Ackerman Effect

Ackerman is the difference in turn radius between the front tires. On oval track cars it can be desirable to create a situation where the left front tire turns faster than the right front tire. The Ackerman effect can help the car turn better through the center of the turn. You can measure the amount of Ackerman you currently have by using a set of turn plates. Typically, Ackerman is measured by turning the right front 10 degrees to the left. If you have Ackerman, the left front will travel further than the right front. A typical amount would be three degrees in 10 degrees of steering. To simplify, moving the right front from zero through 10 degrees of steering will cause the left front to move say 13 degrees in this scenario.

Ackerman is created by your front end geometry. Tie rods that angle forward from the inner pivot point out to the spindle will have more Ackerman.

You can usually adjust the Ackerman by moving the left front tie rod end in a slotted spindle arm. Moving the tie rod end closer to the ball joint will create more Ackerman. Some cars use an offset slug design to make the adjustment. Offset wheelbases have an effect as well. In the shop you should check the Ackerman on your car at the minimum and maximum setting. Having this knowledge in your note book will help you make the quick adjustment at the track.

On 3/8 mile and under tracks more Ackerman is usually more desirable. On 1/2 mile tracks and above less is generally needed. Just like with rear stagger, too much Ackerman will make the car loose on turn exit or will cause premature tire wear. Too much Ackerman can over heat the left front so that it will not perform on the long run. The amount your run depends on your set up and the track. Some tracks like more and others less.

Sometimes you can see the effects of excessive Ackerman by inspecting the wear pattern on the left front. If you see a graining pattern in the tire surface or if you have very high pyrometer readings in the left front you may want to consider reducing the amount of Ackerman.

Just as with rear stagger the right amount of Ackerman will help you through the middle of the turn. Too much and you will not be good on the long run. Through trial and error you can fine tune the car with Ackerman. If your car is just a bit tight in the center then more Ackerman may be the cure. Try adding small amounts as anything beyond what you need will just tear up the left front. Too much can also slow the car down as your horsepower has to over come the the dragging of the left front through the turn. The dragging condition will also be very hard on the performance of the left front tire.

On small tracks Ackerman can be added in aggressive amounts to see if there is a gain to be had. On large tracks a finer adjustment should be utilized. Remember that Ackerman will have the most effect on the car at the apex of the turn. At the apex, the steering is turned to the maximum amount for that turn. While Ackerman has an effect whenever the wheels are turned the effect is going to be most dramatic at the apex.

There are times when the car will cut to the center better on turn entry due to the effects of Ackerman. In this condition, chassis set ups or track layouts load the left front tire more helping the car get to the center. While the turn in benefit helps, it may cause a loose condition on exit due to the steering being overturned at that point in the corner. A balance must be found. You may find that you notice the Ackerman effect on higher banked tracks due to the loading of the left front where as on flat tracks the left front has less weight on it causing more of a undesirable dragging condition.

How to Choose a Stater

There are several choices when it comes to buying a performance starter. Powermaster has a wide range of choices to fit just about any application. Narrowing the choices down to exactly the right unit can be accomplished in three steps:

STEP 1: Torque Requirements
The torque output of a starter is the most important consideration. The starter must be able to spin the engine, and do it without overheating internally. Since there is no such thing as having too much torque -even on a street vehicle - a 200 ft.lb. starter will work for everyone. Speaking in general terms, a over 12:1 compression or higher engine should use a 200 ft.lb. starter. Engines up to 12:1 should use at least a 180 ft.lb. starter. 160 ft.lb. starters are good for engines up to 10.5:1.

One thing to keep in mind is that the torque characteristics of a starter are a function of its design. High voltage batteries or low internal resistance batteries will affect the kilowatt output of the starter by changing the output speed but not the torque. Therefore, buy enough torque to begin with.

STEP 2: Fit
Of course for a starter to work, it must fit the application. Consider headers, oil pans, and the mounting points on the engine. What size ring gear do you have (for Chevy applications)? Does your Chevy block accommodate a straight mount starter, or is the only pattern drilled in the engine block for a diagonal or offset pattern starter? In racing, did the oil pan manufacturer lock you into a particular shape of starter? In your Ford application, is your ring gear 3/8" from the engine plate - indicating a typical manual transmission starter - or is it closer to a 3/4" -requiring a typical auto transmission unit? How tight are the headers around the starter? These are just some of the questions that will help you determine the right starter for your application.

STEP 3: Weight
Lastly, depending on the form of racing, the overall weight of the starter is a consideration.