Lap 5, Let's Talk Brakes

The best way to go fast is to stop really well. On the track, good brakes are a necessity and great brakes are a competitive advantage. Having the confidence to stay on the throttle until the very last moment requires absolute confidence in your ability and more importantly your brakes. On the track, if you're thinking about your brakes you have a problem that needs to be addressed. Having great brakes doesn't take a large investment and it certainly doesn't mean big rotors, fancy multi-piston brightly painted calipers or discs mounted on all four wheels. To get your car to stop when you really need it the most requires the development and maintenance of a finely tuned system.

Let's start with the most popular brake modification of all—the 4-wheel disc conversion. By definition, a disc brake is more efficient than a drum brake because of advantages in cooling, loading and ease of service. Four 4-wheel disc brakes are seen by many as a desirable Mustang braking upgrade because those big rotors shining through custom wheels make a strong statement. But on the track, are they really necessary? Stopping your car well requires a systems approach and putting big, heavy rotors and calipers out back when you already have drums is usually not a good idea. When your car is under heavy braking it's the front tires doing the majority of the work. As the brakes are applied, the nose dives, the front tires load and grip increases while proportionately the rear tires unload and grip decreases. The weight of your car is constant so the amount of weight that temporarily shifts to the front is equally removed from the rear (see Figure 1). This means, compared to the front, you have much less available grip in the rear and the need for much less braking force which is why the proportioning valve reduces hydraulic pressure to the rear wheels. Without a proportioning valve, it would be very easy to exceed the grip limit of the rear tires resulting in lockup and a spin. The goal is very simple, simultaneously achieve threshold braking in both the front and rear tires while getting the most from the rear tires without exceeding the grip limit. As an example, there are currently a number of Boss 302 racecars running rear discs with proportioning valves adjusted to less than 25% of available pressure. They're doing this because the period correct 4-piston Kelsey Hayes setup is just too much brake for the available rear grip. These cars don't need bigger brakes in the rear and neither do you, so save some money by running stock rear drums with Carbon-Kevlar shoes on your track car and you'll be just fine.

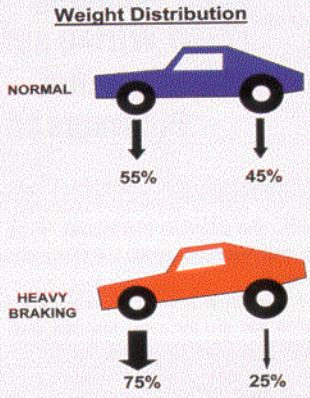

Figure 1

The front of the car is where the real work is done and the early Mustang 4-piston Kelsey-Hayes design is a very good package. Light, strong, stiff, inexpensive and easy to service, used in conjunction with good pads and moderate cooling air enhancement they are more than adequate for the track. Carbon-Kevlar pads combined with 3" ducting positioned under the front valence and routed along the front frame rail into the center of the rotor will provide excellent performance. Keep an eye on your rotors, looking for circumferential cracks which are usually an indication of unequal cooling between the inner and outer surfaces of the rotor. While it is normal to find small radial cracks or "crazing" on the friction surface of your rotors after a few hard runs keep your eye out for large radial cracks that run the width of the braking surface which are indicative of casting defects and should be discarded immediately.

Deflection is a bad thing in a braking system. Anything that deflects as load increases translates directly into increased pedal movement and can contribute to a term called "soft pedal." The popular, single piston floating caliper Granada retrofit for front discs can be plagued with a "soft pedal" as the caliper deflects due to unequal loading applied by the single piston. If you can, stick to the 4 piston Kelsey Hayes design for track use and use Carbon-Kevlar pads to avoid brake fade.

"Soft pedal" is an affliction that plagues many cars and there are common areas to focus on when diagnosing it. If you have rear drums, keep a very close eye on shoe clearance. Routinely remove the rear wheels and rotate the drums by hand checking for slight dragging of the shoes. If they do not drag, remove the drum and adjust them until they do. This will reduce the movement required of the shoes before contacting the drum and will raise or "harden" the pedal. Many experienced racers have learned to make this adjustment after every race, it's that critical. Another area to watch are the front wheel bearings which have a tendency to loosen under the high cornering and braking loads found on the track. Loose front wheel bearings allow the rotor to wiggle slightly and can tap the pads back slightly further than normal and it doesn't take much to make a difference in pedal feel. This creates extra distance for the pads to travel before contacting the rotor and translates into increased pedal movement. Remove the front pads periodically at the track to inspect them and while you're at it check the rotor for bearing slop.

Remember, in a braking system deflection is your enemy and anywhere it occurs will contribute to unnecessary pedal travel. It's a very good idea to replace your flexible stock rubber hoses with braided stainless steel versions designed for brake service. The stainless braid is designed to reduce swelling of the hose under pressure and will reduce pedal travel while providing an extra measure of external protection for the hose.

Remember, to go fast you need great brakes and the confidence to use them.

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