



S&W Race Cars and Components, Inc.

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Please read complete instructions thoroughly before beginning!

Installation Instructions for S&W Instant Center Plotting Kit

The Instant Center Plotting Kit is designed to be used mounted to a rigid surface.

Take the Following Measurements.

These measurements must be taken with the drivers weight in the car, the car in race trim and parked on a level surface.

- Ground to center of bottom hole in front 4-Link bracket.
- Angle of the front edge of the front 4-Link bracket.
- Distance from the center of the rear axle to ground.
- Note the holes on the chassis and housing brackets that the Links are bolted to when these dimensions are taken.

Establish a Ground Line.

Draw a straight level line horizontally on the surface where you will mount the IC Plotting kit 4-link brackets. This line represents the track surface. This line should be at least as long as the wheel base of the car. To better visualize the instant centers you might also want to draw the bottom of the rocker panel.

Mount the Front 4-Link Bracket.

Establish the location of the bottom hole on the front bracket based on the previously taken measurement. Draw a perpendicular line up from the ground line where the IC Plotting kit front 4-Link bracket is to be located. On this line measure up the distance to the bottom hole on the front 4-Link bracket. Locate the bracket on this point. Pivot the front bracket about this point so that it is on the same angle as the brackets in the car. Fasten the front bracket to the mounting surface. The front bracket should be mounted so that it can not rotate. Be sure to arrange the mounting hardware so that it does not interfere with the links as they are moved to other holes. Allow enough room behind the front bracket so that you can reach the nuts that will be used to hold the links.

Mount 4-Link Housing Bracket.

Attach the two links to the front bracket and the housing bracket, using the same holes as when the measurements were taken in the first step. Position the housing bracket so that the distance from the ground line to the housing center hole is equal to the center of axle to ground dimension taken in the first step. Take care that this distance is perpendicular to the ground line. There is a hole in the IC Plotting kit,

housing bracket that is on the housing/axle center line. Use this hole to mount the housing bracket. The housing bracket should be free to rotate. Space the housing bracket so that it is at the same distance from the mounting surface as the front bracket.

Plotting the Instant Centers for Your Car.

The links that are supplied with the IC Plotting Kit are designed so that the straight edges on the extended portion are in-line with the bolt hole centers. The intersections of the two edges are the instant centers. There will be link arrangements that do not intersect due to the length of the extensions. To get these intersections extend the edges with straight edges or string lines. There are 144 possible instant centers locations (you may find that different link location have the same IC's). As you plot the intersections for the various IC's give each a unique identification. One method is to use letters for the holes on the housing bracket and numbers for the holes on the chassis bracket (it is S&W's practice to start with the bottom holes).

Draw the Center of Gravity and the Neutral Axis.

Refer to the Section "Finding Your Cars Center of Gravity" if you have not already done so. The neutral axis is an imaginary line drawn from the intersection of the rear axle centerline with the ground and the intersection point of the height of the C/G with the front spindle center line. (Refer to attached drawing)

Establish a Baseline Instant Center.

Start from a baseline instant center and evaluate the effectiveness of the many IC setting. Choose a baseline Instant Center above or below the neutral line depending on whether you want the rear of the car to raise or squat during the launch. IC's below the neutral axis will cause the front of the car the lift during acceleration. IC's above the neutral axis will cause the rear of the car to lift during acceleration. To obtain a "neutral reaction" chose an IC as close to the neutral line as possible. Note the reaction of the chassis for the base line IC. Experiment with different IC and note the reactions.

With the Instant Center Plotting kit mounted, and the ground line, neutral line and center of gravity drawn you now have a visual method of determining how your chassis will react to different IC's during acceleration.

Finding the Center of Gravity (C/G) of Your car.

Finding the front to rear location of the center of gravity.

For this step you will need access to accurate wheel scales. Note the weight at each wheel with the car in race trim and the driver's weight in the car.

Note the following data.

- W (Total Weight of the car, pounds) =
- WB (Wheel base, inches) =
- Wf (Total weight on both front tires, pounds) =

The formula to find the distance from the center of the rear end to the C/G:

$$D_{cg} = W_f \times WB \div W$$

Finding the Height of the C/G

For this step you will need access to accurate wheel scales and have some knowledge of trigonometry or have a calculator with trigonometric function keys.

When finding the height of the C/G of a car, you must eliminate all suspension and tire movement. Any deflection will distort the actual wheel weights you measure. You will need to lock both the front and rear suspensions through the use of solid links or other means so that the suspension is locked down at ride height. The car should have no suspension movement when finding the height of the C/G.

Weight the car in a level position. Note the weight.

Weight the car at an angle. The information that you will need to record is the weights on the front scales and the angle of the car. Raise one end of the car by placing blocks between the scales and tires. The higher you can safely raise the car, the more accurate the results. The difference in height should be at least 10 inches. Note the weight on the front scales and the angle of the line between the contact point of the front and rear tires and the ground line.

Note the following data:

W (Total Weight of the car, pounds) = _____

WB (Wheel base, inches) = _____

0 (Angle of the tilted car, degrees) = _____

W_f (Front weight of car when level, measured in pounds) = _____

W_{ft} (Front weight of car when tilted, pounds) = _____

ΔW_f (difference between the two front weights) = $W_{ft} - W_f =$ _____

Find the height of the C/G. The formula for finding the C/G height is:

$$\text{C/G Height} = \frac{\Delta W_f \times WB \times \cos 0}{W \times \sin 0}$$