, and level and lock the wheel units after rotating. Press YES on wheel unit.

If calibration is within spec, the computer prints a report on the calibration status of the entire alignment system.

If wheel units have been knocked too far out of calibration, the screen tells you to request a service call, and the calibration report is not printed.

SPECIAL FUNCTIONS - SELF TEST

Overview

The self test checks and reports on system's computer hardware and software.

Procedure

When you press 6 the screen displays the following information:

- amount of system board RAM
- monitor type
- number of diskette drives
- DMA chip installed
- number of RS232 ports
- number of serial printers installed
- disk i.d. version
- wheel unit and system prom versions
- remote eprom version
- last calibration date

After that information is displayed, screen says "press any key to view colors". When you press a key, computer writes blocks of color to the screen, one block at a time, and goes through every color. Press any key at any time to return to menu.

SPECIAL FUNCTIONS - TYPEWRITER

Overview

Use typewriter to create and print messages.

(This same feature can be selected from the Options menu that is available from the Display-All page.)

Procedure

- Use the typewriter keyboard to type in messages.
- Use ARROW keys to move cursor around screen in order to edit.
- Press BACKSPACE or DELETE to delete characters.
- Press CLEAR to clear the screen.
- Press PRINT to print message.

Message will remain stored here at the typewriter screen until you clear it, or until the machine is shut OFF or RESET.

SHIFT	F1	Previous Screen	CONTROL	F1	Left Front NO	ALT	F1	Right Front NO
SHIFT	F2	Continue	CONTROL	F2	Left Front YES	ALT	F2	Right Front YES
SHIFT	F3	Options Screen	CONTROL	F3	Left Front TOE	ALT	F3	Right Front TOE
SHIFT	F4	Big Escape	CONTROL	F4	Left Front	ALT	F4	Right Front Caster
SHIFT	F5	Toe Screen			Camber Caster			Camber
SHIFT	F6	Camber Screen	CONTROL	F7	Left Rear NO	ALT	F7	Right Rear NO
SHIFT	F7	Left Front	CONTROL	F8	Left Rear YES	ALT	F8	Right Rear YES
SHIFT	F8	Right Front	CONTROL	F9	Left Rear TOE	ALT	F9	Right Rear TOE
SHIFT	F9	Left Rear	CONTROL	F10	Left Rear	ALT	F10	Right Rear Caster
SHIFT	F10	Right Rear			Caster Camber			Camber