Basic Kart Setup.

Here are some changes that can be made to kart setup, and what these changes should do to the handling of you kart - in theory. There's never one set rule for every chassis for every track though, so these should only be taken as guidelines. Experimenting with the setup by yourself and taking note of how the changes affect handling is the best way to find out what best works for you and your kart. In addition to the kart chassis setup your engine and carb setting play an important role in your speed. The most important factor however is the nut behind the wheel - and most attention should go into improving your driving rather than spending all your time worrying about the kart.

You should really only start to fool around with your kart setup when you can consistently lap within 2 tenths or so every lap for 10+ lap stints. This way when you make a setup change you should be confident enough that an improvement in lap time was caused by the change and not by the driver. Another important point to remember is that you should only change one thing at a time. If you change two or three factors you will have no idea which change did what. In last-ditch efforts during race weekends it is of course understandable to go for several changes at once - when you are way off on the setup.

An important part of setting up a kart is understanding the handling problems. Often drivers go to try to add grip to the rear of the kart because they are oversteering through a corner. Closer analysis may however reveal that the oversteer is actually caused by understeer earlier in the corner. The understeer makes the driver turn the front wheel more than desired and as the front regains traction the kart snaps into oversteer. It is very important to think what in your driving may improve the handling of the kart.

Tire Air Pressures:

The air pressure in the tires is one of the most important things to get right. Starting with manufacturer recommended pressures is best, and then experimenting with lower or higher pressures. An important point to remember is that for example 12psi might be absolutely perfect during your first three laps but your times might quickly start getting worse (often a sudden .5 tenths per lap slower). This means that your tires were at the optimum pressure when you started but as tires heat up the pressure builds up and the tires will start underperforming when the pressure gets higher than optimum. Being fast right out of the pits is what you need for 3 laps of qualifying, but not for a race.

I find that a good way to find tire pressures that work is by looking at your times. If you are able to consistently drop your times by a tenth per lap for example over the first five laps and then your times stabilise or still improve slightly at a slower rate for the next 10 laps you have found good pressures for a 10-15 lap race. You can try slightly higher pressures until you reach the point where your times get worse after a few laps.

Generally you would use lower pressures for a long race, high ambient/track temperature, and when there is a lot of rubber on the track. For the opposite conditions you would reduce tyre pressure. In wet weather the more water there is on track the more pressure you should run. On a drying track it is important to run low pressures in wets to prevent them overheating as much as possible.

Track (Front/Rear Width):

Widening the rear track stops the kart from binding as easily and in theory makes the rear of the kart looser. If your kart is hopping in the corners or you can feel your engine severely bogging coming out of corners widening the rear track might help (only change rear track about 10mm each time though).

Going narrower on the rear track in theory makes the kart stick to the track better. So if you have lots of oversteer narrowing the rear should help.

In general widening the front track should give more front end grip and improve responsiveness. Narrowing it makes the front end less responsive. Sometimes however it may feel like the front end needs to be widened out but the front tyres may actually be overworked and doing the opposite will solve the problem. There is a small difference in feedback to the driver between the tires being overworked or being underworked - with time you should be able to distinguish the difference.

Ride Height:

Changing the ride height of your kart makes a big difference to handling. When there isn't a lot of grip on the track and the kart is sliding all over the place raising the chassis can help a lot. Normally you would want to run the chassis low for a low centre of gravity to maximise overall grip. On bumpy street tracks having the chassis higher is a good idea - and on a street track it’s better to have a kart which binds a little than to have one which slides a lot. You can also try to change just the front or the rear ride height to affect handling. If you are experiencing lots of understeer for example you may want to raise the front end and see if you can generate a bit more front end bite.

For wet weather you would want to set the chassis high if you have the time. Raising the seat also results in the same result of raising the overall centre of gravity.

Toe-in/out:

Setting the front end alignment is important to have a kart that handles predictably. On karts you will mainly be looking to have 0mm toe to about 2mm toe-out. Having toe-out will make the kart more responsive to steering movements and will improve turn-in. The more your tires are pointing away from dead-ahead however the more rolling resistance you are introducing. In wet weather you would be looking to run 2mm or more toe to reduce understeer which is common place because not as much weight is transferred forward under braking.

Understanding your Chassis

I've read it many times on 4cycle.com about what the optimum setting is for cross. You don't hear it as much with nose and left side, but the question will pop up. The answer is that there are no perfect set-up numbers. What must be realized is that each kart and each driver do not perform the same. Therefore each will require different numbers to perform to both the kart and the driver's ability. These numbers may even go outside what the manufacturer has suggested. The thing that separates the really good drivers form the mediocre ones is experimentation. These racers use the set-up sheets as a baseline to start from and tweak the numbers from there. Now the question is how do you find your perfect numbers? Let me explain.

First you need to understand some things. Setting up a kart is nothing more than a balancing act. What we are looking for is the perfect balance between forward traction, turning traction and sideways traction (side bite). If you have too much forward traction, the kart does not want to turn into the corners. The front of the kart just slides. This is an understeering (pushing) kart. If the kart has too much turning traction then the rear end of the kart slides up the track. This is an oversteering (loose) kart. If the kart has too much side bite it will 'feel' great in the corners but loses speed. This is a binding kart. What is important to remember right now is that turning traction hurts forward traction and vice versa. Then if we have too much turning and forward traction then we have a 'binding' kart as well.

What we are looking for is corner speed. Corner speed equals greater straightaway speeds. This means that we want the maximum amount of forward traction with the least amount of turning traction that we can get away with in the corners. Too much or too little of one or the other or even both will slow you down. Let's look at some things in basic terms.

Nose weight: Nose weight affects how a kart turns. More nose weight equals more turning traction. Less nose weight is opposite. Too much nose will be loose on entry while too little will cause a push on entry.

Left side: Left side controls side bite and how much weight is transferred to the right-side tires. Too much LS will cause a 4-wheeled drift and too little will be tight on entry.

Cross: Cross affects how a kart turns and the distribution of weight transfer. You have varied opinions on cross. Some say increasing cross loosens the kart while others swear it tightens the kart. My advice is to experiment with cross and find out how it affects your kart. Generally too much cross will push on entry while too little will be loose off.

Rear Stagger: Rear stagger affects how well a kart rolls in the corners. More stagger means that the kart will turn in a tighter circle and less stagger will make the kart turn in a larger circle. Careful because rear stagger affects straightaway speed.

Front Stagger: Front stagger affects how the kart redistributes weight as the front wheels are turned. Usually high cross or small tube chassis require less front stagger while low cross or big tube chassis require more front stagger. More front stagger will reduce cross while less front stagger will increase cross. Other factors are with camber, especially camber gains on the RF with steering input. All I'm going to say is try 1 1/4" front stagger then 1 3/4" front stagger (resetting your numbers) and add steering input. Look at your numbers (nose, LS and cross) and camber changes compared to both. You will be surprised.

Caster: Generally, more caster equals more front bite, less caster equals less front bite. There is a lot more to the caster puzzle than this though. I hear this statement a lot: "Caster is a driver preference adjustment". To me there is way more to the caster game than most will admit to. Caster sets into motion the rate of weight transfer. Either caster setting will 'unload' the LR. One does it mechanically (LF) while the other does it by nature (RF). Most will leave the caster settings 'as set by the factory' and few will play with caster. Caster is a great tool to use to tune the kart. You can generally add bite to the kart by decreasing the split or by adding caster to both sides. If you increase the split you can take bite out of the kart. These are very general statements. There is a lot more related to caster than what is obvious.

Camber: This adjustment has several things tied to it. They are: tire grip and the timing for weight transfer. This is why changes in camber can drastically change the handling of the kart. The amount of camber that you need depends on such things as track surface and configuration, tires, and the amount of cross that you have. Generally high cross set-ups need -3.0 camber or more. Low cross set-ups need -2.5 or less.

Basically kart setup is a balancing act between turning traction (nose weight), forward traction (rear weight) and side bite (left side). As discussed above too much forward traction (rear weight) will cause the kart to push and not enough will cause a kart to be loose. Too much side bite (low left side) will cause the kart to bind while too little (more left side) will cause the kart to 4-wheel drift. Too much turning traction (more nose weight) will make the kart loose while too little (less nose weight) will cause the kart to push. Then we have probably the most confusing setup number … cross. I don’t know why but people really confuse themselves with cross. Let’s take a better look at cross.

Cross Weight: You can ask ten different questions on cross and get ten different answers. I'm going to explain it like this: Cross is NOT a primary adjustment tool. Cross should be used to fine tune the kart. If your kart is close on setup here is how to adjust cross. I adjust by air pressure (AP) build up others will adjust using tire temps. If in all cases my RF builds more AP than the RR then I reduce cross. This will relieve the RF of some of its dynamic loading. If the RR is building the AP then I increase cross to relieve it of some of its loading. A lot of what you do will depend on your front-end settings. Generally adding cross decreases the amount of bite in the kart making it more loose. On the other hand decreasing cross adds bite to the kart making it want to push. Like I have said before cross can affect your kart differently depending on your balance (nose vs left side).

I know many race both dirt and asphalt. So what changes do you need to make? Do anything to take bite out of the kart. That would be to increase left side, cross and RF camber and reduce caster and nose weight.

Weight Transfer: The amount of weight that transfers is proportional to the height of the CG, and inversely proportional to the track width of the kart. The following formula will always hold true: Total Transfer = Total Kart Weight * CG height * Cornering G's/ Track Width. We want to minimize weight transfer as much as possible but not to totally eliminate it; this in turn prevents a decrease in overall traction. Remember that the more loaded a tire is the more it grips. The amount of weight transferred is also dependent on other factors like its speed, the radius of the turn and the kart's path through the turn. The fact that the amount of weight transferred is proportional to the radius of the turn is one of the reasons why a large, smooth radius is the fastest line when cornering: it minimizes weight transfer, so it maximizes overall grip and cornering power.

Obviously, weight transfer has an overall effect on handling: more weight on a tire means more grip. So, if the CG is located further towards the rear, the kart will have a lot of rear traction, which is nice to have if acceleration is important. If the CG is located further towards the front, the kart will have a lot of steering, but it might lack rear traction, which increases the risk of spinning out. This is the same for lateral weight distribution in LTO karts except it works left to right. So the CG is very important because it determines the karts roll characteristics and weight transfer.

The reason we run so much left side weight in LTO karts is to better distribute the weight when we corner. Asphalt is a little different but not much. The reason we run more left side on asphalt than we do on dirt is because when we corner we create more G's. Because of this more left side is needed to counteract the greater side-to-side weight transfer. Same thing for dirt. When the track is wet/slick we need less left side because the weight is not going to transfer like it will do when the track is hard/fast. So the more G's we create the more left side that we need and vice versa.

To a certain extent cross plays a role in dynamic load transfer. Chassis design plays a very important role in how a kart distributes dynamic loads. Karts are geometrically and mechanically softer in the front than in the rear. Part of this has to do with CG 'roll'. Something to consider is that dynamic weight transfer will always seek the path of least resistance. Here is an example: due to low lateral acceleration the CG must be able to roll easily (low front roll stiffness). Low front roll stiffness will make the transition stage between turn in and keeping the LR unloaded from the effect of horizontal acceleration easier. All I'm saying is that weight will stay off the LR as the 'jacking effect' is coming off, rather than having the LR 'reload' due to excessive front roll stiffness. This is speaking in terms of a track with low grip. It's opposite for a high grip track.

As a very general rule, entry handling problems can be adjusted at the front-end while exit problems can be adjusted at the rear end. Usually front-end settings affect how a kart enters the corner and the rear end affects how a kart exits.

As for tires and air pressure well… there are so many combinations to that puzzle that it is nearly impossible to cover them all. Not only do you have different combinations of air pressure, tire compounds and tire manufactures but each person's setup has an effect on these combinations as well. The best thing to do is experiment.

This is a very brief explanation of understanding your chassis. I have a manual out that goes into more detail about how all this stuff effects your kart.

Weight Transfer INTRO

In any discussion of kart handling and setup, "weight transfer" is a term that will always come up. It is usually used in a general sense, and is almost meaningless without some additional information. Here is why; on a kart, there are three different ways that weight shifts from one tire to another.

The purpose of this article is to define each of the three types of weight transfer. With a better understanding of weight transfer, discussions on kart setup can be more detailed, and a greater understanding of kart dynamics will be possible.

THREE TYPES OF WEIGHT TRANSFER DEFINED

The three types of weight transfer are:

1) Mechanical Weight Jacking - This type of weight transfer occurs when the steering wheel is moved, causing the front wheels to turn. It can be seen and measured on scales.

2) Dynamic Weight Transfer - This type of weight transfer occurs in corners. It is caused by lateral G-force shifting weight off of the left side (LS) tires and onto right side (RS) tires of the kart.

3) Dynamic Weight Jacking - This type of weight transfer is really just a part of dynamic weight transfer. When weight transfers from the LS to the RS of the kart in a corner, most of the weight will tend to go toward either the right front (RF) tire or the right rear (RR) tire. It is determined by chassis design and setup.

MECHANICAL WEIGHT JACKING

In some ways, mechanical weight jacking is the easiest mode of weight transfer to understand. It occurs when the steering wheel is moved, turning the front wheels. With steering input, the LF tire will move downward, while the RF tire will move upward. This is easily seen and measured on scales. The amount and timing of the weight transfer is affected by all of our front-end setup parameters; camber, caster, KPI, scrub radius, etc.

Despite how easy it is to see and measure, controlling this type of weight transfer is really the "black magic" area of kart setup. The individual setup parameters that control how mechanical weight jacking occurs are simple to understand. Understanding how they relate to each other, and the ability to use them to your advantage, is something very few people have mastered.

I'm not going to go any further into the details of this mode of weight transfer here. Look to Mike McCarty's "Understanding Your Chassis" article in the 4-Cycle Chassis Tech Section (http://www.4cycle.com/chassis/art.asp?art_id=34&art_content_id=210&FormArticle_Page=1&) for a more complete description. For the purposes of this discussion, it is only important to recognize that this type of weight transfer differs from the other types.

DYNAMIC WEIGHT TRANSFER

The concept of this type of weight transfer is very simple; when a kart is turning, weight transfers from the LS of the kart to the RS. Dynamic weight transfer refers to the total amount of weight that transfers from left to right. It can be easily predicted.

There are only a few items that affect dynamic weight transfer:

1) VCG - the height above the ground of the centre of gravity of the kart and driver.

2) Kart Track Width - the width of the kart. The distance between the outside edge of the rear tire tread can be used.

3) Lateral G-Force - the sideways force generated in a turn.

4) Total weight of the kart

In the "Understanding Your Chassis" article in the 4-Cycle Chassis Tech Section, mentions the formula for calculating dynamic weight transfer:

"Weight Transfer: The amount of weight that transfers is proportional to the height of the CG, and inversely proportional to the track width of the kart. The following formula will always hold true: Total Transfer = Total Kart Weight * CG height * Cornering G's/ Track Width."

Think about it this way; the length of the VCG is a lever. The total weight of the kart and driver is distributed between the LS and RS of the kart. As G-force builds in a turn, it pushes to the right on the VCG lever, attempting to lift the LS of the kart. As the LS of the kart lifts, weight is taken off the LS tires, and moved to the RS tires. As more G-force pushes on the VCG, more weight will be transferred.

It is important to understand that the amount of dynamic weight transfer does not depend on tire pressure, chassis stiffness, or any other characteristic of kart design or setup. Also, on a kart, this type of weight transfer happens almost instantaneously. There isn't much that can be done to speed dynamic weight transfer up or slow it down, but it is easy to control the total amount that occurs. Adjusting the VCG height or the track width of the kart will change the total amount of weight transfer that occurs. Adjusting the amount of static LS weight will determine how much total weight ends up on the RS of the kart in a turn, which controls "side bite".

DYNAMIC WEIGHT JACKING

As mentioned previously, dynamic weight jacking is really just a part of dynamic weight transfer. It is simply the distribution of the dynamically transferred weight between the RS tires. Some percentage of the transferred weight will go to the RF tire, and the remaining percentage will go to the RR tire. These percentages are determined by setup parameters and, more importantly, chassis design.

The goal of chassis design and setup is to reach a neutral balance in handling during turn-in, at the apex, and during the exit of a turn. The key to this balance is controlling the loading on the RS tires throughout the turn. In controlling this balance, the unloading and re-loading of the left rear (LR) tire is critical.

Statically, the LR tire on a kart carries the most weight. In a corner, most of the weight that will transfer is going to come off of the LR tire. It will not transfer directly from left to right. Much of the weight statically loaded on the LR tire will transfer to the RF tire.

From a chassis design perspective, the distribution of dynamic weight transfer is determined by things like tubing diameter and wall thickness, and the stiffness or softness of the waist of the kart. Another factor is the stiffness of the rear axle. Some chassis are equipped with split tubes that can be clamped. This allows some adjustment of the dynamic weight jacking characteristics of the chassis.

From a setup perspective the main thing that affects distribution of weight is the relative stiffness of the RF and the RR of the kart. It helps to think of each corner of the kart individually. Anything that changes the relative stiffness of the RF corner of the kart compared to the RR corner will affect transferred weight distribution.

The key point to remember is that a stiffer corner will be more resistant to weight transfer. Anything that softens a corner of the kart will cause more weight to transfer to it.

Let's go back for a minute to the first type of weight transfer discussed; mechanical weight jacking. When the steering wheel is turned, it is obvious that weight is transferred from the RF/LR tires onto the LF/RR tires. What is less obvious is that the RF is being made softer compared to the RR. With the steering wheel turned, more of the transferred weight will be distributed to the RF tire. More caster, scrub radius, etc. (anything that causes more mechanical weight jacking), will cause more weight to transfer dynamically to the RF, creating more grip on the RF tire and less on the RR tire.

Cross weight will also affect the distribution of transferred weight. With low-cross setups (generally 54% or less) lowering cross weight will further soften the RF, increasing bite via more weight transfer.
High-cross setups work differently. A high-cross setup creates a relatively stiffer RF compared to the RR, and so less weight will transfer dynamically to the RF compared to a low-cross setup. This type of setup works because of the grip provided by weight that is statically pre-loaded onto the RF tire.

CONCLUSION

These are the basic issues surrounding weight transfer. Mike McCarty goes into a much more detailed discussion of weight jacking axes, and chassis design variables in his manual "Understanding Chassis Theory and Dynamics".

Next time the subject of weight transfer comes up, think about which type of weight transfer is really being discussed. When you have questions about a setup issue, try to use these terms to describe your thoughts.
Ignition Timing UNDERSTANDING IGNITION TIMING

Q: Why does a Non-Restricted engine seem to operate well with 28 degrees Ignition Timing and a .052" jet at 6200 rpm, while a Restrictor Plate engine runs well with 30 degrees Ignition Timing and a .062" jet at 5600 rpm?

Theory #1: You could assume as a rule that the higher the rpm band you operate in, the less Ignition Timing you need to use.

Theory #2: You could assume as a rule that since the restricted engine is utilizing a larger jet that you would need increased Ignition Timing in order to burn all of the fuel.

So we have:
Non-Restricted= Low Ignition/High Fuel
Restricted= High Ignition/Low Fuel

Is either theory true? No. The hole in both theories is that a Limited Modified engine will operate properly in excess of 9200 rpm while using High Fuel and High Ignition Timing. What about the Restricted engine using a larger jet? Even though the jet size is larger on a restricted engine, it has to be larger because of the reduced fuel signal in the carb venture. So, the restricted engine will rarely use more fuel than a Non-Restricted engine, even though the jet size would make a person think so.

So, if tested within a predefined test time, we now have:
a Restricted engine uses 4oz of fuel
a Non-Restricted engine uses 6 oz of fuel
and a Limited Modified uses 9 oz of fuel

Does more fuel use require more Ignition Timing? No. The final clue to my puzzle came in building an Open class engine. Larger than all of the aforementioned engines, this baby was a Fuel Hog, yet it operated best at 28 degrees of Ignition Timing.
So, we have:
Open= Low Ignition/Very High Fuel

How can that be? The answer is found in VE (Volumetric Efficiency). Volumetric Efficiency is simply how well an engine cylinder fills and evacuates (empties) within a given amount of

time.
In the case of our restricted engine, any engine when restricted by a plate forms turbulence inside the port, which in turn impedes flow. The end result is reduced VE. Turbulence creates a poorly mixed fuel/air charge which resists efficient combustion in the cylinder, thus Increased Ignition Timing is required in order for the engine to produce peak combustion pressure at the most opportune time, transferring the resultant forces to the piston, connecting rod, and eventually the crankshaft.
What about the Limited engine? The Limited worked well with Increased Ignition Timing because there was a lot more fuel to burn, but the Open worked well at 28 degrees with even more fuel. Why? Because of flow. The Open had optimized larger ports, Big valves, and a harder "pull" to fill the cylinder because of increased cubic inches (bore and/or stroke are larger). In short, because the Open filled the cylinder more efficiently (VE) than any of the other engine designs.

In Summary:
The proper use of Ignition Timing is a balancing act dependent upon VE.

Tires!!!!

Tires. Boy, what a can of worms this is! I could tell you how to mount them, and spend this evening watching the Winston Cup race I taped, but then I wouldn't get all those lively discussions these articles generate when I'm informed that my info is "slightly" inaccurate!

Enough whining, let us look at those numbers and compound codes printed on the side. Racing kart tires are very low and very wide as compared to other race tires. The aspect ratio or relationship of sidereal height t tread width is between 6% and 37%. Formula 1 tires are 45%. This allows karts to have a low ride height and large contact patch. This ratio is shown in a street tire as the "50" number in a 235/50R15 type of high performance tire. The other numbers that describe the tire, for example an 11x6.00-5 tire are the dimensional sizes in inches. "11" means it stands 11 inches tall (and is 11 inches in diameter). The "6.00" means the tread width or contact area is 6 inches wide (give or take
a little). The "5" is the wheel diameter if 5 inches.

The tire parts include the tread or section that contacts the road. A thin layer of rubber is bonded to the tire here. It is the compound or formulation of this rubber that determines its grip and wear characteristics. A soft compound such as Dunlop[1]s R6 is best suited to colder weather or low grip tracks.

The carcass is the main part of the tire. It is a bias or diagonal overlap of nylon cord layers. This angle, cord size and sidewall stiffness determine the tire[1]s response and ride nature.

The bead area is a bundle of steel wires that strengthen the carcass where it meets the wheel. This forms the air seal and sometimes makes mounting and removing the tires so difficult.

The tires should be mounted on a wheel that is approximately the same width as the tire. (For example, mount a 4.5 tire on a 4 1/2" or 5" rim width.) This should provide a good contact patch which uses the full tread to good advantage.

Here comes the tough part. Inflation pressure! Pressure and slip control the heat build-up in a race tire. Finding the correct combination sometimes seems to fall between "dumb luck" and "black art". Tire temperature determines the grip and rolling resistance a tire has.

"Proper" inflation pressure is a difficult thing to achieve because its meaning can vary with driver, chassis, track layout, road surface, weather and temperature. Most manufacturers have an approved range of 10 psi to 25 psi. However, a starting point of 16-18 front and slightly more (2-3psi more) rear will give you a baseline from which to adjust. Because the tire pressure is important to performance, an accurate dial type gauge is essential.

Let's look at some basic Rules of Thumb.

Atmospheric Temperature Change: The general rule is to raise pressure during the cool part of the day. This will decrease the contact patch and generate more heat sooner. In a 4-cycle kart we are unlikely to badly overheat a tire unless the driver is very erratic or the chassis has a handling or weight distribution problem.

As the day warms up (noon), we can decrease the pressure 1.5 - 3.0 psi to decrease heat build-up. Remember, heat is generated by the tire sliding. You know how hot sandpaper gets as you work it harder and harder!

Oversteer/Understeer (Loose-Push): Usually we adjust rear tire pressure first to cure a handling problem. This is because a front tire needs stiffness for steering response and changing it by changing pressure can have more dramatic effects than by changing rear pressures. If the driver has a push (i.e. exits the corner too side, cannot keep it low in the corner), then add pressure to the rear tires. This causes a slight increase in rear slide, thereby neutralising the chassis. If the kart is loose (i.e. driver is constantly correcting the line in the corner), then decrease rear pressure. This should improve rear traction by increasing tire footprint, and thus keep the rear of the chassis behind the front!

Compounds: Soft compounds are best suited to Spring/Fall racing or tracks where the surface is very old or slippery. Harder compounds work better in warm, summer weather. "SL" or club compounds work best with slightly higher pressures.

Watch for the tire to shred or get tiny little cuts or splits in the surface. This tire is overheated. It should have a "pebbled" look to it. If the tire overheats even once, it will suffer a significant amount of deterioration in grip next time you run it. This happens because tires "cure" or get harder as heat cycles are applied to them.

Variation in Road Surface: If you attend a big race event, especially with a lot of 2-strokes, rubber will build up on the track and some experimentation will be required. Usually you will lover the tire pressure unless a bounce or hop begins in the chassis.

Rim Width Changes: A change in width on the same tire will change both lateral and vertical stiffness. Do not make large changes here, but if the chassis doesn't slide smoothly, or if it hops, or if it doesn't turn in comfortably, then widening the rim will make the transitions more predictable. Overall grip will remain the same with equal pressure, however.

Tire Size: Larger front tires can cure a push or you could go to a narrower front rim width with the same tire size. A larger tire (front or rear) will tend not to "bog" the chassis down on a very sticky track. Narrower tires are usually used on Jr. karts or slippery tracks. Don't forget that as you change the size at the rear, you also affect gear ratio. If you increase circumference, each 1/2" requires a change of one tooth on the rear gear.

Breaking In Tires: A good rule for tire break-ins is to run 5 to 8 laps (but not a full speed) and then let them cool completely or delay use for 1 day. The tread should appear rough or "pebbled".

Remember, the tire needs heat to work effectively, but there are limits to how much. The chassis should try to use all 4 tires as much as possible. That will show the best times "on the watch". Use tire pressures when the chassis can't be adjusted any further or if tiny changes need to be made. Don't be afraid to try changes, but get feedback from the driver, form lap times, and from watching races on TV that tires are the most important factor in performance. Use them effectively and have a great race!