TC3 TUNING GUIDE

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Most of these tips will work with all cars

Basic Mechanics

What are the Basic Mechanics?

I will try to explain, as best I can, the ideas behind car handling. Basically you have to understand that setting up your car is nothing but managing how you transfer the physical weight of your car to maximize traction. You must also have a good balance for your vehicle to be ready for different course conditions.

Your vehicle's chassis is subjected to many forces while on the track. Many different elements can affect handling, and handling affects how the vehicle reacts to different situations. The optimum suspension should be compliant enough to absorb road imperfections in low traction/bumpy conditions, and still be stiff enough to give you maximum 'G' forces in the corners. Many other forces can affect your handling. Such things as shimmying (which is generally caused by loose steering or suspension components), surging (which can be caused by badly glued tires, cracked wheels, etc), and lurching (side-to-side motion caused by similar forces to surging) can all affect car handling.

ROLL

Roll is one of the most common forces countered by suspension tuning. As in the illustration, the vehicle chassis will try to lean excessively in either direction. The primary component that combats chassis lean is the anti-roll bar, or swaybar.

PITCH

This occurs on the transverse rotational axis. The forces of pitch cause diving under braking, or rear 'squat' under acceleration. Both shocks and springs play an important role in reducing the amount of pitch, but only good, progressive suspension design prevents harsh oscillations when combating this force.

YAW

Yaw is a force directly associated with the vertical axis. This condition draws all of the suspension components into play. The ideal suspension on any vehicle should be tuned to provide completely neutral handling during hard cornering. Most vehicles are factory-designed with understeer (push) to make the front end of the vehicle start sliding first under hard cornering. This approach is to help prevent the average driver from spinning out when decelerating in a corner. Stiffening your suspension one end at a time can induce severe 'yaw' conditions. Over-tuning the rear suspension can create excessive oversteer (tail-out). The opposite occurs when the front is over-stiffened, creating understeer.

DRIVING STYLE

Believe it or not, there really is a proper driving style. You don't know how may people have come up to me and asked me to try their cars, and let them know what I think. They tell me their cars just aren't working. So, I drive it and, in a few cases, their cars feel better than mine!!!!

The proper driving style is probably one of the most important aspects of racing. There are 3 points to a turn: The Entrance, The Middle, and The Exit. Ideally, you want your car to enter the corner well, travel through the middle with just a hair less speed, and be able to rip it out of the corner. With the proper driving style (and car setup), you'll be able to do just that! You have to learn when to brake (or lift if you don't use brakes), when to use mid-throttle (believe it or not, ALL ESC's have a mid throttle), and when to use full throttle. For modified or nitro, learn to ease on the throttle. Learn how far you can push the car before it spins out or pushes. You can actually use the throttle to steer, also! As you go into a corner, lift the throttle a little and start turning the wheel. As the car goes through the corner, lift a little bit more on the throttle to get the car to turn more. This will scrub less speed, and be much smoother than cranking the wheel left and right.

And remember...MAKE ONLY ONE CHANGE TO YOUR CAR AT A TIME!!! If you make a change and it makes the car worse, you know what you did. If you make multiple changes and the car gets worse (or better), you won't know which change actually did what

Maintenance

What About Maintenance?

What about Maintenance? Well, to keep your car in the best working condition, you will need to do some maintenance. The following schedule is suggested (but certainly not official!), and it should be adjusted according to your race schedule (this is assuming you race once or twice a week).

Every Race Week:

- Check the smoothness shocks and suspension components. Make sure nothing is binding or cracked/broken.
- Check/replace worn or sloppy ball cups or shock ends.
- Check tires to make sure they are in good condition and the glue is still holding strong.
- Check drive belts and gears/pulleys for debris stuck in them.
- Re-lube bushings.
- Check pinion/spur gears for broken/bent/worn teeth.
- Check screws for tightness (more important on a Nitro car!). Loctite if necessary.

Every Race Month:

- Check/replace worn plastic parts.
- Check/replace hinge pins.
- Clean out bearings.
- Re-build shocks.
- Check/rebuild diffs.

Miscellaneous:

- Electric Motors require alot of maintenance (modifieds, especially). Make sure the brushes or springs are not discolored, and that the motor comm is not grooved. If it is, it's time to cut it (and replace the brushes!!!).
- Batteries should be discharged and stored in a cool, dry place!
- Nitro Motors don't require as much maintenance. Just note that after 2-3 gallons of fuel, it might be time for a rebuild.

Recommended Cleaning Tools:

- Motor Spray. Use only motor spray that is made for RC Vehicles. Some people use 'Electric Motor Cleaner' made for full size car alternators and such, but some of that has some strong ingredients that will eat away the coating on RC Car motors, causing them to detonate (cool looking if it's not YOUR car!)
- Toothbrush. Preferably an old one no one uses anymore. And, don't grab your sisters, use it, and then put it back!!! Well, on the other hand, if she's really mean....
- Large Bristle Brush. This is to help clean off all the dust and larger debris from the car.
- Denatured Alcohol. Good for cleaning tire marks (or other imperfections) off the car body.
- After Run Oil. Good for Nitro motors. It absorbs moisture that might enter your motor.
- Compressed Air. If you're lucky enough to have a compressor, this little gem will help clean out all the goobers floating around in the car!!!

At The Track

What Should I Do When I Get To The Track?

Find a pit spot and unload all your gear. Get set up and start charging a battery. Once you have everything situated and have a few extra moments, walk over to the track and check it out. If it is a track you race at all the time, you'll be familiar with the size, the traction, and the competition. If this is not a track you know, pay close attention to the size. This will give you an idea of the motor and gearing you will go with. Also, if you can, check out one of the locals on the track. He (or she) will most likely be making some fast laps and will show YOU the fast lines! Look for cracks in the pavement, bumps, or any other irregularities that will cause you handling problems. On dirt, look for large ruts or unbalanced/uneven jumps. Off-road might be a bit easier since a 'groove' will form to show you around the track.

Where Do I Start With The Setup?

First, I would suggest a starting setup...something that is easy to drive but probably not the best setup for every track, and ALWAYS have it on the car when you get to the track. You know how it works and it's easy to make changes to it to make your car faster.

Pay attention to the weather, also. Cold, windy or overcast days will wreak havoc on traction. You may have to soften the car up a bit to get the maximum performance from your car. Hot, humid days will make the ground sticky, especially if you are running soft tires. This could cause your car to push or even the dreaded traction roll!

On The Track!

Once you have an idea of where to start, put your battery in and head for the track. The first couple laps don't need to be hot laps. This is the track learning period. I've seen to many people go out right off the bat and crush their car because they wanted to keep up with the guy who's had 5 batteries on the track already. Learn the track first, then take some hot laps. It should take you about 5 or 6 laps to get the track down pretty good. Finish off the battery.

Back In The Pits!

Go back to your pits, start another battery, and make ONE change to your car. Follow the procedure above, but you should only need to do 2 or 3 slow laps to get used to the change in the car. Continue to do this until you find a good setup you're happy with.

Tires. Tires are EVERYTHING!!! A good set of tires will make an ill handling car driveable. If you know the track and what tires everyone runs, great. If you don't, FIND OUT! That can make or break your experience at the track.

Most of all, though, this is a FUN sport. If you're not having fun, there's no reason to be there. I understand tempers flaring. We've all experienced it But, in the immortal words of a World Class Driver - "We are racing toy cars for bowling trophies". That's really all it is.

Have fun!

Ackerman

What is Ackerman?

Ackerman is the angle of the front tires, in relation to each other, as you make a turn. Basically, it causes the inside front tire to turn tighter than the outside front tire.

How do you change Ackerman?

The standard setting (kit setting) on most cars is set so as to make the car easy to drive. Making the Ackerman Link longer will take away Ackerman but make the steering more aggressive. Making the link shorter will result in more Ackerman, or less aggressive. You can also try mounting the ball stud on the steering knuckle to the outer holes (less Ackerman, more aggressive) or the inner holes (more Ackerman, less aggressive).

On the TC3, simply adding two .100" (2.5mm) shims and the optional longer ball studs to the steering rack will do the trick. This will give less Ackerman, and a more aggressive steering feel.
As a rule, less Ackerman is a bit harder to drive.

There have been times where we wanted more Ackerman than the stock steering rack will allow. To do this on the TC3, you will have to disassemble your steering and remove the rack from the car. Remove the ball ends from the steering side, and shave the rack 'nubs' down 2.5mm, or roughly equal to the re-inforcement rib. You will also have to slightly shorten the ball ends so they don't poke through the rack and hit the rack bearings. This will give you MORE Ackerman, and actually make the car easier to drive. This has worked very well for extremely high bite tracks such as carpet.

Aerodynamics

What is Aerodynamics?

Aerodynamics is the mechanics that deals with the motion of air (normally) over or through an object, in our case a RC body and wing.

Aerodynamics play a huge part in the handling and speed of the vehicle. You have to find a body and wing combination that provides sufficient steering and good rear traction, but not so much that it causes alot of drag on the straights.

Bodies do most of their work at high speeds. At speed, the body will generate a tremendous amount of downforce on the cars suspension and tires which will drastically affect handling. That is why the body and wing combination is so important.

Some body examples:

1. Dodge Stratus. The Stratus body has been the favorite for some time now because of its neutral handling characteristics. It has good steering and good rear traction, yet does not create a lot of drag. This is by far the best handling body available today!
2. Honda Accord. The Accord is another body that has become a favorite for those that love the Stratus, but desire a little more steering out of the body.
3. Alfa Romeo. The Alfa body has a lot more steering than the Status! It is used more on high traction tighter tracks where steering is needed.

Wings also play a huge part role in the cars handling. First off, the angle of the wing, the location of it on the 'wing standoffs', and the way you cut it will all affect rear traction and stability.

How do you change Aerodynamics?

Mounting the wing farther back on the 'wing standoffs' will provide more rear traction. Mounting it farther forward will provide more steering. Cutting the wing down will provide more straight-away speed, but will reduce rear traction on high-speed turns.

There are a few tricks to body handling. First, a few hints about body style. For steering, look for a body that has a large front window and blunt nose. This will provide alot of front downforce which equates to alot of steering. For rear traction, a body with a low roofline will allow cleaner air to flow over the body and hit the wing. Also, a body with the front windshield closer to the center/rear of the car will provide more rear downforce. This, though, might cause a car to understeer, or push, more than if the windshield was located farther forward.

For the wing, here are a couple tips to try. First, mount the wing farther back on the standoffs so that it is level with the rear bumper. This is usually a good starting position. And, don't cut it down too far to start. Run the car and try cutting it down after every run to gain more steering if you need it. Also, try experimenting with the side dams on the side of the wing. You'll be surprised how much this can add to the stability of your car (at higher speeds). Although not a normal adjustment, you can purchase wings separately and try different wings with different bodies.

Anti-Roll Bars

What is an Anti-Roll Bar?

Anti-Roll Bars, also know as Sway Bars, are used to reduce chassis roll while cornering by connecting the left side of the car to the right side. Typically, Anti-Roll Bars are used on high-traction surfaces to keep the chassis flat through the turns. This will also provide even traction for all 4 tires resulting in a more responsive car.

How do I change Anti-Roll?

Using the front Anti-Roll Bar only will decrease front chassis roll, giving the feeling or more rear traction, or less steering. Using the rear Anti-Roll Bar only will decrease rear chassis roll, giving the feeling of more steering, or less rear traction.

For bumpy conditions, Anti-Roll Bars are a bad idea. If you use the bars on a bumpy track, you lose the benefits of the cars independent suspension, making it difficult to drive. The bumpier the track, the harder Anti-Roll Bars make the car to drive.

Some cars come with different thickness' of Anti-Roll Bars to tune your car. Others, like the TC3, only include one thickness. To adjust for a stiffer bar, slide the Anti-Roll Bar Pivot farther onto the bar. This will change the leverage on the bar, changing the way the bar reacts.

Anti-Squat

What is Anti-Squat?

Anti-Squat is basically caster for the rear wheels. It is measured from horizontal when looked at from the side of the car. 0 ° of Anti-Squat means that the rear arms are level with the chassis, while 2 ° of Anti-Squat means that the front of the rear arms are angled up higher than the chassis. Adding Anti-Squat lets the car 'Squat' under acceleration, providing more traction in a forward motion, or on power, but will reduce traction off power, or into turns. The more Squat, the more forward traction. Removing Anti-Squat will give you more on-power steering, but will make you car push a little more going into a turn. Less Anti-Squat will also improve acceleration under bumpy conditions.

How do I change Anti-Squat?

Anti-Squat is easily changed on most vehicles. On the TC3, it requires simply removing the rear arm mount (R+3+2) and changing it to the optional R+3+0. On other vehicles, you might have to remove the rear hinge pin and re-position the rear arm mount to another set of holes. In off-road, sliding small washers under the front of the rear arm mounts will add Anti-Squat. Typically, 2 ° of Anti-Squat is the norm.

For faster rear arm mount changes, try this tip. Remove the REAR bumper from the car. On it, you will see 4 holes. With a sharp pair of sidecutters, nip the plastic so the 2 outermost holes will be removed. Re-install the bumper. The next time you need to change the rear arm mount, all you need to do is remove the REAR ARM MOUNT SCREWS, and the rear arm mount and bumper will slide right out.

Battery Placement

What is Battery Placement?

Most cars allow you to adjust the placement of your battery pack, whether it's front-to-back or side-to-side. Doing this can change the handling characteristics of your car.

How do you change the Battery Placement?

Sliding the pack forward will increase steering but reduce rear traction. It may also result in a less responsive steering feeling due to the greater load placed on the front wheels. Sliding the pack back will result in less steering but more rear traction.

In off-road, weight jacking can also cause your buggy or truck to jump differently. More weight forward will make the vehicle nose-heavy while in the air. More weight back will make it rear-heavy.

Then, there's the split pack. Running three cells back and three cells forward (connected by a short piece of wire) will give you a happy medium. I know a couple guys that run two cells forward and four back. This is a very easy setup to drive as it balances the car much better than full front or full back. This might also work good in off-road!!! In any event, always use the foam pad to hold the batteries in place.

Bearings

What are Bearings?

All cars come equipped with either Bearings or Bushings. Most entry-level vehicles come with Bushings. The Bushing is a VERY inexpensive solution to the Bearing. Bearings, on the other hand, provide less rolling resistance, better efficiency (which leads to longer run times), and an overall faster car! The downside? Bearings need maintenance and they're expensive! But, I would HIGHLY suggest Bearings as your first performance upgrade (if you don't have them already!).

How do you change to Bearings?

First, purchase a Bearing kit at your local hobby store (or track). Every company sells an upgrade Bearing kit for every model of vehicle they offer. You will then need to sit down and allow yourself a few hours (depending on your vehicle) to do the change-over. Remove all the bushings that are in your car and replace with the Bearings. It's pretty simple.

There is a way to make your Bearings SUPER-SMOOTH!!!! I would suggest doing one end of the car at a time (unless you WANT to disassemble your entire car from the get-go). Have a can of motor spray, some VERY thin oil (Trinity's Royal Oil works well) and a large trash can.

DISCLAIMER: This tip works best on the TC3 (or any car with a closed drivetrain) as it requires removing ONE seal from the Bearing and leaving it off. If you don't feel comfortable doing this (or you have an open drivetrain) I would NOT suggest this tip! It does require you to maintain your Bearings a little more often, but the end result is well worth it! I take no responsibility in your car, your Bearings, or anything else getting messed up!

Ok, that said. First, remove a Bearing from the car. You will see (on each side) either a black, rubber seal or a white, Teflon seal. With the tip of an Xacto knife (or something similar), carefully remove ONE seal from the Bearing. Inspect the Bearing. You should see alot of goop in the Bearing (more if the Bearings are brand new!). This is what we need to get out of there. Use the motor spray to clean out ALL of the goop in the Bearing. Depending on the condition of the Bearing, this may take a few minutes work. Now, fill the motor spray cap (or other small container) with motor spray (about 1/4 full is fine). Drop the Bearing in there and let it set while you go on to the next Bearing. After all the Bearings are done (either the entire set or one end of the car), shake the cap up a little and let the Bearings soak for about 15 minutes. Now, take one Bearing out at a time and place it on a soft, dry, CLEAN rag. Let it set for a few minutes to drain the spray out of it. Apply ONE drop of Trinity Royal Oil and replace in the car, UNSEALED SIDE IN!!!!!! It is VERY important that you put the side WITHOUT the seal facing into the CLOSED DRIVETRAIN!!!! This is why this only works on a closed drivetrain vehicle. That's it. If you want to have a REALLY free drivetrain, don't put ANY oil on the Bearing. This is not recommended unless you like ALOT of Bearing maintenance or have TONS of Bearings sitting around.

Bump Steer

What is Bump Steer?

Bump Steer gets its name from just that...undesirable steering while going through bumps. A good way to check this is to set your race-ready car on a completely flat surface (race ready meaning with the battery installed). Slowly press down on the front of the car. Does the angle of the front tires switch from toe-straight to toe-in or out? If so, then you will experience Bump Steer! This effect will cause the car to bounce back and forth through bumpy track sections, instead of going straight!

How do you change Bump Steer?

As a general rule, this should work for all cars (assuming you have 2 ° of kickup):

- 0 ° of caster, add a .100" spacer under the front ball stud on both steering knuckles.
- 2 ° of caster, add a .060" spacer under the front ball stud on both steering knuckles.
- 4 ° of caster, add a .030" spacer under the front ball stud on both steering knuckles.

You should change the Bump Steer EVERY time you change your caster

Camber

What is Camber?

Camber is the angle of the tops of the wheels from straight up and down. Leaning in is Negative Camber, leaning out is Positive Camber.

As a car turns, the chassis rolls. As the car rolls, this causes the tires to lean over towards the turn, causing less tire to come in contact with the ground (at 0 ° Camber). So to compensate, we add a few degrees of negative Camber. When the same car rolls, it rolls up on to the negative Cambered tire, now setting the tire at 0 °, or the largest possible contact patch the tire can have. As we all know, the larger the contact patch, the more tire in contact with the ground, and the most possible traction you can have.

Giving one end of the car less Camber gives that end less traction. For instance, if your car is loose (oversteer), you could either add a degree of rear Camber, or take out a degree of front Camber.

While positive Camber is not normally recommended, I have seen some off-roaders us it. This helps get traction to the INSIDE wheel while cornering. I haven't used this myself, so I can't tell you from experience if this is a good thing or a bad thing.

2° to 3° of negative Camber is the norm for most vehicles.

How do you change Camber?

Camber is usually adjusted by turnbuckles that pivot the wheel from the lower outer hinge pin.

There is one trick to this, though. You also want the tire to wear evenly. This means that the 'wear pattern' should be right in the center of the tire. A good way to test this is to run your car through a full battery (or tank of gas) and bring it back to your pit. You should be able to see the 'wear pattern' on the tire. If it is to the outside of the tire, you need more negative camber. Once you have the 'wear pattern' in the middle of the tire you can be sure that the best contact patch is made on the tire in the turns.

Camber Link

What is the Camber Link?

The Camber Link is the adjustable rod (in some cases a fixed-length plastic rod) that connects the shock tower to the steering block or hub carrier. Camber Link adjustments have been a mystery to many for a long time. While I will give you the general rule to use them, you may find slightly different results depending on the rest of your setup. Basically, the Camber Link will affect how much the Camber changes during suspension travel.

How do you change the Camber Link?

Making the Camber Link longer or higher will result in less Camber change during suspension travel, which will increase traction but decrease stability. A shorter Camber Link will result in more Camber change, or a decrease in traction but more stability.

Caster

What is Caster?

Caster is the angle of the steering block kingpin as it leans toward the rear of the car. There is a bit of misconception here, though. Caster is also directly affected by Kickup. So, if you have 0 ° Caster blocks, you really still have 2 ° of Caster (assuming you have 2 ° of Kickup, as most cars do). So, using this formula, 4 ° Caster blocks actually gives you 6 ° of Caster (4 in the blocks and 2 in the Kickup).

More Caster will make your car easier to drive. It will also make it more stable on the straights and through bumpy sections. Less Caster will give the car more steering into corners and make it react quicker to steering inputs. Less Caster will also make your car feel a little more twitchy.

How do you change Caster?

On the TC3, you can change Caster by replacing the front Caster blocks, which ARE directional!!! If you put the left Caster block on the right, you'll end up with 2 ° of, well, I guess Anti-Caster!!! :)

Other cars change Caster by placing small clips on the upper suspension arm hinge pin (at the bulkhead). Either way, most cars use 0, 2, 4 or 6 degrees of Caster as an adjustment.

Most cars allow you to change Caster by swapping out the front Caster blocks. A quick tip is to get a paint pen (found at any art supply store) to write the degree on the blocks. This will help you keep track when you need to change them.

Chassis

What is the Chassis?

There are really only 4 types of chassis compounds: Molded Composite (or Plastic), Fiberglass, Carbon Fiber Composite and Woven Carbon Fiber (also known as Graphite).

Molded Composite: Molded Composite chassis' are normally a tub design chassis. They have ribs and ridges in them for re-inforcement. This makes them the heaviest of the bunch, but it provides alot of flex which is good for traction, in some instances.

Fiberglass: Not a real popular choice anymore, Fiberglass chassis were used mostly on pan cars. It's cheap, easy to produce, and has good flex and strength properties. With the cost of the other materials continually dropping, Fiberglass has really lost its niche in the R/C world.

Carbon Fiber Composite: Carbon Fiber Composite, on the other hand, has seen lots of benefits lately. It's lighter, stronger and more rigid than the other materials. It also has ribs and ridges molded into it for re-inforcement. This does, though, cause the vehicle to be more responsive, and may not be the best choice for slippery surfaces.

Woven Carbon Fiber: The best looking type of material, the Graphite chassis has been around a long time! Typically, a Graphite chassis comes in 2 pieces: the Chassis and the Upper Deck. It is usually attached to the bulkheads and possibly some standoffs to make the whole assembly rigid. While Graphite is pretty simple to produce, it does have it's drawbacks. There is quite a bit of preparation required to produce a good chassis. Since the edges are laser or water cut (in most instances), the edges can be sharp. This can cut fingers or, worse yet, the shrink wrap on your batteries, causing them to short. And, since the Graphite chassis is formed using layers, it has a tendency to peel in a bad crash, loosing it's rigidness and in most cases becoming useless. To properly prepare a Graphite chassis, you need to sand all the sharp edges off (especially around the battery slots), apply some superglue to the edges (to keep them from splitting during a bad crash), and, as a final measure of protection, put some tape or some sort of covering near the edges of the battery slots. Alot or work, but the final product can be a masterpiece...just don't crash it!!!

How do you change the Chassis?

Well, that's A LOT of work, but it's pretty self explanatory. Remove everything from one chassis and install it on the other!

Diff Adjustment

What is the Diff Adjustments?

This one is pretty basic. Looser diff: low-traction tracks. Tighter diff: high-traction tracks. A tighter diff will allow more instant throttle response and greater acceleration.

How do you make Diff Adjustments?

All cars have their own adjustment rule. For the TC3, there is a set setting for the lightweight diffs to make sure they work at their best. As you tighten the diff bolt, make sure you tighten it down to where it is fully compressed, but DO NOT OVERTIGHTEN! This is extremely important. Once compressed, back it off 1/2 turn for the lightweight outdrive and 1/8 to 1/4 turn for the steel units - no more, no less. Run the car for a complete pack, and re-check the diff setting.

In off road, you want the diff as loose as possible with slipping. If you land off a jump and hear a 'barking' sound, your diff is too loose. You need to tighten it up slightly.

The Differentials are probably the most underrated performance parts of the car. Most people just build them and install them. If not done correctly, they can lead to dramatic handling problems which might make you chase down in other areas of the car. There are a couple things you can do to insure a great working diff. First off, get yourself some 600 grit sandpaper. Take the diff rings and run one side of them over the sandpaper until all the shininess (is that a word?) is gone. You only need to lightly sand the rings to achieve this. The sanded side will go AGAINST the diff balls. Also, make sure you trim all the burrs off the plastic gears. Use the Associated White Grease on the diff balls ONLY! The thrust assembly uses the Black Grease only! And finally, follow the directions on collapsing the diff spring. This can REALLY mess up your diff setting if not done during buildup

Droop

What is Droop?

Droop is the amount of down travel a shock has. Typically, less Droop reduces body roll. Less in the rear will free up the rear a bit, giving more steering. More Droop in the front is good for better on-power steering. It should always be necessary to increase Droop for bumpy tracks, and decrease Droop for high-traction tracks, such as carpet.

How do you change Droop?

You can limit this in a couple of ways. The TC3 offers Droop screws located in the arms. By screwing these in or out, you adjust how much Droop that corner of the car has. On vehicles without Droop screws, Droop is adjusted by placing small spacers IN the shock itself. These are placed on the shock shaft below the piston. This limits how much the shaft extends out of the shock body. You can also adjust Droop by screwing up or down the ball end on the bottom of the shock shaft.

Too little Droop can cause a loss in traction.

It is advisable to pick up one of Team Associated (or another company's) purpose made Droop gauges. This will be an invaluable tool in setting Droop. To use, first remove all 4 tires. Place the gauge on the bottom of the car with the steps out and next to one of the arms (make sure the gauge is not resting on any screws). Now, slide the gauge over until one of the steps rests on the OUTER lower hinge pin 'bubble'. This is your setting (Standard setup dictates 6 in the front, 4 in the rear). If it is not set correctly, adjust the Droop screw (for the TC3) until the hinge pin 'bubble' rests on the appropriate number. Re-peat for the other side. Droop is now set.

Gearing

What is Gearing?

There are 2 Gears on your car that you need to worry about changing: the Spur Gear and the Pinion Gear. The Pinion Gear is the one attached to the motor.

Changing the Pinion or Spur Gears will result in much different results.

On the Pinion Gear, the higher the number of teeth, the faster (top end) your car will have, but you will lose acceleration. The lower the number of teeth, the faster your car will accelerate, but you will lose top end. More top end usually results in less run time, also.

On the Spur Gear, the higher the number of teeth, the more acceleration the car will have, but the less top end. The lower the number of teeth the more top end you will have, but you will lose acceleration.

It is normally easier to change your Pinion Gear than to change the Spur Gear.

How do you change the Gearing?

The Pinion is changed by loosening the screws to the motor (to let it have some adjustment) and then removing the Pinion. Slide the new Pinion on and re-adjust the Gear mesh.

To change the Spur requires a little more work. Depending on the vehicle you own, it could be as easy as removing 2 screws or disassembling a whole portion of the car.

See Gearing Chart elsewhere on the site.

Kickup

What is Kickup?

Kickup can be described as another form of Caster. While Caster is set by changing the Caster blocks, Kickup is changed by adjusting the angle of the front of the hinge pins on the front arms. 0° of Kickup would mean that the front inner hinge pins are completely level with the chassis. 2° of Kickup would mean that the front inner hinge pins are angled 2° higher than the chassis.

Changing the Kickup also affects Caster. For instance, if you have 2 ° of Kickup and 2 ° of Caster, you would really have 4 ° of Caster. 0 ° Kickup and 2 ° of Caster would give you 2 ° of total Caster, and so on.

0 ° of Kickup will give the car a more aggressive steering feeling, but will not handle bumps well. 2 ° of Kickup will handle bumps better, but settle down the steering, making it a bit smoother.

How do you change Kickup?

For the TC3, changing Kickup is as simple as removing the front hinge pin block and changing it from a F+2 to F-0.

For faster Kickup mount changes, try this tip. Remove the FRONT bumper from the car. On it, you will see 4 holes. With a sharp pair of sidecutters, nip the plastic so the 2 outermost holes will be removed. Re-install the bumper. The next time you need to change the Kickup mount, all you need to do is remove the KICKUP MOUNT SCREWS, and the Kickup mount and bumper will slide right out.

One Way Diff/Pulley

What is a One-Way Diff/Pulley?

The One Way Diff simply removes diff action from the front of the car. It allows the front wheels to free-spin (off power), giving you a much better cornering ability. You will, however, need to change your setup and driving style. Setup changes will include (possibly) a stiffer front spring, maybe heavier front oil, a softer rear spring or softer rear oil. As far as driving style, you will have to change that to a smoother, flowing style. No longer can you full throttle into a corner, slam the brake, and power out of it! It does take some getting used to, but it is by far a much faster way around the track.

One Way Diffs are recommended mostly on high bite tracks. The exception to this rule might be carpet, as the aggressiveness of the One Way might be a bit too much.

On belt drive cars, you have the option of a One Way Diff or a One Way Pulley. Both act basically the same, but the One Way Pulley allows the use of the front diff for cornering, but the freewheeling action of a One Way for straights and braking. You will notice a less drastic effect on handling with the Pulley. You could even try BOTH!!!

How do you change the One-Way?

Changing to the One-Way is fairly simple. For the One-Way Diff, it requires you to remove the front Diff out of your car and slide the One-Way assembly in it's place. All One-Ways come pre-assembled.

For a One-Way Pulley, again, it's a matter of removing the stock Pulley and just sliding this in it's place. The One-Way Pulleys also come pre-assembled.

It is important that you follow the directions for assembling the One Way Diff. Make sure you put plenty of RED LABEL ASSOCIATED Grease in the One Way bearings. DO NOT use any other lube, and don't pack it in. It may feel a little tight the first time you spin it, but, after the first run, it should free itself up.

Ride Height

What is Ride Height?

Ride Height is the distance measured from the bottom of the chassis to the ground. This adjustment should always be made with the car in race ready condition, meaning all electrics installed, including the motor and battery. Basically, Ride Height changes the speed of how the car reacts while changing directions. It will be really noticeable in chicanes, or S-turns, where changing directions is crucial.

For high bite tracks, use a lower Ride Height. For low traction surfaces, raise the car up slightly. This will cause the car to roll more, allowing for more traction. Raising the car up will also help in bumpy situations.

How do you change Ride Height?

Ride Height is easily changed on all cars. Some cars have pre-load clips, others threaded shocks. To change the Ride Height, first place the vehicle on a flat surface. Make sure you have some sort of gauge to keep accurate measurements (simply making the shock collars or pre-load clips even on each side of the car will not work). Team Associated sells a cool Ride Height gauge for a couple bucks, and can be invaluable in this situation. Slide the gauge under the car until one of the steps comes in contact with the bottom of the chassis. This is the Ride Height of this part of the car. Add/remove pre-load clips, or adjust the shock collars, until the desired Ride Height is achieved.

Contrary to what you might have heard, Ride Height DOES NOT affect spring stiffness. Simply adding more pre-load does not make a spring stiffer, it basically takes away spring 'throw'. Your car might bounce more but it's not because the spring is stiffer, it's because the spring, well, can't spring!!!

Another useful tip. This works well on the TC3, but I'm sure it will work the same on other cars as well. Flip your car over. You will see scratch marks on the edges of the chassis. You might even notice more scratches on one side than the other. DO NOT TAKE RIDE HEIGHT MEASUREMENTS HERE!!! You will get an inaccurate reading. Instead, slide the gauge under the chassis where the Droop screws are located (on a TC3). This part of the car rarely comes in contact with the track, and will always be flat and un-scathed.

Rollout

What is Rollout?

Rollout is a measurement that helps calculate gearing. It is something that is used more for foam tire setups, but can be applied to rubber setups, also.

Rollout is defined as the distance a vehicle moves forward per revolution of the motor. It can change due to tire wear or a tire swap (on foam tires). Rollout is measured using this equation:

Tire Circumference x Transmission Ratio x (Spur x Pinion) = Final Drive Ratio

Your Rollout depends on your tires circumference. You can calculate the circumference by doing the math: Tire Diameter x 3.14 = Circumference. You can also use a ruler to measure. Place a mark on the tire and roll it along the edge of the ruler until it comes around to the bottom. This is your circumference.

Rollout is best used to match a faster racer's gearing. Simply using the same spur/pinion combo will probably not work if he is using larger or smaller tires or his transmission ratio is different. If you know the circumference of his tires (and tranny ratio), you can use the above equation, determine his ratio, then plug in your numbers until you reach a similar ratio.

All rubber tires are basically the same circumference, and since wear isn't that much of a problem, Rollout is much easier to achieve. All that is basically needed is transmission ratio and you can find a faster drivers Rollout.

Shocks

What are Shocks?

Also called Dampers, the Shocks purpose is to dampen the oscillation of the spring. They also affect handling conditions during cornering. Too stiff, and they can cause harshness and a bumpy ride. Too soft, and they can feel mushy and reduce responsiveness. Every part of the Shock can be tuned for the perfect Shock absorption.

In this section we will cover the Shocks and all it's parts: Shafts, Bodies, Pistons, Oils, and Springs.

Shock Shafts:

The Shaft runs through the bottom of the Shock Body. Inside the Body, the Shaft has the Piston attached to it. There are a couple different types of Shock Shafts.

- Standard Shock Shaft. Excellent unit, but not hard coated or treated with any type of covering.
- Unobtanium (Associated Upgrade Unit). Same as the Standard Shaft, but coated to produce a much smoother shock action. Highly recommended for racing.
- MIP's Gold Nitrade: Again, same as a stock unit, but coated to produce better Shock action.
- Others. I'm sure there are other 'coated' Shafts available, but they're all going to do the same basic thing. It is recommended to upgrade for a stronger, smoother Shock action.

Shock Body:

The Shock Bodies hold the Oil and Piston and are normally made of 2 materials: Plastic and Aluminum. While plastic units are light, they wear out fast due to the friction of the Shaft and Piston moving up and down. Plus, I've seen alot of people blow the plastic caps off the Shocks. Plastic Bodies use plastic threads and will not be as strong to impacts as

aluminum units. It is suggested that you upgrade to Aluminum Shock Bodies for racing. It is also suggested that, if your budget allows, you upgrade to threaded Shock Bodies. They are far easier to tune and more precise than normal un-threaded units.

Shock Pistons:
Pistons determine Shock dampening. The Piston is usually a round disc with holes in it. Pistons have 1, 2, or 3 holes. The Oil travels though the holes during compression and rebound. The size or number of holes determines how fast the Oil travels through it. Larger holes (or more holes) allow Oil though quicker, making for responsive Shock dampening. Smaller holes (or fewer holes) allow Oil though slower, resulting in sluggish Shock action. As a general rule, the smoother the track conditions, the smaller (or fewer) the Piston holes.

Shock Oil:
Shock Oil determines the dampening of your car. Heavy Oil will make your car seem sluggish. Lighter weight Oil will make your car seem more responsive. Oil is sold in small bottles from (usually) 10wt to 100wt. The higher the number, the heavier (or thicker) the Oil. As a general rule, lighter Oil is better for bumpy conditions, but allows more chassis roll. Heavier Oil is better for smooth tracks, but decreases responsiveness.

Shock Springs:
The purpose of the Springs is to keep the car level during acceleration, deceleration, and cornering. Springs come in many different Spring rates (or lb ratings) that are usually designated by their color. See the chart for all the color coded Springs. Generally, stiffer Springs make your car respond quicker and reduce chassis roll, but will not work well on bumpy tracks. Stiffer is better on smooth or high traction tracks. Softer Springs are better on slippery or bumpy tracks. Normally you will run heavier Springs on the front than the rear.

Get Threaded Bodies!!! You will be doing yourself a favor!!! They are easier to tune and just make life easier...and you don't have to carry around any more of those little pre-load clips!!!

Also, when building your Shocks, make sure the Piston is right side up (the little number on it will face up). It's not necessary to build it this way (the Shock will work the same if the number is facing down), but it's much easier if you want to see what number Piston is in the Shock. Also, you can take a fine felt tip marker and highlight the number on the Piston. This will also make it easier to read.

For most track conditions, Oil lighter than 25wt or heavier than 60wt is not normally recommended. You might use heavier Oil on really high traction surfaces, like carpet.

Shock Mounting Locations

What are Shock Mounting Locations?
There are many different configurations for mounting the Shocks. On the TC3, there are 3 on the tower and one on the arm. On other cars, there might be more on the tower or more on the arm.

How do you change Shock Mounting Locations?
On the front, standing the Shock up will make the Shock feel softer (as the car rolls) and will decrease steering, but increase dampening. Laying the front Shock down will make the Shock feel stiffer (as the car rolls) and will increase steering, but decrease dampening. On the rear, standing the Shock up will decrease traction, but increase dampening. Laying the rear shock down will increase traction, but decrease dampening. As a rule, the more traction the track has, the more you can lay the Shocks down.

Slipper Clutch

What is a Slipper Clutch?
The Slipper Clutch is another tuning tool used only in off road. It is illegal to race with a Slipper Clutch in on road.

Basically, the Slipper Clutch allows you to run the diff a bit tighter. It helps with acceleration on slippery tracks and bumpy sections. In stock, you can set the Slipper Clutch quite tight. In modified, however, the Slipper should be set loose.

How do you change the Slipper Clutch Adjustment?

The best way to set the Slipper Clutch is to have your car ready to run. Turn it on (and the radio), and face it away from you. Now, place both forearms on both rear tires, pressing down firmly. With the radio in one hand, give the car some throttle. One of two things will happen; either the car will make a slipping sound or the front wheels will lift off the table. The best setting is to have the front end to lift, but not quite off the table. This is the best starting point for the Slipper Clutch.

Tires

What Are Tires?

Tires are probably the most important tuning tool (other than practice). You could have the PERFECT setup (if there is such a thing), but if you make a bad Tire choice, your race is over!

Todays Tires range from the inexpensive 'play' tire to the super soft racing slick to the ultra high grip exotic foam Tire. The 'play' Tires are usually of hard compound and come with a flexible bubble foam insert. They typically have long life and decent traction.

The racing slick comes as a pair of Tires ONLY. This allows you to pick a racing insert (of different densities) for the track you will race at. The racing Tire also comes in different densities, normally Hard, Medium, and Soft.

The ultra high grippy foam Tire is the ultimate in traction. It is usually only used in Nitro Racing, but is slowly becoming a popular choice for electric sedans, also. Off Roaders use only soft rubber tires.

Typically, hard compound tires have average grip and long life. Medium compounds a little better grip and average life, and soft compounds very good grip with a short life span. Treaded tires are good on dusty, dirty, or unkept surfaces. Slicks are perfect for a well groomed race track or a prepared parking lot surface.

What Are Inserts?

A Tire needs to have some sort of support in it for it to work correctly. If you don't have an Insert, the Tire won't be of much use. So, along came the Insert. An Insert is a foam ring that fits in the Tire to give it support under play or racing conditions. The density of the Insert will determine how the Tire will react. For instance, a soft Insert will give good traction, but will increase drag. A harder Insert has less rolling resistance, but can cause a car to feel loose.

The Insert is as important as Tire choice. You can also mix-and-match Tire and Insert. For instance, a Hard compound Tire with Soft Insert. You would get the benefits of less rolling resistance of the hard tire and the soft Insert, but you might loose a little traction in the corners. This is best left to trial and error (or asking a track local what the hot Tire and Insert setup is!).

Which Wheel Should I Use?

Wheels come in many different designs and colors. The basics on Wheels is this: Harder, stiffer Wheels provide less flex. This allows the Tire, Insert and Suspension to do all the work. If set up correctly, this is usually the fast setup. Soft, pliable Wheels have more flex. This usually means better traction in the corners, but more resistance. If your car is not setup quite right, a softer wheel might do the trick. Or, you might try the soft wheel on an unprepared, slippery outdoor track.

Wheel designs really don't make that much of a difference. I've noticed that the Velocity Wheel (or Dish Wheel) does make a big difference on large, open tracks where steering at high speeds is needed. The Dish Wheel, while turned, changes the flow of air around the front of the car, increasing steering. Need less high speed steering, try a Wheel with holes in it, like Pro-Line's Gumby Wheel.

Gluing Tires.

If you don't glue your Tires, you will lose traction, stability, power and possibly, your Tires!!! There are, I'm sure, many different methods to glue tires, and all of them are the best way. I'm going to give you my way, and the way most Pro Drivers glue their tires, and very few have ever had any tire problems in the past.

First, stuff your Insert into the Tire. Take your Wheel and remove all the flash that might be left on the edge where you will mount your Tire. Next, take an Xacto and make two holes in the Wheel, on opposite sides of each other, about

1/16th of an inch. These are vent holes. If you glue your Tires up and you don't have vent holes, your Tires will balloon up under the pressures of racing and cause radical handling problems. Next, fit the Tire (with the Insert, well, inserted) over the Wheel. Make sure the Tire bead fits into the little channel on the Wheel. Open your bottle of Tire glue. ***BE CAREFUL!!!! THIS IS SUPER GLUE AND WILL GLUE EVERYTHING IT COMES IN CONTACT WITH TOGETHER IN A MATTER OF SECONDS!!!!!! DO NOT GET THIS ON YOU!!!! IF YOU DO, WIPE IT OFF IMMEDIATELY!!!*** (Just not on mom's couch, table, rug, floor, etc.) Now, carefully pull back the Tire bead and drop a small amount of glue into the bead. Work it around until the drop has coated as much as possible. Repeat until you have glued one side of the Tire. Stretch a small rubber band all the way around the Tire to help keep the Tire true. Set aside and go to the second Tire. When all four are complete, let them dry for 10 or so minutes (just to be sure). Now, turn the Tires over and repeat the above steps to the backside of the Tires.

That's it. Using this method you should have perfectly glued Tires everytime!

Toe In/Toe Out

What is Toe In/Toe Out?

Toe In/Toe Out describes the angle of the front (or rear) tires when viewed from above. If the front of the tires angles in (or towards the chassis), that is Toe In. If the front of the tires angles out (or away from the chassis), that is Toe Out.

How do you change Toe In/Toe Out?

Toe In/Toe Out can be adjusted to increase or decrease steering and steering response. You adjust Toe In/Toe Out by turning the turnbuckles attached to the steering knuckles.

Front: Adding Toe In will decrease steering into a corner, but add steering out of a corner during acceleration. Toe In will also stabilize the car under acceleration. Toe Out will increase steering into a corner, but cause the car to wander a little on the straights and in bumpy sections. It is not normally suggested that you use more than 1 ° of Toe In or Toe Out.

Rear: On the rear, more Toe In results in less on-power steering and slightly more entering a corner. Less Toe In results in more on-power steering and slightly less entering a corner. Less Toe In will also increase straightaway speed, as the rear tires will scrub less.

On the rear, there will always be Toe In or 0° of Toe. You will never use Toe Out in the rear. On most cars, a Toe Block designates the degree of Toe, while others have turnbuckles to adjust (similar to the front). To change rear Toe, either adjust the turnbuckles or remove the Toe block and replace with another block. To change rear Toe on the TC3 (kit uses 3° of rear Toe), remove the rear block (R+3+2) and replace with the R+2+2 block. This will change rear Toe In to 2°.

There is a way to give the TC3 0 ° of rear Toe In. Take an extra F block (it's the block that holds the REAR of the front inner hinge pins) and put it in place of the R block (the one that holds the FRONT of the rear inner hinge pins). Placing the R+2+2 block (or R+2+0 block) will give you very close to 0 ° of rear Toe-In. This will make the car much faster in the straights, but alot more twitchy and harder to drive.

Tweak

What is Tweak?

Tweak is the adjusting of the shock pre-loads to get all 4 tires touching the ground with equal pressure. If one side has more pressure than the other, this will cause your car to not handle consistently turning left and right. In other words, your car will be Tweaked.

How do you adjust Tweak?

First, I would suggest getting a tweak station, similar to MIP's unit. To adjust Tweak on a Touring Car, a few minor checks need to be made first. Make sure all the suspension parts are free and are not binding. Also check your turnbuckles for correct length. Disconnect the Anti-Roll Bars and place the car on the tweak station, making sure the car is centered. Now (assuming you placed the front on the swing arm), push down on the front and rear of the car to settle the suspension. Look at the bubble. I should be centered between the two lines. If it is, Tweak is good. If it isn't, Tweak is off and needs to be fixed. If the bubble is to the right, you need to add more pre-load to the LEFT front side of

the car. If the bubble is to the left, you need to add more pre-load to the RIGHT front side of the car. Once you've corrected this, rotate the car and do the same thing to the rear. To add more pre-load, there are two ways to do this. You can either add the pre-load to the FRONT shock or the REAR shock. You can ask 10 different people which way is better and you will get 10 different answers. You will have to experiment with this yourself to find out which is best for you. Just remember, if you need to add pre-load to the LEFT front, you can either pre-load the LEFT FRONT shock, or the RIGHT REAR!!!! Pre-loading the LEFT rear will put more pressure on the RIGHT front, and vice versa.

Now, re-attach the Anti-Roll Bars. This MIGHT upset the Tweak of the car. Put the car back on the Tweak station and re-check it. If is off to the left, remove the right Roll Bar Mount and lengthen it slightly and then re-attach. If it off to the right, remove the left Roll Bar Mount and lengthen it slightly and then re-attach. Do this until you get the Tweak bubble in the middle of the two lines.

Tweak for pan cars is a bit different. You can use the Tweak Station or you can use the penny trick (the penny trick is a little less expensive!!!!) Set your pan car up on a flat surface in race ready trim. Now, place one penny on each front tire, but not quite in the dead center. Place it slightly forward of dead center. Find a center point under the front of the chassis and take an Xacto (or other pointy object) and lift SLOWLY. If both pennies fall at the same time, your Tweak is good. If the left one falls before the right, slightly tighten the right Tweak screw (located on the T-Bar). If the right one falls first, slightly tighten the left Tweak screw. The same system can be used to adjust Tweak on 1/12 scale cars.

Sometimes we use what is called 'Track Tweak'. After getting the car close on the Tweak station, we set the car on the track and do a couple full throttle blips followed by hard turns. This does 2 things; 1) it scrubs in the tires, and 2) it gives us an indication of how the car is Tweaked. If the car turns equally hard in both directions (without a 'loose' feeling), the car is set correctly. If it turns harder to the right, we will adjust the left slightly (more pressure), and vice versa. This works good and, with some practice, can be done quickly before a race to correct an ill handling car.

Vehicle Weight

What is Vehicle Weight?

At most club races, legal Vehicle Weight is not something that is strictly followed. But, at major events (Divisionals, Nationals, and The Worlds), there is a weight requirement. All cars must be AT or OVER the legal Weight. So, here's our car. It has the motor, battery, stickered body, wheels and tires. But, it's still under weight!!!

How do you change Vehicle Weight?

Lead weight. Team Associated sells small lead squares that can be broken off in 1/4oz increments and added to the car. The benefit of this is that now, instead of having a race ready car that is overweight, you can add weight ANYWHERE you want to reach the legal limit. Remember, the heavier the car, the more power it takes to move it. So, by getting the car as close to legal as possible (at or over, of course), you make your car as light as legally possible.

ALL WEIGHT IS DONE PRIOR TO THE PLACEMENT OF THE TRANSPONDER!!! That includes PRACTICE Transponders. Don't listen to anyone else! This is the rule and has been for a long time!!!

The following Sanctioned Bodies are listed below, along with their weight requirements:

NORRCA:
4WD Touring Sedans - 52 oz
1/10 Sportsman Oval - 40 oz
1/10 Expert Oval - 38 oz
Off Road Buggy - 56 oz
Off Road 4WD Buggy - 52 oz
Off Road Truck - 60 oz
GTP Sportsman - 40 oz
GTP Expert - 38 oz
1/12 GTP - 27 oz
1/10 Nitro Oval - 48 oz
Nitro Off Road Trucks - 60 oz
Nitro Off Road Cars - 56 oz

ROAR & IFMAR:
Off Road 2WD Buggy - 52 oz
Off Road 4WD Buggy - 56 oz
Off Road 2WD Truck - 60 oz
Off Road 4WD Truck - 64 oz
1/12 4 Cell - 28 oz
1/12 6 Cell - 32 oz
1/10 6 Cell - 40 oz
1/10 T1 Touring Car - 53 oz
1/10 T2 Touring Car - 53 oz
1/10 CART/F1 - 36 oz
1/12 Oval w/Foam Tires - 28 oz
1/12 Oval w/Capped Tires - 30 oz
1/10 Oval 4 Cell w/Foam Tires - 38 oz
1/10 Oval 4 Cell w/Capped Tires - 40 oz

1/10 Oval 6 Cell w/Foam Tires - 42 oz
1/10 Oval 6 Cell w/Capped Tires - 44 oz
1/10 2WD Dirt Oval - 50 oz
1/10 4WD Dirt Oval - 52 oz
1/10 Truck Dirt Oval - 50 oz
1/10 2WD Nitro Off Road - 56 oz
1/10 4WD Nitro Off Road - 60 oz
1/10 2WD Nitro Off Road Truck - 60 oz
1/10 4WD Nitro Off Road Truck - 64 oz
1/8 Nitro Off Road - 112.9 oz
1/10 2WD .15 Nitro On Road w/Suspension - 64 oz
1/10 2WD .15 Nitro On Road Pan Car - 52 oz
1/10 4WD .15 Open - 70 oz
1/10 4WD .12 Touring - 54 oz
1/10 4WD .15 Touring - 64 oz
1/8 2WD Nitro On Road - 85 oz
1/8 4WD Nitro On Road - 88.18 oz
1/8 Nitro Pan Car - 80 oz
1/5 Super Touring Car - 21 lbs
1/5 Sports GT - 21 lbs

Weight placement is key to keeping the car as balanced as possible. The best place to put weight (on a TC3) is down the center of the chassis, under the shaft. This will keep it as centered as possible without upsetting side to side weight distribution. You can even use this to tune the steering or rear traction slightly by moving it towards the front or back, respectively

Wheelbase

What is Wheelbase?

Wheelbase adjustments are made by shifting the rear hub carriers either forward or back. The measurement is the distance from the middle of the front axle to the middle of the rear. It is usually adjusted by moving small shims from one side of the hub to the other.

How do you change Wheelbase?

Most of the time you want to have a mid Wheelbase; that is, the hubs in the middle. This will provide the best overall feel. Moving the hubs forward (shims to the back) will shorten Wheelbase and give the car more rear traction. Moving the hubs rearward (shims to the front) will lengthen the Wheelbase and give the car more steering.