

LAP #8, PICKING A REAR GEAR

Picking the correct rear gear is a great way to get the most out of your Mustang. Understanding the advantages of having the right gear ratio and then selecting the best one for the current situation is so important that road racers seldom discuss it in public. When examining a race car, you may have noticed the ratio written with grease pencil on the center section. Beware, don't trust it as most racers closely guard this information and the number you read is probably left there just to throw you off. For a given track, it's common to select a ratio based upon the rpm seen at the end the longest straightaway. Common logic is this will result in running the highest possible ratio which achieves the best possible acceleration out of the corners. However, there is much more to consider as points are extremely important in road racing. Selecting a gear ratio that places a shift point in a bad position, like a critical corner, can slow you down tremendously. Many times, in a racing situation, you're better off to not shift and just carry the constant rpm, down the track to the next braking point. Shifting upsets the car, reduces grip and provides an opportunity to make a mistake. All these things will slow you down, staying in the gas never does. A good rule of thumb is not to shift unless it's absolutely necessary.

Gear ratios are easily determined by dividing the number of gear teeth on the ring gear by the number of teeth on the pinion. The most common ratio is the 3:89, but most vintage race cars are running something that starts with a "4" or even a "5"! The lower the ratio the "taller" the gear, the higher the ratio the "shorter" the gear, these terms describe the effect they have on performance. A car running a lower ratio will feel like it's trying to climb a taller hill than one running something higher which feels like its climbing a shorter hill. If you see cars pulling away from you under acceleration the problem may not be under the hood, it might just be your gear ratio.

Many people are unaware that fourth gear is the most efficient gear in a four speed transmission. It is the only gear where the engine is directly driving the rear wheels through the transmission without passing torque load through the cluster gear. Many track cars are not using fourth gear enough because they're running too tall a gear set. On the track you should be seeing a lot of fourth gear if you're running an optimal gear ratio.

Mustangs are fortunate to be blessed with the Ford 9 inch. It is a rugged, proven design that makes it very easy to change ratios by just swapping the center section or "pumpkin". With experience, you can change a center section and replace the oil in about 30 minutes. This makes having several pumpkins with different gear ratios feasible and a good idea for different tracks. Here's a tip... to make swapping pumpkins much faster, cleaner and easier you can glue the paper gasket to the face of the housing with weather-strip adhesive. Then install the pumpkin using no sealer between it and the gasket that is glued to the housing. It will seal very well because the mating surface on the pumpkin is machined smooth. Use the standard copper washers under each locknut but only tighten them enough to create a seal without deforming them. This will make them easy to remove the next time. Later, when

you remove the pumpkin it will easily come loose, leaving the gasket behind on the housing for reuse. Using this approach, I know some cars that have used the same paper gasket through many pumpkin swaps over many years with no oil leakage. Another tip to save time is to fill the housing with oil using the axle tube before installing the drivers side axle. Using this technique you can leave the drain plug in place on the housing and just pour the gear oil into the end of the housing where the bearing seats and let it drain down into the axle tube into reservoir where the pumpkin resides. Then install the axle and you're done!

There is much debate about what type of differential is best for use in road racing. The Ford Trac-Lock and Detroit Locker are two common options but there are other more modern designs that provide locking action. But, the vast majority of racers use the Detroit Locker for its ability to operate reliably in the racing environment. If your Mustang sees both street and track use don't be afraid of the Detroit Locker as newer versions are much improved. The days of the noisy, harsh Detroit Locker are behind us as they now work quite well on the street while giving the added benefit of bulletproof performance on the track. When selecting a differential you'll be questioning whether to use 28 or 31 spline axles. In road racing, spline count is not nearly as important as in drag racing. The more common 28 spline axle is lighter and perfectly suitable for racing service. It is a good idea to replace the stock design with stronger aftermarket offerings because, due to fatigue, they commonly break just inside the wheel bearing. If you need to prioritize, replace your axles before performing any other rear drivetrain upgrade.

When you get your new gear set out on the track take it easy for the first 10 laps or so. Give the ring and pinion time to get happy with each other. Don't be afraid to load it hard under acceleration then allow time to relax and cool as the mating parts get friendly. Then don't baby it, get after it and you'll be rewarded with good performance and long life. Although I'm a fan of synthetic engine oil, I prefer to use regular gear oil in the rear end and change it often.

I bet you can't wait to get that Mustang back out on the track and try your new rear gear!

Next lap,

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