# **HOT TIPS FOR MORE FUN**

# AND SAFER RACING

# CAR SET UP HINTS

<u>Mirrors</u>	Mount mirrors as close to your eyes as possible.
	Mount mirrors so that they don't vibrate.
Instruments	Mount them so they can be seen at a glance.
	Put an idiot light plus a gauge on your oil pressure.
	Be sure to have an oil temp gauge and do not tromp on throttle until it is showing temp
<u>Foot Controls</u> safe to do so.	Adjust brake and accelerator pedals such that you can apply throttle when brakes are applied (heel and toe) for downshifting (VERY IMPORTANT). Practice heel/toe on street whenever Practice makes it possible!
Driver's Seat	Get a seat with good side support.
	Make sure you are secure in seat and not using steering wheel or pedals to balance yourself in car under racing loads.
	Pad areas close to shoulders and head.
Tires	Never change tire pressures by more than three pounds in one change!
	Run slightly higher tire pressure in the wet.
	Don't over torque lug nuts (check manufacturer's specs). Loosen before tightening. Use a torque wrench!
	Check tire pressures after every session!
	If checking tire temps at the end of a session, check them in pit lane as tires can cool quickly. Check temps on inside, middle and outside or tread face. Consider the effect of tire pressure, camber, right and left turns and braking.
	When adding air to tires at the community air pump; overfill, move car out of line and reduce pressure to desired level.
<u>Chassis</u>	In wet racing, consider disconnecting sway bars
Brakes	Check hydraulic balance- make sure fronts skid before rears when brakes are hot. Use a proportioning valve if necessary or balance bar.
	Balance for more rear braking in wet.
	Burnish/bed new linings. Race linings will glaze if not properly bedded

## <u>PREPARATION</u> (prevents DNFs.)

Car	Do a general nut and bolt check. Strange things loosen during racing!
	Keep list of all past trouble and check every those item before each race.
	Check tire clearances, suspension, steering and brakes before every race.
	Log all variable items (lap times, tire pressure, carb jets, etc.)
	Get to track ready to race! Don't defer work assuming it can be done at the track.
	Develop a pre-race checklist and use it.
	Develop a checklist of all items needed at a race event.
<u>Driver</u>	If appropriate, gear the car for each track. Get sufficient sleep before racing.
	Don't drive long distances immediately before racing.
	Use ear plugs to prevent hearing damage.

## DRIVING/STARTS

#### Starts-Rolling

Be in two lines, no more than one car space between cars--no strangling! No jumping out of line before the flag drops.

Know the starter-if necessary, watch other races to determine when she drops the flag.

Don't crowd the car in front of you-give yourself room to be able to see and maneuver.

Choose the proper starting gear-don't get caught over-revving or lugging.

If you are in the back of the pack, try to maneuver to the inside for the first turn.

Be cautious on the first lap- cold brakes, cold tires, cold brains!

Try warming up brakes more than tires on pace lap.

### NO RACING UNTIL YOU CAN SEE THE GREEN FLAG !!!

#### Restarts single file

Plan ahead-know your competitors and starter.

Just before flag, bring revs up into usable range.

Release clutch slightly to take up driveline lash and to make sure that transmission is in starting gear.

If you are fortunate enough to be on the pole, choose a starting speed and gear that is to your advantage but comparable to the pace car's speed.

#### Turns

BE SMOOTH- try to make one move on the brakes, one rotation of steering wheel, one progressive press on the throttle

When learning a new track or beginning a session, go into turns slower than you know you can	make the
turn and practice accelerating from the moment of turn in, not waiting until apex to accelerate.	Use a late
apex when learning/unsure/new to track (high powered cars especially)	

Keep hands at 3 and 9 or 10 and 2 o'clock. Do not reach inside of steering wheel for leverage

Establish braking points (landmarks).

Brake hard but never abruptly. Try to do all braking and downshifting while in a straight line.

Don't start turning-in early.

Load tires firmly but not abruptly. Loaded tires increases grip.

Do not "glide" through turns. Be on throttle or on brakes, but never in "neutral".

Use all the track width from turn in to apex to turn out. It is a huge competitive advantage!

Track transitions from level to upgrade or from downgrade to level allows loading the tires and makes harder cornering possible.

If two or more corners are linked, come out of the last one clean and fast.

If possible, don't change gears in a turn.

#### IF A SPIN OCCURS, "BOTH FEET IN" LOCK BRAKES (VERY IMPORTANT)

<u>Straightaways</u> Establish optimum shift points (tach).

Learn to check instruments on straights.

Check mirrors-more than once.

Learn to relax muscles (not brains) while driving.

<u>General</u> Be aware of what the cars around you are doing.

Be aware of conditions ahead of the car you are following or passing.

Don't follow too closely in areas where braking is expected (especially hard without brake lights). Don't rely on other cars brake lights for your braking actions

If you are being lapped, don't try to race with the passing car.

Draft and slingshot when appropriate. Learn how to time your passes.

In open wheeled cars, avoid tire contact with other cars.

If you are racing late in the day when the sun is low, tape your goggles or shield so that you are looking through a horizontal slit.



# TIRE TO ROAD FRICTION CIRCLE DIAGRAM

The forces that are generated at the contact area of a tire by the road may be diagrammed using the "Friction Circle".



The diagrams are useful for understanding combinations of cornering and acceleration or braking. The lengths of the force vectors (arrows) are proportional to the forces being generated. The circumference of the circle represents the limit of adhesion of the tire. If the driver attempts to exert forces braking, acceleration, and/or corning forces greater than the radius of the circle, adhesion limits will be exceeded and lock-up, wheel spin, or slide will occur. It should be noted that the limits influenced by tire temperature, pressure and design, track composition and temperature, suspension geometry, settings and load.

The object is to keep the resultant force vectors (dark arrows) as close to the circumference of the circle as possible as you transition from braking, cornering, to acceleration. Traditional cornering consists of progressing from diagram 2 to 3 to 4 to 1. Trail braking into the corner consists of progressing from diagram 2 to 5 to 3 to 4 to 1.

## **HEEL AND TOE DOWNSHIFTING**



The expression "Heel/toe" comes from a early time where the pedal arrangement differed from the norm of today. Today, most drivers use the ball and outside edge of the right foot, not the heel and toe, to downshift while braking. To do this easily, the brake and accelerator pedals must be positioned so the brake pedal ends up slightly above the accelerator when the brakes are applied. The lateral distance between the pedals should be 1 to 2 inches as shown.

Brake with the ball of the right foot on the edge of the brake pedal and about half of the outside edge of the right foot over the accelerator pedal as shown. Do not lift the heel off the floor. While braking, when the car has slowed enough to engage the next lower gear without over revving the engine, perform the following as quickly and smoothly as possible:

- Disengage the clutch
- Roll the edge of the right foot onto the accelerator <u>while keeping a</u> <u>constant force</u> on the brake pedal (this is the hard part).
- While the engine is accelerating, engage the lower gear.
- When the engine speed matches the transmission input shaft speed, roll the foot off of the accelerator and engage the clutch (this is hard too). When this matching is done properly the car will not lurch forward and the drive wheels will not lock up, thus maintaining the car's balance.

While you are learning this procedure go down one gear at a time (4<sup>th</sup> to 3<sup>rd</sup>, to 2<sup>nd</sup>, etc.). When the procedure is mastered, try skipping gears. This saves time and wear on the engine and driveline, but the matching process is even more difficult.

Heel and toe downshifting is very important and it is not easily learned. Most road cars require accelerator pedal position adjustment for easy heel and toe downshifting. A piece of wood or another pedal bolted or taped to the existing pedal works fine.





