The Art and Science of Staging

In this column, I'm going to focus on a seemingly simple but often misunderstood element of drag racing: staging. Anyone who has made a run has staged his or her vehicle, lighting the stage bulbs and waiting for the Christmas Tree to come down before accelerating downtrack.

On the surface, the whole staging process looks pretty simple, and being far from rocket science, I am constantly amazed at the number of racers, even winning racers, who don't do a proper job of staging consistently.

Proper staging isn't difficult. In fact, it's one of the easiest chores that we have as drivers, but it is monumentally critical, so I have to assume that those who aren't precise either don't entirely understand the importance of careful, consistent staging or have grown complacent in their routines. In this column, I'll explain in detail the importance of consistently staging a car and how it translates to wins and losses.

In my tutorials on ThisIsBrackeRacing.com or in my live driving schools, you won't often hear me say that there is a right or wrong way to do something. Racing, like most aspects of life, creates opportunities for personality to dictate a lot of habits and tendencies, but staging is not like that. No creativity or imagination is involved. The process must be followed to the letter every time you go down the racetrack to be successful.

The placement of your front tire in the staging beams affects everything that happens for the remainder of your run, so it stands to reason that proper staging is the single-most critical aspect of making consistent, competitive runs in bracket-style competition. With proper, consistent staging, you can accurately predict your elapsed time, hone your reaction time, discover discrepancies from lane to lane, and gather other valuable data.

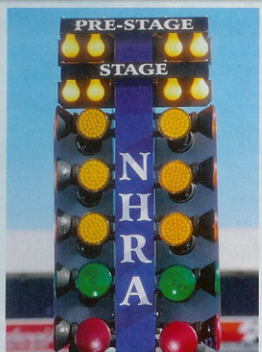
Drivers who are inconsistent in their staging process, due either to ignorance (not realizing how critical the process is) or a simple lack of focus, will not be able to do any of the above and therefore will have difficulty turning on the win light with any degree of regularity.

Now that I've emphasized the importance of consistent staging, let's get down to the nuts and bolts of staging a race car by beginning with a brief discussion of the timing equipment utilized at racing facilities. The pre-stage beam triggers the top light on the Christmas Tree and simply lets a driver know that he or she is within 7 inches of the stage beam. It's just a locater, for our benefit as drivers, to know where we are on the racetrack. In essence, the pre-stage beam has no correlation to the rest of the timing system and has no effect on reaction time or elapsed time. The pre-stage and stage beams are actually just that: beams of [infrared] light stretching from one side of the lane to the other. Those beams are about the size of a pencil tip and are roughly 1.5 inches above ground. When the front tire "breaks" the pre-stage beam, interrupting the transfer of light from one side of your lane to the other, you are pre-staged. When your front tire breaks the stage beam, you are staged. Once the pre-stage and stage beam are broken in both lanes (assuming you are not competing in a deep-

No matter what type of vehicle you race, the importance of proper staging cannot be overstated. The following sequence illustrates the careful staging technique that necessary for long-term success, particularly in bracket and index racing. You begin by (above left) rolling forward until the pre-stage light is lit. Then (above right) yo continue to carefully inch forward, barely illuminating the bottom stage bulb. This technique will often produce the most consistent results.

staging eliminator), the Tree is activated, which starts the race.

That being said, the forward-most portion of your front tire (at 1.5 inches off the ground) will break the stage beam. Then, depending on the size (diameter) of your front tire, you will roll forward roughly 10 to 15 inches before the tire is completely clear of the stage beam. This distance is commonly referred to as "rollout." Rollout is the measure of the distance traveled (and the time it takes your car to travel it) between the instant you say go by pressing the accelerator (or releasing the transbrake or clutch pedal) until your car clears the stage beam. From a correct, shallow-staging position, it takes the average bracket car from .2- to .35-second to cover that distance. The entire race-timing process is controlled by your car's tires leaving the stage beam. The reaction timers start when the third amber bulb lights and stop when the stage beam is exited. The elapsed timers start when the stage beam is exited and stop when the finish-line beam is broken. Therefore, leaving the stage beam is the critical event that controls both reaction time and elapsed time in each round of competition; and altering your rollout (by staging inconsistently) has a direct impact on the consistency of that critical event.



In most cases, you want to stage as shallow as possible to guarantee a consistent launch each time. It is not uncommon to see a driver barely flicker the stage bulb as he or she prepares to race. This is not a mistake but rather a deliberate attempt to stage in exactly the same place on each run.

Staging practices differ by driver, car, and class of competition. In the Full Throttle categories, you'll occasionally see drivers roll into the stage beams so far that they actually turn off the pre-stage bulb (deep stage). In bracket classes where electronics are allowed (and in any Lucas Oil category), this practice is not allowed, and a deep stage will result in an automatic disqualification. In footbrake bracket competition (depending on the region of the country and track policies), deep staging is often allowed, and in some regions, it is extremely common. So what does deep staging accomplish? For one, it will result in a slower elapsed time. Now, some of you might be thinking, "That can't be true because they are actually closer to the finish line," but trust me, it is true.

By deep staging, racers reduce their rollout by roughly 40 percent. As we know, the average bracket car (when shallow staged) has between 10 and 15 inches of rollout before exiting the stage beams. That means that the car has that distance to build momentum: The car is actually rolling by the time that the e.t. clocks are activated (when the car exits the stage beam). By deep staging, we cut that rollout nearly in half, and the car doesn't have to travel as far before the timers start, so it doesn't have as much momentum (speed) when exiting the beams. The result is twofold. By deep staging, racers have a slower elapsed time but a quicker reaction time (because the distance traveled to exit the stage beam is shorter, meaning that the car covers it in less time).

Deep staging versus shallow staging shows a large discrepancy in terms of reaction time and elapsed time and their correlation. But the same theories apply to the depth of staging even when we don't roll in far enough to actually deep stage by turning off the pre-stage bulb. Let's say that you're driving a Super Comp-style dragster at an eighth-mile event in the high-four-second range. You have roughly 10 inches of rollout when shallow staged, and your car covers that distance in roughly .2-second from the time the transbrake is released. Simple math says that the effect of time to distance is then 1 inch for .02-second. Though the laws of physics make that simple breakdown slightly incorrect (because the car doesn't cover the first inch as quickly as the 10th), it is a fair estimate.

Because we have 10 inches of rollout and 7 inches between the pre-stage and stage beams, we essentially have 3 inches of possible staging discrepancy, meaning that the physical location of the car can move 3 inches and you'll still be staged with both the pre-stage and stage bulb lit. This means that you can affect your rollout by .06-second without rolling in far enough to turn off the pre-stage bulb! Though that math isn't exact, it's close enough to realize that you can very easily affect the outcome of your run (both reaction time and elapsed time) by not staging consistently. Those of you who bracket race realize that .06-second is a huge variance. Also keep in mind that a slower car with more rollout only multiplies that variance. It's not uncommon for a racer in a slower vehicle to be able to adjust rollout by nearly a tenth of a second while still being fully staged (without rolling in far enough to turn out the pre-stage bulb).

Using the formula that we've developed, you can see that a single inch of variance in staging position can make for a huge discrepancy in rollout, affecting both elapsed time and reaction time. This is a discrepancy that we as drivers can control. And it is absolutely imperative that each of us devotes a great deal of attention to maintaining a consistent staging process.

My personal staging routine, which is consistent with that of most successful bracket competitors, is to stage as shallow as possible, by barely inching forward just enough to light the

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Inconsistent staging will affect the performance of any racing vehicle, particularly street cars that tend to run slower elapsed times. In a street-legal vehicle, a variance of just 1 inch in the staging process can result in a loss of several hundredths in elapsed time downtrack and a significantly quicker reaction time.

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In addition to helping you accurately track and predict the performance of your vehicle, a consistent staging routine will allow you to detect a variance from lane to lane at each racetrack.

stage beam. In fact, in many instances, you'll see me actually bump into the stage beam so cautiously that the stage bulb flickers. This isn't a mistake; it is by design. In doing so, I know exactly where my tire is during the staging process. Staging as shallow as possible is the only way to truly know where you are within the stage beams. I say this because your only reference on the Christmas Tree is the stage bulb.

Looking at the examples below, you could focus only on the Tree and not know any difference between your staging positions. In both instances, the pre-stage and stage bulbs are lit. But with the two different starting positions, you have made a monumental change in rollout, which will affect your reaction time and your elapsed time. Again, the only reference you have is the stage bulb (and beam) itself. So the only way to know that you're consistently staging in the same position is to roll (or bump the car) forward ever so slightly after pre-staging until you barely break that stage beam to light the stage bulb. If you continue to roll forward after lighting the stage bulb, you no longer have any way to reference your position. Put simply, staging is black and white. Staging as shallow as possible is correct, and anything else is unacceptable.

That being said, in certain situations, such as Pro Tree racing or bottom-bulb racing with a slow car, you simply have too much rollout when staged perfectly to achieve a competitive reaction time. In these instances, if there is any way to adapt the car (change launch rpm, change front tires, change air pressure, etc.) to allow you to continue to stage as shallow as possible and have a competitive reaction time, that will be an advantage. I recommend using different staging tactics to alter rollout only as a last resort.

Below, I have documented an example of the effects of inconsistent staging. Assume that you have made back-to-back passes at the same racetrack in the same lane. On the first run, you stage correctly, as on Run 1. On Run 2, you roll in much deeper. You're not completely deep staged but are in much deeper than on Run 1. After such a practice, you may very well see a pair of time slips that look like this:

Run 1
Reaction time: .030
60-foot time: 1.325
330-foot time: 4.020
660-foot time: 6.128
660-foot speed: 108.52
1,000-foot time: 8.151
Quarter-mile time: 9.765
Quarter-mile speed: 136.75

Run 2
Reaction time: -.025
60-foot time: 1.378
330-foot time: 4.071
660-foot time: 6.180
660-foot speed: 108.49
1,000-foot time: 8.204
Quarter-mile time: 9.819
Quarter-mile speed: 137.00

As a racer, you could come back from these two time trials and be thoroughly confused. You felt good about your driving on both runs, but your reaction time varied by .055-second. You thought you had a consistent car, but it also varied more than .05-second. Suddenly, you're entering the first round of eliminations with little or no confidence. In reality, you've just made two nearly identical runs with the exception of staging the car differently. By rolling the car farther into the beams on Run 2, you decreased rollout immensely. As such, you had a quicker reaction time (-.025 from .030) and a slower 60-foot time (1.378 from 1.325). Notice the corresponding difference: You gained .055 in reaction time and lost .053 in 60-foot time. The laws of physics don't allow those corresponding figures to be exactly 1 to 1, but for our purposes, it is close enough. Generally speaking, if you roll in enough to improve .01-second in reaction time, you'll lose nearly .01-second in e.t. We use the 60-foot increment when determining rollout rather than any downtrack times. We do this because although rollout discrepancies can generally be seen at each timing increment and the final e.t., as you get farther down the racetrack, additional variables (weather, wind, traction) can also affect elapsed time. In this instance, the 60-foot and reaction time show a variance that closely corresponds (.055 quicker r.t., .053 slower 60-foot), so it's easy to link that directly to a change in rollout.

The example used above is dramatic. It's rare for any seasoned racer to vary his or her staging process enough to affect rollout by more than .05-second. But the point is that even a minor change in staging position affects rollout as well. A fraction-of-an-inch discrepancy can affect both reaction time and elapsed time by a few thousandths of a second or more, which is often enough to decide the outcome of a bracket race.

This discrepancy doesn't have to happen. We're all very capable of staging our cars in the exact same position run after run. It's one of the few on-track variables that we can actually control. Pride yourself on consistent staging and pay attention to every detail in the staging process. No matter what you race, stage as shallow as possible, and you'll notice greater consistency in reaction times and elapsed times, which will make your total racing program better.

As always, for more in-depth discussion and analysis, log on to www.ThisIsBracketRacing.com. ND

Luke Bogacki earns his living behind the wheel of Sportsman racing machines. He has accumulated event wins and series championships in NHRA and IHRA competition and at countless big-dollar bracket events for more than a decade. In addition, Bogacki created ThisIsBracketRacing.com, an instructional website aimed at Sportsman racers. He also hosts a number of on-track driving schools each year. E-mail questions or comments to Luke@ThisisBracketRacing.com.