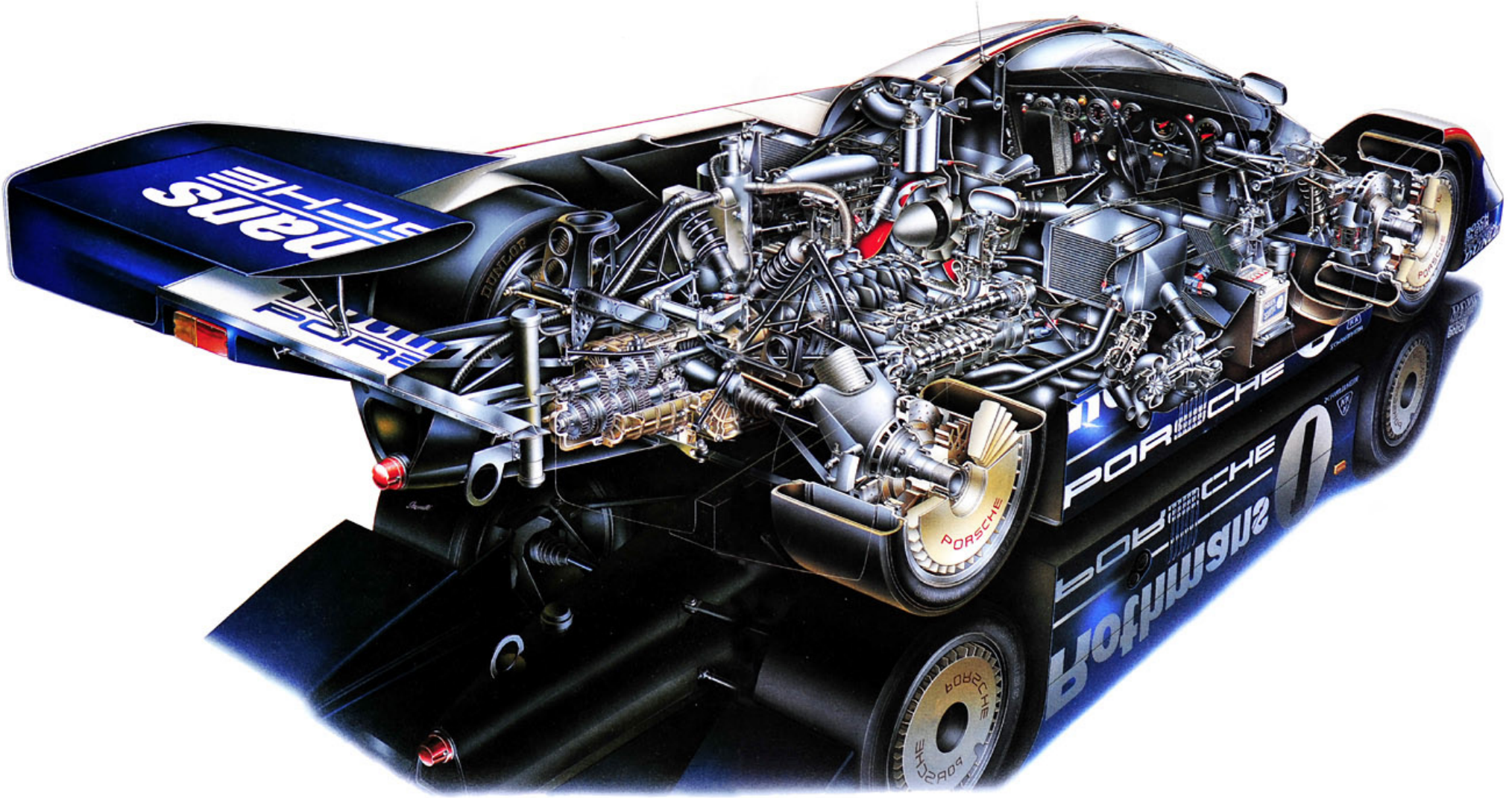
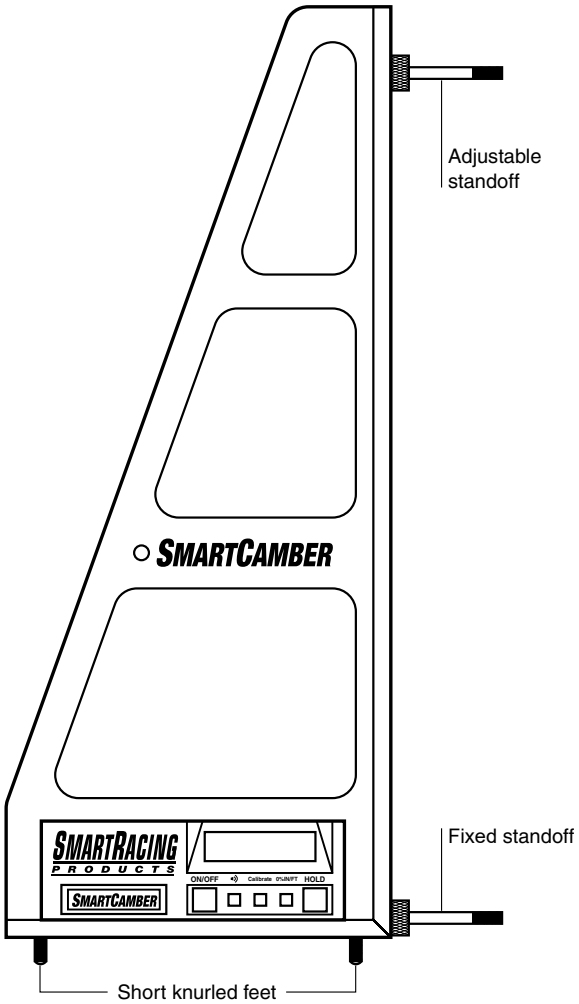
SmartCamber™

SmartRacingProducts.com



Owner's Manual



Contents

Welcome 1
Overview 1
Battery Installation 1
SmartTool - Digital Inclinometer 2
Camber 3
Tips and Suggestions 3
Level Surface Alignment 4
Non-Level Surface Alignmentt 6
Caster 8
Module Calibration for Use Without Frame 10
Optional Hands-Free Adapter 12
Optional Parts 12

Welcome!

Thank you for your purchase of our SmartCamber tool. You are now the owner of what we believe is the best portable camber and caster measuring tool available. Both the occasional user and experienced race car tuner will appreciate the simplicity of the SmartCamber tool and its ability to give fast and accurate results.

We are proud that our SmartCamber tool is used by some of the fastest and most successful racing teams but equally so by all the home enthusiasts and club racers. In addition, some of the largest automakers in the world have purchased our tool to teach alignment techniques in their technical training programs. If at any time you have a question or suggestion, please do not hesitate to call.

Thank you,

Craig Watkins
Founder

John Slater
Owner

Please note you should set and confirm the calibration of the gauge before each use. see pages 3-10.

Overview

The SmartCamber tool was designed to maximize measuring over a wide variety of wheel/tire combinations. Utilizing repeatable digital technology, the tool allows accurate measuring regardless of where the vehicle is or what angled surface it is on.

There is no misinterpretation with this tool because there are no bubbles or lines to subjectively read. The SmartCamber tool takes all of the guess work out of camber and caster measuring.

Since there are nearly an infinite number of wheel and tire combinations, it was necessary to design a tool that would be quick and easy to use.

The number one design premise was to allow camber and caster to be measured almost anywhere without removing hub caps, lug nuts or jacking the car off of the ground, the use of magnets etc.

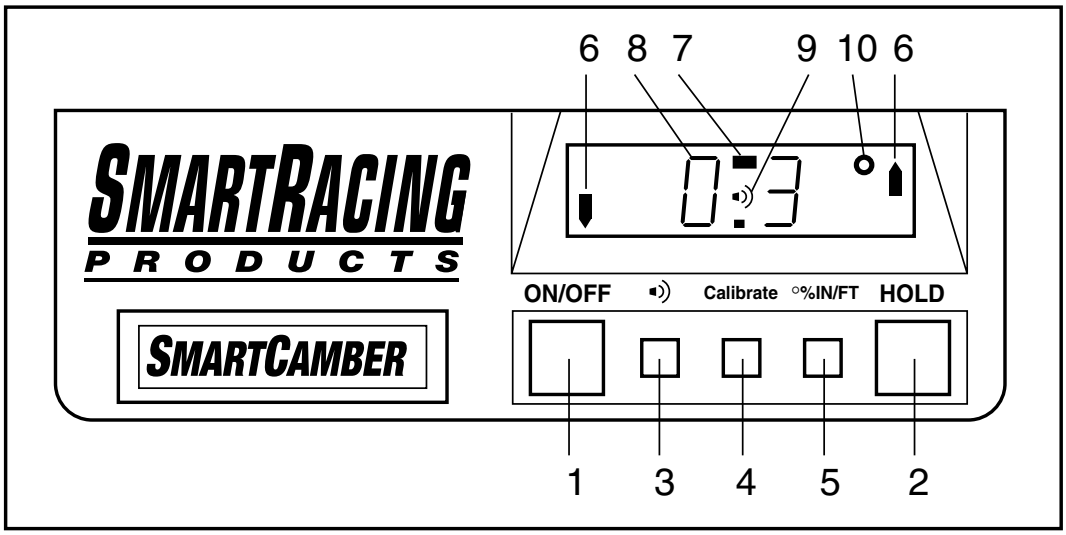
Though it is basic in concept, the results are excellent. One fixed and one adjustable standoff allows the owner to use the tool on almost any vehicle.

For toe adjusting - please see our website for our SmartStrings tool.

Battery Installation: (Battery included)

Remove back cover. Attach 9-volt battery to terminals and replace the cover.

SmartCamber - Digital Inclinometer



Controls:

1 **ON/OFF** - If left idle for 6 minutes, the **SmartCamber** tool will automatically shut off.

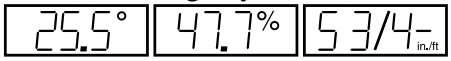
2 **HOLD** - Push to "freeze" and "unfreeze" display readings.

3 **LISTEN & LEVEL AUDIO** Push to activate and de-activate the beeper. Beeper will sound at level and plumb.

4 **CALIBRATE** (see Calibration procedures)

5 **° % in/ft** - Push to change the display units: Degrees (°), Slope (%), Pitch (in/ft).

Pitch readings are in 1/8 in/ft increments. Plus and minus signs indicate when the pitch is slightly more (+) or slightly less (-) than the pitch shown on the display.



Note: The ° % IN/FT button 5 can be used even when the display is in HOLD. This feature is a convenient way to convert angles from one unit to another.

6 **UP/DOWN ARROWS** - Left and right indicators point toward level or plumb (whichever is closer). Indicator arrows get shorter as the tool gets closer to level (0°), or plumb (90°).

7 **LOW BATTERY** - Low 9V battery indicator. Replace battery as soon as possible. Battery life is typically 100 hours.

8 **DIGITAL DISPLAY** - Display readout of current measurement.

9 **LISTEN & LEVEL AUDIO**

10 **° % IN/FT MODES** - Indicates measurement "mode": Degrees (°), Slope (%), Pitch (in/ft).

Note: Display reads right-side-up when the **SmartCamber** tool is upside down, convenient feature.

Camber

What is Camber?

The inclination of the wheels from true vertical is referred to as “Camber”; read as either positive or negative.

Positive Camber: As viewed from the rear, the tops of the tires are further apart than the bottom (very uncommon).

Negative Camber: As viewed from the rear, tops of the tires are closer together than the bottom (very common).

Measuring Camber

1. Hold the SmartCamber tool against the wheel, which you are planning to measure, at the twelve and six o’clock position. Adjust the sliding long standoff so it touches the wheel face near the edges (if the wheel has a curved face, at the top of the wheel, put a piece of racer’s tape with a dot on it so you will always measure from the same location). Be sure the frame itself is not touching the tire.

Tips and Suggestions

1. Keeping a simple log book for your car is a great idea. Noting all important information and suspension settings and how they have worked in the past can be a real time saver.
2. Sometimes the long standoffs are not long enough for certain fender shapes and configurations. We do have longer standoffs (3.75”) available for you to order part numbers SRP.102.024 & .025.
3. Practice using your SmartCamber tool, the more you use it the faster and easier it will be to make changes.
5. The SmartCamber tool module is very position sensitive. When measuring any angle, wait 2-3 seconds for the reading to stabilize.
6. Some wheels (and related suspension parts) have more run-out than others and can give you erroneous camber readings. To correct for this, mark the top and bottom of the wheel. Measure in that position. Spin the wheel half a turn and remeasure. Take the average of those two readings and that will be your true wheel angle.

See our website at www.smartracingproducts.com for more information.

Level Surface Alignment
Most Commonly Used Method

Setting up SmartCamber Tool for Leveling Garage Floor (Fig 1)

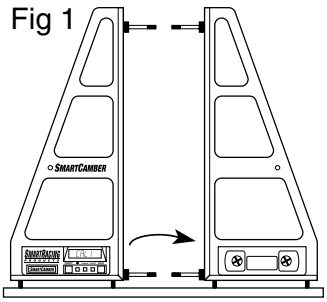


Fig 1
To set horizon for short feet

1. Turn the SmartCamber tool **ON** .
2. Put SmartCamber tool on horizontal surface on the short feet. Wait 10 seconds. Push and hold **CALIBRATE** button, **CAL1** will appear then a **flashing number**.
3. Rotate the SmartCamber tool 180°. Wait 10 seconds. Press and hold **CALIBRATE** button, **CAL2** will appear and then a **number**. This number will read the same turned either direction on your horizontal plane. Your tool is now ready to be used to level your surface.

Setting up Your Car/Garage when not using Scale pads

You will need three things:

- A piece of 1.5” square aluminum box tubing (or long level) that is about 6” wider than the track width of your car (mark one side of the tubing with the words “Top Center”) in case it isn't 100% flat.
- Two 1” sockets or equivalent (the idea is to have two round spacers that are the same height).
- Something to use as leveling shims. Pieces of 1/4" plywood or even cheap linoleum tiles from the hardware store work fine. Cut to apprx 12"x12"

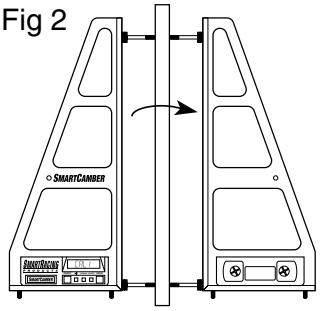
1. Mark the four tire positions on the floor where you plan to do your setups.
2. Roll the car back and put the two sockets (or spacers) where the front tires would be and lay down the aluminum box tubing (with the marked “top center” up). Put the Smart Camber tool horizontally in the center of the box tubing and note the reading. If it reads zero, your floor just happens to be parallel to true horizon and you should consider it your lucky day! If not, shim the side that is low using 12” x 12” linoleum floor tiles (they’re about .060” thick) until the tool reads zero. Double check it by turning the tool around so the display is facing the other direction; it should still read zero.
3. Now move the spacers and tubing to where the rear tires would be and repeat the process until the tool reads zero.

   Note: Mark the floor or your logbook so you know how many tiles to use next time.

4. You can then check to see if the floor is level fore and aft by putting the spacers and tubing where the left front and left rear tires would be and check it. If it is way off (a couple of degrees), you should shim accordingly. this is really only an issue if you're checking the angle of attack, corner weighting or checking the CG position.

Setting up SmartCamber Tool for Level Surface Alignment (Fig 2)

Fig 2



To set horizon for long feet

1. Turn the SmartCamber tool **ON** .
2. Put SmartCamber tool up against a verticle plane (a shop window works well). Wait 10 seconds. Push and hold **CALIBRATE** button, **CAL1** will appear then a **flashing number**.
3. Go to other side of your vertical plane (visibly as close as possible to the same plane on the other side). Wait 10 seconds. Press and hold **CALIBRATE** button, **CAL2** will appear and then a **number**. This number will read the same on either side of your verticle plane. Your tool is now ready to be used on a level surface.

Reading your SmartCamber Gauge

Hold SmartCamber tool up to wheel and take your readings. No further calibration of tool is needed for level surface alignment.

Note:
1 Be sure you are in the ***degree*** mode not **percent** or **inches/foot** mode.
2 The verticle parallel plain surface can be a verticle window or a level held firmly in a verticle position.
3 A verticle or horizontal surface up to 7° from true verticle or horizontal works just fine for calibrating the tool.

ATTENTION

If tool has been used for a Non-Level surface alignment it must be re-calibrated for a Level Surface alignment.

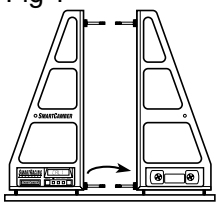
Non-Level Surface Alignment

Preparing the SmartCamber Tool (Fig 1, 2, 3, and 4)

Squaring the tool is a procedure to adjust the bottom feet to be square to the long standoffs. If the tool should happen to be mishandled, it should be re-checked. A house or building window works well as a vertical surface.

1. Turn the SmartCamber tool **ON** .
2. Horizontal short feet adjust (fig 1). Place the SmartCamber tool on a flat smooth surface (up to 7° from level). Wait 10 seconds. Push and hold the **CALIBRATE** button, **CAL1** will appear and then **a flashing number**.
3. Rotate the SmartCamber tool end-for-end (fig 1). Push and hold the **CALIBRATE** button, **CAL2** will appear and then **a number**.
4. Plumb short feet adjust (fig 2). Place the SmartCamber tool against a window with long feet up. Wait 10 seconds. Push and hold the **CALIBRATE** button, **CAL1** will appear and then **a flashing number**.
5. Move the SmartCamber tool to the other side of the window. Wait 10 seconds. Push and hold the **CALIBRATE** button, **CAL2** will appear and then **a number**.
6. Repeat steps 4 and 5 with the long feet down (fig 3). Now the SmartCamber tool is calibrated for plumb.
7. Turn the SmartCamber tool **OFF** .
8. Put the SmartCamber tool up against the window on its long feet (fig 4). Press and hold **CALIBRATE** while pressing the **ON** button **CAL2** will appear and then the **number 0**.
9. Now put the SmartCamber tool up against the window on its short feet. Adjust the short feet until tool reads 90°. Your frame is now square.

Fig 1



To set horizon for short feet

Fig 2

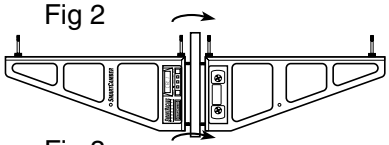
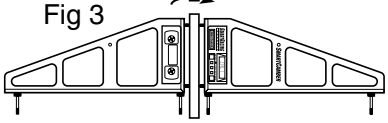
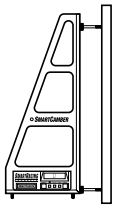


Fig 3

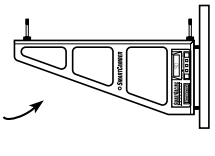


To set plumb for short feet

Fig 4



Squaring frame



Adjust short feet to achieve 90° reading

ATTENTION

If tool has been used for a Non-Level surface alignment it must be re-calibrated for a Level Surface alignment.

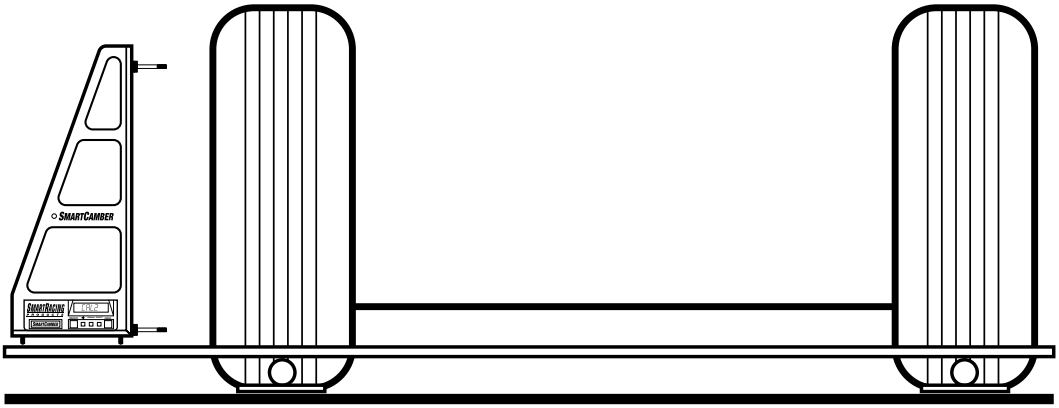
Reading Camber Settings on a non-level Surface

You will need three things:

- A piece of 1.5” square aluminum box tubing (or long level) that is about 6” wider than the track width of your car (mark one side of the tubing with the words “Top”);
- Two 1” sockets or equivalent (the idea is to have two round spacers that are the same height).
- 2-12”x12” linoleum smooth tiles to make a smooth surface.

1. Position the car where it is to be aligned.
2. Put the linoleum smooth tiles and sockets in front of the wheels/tires.
4. Put the aluminum box tube or level on top of the two sockets.
5. You now need to **Zero Adjust** the tool while it sits on the tube or level.
   a) Turn SmartCamber tool **OFF.**
   b) Put the SmartCamber tool on your tube or level on its short feet. Wait 10 seconds. Press and hold the **CALIBRATE** button and while still pressing the CAL button, press and hold the **ON** button, **CAL2** will appear and then the **number 0;** this is called **zero adjust**. Your tool is now ready to be used.
   (You must do this step at each wheel).
6. This procedure has changed the verticle axis to be 90° from your horizontal plane.
7. Measure camber.

Take these tools everywhere you go because even if you are on rough crummy asphalt, this method will average out the surface and you will get good, accurate camber readings.



Set horizon (must be done at each wheel)

Caster

What is Caster?

The caster angle is the inclination of the imaginary line the spindle pivots around. Typically tipped towards the rear of the car. The caster angle creates forces that result in the following:

1. Returns the wheel to the center-steer position after a turn is made.

2. The vehicle tracks straighter and more predictably.

3. Increases or decreases the camber gain of the wheel, as it turns, to help maximize the potential of the tire.

Determining Positive and Negative Caster

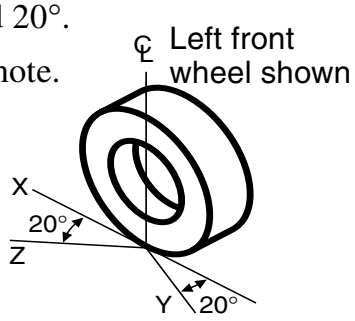
1. Take a camber reading with wheels pointing straight ahead.
2. Turn rear of wheel 20° in toward chassis of car. Take a camber reading.
3. If the camber reading is less you have positive (+) caster.
4. If the camber reading is more you have negative (-) caster.

Measuring Caster

Caster is calculated by measuring the camber angle in two different positions and then putting those measurements into a simple formula.

To measure caster, do the following, but be sure to take your time the first few times you do it:

1. Start with the left front wheel.
2. Place the layout template sheet (included) on the floor and use chalk (or paint for permanent marking) to scribe lines that are about a foot longer than the template. Then remove the template and connect the lines as on the template. (you can make copies of this sheet or download the template at www.smartracingproducts.com)
3. Roll the car until the front wheel is on the centerline (CL) axis and parallel to the X axis.
4. Turn the steering wheel until the left front wheel is parallel to the Z axis.
5. Use a stiff piece of cardboard approximately 7”x18” as a “plane” reference template (flat sheet metal is better), carefully put the plane on the Z axis line and carefully lean the template against the tire. If it touches the tire evenly, then the wheel is turned 20°.
6. Measure the camber angle in this position and note.
7. Steer the wheel back through the center-steer position and parallel to the Y axis. Repeat the plane template alignment method.
8. Measure the camber angle in this position and note.



9. Calculate the caster angle using one of the following examples:
   Note: 1. Example No. 2 is the most common.
   2. What you are trying to achieve is camber difference from turning left and right.

   1. If both measurements are negative then
      Subtract the small number -3 *
      from the larger number -1
      ———
      Equals 2
      Multiply 2 by 1.5 = 3
      The wheel has 3° of caster.
   2. One negative and one positive, then
      Add the numbers together -3 *
      +1
      ———
      Equals 4
      Multiply 4 by 1.5 = 6
      The wheel has 6° of caster.
   3. If both are positive, then
      Subtract the smaller number +3 *
      from the larger number +1
      ———
      Equals 2
      Multiply 2 by 1.5 = 3
      The wheel has 3° of caster.

Note:

If you cannot turn your wheels 20° determine the angle you can turn both wheels. Note that number and use the multiplication factor below. The procedure does not change, however.

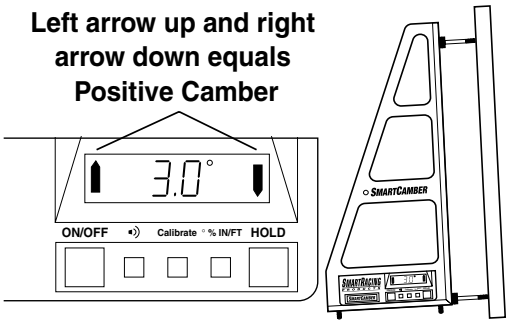
Multiplication Factors

20° = 1.5
15° = 2.0
10° = 3.0

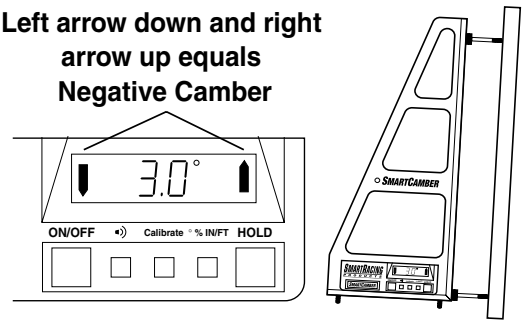
*** Ignore Negative and Positive symbols when adding and subtracting**

10. Make whatever adjustments are required and remeasure until you have the angle you want.
11. Repeat the same steps on the right front wheel.
12. Reset the toe (can be done with SmartRacing Products-SmartStrings). Any changes to the caster or camber angles will have changed the toe settings.

Left arrow up and right arrow down equals Positive Camber



Left arrow down and right arrow up equals Negative Camber



Tech Note:

It is helpful to put a temporary witness mark on the steering wheel hub to the steering column (with tape), so you always return to the same angle of reference. Also, zeroing the car is not necessary because you are only interested in the difference in camber in the two positions.

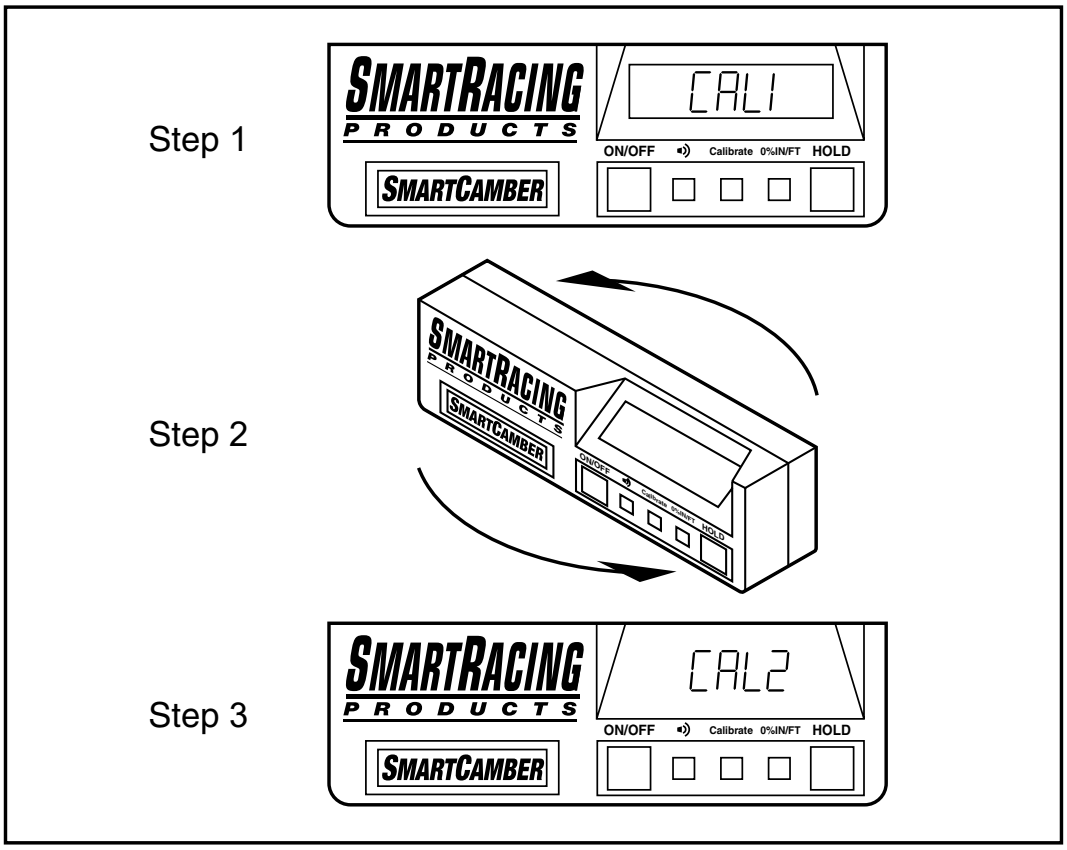
Module Calibration for Use *Without Frame*

Before your SmartCamber module can be used, the module (new or used) must first be calibrated to itself. The calibration instructions are also on the back of the module itself.

Procedure for Level

1. Turn the SmartCamber module **ON**.
2. Place the SmartCamber module on a flat smooth surface (table top). Wait 10 seconds. Push and hold the **CALIBRATE** button, **CAL1** will appear and then **a flashing number**.
3. Rotate the SmartCamber module end-for-end. Wait 10 seconds. Push and hold the **CALIBRATE** button, **CAL2** will appear and then **a number**.

The SmartTool has now been calibrated for level.

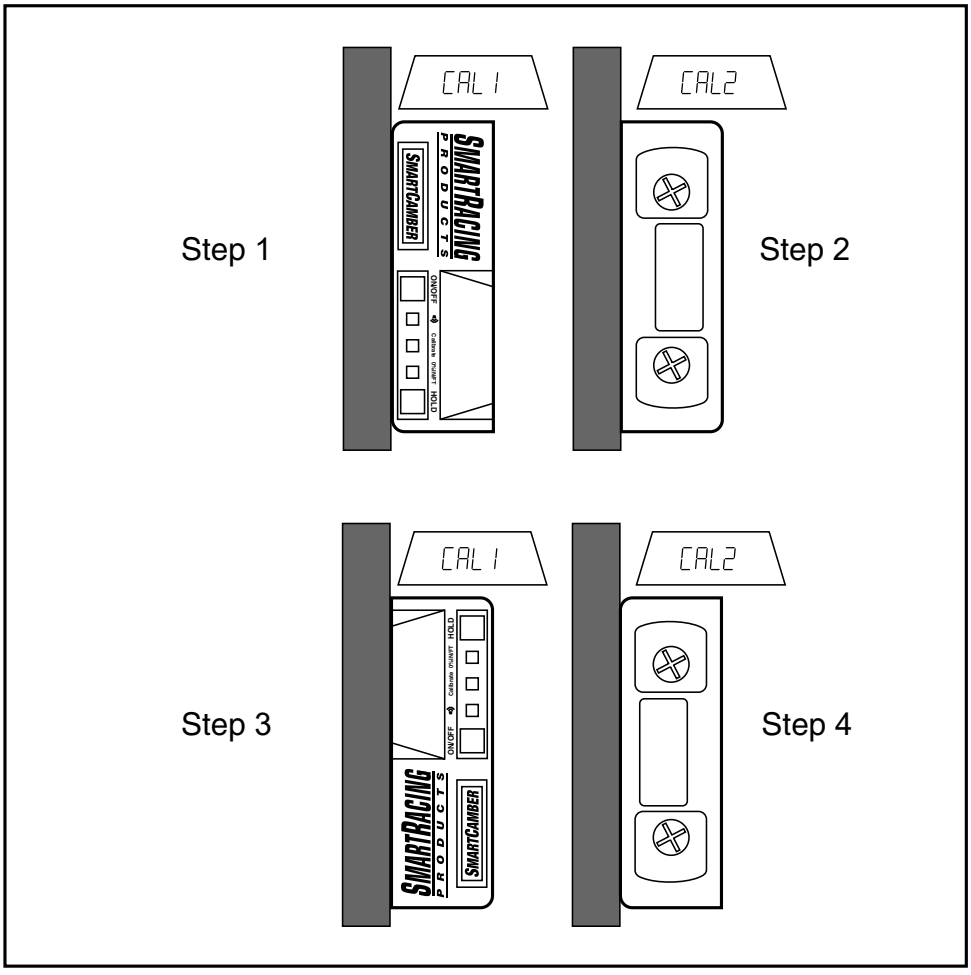


Overhead Measuring for Level

If you need to read the display upside down, you must calibrate the top surface of the angle finder. Repeat the steps described above except the SmartCamber module should be upside down.

Procedure for Plumb

1. Turn the SmartCamber module **ON** .
2. Place the SmartCamber module against a flat vertical smooth surface with the LCD display at the bottom, and away from the surface. Wait 10 seconds. Push and hold the **CALIBRATE** button, **CAL1** will appear and then **a flashing number**.
3. Rotate the SmartCamber module edge-for-edge along its long axis (i.e. LCD display is still at the bottom, but is now against the flat vertical surface.) The display should face away from you. Wait 10 seconds. Push and hold the **CALIBRATE** button, **CAL2** will appear and then **a number**.
4. Repeat the steps above for plumb, except with LCD display at the top. Now the SmartCamber tool is calibrated for plumb.



If "CAL ALL" is displayed

1. This means that the tool is out of calibration.
2. Calibration must be done as explained in "Module Calibration for Use ***Without Frame"*** page 11 and 12.

Optional Hands-Free Adapter

The Hands-Free Adapter was developed to allow the SmartCamber tool to be attached to the wheel so as suspension adjustments are made the user can see the changes as they happen. The tool attaches to wheels that have a lip by making a three-point pressure fit between the adapter's pins and the inside lip of the wheel.

Camber angles can be just as easily measured with or without the Hands-Free Adapter in place; the performance of the tool is exactly the same.

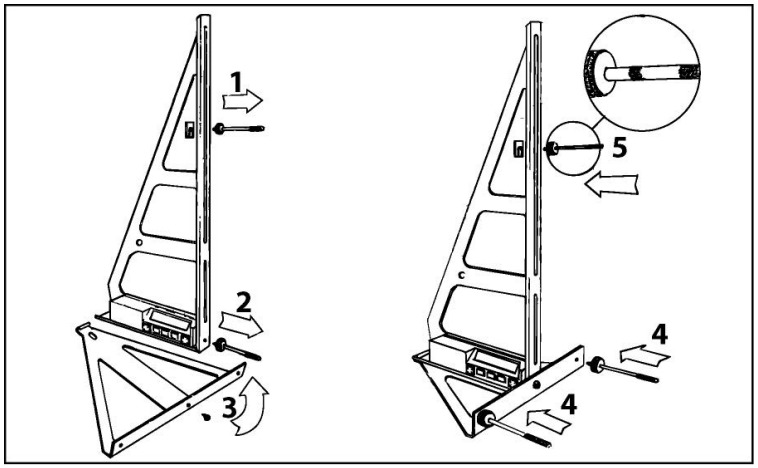
Attaching the Hands Free Adapter

Step 1:

1. Remove the pin and sliding block from the top of the SmartCamber tool and set aside.
2. Remove the pin from the bottom hole of the SmartCamber tool and set aside.
3. With the Hands-Free Adapter so the right angle bend is facing upwards, hook the back of the Adapter onto the outside edge of the SmartCamber tool. Install the provided pan head screw through the center hole of the Hands-Free Adapter, and into the bottom hole of the SmartCamber tool. Tighten pan head screw to secure Hands-Free Adapter to the gauge.

Step 2:

4. Using the two original pins from Steps 1 and 2, screw the pins into the holes on either side of the Hands-Free Adapter.
5. Install the special double knurled pin provided with the Hands-Free Adapter into the top of the SmartCamber tool with the sliding block.



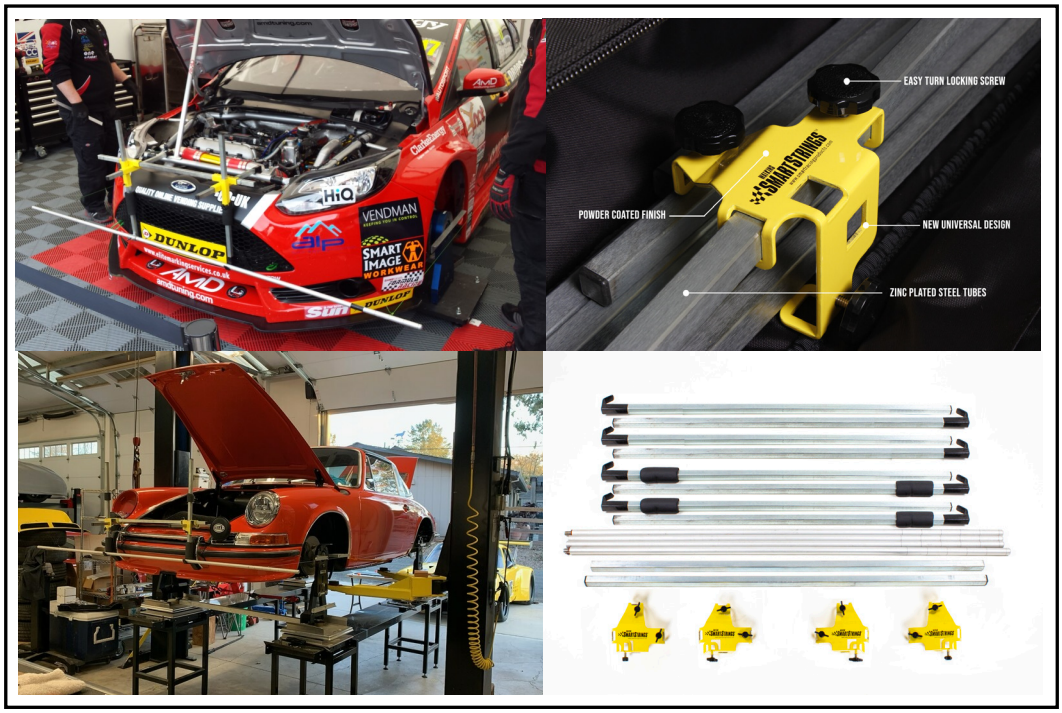
Note: The special double knurled pin provided with the Hands-Free Adapter is 0.1" longer than the two original pins. It must be installed at the top of the SmartCamber tool to keep the tool properly calibrated (it offsets the thickness of the Hands-Free Adapter). You can use a piece of tape on the wheel so the Hands-Free Adapter pins will not score the finish.

Longer standoffs are available to help with deep wheels or fender flare. Part# SRP.102.224. and SRP.102.025 find these on the website www.smartracingproducts.com or give us a call.

SMARTSTRINGS™

SMARTRACINGPRODUCTS.COM

Toe Alignment Kit



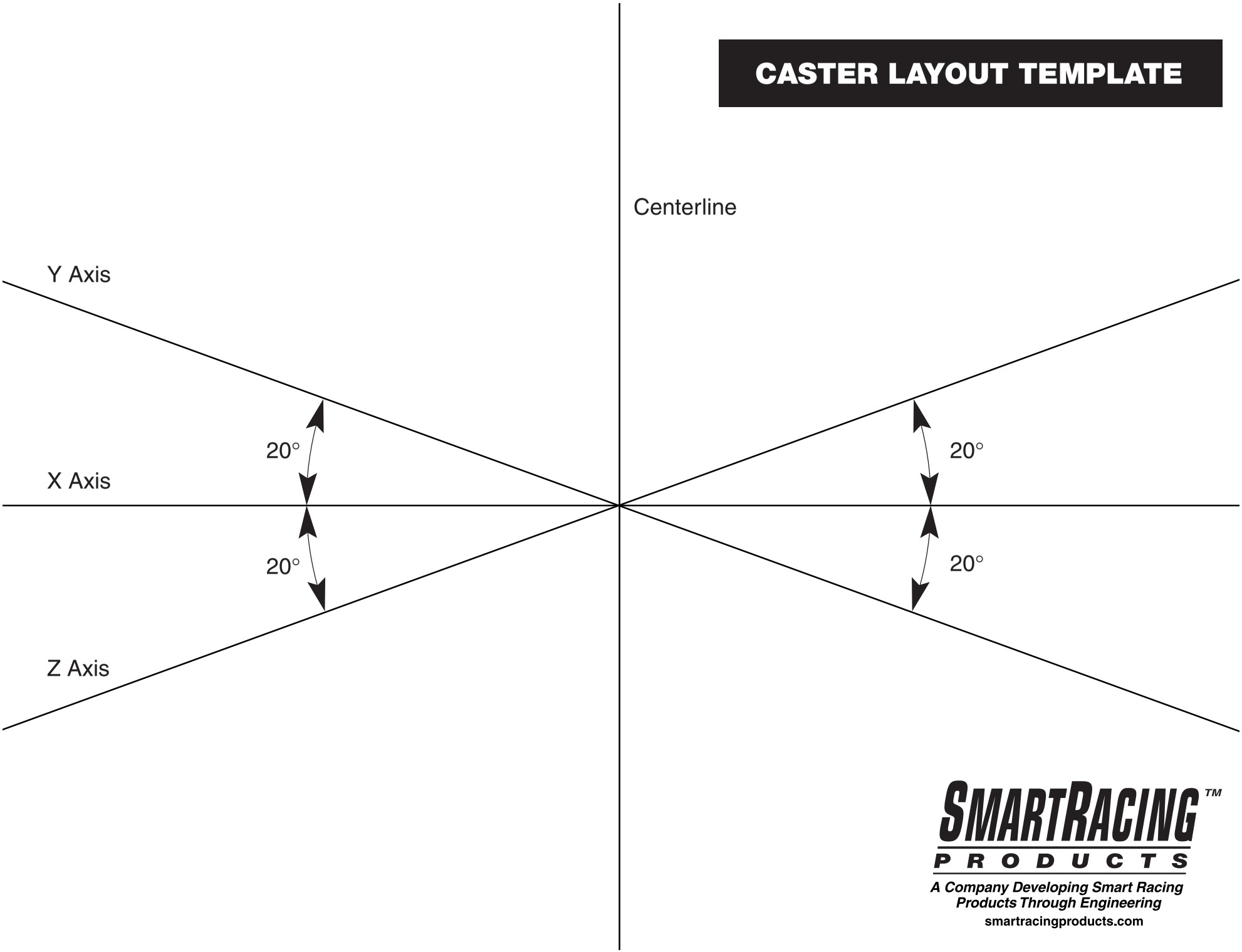
We now have what we believe to be the best and most universal way to quickly perform an accurate four-wheel alignment on virtually any car, anywhere.

Why SmartStrings? The number one design premise was to allow all four wheels to be aligned with one simple, accurate, portable and affordable tool. Just so you know, some of the fastest cars in the world - including Indy style cars, 200 mph road racing cars and NASCARs etc are aligned with strings.

As with our SmartCamber gauge, SmartStrings are designed to be used on as wide a variety of cars as possible; its telescoping design in all three planes assures that. The attaching or hooking features on the Attaching Arms have also been carefully thought out to be as versatile as possible.

Unlike nearly all other toe measuring gauges on the market today, our SmartStrings allow you to simultaneously align and “square” the car, that is, insuring that the rear axle is running true and parallel to the front axle. Also, since our strings attach to the car, they move with the car so when adjustments are made, the vehicle can be rolled to settle the settings without the worry or bother of the gauge having to be recalibrated. Since you can adjust all four wheels relative to one another, you can set the car up however you like, or however track conditions require. Properly installed, the parallel strings form a perfect parallelogram around the car’s own centerline.

CASTER LAYOUT TEMPLATE

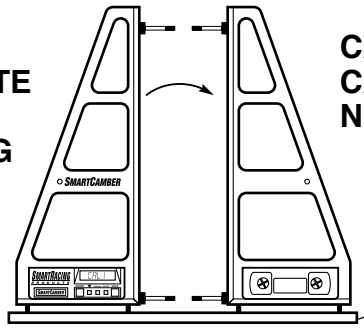


SMARTRACING™
PRODUCTS
A Company Developing Smart Racing Products Through Engineering
smartracingproducts.com

SmartCamber Tool Quick Reference

Squaring Frame

ON
CALIBRATE
CAL1
FLASHING
NUMBER

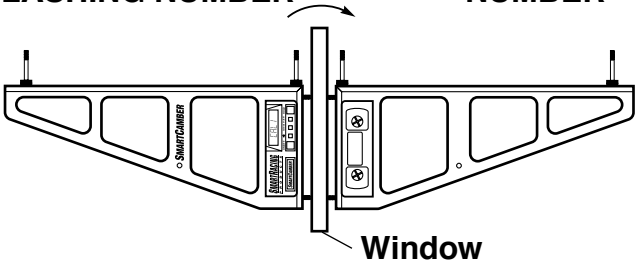


CALIBRATE
CAL2
NUMBER

Table
Top

ON CALIBRATE
CAL1
FLASHING NUMBER

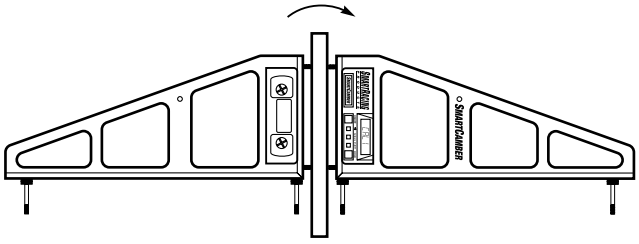
CALIBRATE
CAL2
NUMBER



Window

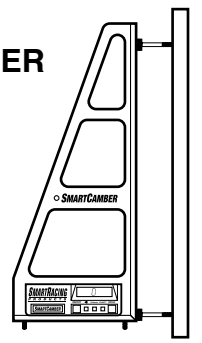
ON CALIBRATE
CAL1
FLASHING NUMBER

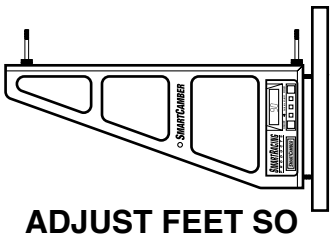
CALIBRATE
CAL2
NUMBER



NOTE: TOOL CAN BE USED AS A LEVEL FOR HORIZON AND PLUMB AT THIS POINT

OFF
CALIBRATE (HOLD)
ON
CAL2
NUMBER

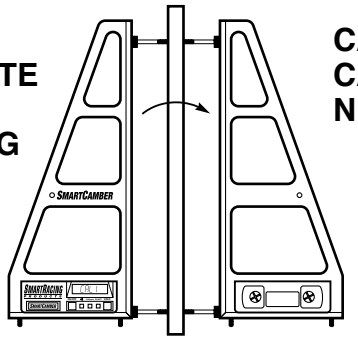




ADJUST FEET SO
READING IS 90°

Level Surface Alignment

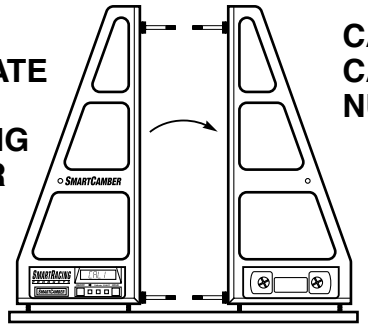
ON
CALIBRATE
CAL1
FLASHING
NUMBER



CALIBRATE
CAL2
NUMBER

Non-Level Surface Alignment

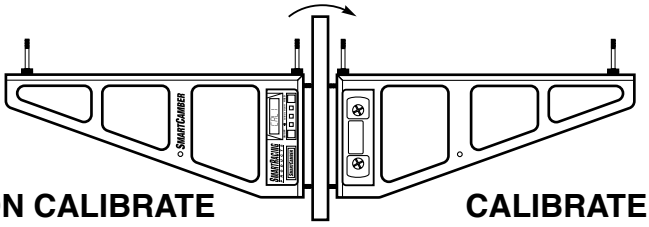
ON
CALIBRATE
CAL1
FLASHING
NUMBER



CALIBRATE
CAL2
NUMBER

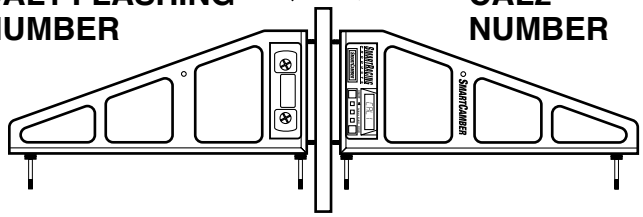
ON
CALIBRATE
CAL1 FLASHING NUMBER

CALIBRATE
CAL2
NUMBER



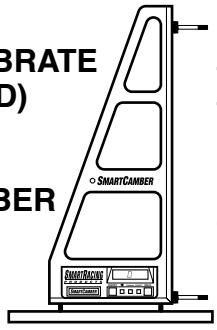
ON CALIBRATE
CAL1 FLASHING
NUMBER

CALIBRATE
CAL2
NUMBER



NOTE: TOOL CAN BE USED AS A LEVEL FOR HORIZON AND PLUMB AT THIS POINT

OFF
CALIBRATE
(HOLD)
ON
CAL2
NUMBER



ZERO ADJUST

TOOL CAN ONLY BE USED TO ADJUST ONE WHEEL AT A TIME. DO A ZERO ADJUST AT EACH WHEEL. ONLY ZERO ADJUST STEP IS REPEATED.

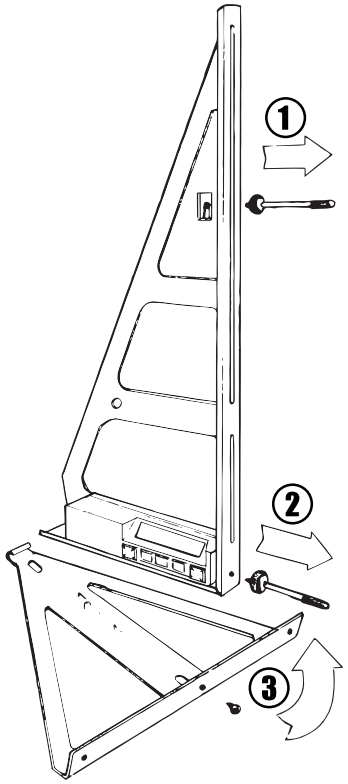
See Manual Pages 4 and 5 for Complete Instructions

011074 Rev 1

HANDS-FREE ADAPTER

The Hands-Free Adapter was developed to allow the SmartCamber tool to be attached to the wheel so as suspension adjustments are made, the user can see the changes as they happen. The tool attaches to wheels that have a lip by making a three-point pressure fit between the adapter's pins and the inside lip of the wheel. If your wheels do not have a lip or surface to attach to, this feature will not work.

Camber angles can be just as easily measured with or without the Hands-Free Adapter in place; the performance of the tool is exactly the same.

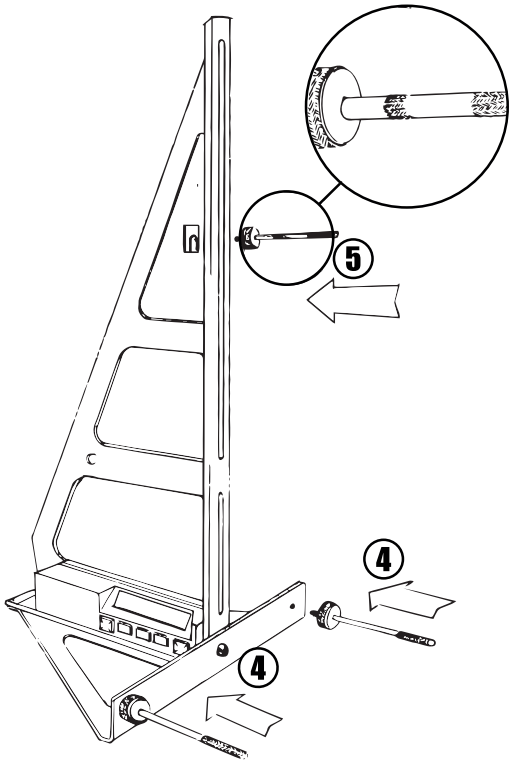


STEP 1

1. Remove the pin and sliding block from the top of the SmartCamber tool and set aside.

2. Remove the pin from the bottom hole of the SmartCamber tool and set aside.

3. With the Hands-Free Adapter so the right angle bend is facing upwards, hook the back of the Adapter onto the outside edge of the SmartCamber tool. Install the provided pan head screw through the center hole of the Hands-Free Adapter, and into the bottom hole of the SmartCamber tool. Tighten pan head screw to secure Hands-Free Adapter to the gauge.



STEP 2

4. Using the two original pins from Steps 1 and 2, screw the pins into the holes on either side of the Hands-Free Adapter.

5. Install the special <u>double knurled pin</u> provided with the Hands-Free Adapter into the top of the SmartCamber tool with the sliding block.*

*NOTES

The special double knurled pin provided with the Hands-Free Adapter is 0.06" longer than the two original pins. It must be installed at the top of the SmartCamber tool to keep the tool properly calibrated (it offsets the thickness of the Hands-Free Adapter). Use a piece of tape on the wheel so the Hands-Free Adapter pins will not score the wheel.

WWW.SMARTRACINGPRODUCTS.COM
PH. 231.409.1155
Sales@smartracingproducts.com

NAME	
CHASSIS	DATE

WWW.SMARTRACINGPRODUCTS.COM
PH. 231.409.1155
Sales@smartracingproducts.com

NAME	
CHASSIS	DATE

WWW.SMARTRACINGPRODUCTS.COM
PH. 231.409.1155
Sales@smartracingproducts.com

NAME	
CHASSIS	DATE

SMARTRACING PRODUCTS.COM™

MADE IN U. S. A.

WWW.SMARTRACINGPRODUCTS.COM
PH.+1.231.409.1155
Sales@smartracingproducts.com

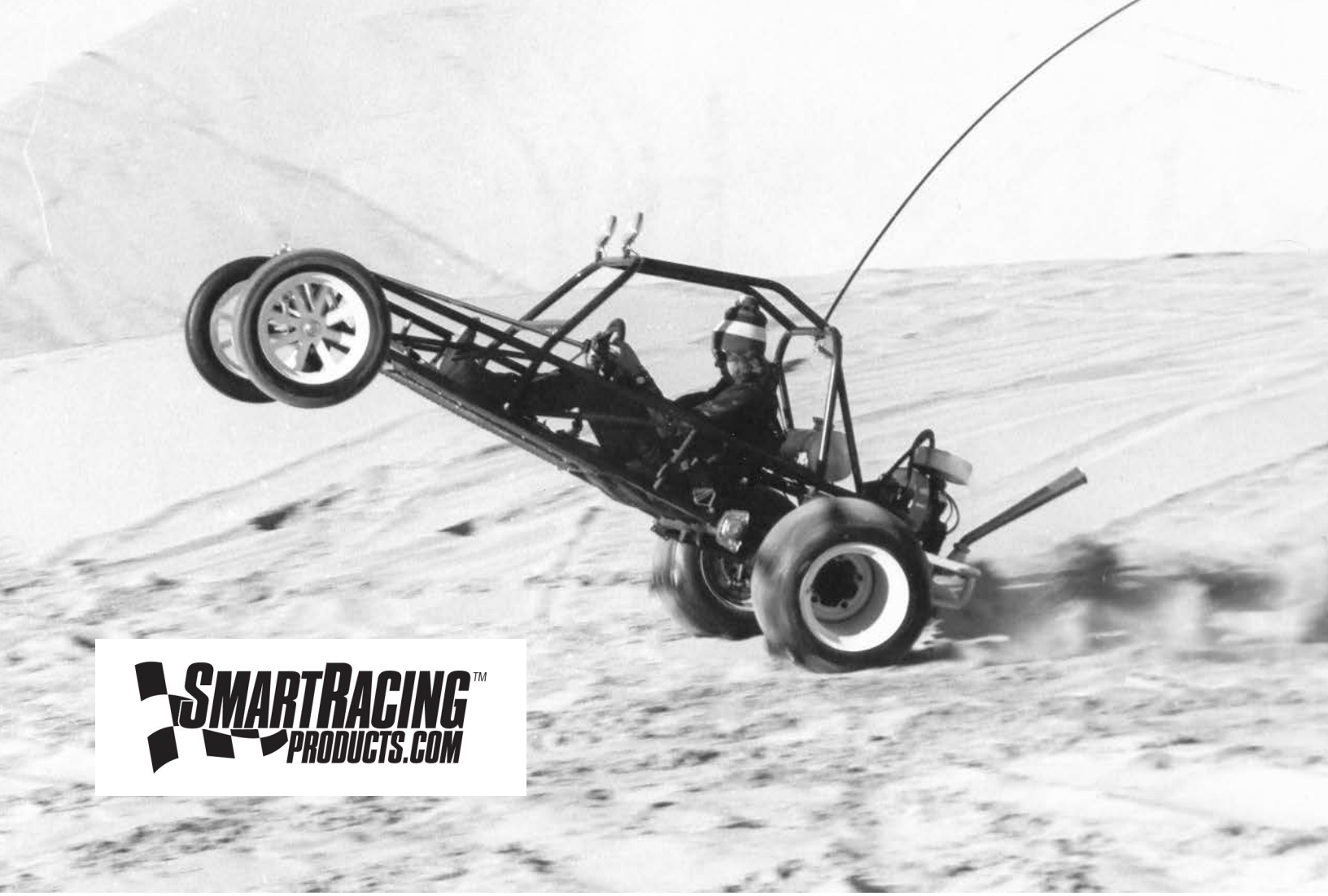
Cross Weight	Ride height	Camber	Caster	Toe	Springs	Tire Pressure

SMARTRACING PRODUCTS.COM™

MADE IN U. S. A.

WWW.SMARTRACINGPRODUCTS.COM
PH.+1.231.409.1155
Sales@smartracingproducts.com

Cross Weight	Ride height	Camber	Caster	Toe	Springs	Tire Pressure



Smart Racing Products have been providing high quality tools and performance parts for over 25 years. With our roots in California and our new headquarters in Michigan, we are a true "Made in the USA" small business.

Our family based team is committed to offering useful products and a high level of customer support. Please feel free to call or email with any questions or comments.

Sales and Technical Support

sales@smartracingproducts.com

Ph. 231-409-1155

MADE IN U. S. A.

SmartCamber, SmartStrings, SmartRacing Products, are registered trademarks, used by permission where applicable.

Copyright 1991-2022 Rev. 16 February 2022