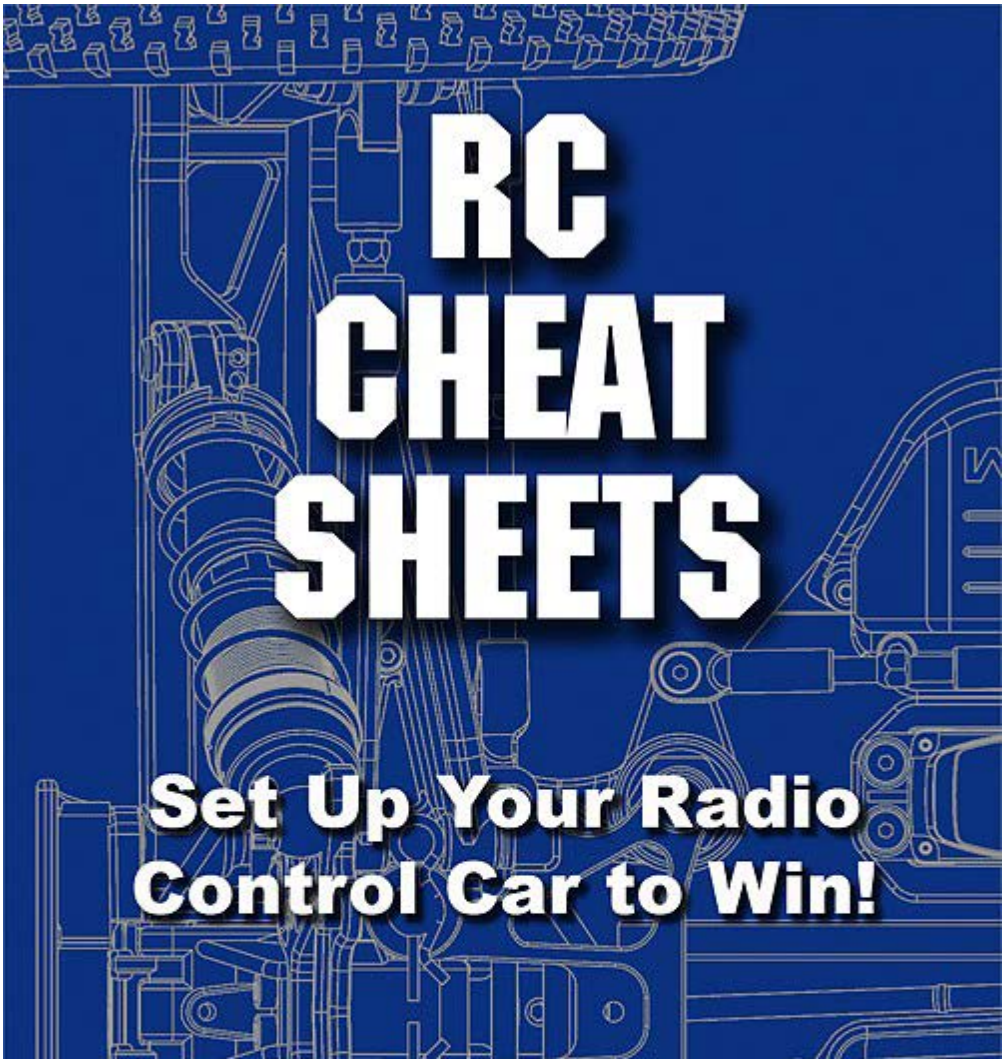


Set Up Your Radio-Control Car to Win!

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Ackermann

less Ackermann
more aggressive steering
harder to drive

more Ackermann
less aggressive steering
easier to drive

Ackermann is a term describing the effect of the inside front wheel turning tighter than the outside front wheel.
More Ackermann means the inside wheel is turning in a tighter arc.



You change Ackermann settings in the RC10B4.1 buggy by moving the connection from the current holes (standard Ackermann) to the lower holes.

Anti-dive (onroad)

lower angle
decreasing anti-dive
adding anti-dive

larger angle
increases corner entry steering
increases caster at the wheel

This setting refers to the angle of the front arm mount when the rear arm mount is higher than the front arm mount. The "dive" refers to the tendency of the front end to dive, or lower, when braking.

Anti-roll bars can also help balance the pressure between the front and rear. If your car is oversteering, consider adding a front anti-roll bar only (or making the front bar thicker than the rear). If your car is understeering, consider adding a rear anti-roll bar only (or making the rear bar thicker than the front).

Anti-roll Bars, Sway Bars

softer or thinner bars
for low and med. bite tracks

stiffer or thicker bars
for high traction tracks

Anti-roll bars are used to stabilize a vehicle from excessive chassis roll (such as when a buggy leans through the turns by centrifugal force).

On a high-traction surface, a vehicle not using anti-roll bars will tend to have a lot of chassis roll, which results in the vehicle being less responsive.

Adding anti-roll bars (or making them thicker if you already have them on) will help minimize the chassis roll, making the vehicle more responsive in cornering, and at the same time making it more stable.



Roll bar on the front of the #30106 Factory Team TC6 1:10 scale electric touring car.

Anti-squat, off-road

less anti-squat
more side traction in corners
more rear traction for slick or bumpy surfaces

more anti-squat
less side traction in corners
more rear lift in jumps

Anti-squat denotes the angle of the rear arms relative to the chassis, when looked at from the side.
0 deg. anti-squat means that the rear arms are flat, parallel with the chassis. 2 deg. anti-squat means the front of the rear arms are creating a 2 deg. angle to the chassis.



This photo shows a 2 deg. anti-squat angle on the rear of an RC10B4.1 buggy.
Change anti-squat by placing shims underneath the front of the rear arm mounts, angling them higher.

Anti-squat, onroad

decreasing
less steering entering corner
improve acceleration over bumps

increasing
more steering entering corner
more traction exiting corner

Anti-squat denotes the angle of the rear arms relative to the chassis, when looked at from the side.
0 deg. anti-squat means that the rear arms are flat, parallel with the chassis. 2 deg. anti-squat means the front of the rear arms are creating a 2 deg. angle to the chassis.

Axle Height, off-road

lower
more steering entering corners
less steering exiting corners
higher
less steering entering corners
more steering exiting corners

The front axle height on Team Associated 2WD off-road vehicles (such as the B4, T4, and SC10) can be raised or lowered to optimize handling for different track conditions.



By moving both spacers to the top or bottom, you can change the axle height.

Bump Steer

fewer washers
bumpsteer in
less steering
More stability

more washers
bumpsteer out
more aggressive
less stable

Bump Steer takes its name from the fact that when the car goes over "bumps," it changes the "steering." Bump steer is the undesirable effect of extra toe-in or toe-out as your car goes over randomly-spaced hilly



bumps closely spaced together in an area, making your steering unpredictable. Your car then bounces back and forth instead of going straight through the bumps.

You modify bump steer by adding or removing spacers on this ballstud.

Camber, front

less (0 deg.)
more straight-line acceleration
tyre is vertical

more (2 deg.)
more high-speed traction through turns
tyre leans inward

Camber describes the angle at which the tyre and wheel leans toward the car when looked at from the front or back.

Negative camber means that the tyre leans inward at the top.
Positive camber means that the tyre leans outward at the top. (Positive camber is not recommended.)
Camber is measured in degrees.
You can use Associated's #1719 camber gauge to set your camber.



The front camber of the B44.1 is being checked with the #1719 Factory Team Camber + Track Width Tool Camber Gauge. The number at the bottom corner of the gauge nearest the tyre indicates the angle of camber.

Camber Link, front

shorter link
standard for high-grip tracks
more corner entry steering
less mid and exit corner steering

longer link
better for med.-grip loose tracks
less corner entry steering
more exit steering

The front camber link is the turnbuckle link connecting the ballstud on the shock tower to the ballstud on the caster block.

Lengthening or shortening the camber links can affect traction, stability, and handling.



You lengthen or shorten the camber link by mounting the camber link turnbuckle in one of two holes in the tower (SC10 short-course truck shown).

Camber Link, rear

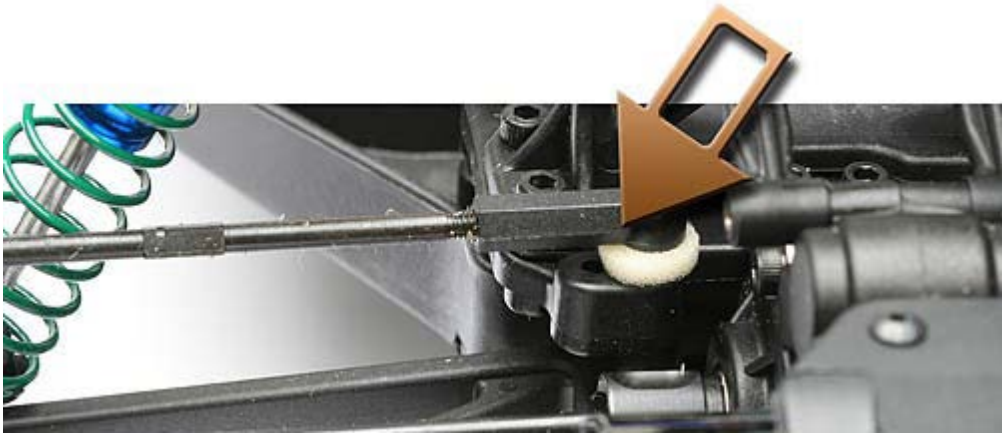
shorter link
better for med.-grip loose tracks
stiffer rear suspension
accelerate better
more turn-in steering
less mid-to-exit corner steering
decreases traction
more side-to-side stability

longer link
standard for high-grip tracks
softer rear suspension (more chassis roll)
less corner entry steering
more exit corner steering
more traction
less side-to-side stability

The camber link is the turnbuckle that connects the ballstud on the shock tower to the ballstud on the rear hub.

Lengthening or shortening the camber link turnbuckles can affect traction, stability, and handling.

The camber link will affect how much the camber changes during suspension travel.
The longer the link, the less camber change, and the more traction.
The shorter the link, the more camber change, and the less traction.



This vehicle provides two mounting options for the shock tower ballstud.

Camber, rear

less (-2 deg.)
More high-speed traction through corners
tyre leans inward

more (2+ deg.)
removes straight-line acceleration
tyre leans outward

Camber describes the angle at which the tyre and wheel leans toward the car when looked at from the front or back.
Negative camber means that the tyre leans inward at the top.
Positive camber means that the tyre leans outward at the top.
At zero degrees, the tyre is vertical; benefit of zero camber is more straight-line acceleration than positive camber.
Camber is measured in degrees.



The rear camber of the B44.1 is being checked with the #1719 Factory Team Camber + Track Width Tool Camber Gauge. The number at the bottom corner of the gauge nearest the tyre indicates the angle of camber.

Caster, front

less caster
less steering entering corners
more steering exiting corners

more caster
more steering entering corners
less steering exiting corners

Caster describes the angle of the kingpin when it is leaning toward the rear of the vehicle.
Positive caster means the kingpin leans rearward at the top.
Negative caster (leaning the kingpin forward) is never used.



You can see the angle of caster on this SC10 short-course truck.

Chassis Length

shorter
more steering
quicker response in corners
quicker left-right turning

longer
more stability in high-speed corners
more rear traction
slower turn-in steering
better stability on rough tracks
slower turn-in steering
better jumping

Some vehicles have more than one chassis length available.

Diff Fluid, Centre Diff, off-road

lower weight, lower viscosity
thinner or lighter
smoother acceleration, better in bumps
for rough, low-traction conditions

higher weight, higher viscosity
thicker or heavier
accelerates harder, but worse in bumps
for smooth, high-traction conditions

Diff Fluid, Front Diff, off-road

lower weight, lower viscosity
thinner or lighter
more steering, but less stability
for low-traction conditions

higher weight, higher viscosity
thicker or heavier
less steering, but more stability on power
for high-traction conditions

Use the pro setup sheets online for reference and recommendations.

Diff Fluid, Front Diff, onroad

lower weight, lower viscosity
thinner or lighter
more steering through the centre of the corner
for low-traction conditions

higher weight, higher viscosity
thicker or heavier
less steering into corner and smoother through centre of corner
for high-traction conditions

A gear diff in the front requires a thick fluid somewhere in the neighbourhood of 300K or thicker. Using too thin of a fluid in the front diff will result in an inconsistent car through the corner, making the car very hard to drive.

Diff Fluid, Rear Diff, off-road

lower weight, lower viscosity
thinner or lighter
more grip, but less stability on power
for low-traction conditions

higher weight, higher viscosity
thicker or heavier
less grip, but more stability on power
for high-traction conditions

Use the pro setup sheets online for reference and recommendations.

Diff Fluid, Rear Diff, onroad

lower weight, lower viscosity
thinner or lighter
more corner entry steering
for low-traction conditions

higher weight, higher viscosity
thicker or heavier
more on power steering and less steering into corner
for high-traction conditions

Droop, onroad

less droop
less shock travel
for smooth, high-traction tracks
larger number on Droop Gauge

more droop
more shock travel
for rougher, lower-traction tracks
lower number on Droop Gauge

You can limit the amount of shock travel by increasing or decreasing an onroad car's suspension arm droop.
One of its effects is to reduce "chassis roll."



Team Associated's #3987 Factory Team Droop Gauge helps measure droop.

Final Drive Ratio

Lower number
more top end speed possible
slower acceleration

higher number
less top end speed
quicker acceleration

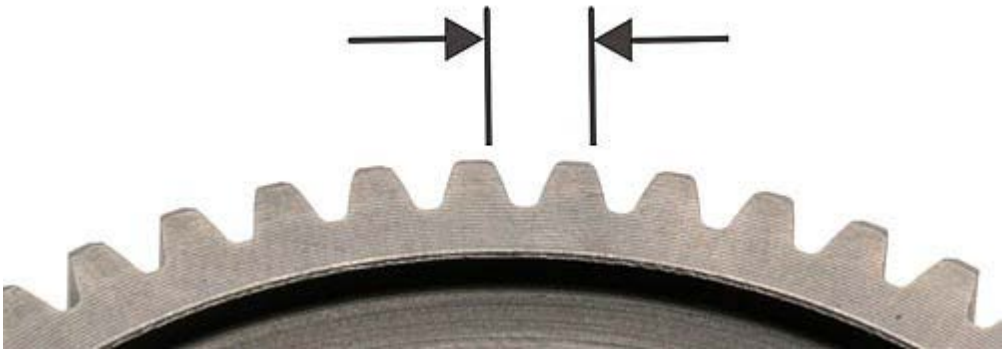
Final Drive Ratio is: (Spur Gear divided by Pinion or Clutch Bell tooth count) times Transmission Ratio
No matter what vehicle you have, the equation is the same.
You'll get the transmission ratio from the instruction manual or the manufacturer. (This app supplies the transmission ratios for most Team Associated vehicles.)

Gear Pitch

smaller pitch
best for onroad
finer gearing adjustments possible
more efficient
quieter
more easily damaged by rocks

larger pitch
stronger teeth
best for nitro
best for off-road
fewer gearing adjustments

In the RC hobby we use mostly 32-, 48-, and 64-pitch gears.
The pitch has to do with the size of the teeth, not number of the teeth, on the gear.
32-pitch gears are the largest pitch with fewer teeth per inch.
Fewer teeth per inch means the teeth are larger and therefore stronger.



The gear pitch distance from tooth to tooth.

Gear Ratio

lower number
"gear up"
more top end speed

higher number
"gear down"
faster acceleration

Gear ratio is Spur Gear divided by Pinion Gear. Example: 75-tooth spur gear divided by 15-tooth pinion gear = 5.
This means the pinion gear must turn five times to make the spur gear turn one complete revolution.
On large tracks, you might aim for more top end (using a pinion gear with more teeth). For small tracks or tracks with tighter turns, you might aim for more acceleration. So using a pinion with fewer teeth will help.

Kickup

less kickup
better turn-in and through a corner
fast weight transfer to front of car
best for high traction tracks

more kickup
turns into corner more
standard for most situations

Kickup refers to the angle, at which the on-road front suspension is mounted, measured from the horizontal,
when looked at from the side of the vehicle.
0 deg. kickup means your front arms are level with the chassis.
20 deg. kickup means the front of the front arms are higher, creating a 20-deg. angle with the chassis.



Here's the kickup angle of an RC10B4.1 buggy.

Pinion Gear

fewer teeth
more acceleration
more run time
gear ratio goes down

more teeth
more top speed
less run time
gear ratio goes up

The pinion gear is attached directly to the electric motor shaft and drives the spur gear, which in turn interfaces with the transmission.
Changing the pinion gear to more or fewer teeth will make big changes to your vehicle's run time and top speed.



#8255 18 Tooth, Precision Machined 48-Pitch Pinion Gear shown.

Ride Height, front

lower
creates more push
onroad: best for carpet
onroad: less chance of flipping in corners

higher
creates more steering
onroad: higher chassis means more chassis roll and better traction on bumpy tracks

The front ride height is the distance from the ground to the bottom of the chassis measured at the front (with the vehicle fully equipped). This adjustment helps to speed up or slow down how fast the car changes direction when cornering.

To set the standard front ride height for off road, lift up the entire car about six to eight inches off the bench and drop it.

When the suspension settles, the front edge of the A-arms should be level.
If they are not in a straight line, then add or subtract preload spacers to the front shocks, or adjust the threaded shock collar up or down until it is level.

If you move the batteries forward or back, then recheck the ride height and adjust so it is level.
You should always check the ride height after making all your other adjustments, just before you are ready to race.



You change the ride height of the B44.1 buggy by turning the shock collar on the threaded shock bodies.



You can measure the ride height with a tool, such as the #1449 Factory Team Off Road Ride Height Gauge.

Ride Height, rear

lower
less rear end sliding in corners

higher
better acceleration in loose terrain
better lift off jumps

The rear ride height is the distance from the ground to the bottom of the chassis measured at the rear (with the kit fully equipped).

Check the ride height by lifting up the entire car about six to eight inches off the bench and dropping it. After the suspension "settles" into place, then add or remove preload clips, or adjust threaded shock collars up or down so the dogbones are in a straight line.

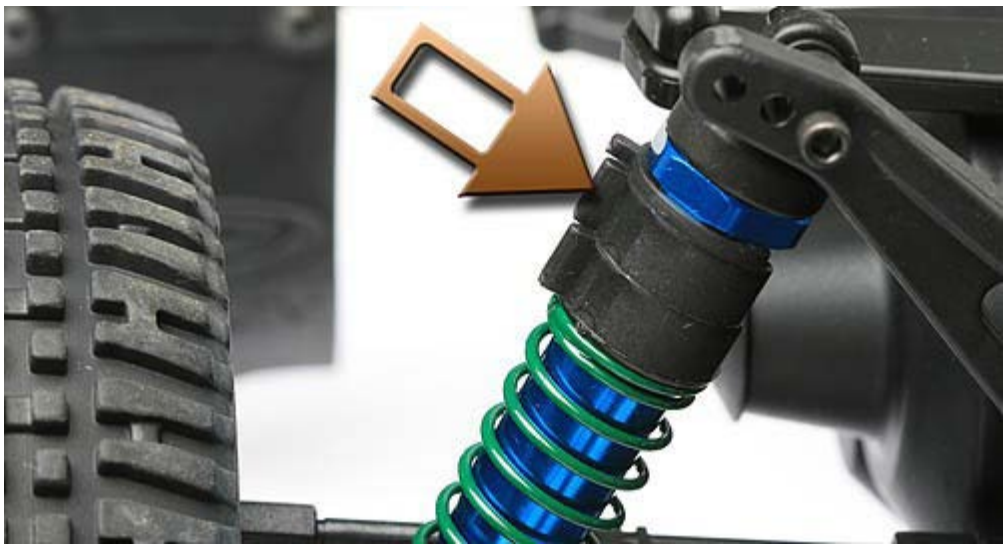
If you decide to move the battery pack forward or back, then recheck the ride height and adjust so it is level.

The rear ride height setting you should use most often in off-road is with the outdrive, driveshaft, and axles all on the same imaginary horizontal line (referred to as "bones level").

Making large ride height adjustments up or down from this setting will tend to make the car feel unpredictable.

You should always check the ride height after making all your other adjustments, just before you are ready to race.

Ride height "bones level" is a starting point.



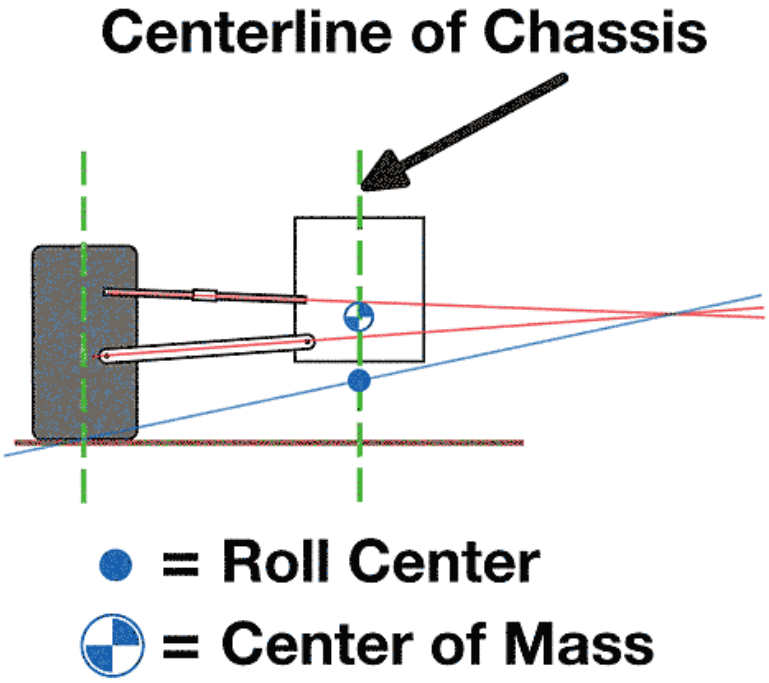
You change the rear ride height on the SC10 short-course truck by adding or removing preload spacers (arrow).

Roll Centre

lowering roll centre
more washers under ballstud
lower rear inner pin
for high-traction tracks
leans more when cornering

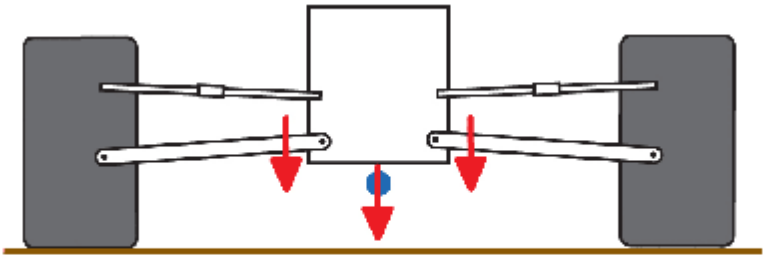
raising roll centre
fewer washers under ballstud
higher rear inner pin
for low-traction tracks

The roll centres for a chassis are defined by the suspensions' geometry. Roll centres are effectively positions in space (see drawing) that the suspension will "roll around." The roll centre height can be adjusted by changing the angle of the suspension arm, camber link, or both. Typically, this is done by changing the height of the inner positions of these members (the inner pin for suspension arm, and inner ballstud for camber link).

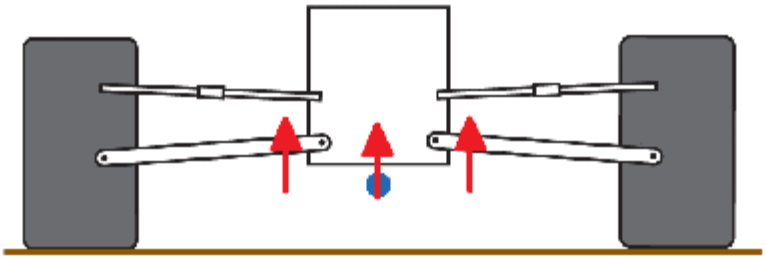


Changing arm position.
On some chassis, the inner pin position for the suspension arm can be adjusted up and down to change the angle of the suspension arm.

In this case, the roll centre will move in the same direction as the adjustment to the inner pin: if the inner pins are moved up, then the roll centre moves up as well.



Lowering Roll Center, arms

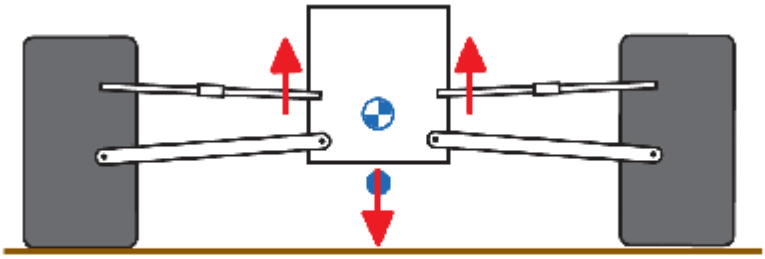


Raising Roll Center, arms

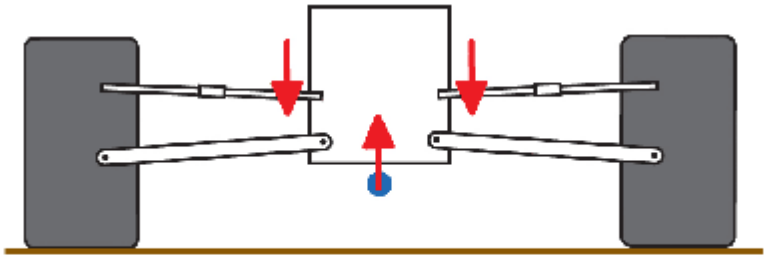
Changing ballstud height.
The angle of the camber link can be changed by changing the height of the inner ballstud.

This angle change has a much smaller effect on the height of the roll centre, so it is a finer adjustment and less noticeable on the track.

With this adjustment, the roll centre will move in the opposite direction than the adjustment to the inner ballstud: if the ballstud is raised, the roll centre is lowered.



Lowering Roll Center, ballstuds

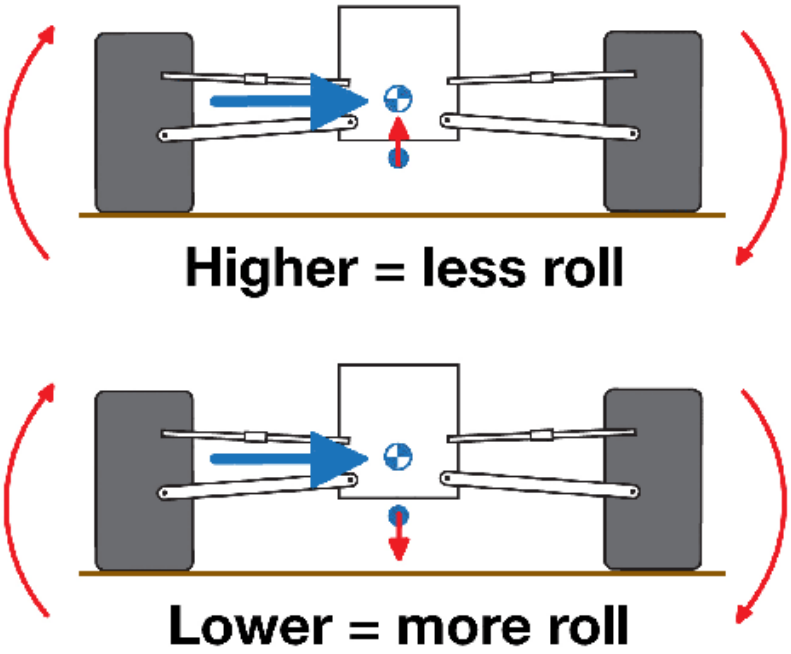


Raising Roll Center, ballstuds

High and low roll centre effects.

Changing the roll centre height will affect the stiffness of the suspension when the chassis is in roll (or leaning).
This is due to how the inertial forces are applied to the chassis as it goes through a corner. As the car changes direction to transfer through a corner, these forces are applied at the centre of mass of the chassis.

The farther away that the roll centre is from the centre of mass (or, in other words, the lower the roll centre is), the more leverage the inertial forces will have to make the chassis roll.
So in effect, as the roll centre is lowered, the chassis will be softer in roll, allowing it to lean more in the corner.



Suspension systems with lower roll centres are less responsive (or less "reactive"), and more forgiving than those using a higher roll centre.

Typically, lower roll centres are used on a smooth, high-traction surface and higher roll centres are used when the traction is low.

Keep in mind that the front and rear roll centres may not be the same, as it depends on the mounting position of the suspension arm and camber link. Staggering the roll centres front and rear can be an effective tool in helping to balance the car through the corner. You can raise or lower the ballstuds by inserting washers where the ballstuds are mounted to the tower



Shock Mounting, front suspension arm

inner hole
softer
less stable

outer hole
stiffer
more stable



These holes on the front arm of the T4.1 truck give you two mounting options.

Shock Mounting, front tower

inner hole
increases initial steering into corners
less lift off of jumps

outer hole
softer less steering entering corners
more front end lift off jumps
stiffer



In this B44.1 4WD buggy, you change the top shock mounting with these two hole options.

Shock Mounting, rear suspension arm

inner hole
softer
good for bumps and jumps

outer hole
stiffer
less responsive, more locked in

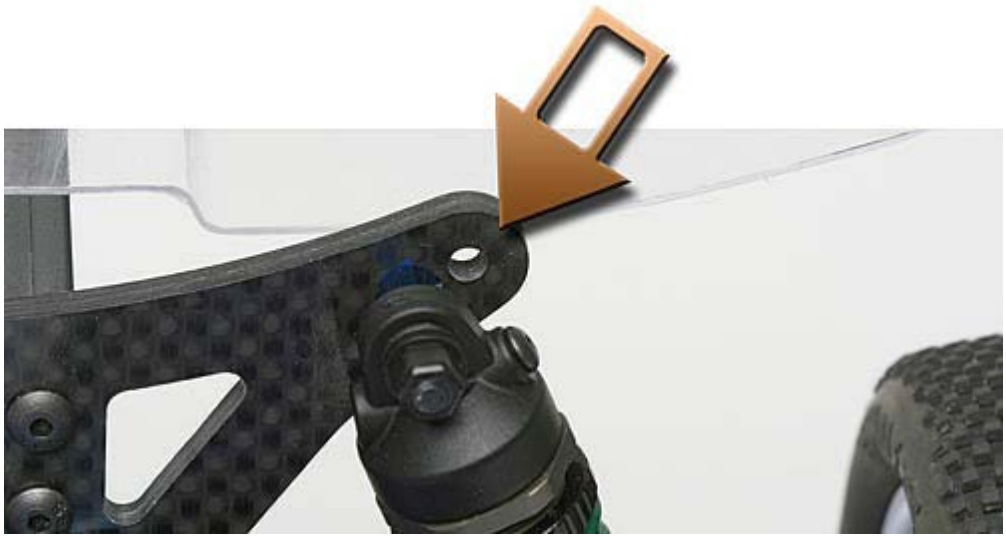


These holes on the rear arm of the T4.1 truck give you two mounting options.

Shock Mounting, rear shock tower

inner hole
more stability in entry and cornering traction
less lift off jumps
better in bumps
onroad: more traction

outer hole
softer less side bite (less cornering traction)
more lift off jumps
onroad: less traction
stiffer



In this B44.1 buggy, you change the top shock mounting with these two hole options.

lower weight, higher weight
higher viscosity, thinner or lighter
faster rebound
for many small bumps

lower viscosity
thicker or heavier
less bottoming out

Shock Pistons

smaller holes
improve jump lifts and landings
for smoother tracks
increases responsiveness
more damping

larger holes
for small bumps
less damping

The shock piston has two or three holes through which the oil flows as the piston travels up and down in the
shock. Pistons along with shock oil help determine shock damping.

A shock's damping is a measure of the resistance of the shock as it is compressed. Changing the piston hole size changes the damping characteristic of the shock.

Keeping the same oil, the smaller holes provide more damping, also known as more "pack," while the larger holes provide less damping, or less "pack."

Associated #6465 includes these 2-hole pistons: #1 (.055" hole diameter), #2 (.052"), and #3 (.047"). Four of
each size are included.

When changing to the next smaller hole, it will have a similar feel of increasing shock oil by 5 wt. thicker.

A shock with a #1 piston and 30 wt. oil, when changed to a #2 piston with the same oil, will give the feel of thicker 35 wt. oil, because the #2 piston has smaller holes and moves with more resistance.



Shock pistons #6465 (left), #6463 (centre), #89353 (right). #6463 are blank pistons, which means that you may drill your own size holes, as many or as few as you wish.

Shock Springs

softer
lighter tension
great on rear for off-road
gives more traction
best for small bumps

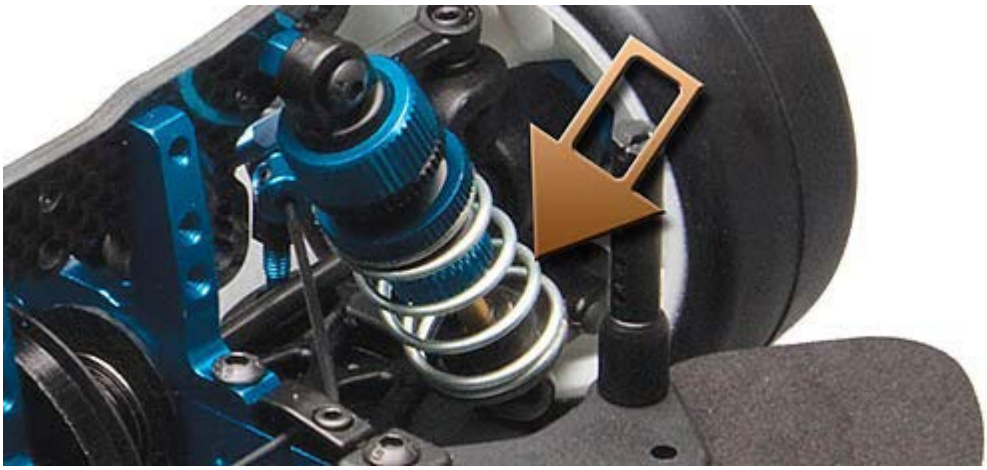
stiffer
heavier tension
creates less traction
lifts higher off jumps
better suspension response

The springs' purpose is to keep the vehicle level.

The shock spring controls the stiffness of the suspension.

This affects how the car corners and how it lifts off of jumps.

Several spring tensions are available to moderate these factors.



Shock spring on the Factory Team TC6 touring car.

Shock Travel Limiters

fewer limiters
for bumpy tracks

more limiters
used in side shocks when car leans too much in turns
in rear shocks they add traction when front end rises on acceleration

Limiters placed outside the body will limit the up-travel of the shock.

Limiters placed inside the shock limit shock down-travel.



These travel limiters will be placed on the inside of the shock body.

Slipper Clutch

tighter
for high bite tracks
more instant acceleration
smoother corner entry
looser corner exit
onroad: feeling of less steering

looser
for tracks with low traction
more traction exiting corner

By adjusting the clutch, you determine how much you will allow the wheels to slip.



On this Team Associated vehicle, adjust the slipper by turning this nut. (To help you remember which way to turn, think: "lefty loosen, righty tighty.")

Spur Gear

fewer teeth
smaller gear ratio

more teeth
larger gear ratio
off-road: more traction because it pushes the motor back

The spur gear is attached to the transmission. It interfaces between the motor's pinion gear and the transmission.



The spur gear.

Tyre Compound

softer compound
for smoother surfaces
for higher temperatures

harder compound
for bumpier surfaces
for grass
for wet conditions

Tyre Inserts, foam

softer
more traction
more drag

harder
less rolling resistance
better cornering

Tyres are typically thin and need support to retain their shape.

Tyre inserts give this support.
The foam insert's density is important.
The foam insert that comes with the tyres nine times out of ten is the insert you should use.
Too firm an insert will cause your car to bounce, resulting in loss of traction.
Too light a foam will cause the car to wander and to be very unstable.



You can see the white foam inserts that come standard with every pair of #21254 off road tyres.

flatter
for flat and smooth surfaces
higher contact patch gives better traction on smooth surfaces
best for onroad and oval for

rounder
bumpier surfaces
for tracks with many turns
best for off-road

Tyre Sauce, Tyre Additive

no sauce
when surface is dusty or dirty

add sauce
for prepared surfaces
for rubber tyres

Toe-in, toe-out, front

0 deg. toe
standard for all conditions

toe-out
quicker corner turn-in
unstable in bumps and slippery straightaway

Front toe-out describes the angle of the wheels when viewed from above, the front of the wheel turning inward (toe-in) or outward (toe-out), or pointing straight ahead. It is measured in degrees.

Aftermarket gauges are available to help you measure it.



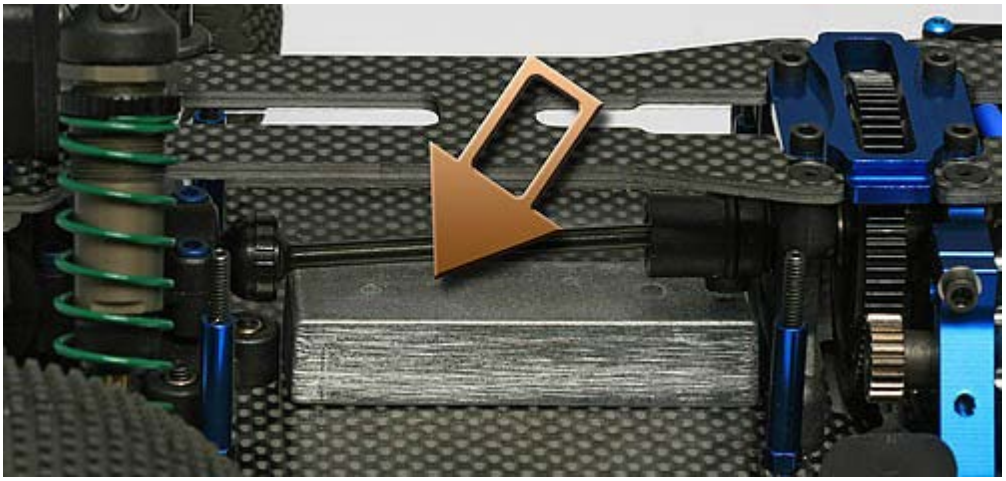
The 1 deg. toe-out angle is seen from the top of the vehicle.

Weight Distribution, adding weights

front
more steering while accelerating
changes direction slower
more nose-down jumping

rear
less steering
more rear traction
more stable under acceleration and braking

You can balance the chassis' weight by adding weights to the car, or by shifting your batteries forward or back.



The 87g #9776 Ballast Weight has been inserted into the Factory Team B44.1 buggy.

Wheelbase

shorter
wheels closer together
more rear traction
weight shifted to back

longer
wheels farther apart
slightly more steering
better stability
weight shifted to front

The wheelbase is the distance between the front and rear wheels at the axle centre lines.

You can make adjustments to your wheelbase. That is, you can shift the wheels forward or back to lengthen or shorten the wheelbase.



Moving these spacers to the other side will shift the front wheel back, shortening the wheelbase.

Wing

steeper angle
more rear traction

more horizontal
standard traction

Wings are a vital part of the car's stability. The angle at which you place the wing and how much of the wing
you cut will cause the car to handle differently.

Wing angle aids in rear traction.

You can adjust the amount of traction by changing the wing angle.

On road: You can slide the wing back for more rear traction. Some aftermarket wings allow more adjustments.

The canards, which are sides of the wings, can change the handling based on how tall and long they are. Use side dams when you need more stability in the straights and high speed corners.



The wing angle of the B44.1 buggy (as seen from this underside view) is changed by the use of tapered wing shims.

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Battery "C" Rating, LiPo

lower rating
lower discharge load

higher rating
higher discharge load
more punch when accelerating



The #629 Reedy LiPo battery has a C rating of 60C.

Battery mAh Capacity

lower number
lower capacity
shorter run time
less cost

higher number
higher capacity
longer run time
more cost

Your battery's capacity is rated in milliamp-hours, abbreviated mAh.



The #629 Reedy LiPo battery has a capacity of 5500mAh.

Battery Cell Count

fewer cells
lower voltage
less speed

more cells
higher voltage
more speed



Six cells are in this Factory Team TC5R.

Battery Label (NiCd and NiMH)

Battery resellers enhance the performance of their cells and provide certain cell characteristics on their labels.
The cells are machine-tested and labelled. Compare these numbers on the NiCd and NiMH battery labels to get the best cells. You'll find this information on matched packs, not your regular stick packs.

A/V (Average Voltage).
Higher number means more voltage.
Higher number = better.

A I/R (Actual Internal Resistance in Milliohms).
Lower number means better power output because less loss through resistance.
Lower number = better.

SEC (Cell Runtime).
Higher number means more run time.
Higher number = better.

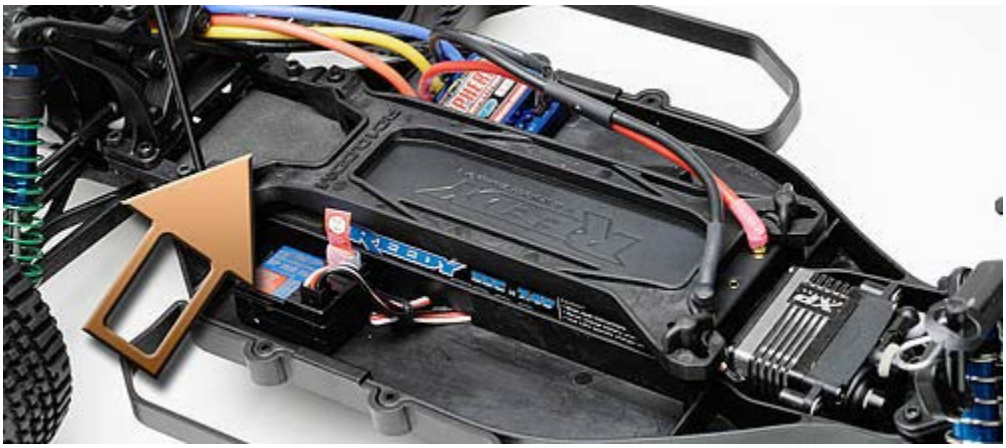
Battery Placement

forward
more steering
less rear traction

rearward
less steering
more rear traction

You can slide the batteries forward or back. Its weight bearing down on the front or rear will emphasize that area's unique suspension aspects.

(Off road: on extremely high or low traction tracks, moving batteries forward may balance the car and give better rear traction.)



This foam bar at the rear of the Team Associated SC10 short-course truck pushes the batteries forward. The foam can be cut, moving the batteries back incrementally, placing the cut pieces at the front.

Battery Voltage

lower voltage
slower acceleration
runs cooler

higher voltage
faster acceleration
runs hotter



The #629 Reedy LiPo battery is 3.7 volts.

Drag Brake

less drag brake
free-wheel to a stop

more drag brake
faster brake engagement

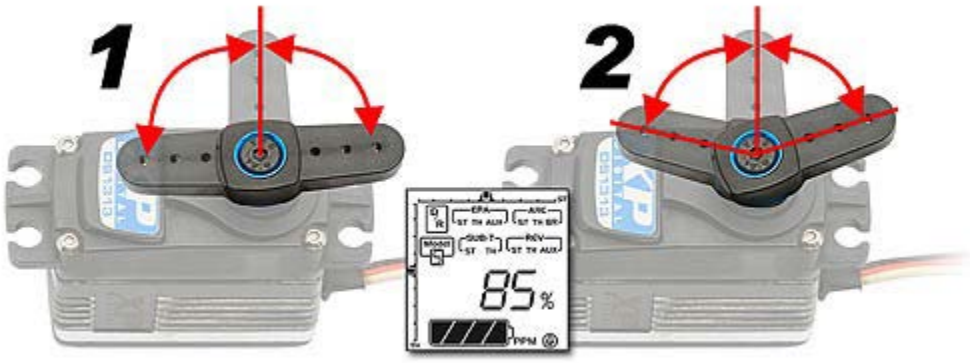
The amount of braking achieved when the throttle is returned to neutral.
A setting of 0 per cent means the car will free wheel to a stop while higher settings will stop the car faster.
Change this setting by adjusting your radio transmitters brake EPA setting.
Some high-end transmitters can adjust this setting. Otherwise, it's set through a electronic speed controls (ESCs).

Dual Rate (D/R)

lower percentage
turns down the amount of steering you have from full left to full right
use when you keep over-compensating for your steering mistakes on the road
for larger tracks
for a softer steering feel

higher percentage
gives more steering left to right
use when you have smooth control over your car
good for tighter tracks
for a more responsive (aggressive) steering feel
to make tighter turns

The dual rate refers to setting your steering servo's maximum angle of rotation, or "throw," to two different limits.
The steering servo has a maximum throw to its travel left and right.
Those points are the "end points."
First you set the end point adjustment of the steering servo; the dual rate setting for left and right will be a percentage of that value.
This transfer from one rate to the other is achieved by a control on the transmitter. It affects your turning radius.
You adjust the dual rate amount so that you can make the turns most efficiently. Since the control is located near your thumb on the transmitter, you can adjust the rate at will for different parts of the track.



Picture #2 shows the angle change when you set the dual rate to 85% of the setting in picture #1.

Expo/Exponential, steering servo

negative percentage
decreases (softens) the steering rate at initial wheel turn and accelerates rate at end

positive percentage
accelerates the steering rate at initial wheel turn and decelerates (softens) rate at end

Without an expo setting, if you turn your transmitter wheel left or right, the servo turns left or right at the same linear rate of speed.

But with a negative expo percentage applied, one adjusts this rate of change so that at the initial turn of the transmitter wheel, the steering response is minor or softened; but as you continue turning the wheel, the steering response is accelerated exponentially (hence the name, "exponential.")

A greater negative percentage will accentuate the rate.

A positive percentage will reverse these rates.

A linear rate is set at expo 0%, which is a comfortable and predictable rate for beginners. (The Team Associated XP3D radio manual calls this feature the ARC/ST, Adjust Rate Control, steering servo.)

Expo can also be applied to the brakes and the throttle.

For instance, a more negative percentage will soften the rate at the initial control movement (braking or acceleration) and accelerate the rate at the end of the movement.

EPA/End Point Adjustment, steering servo

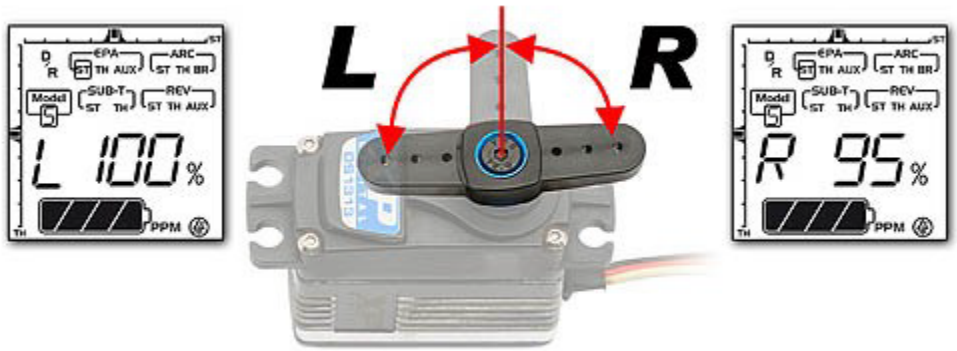
lower percentage
makes wider turns
shorter throw

higher percentage
makes tighter turns
longer throw

The steering servo has a limit or maximum "throw" to its travel left and right. Those points are called the "end points."

You adjust the end points to achieve an equal amount of steering left and right, then you adjust the "dual rate" to fine tune the adjustment. To this end, the EPA for left and right steering are adjusted individually.

You can set the steering servo throw end points for the left and right individually.



Here, the left is set at 100% of the throw while the right is limited to 95% of the throw.

lower percentage
shorter throw

higher percentage
longer throw

The throttle/brake servo on nitro vehicles has a maximum throw to its travel left and right. Those points are the "end points."

You adjust the end points to achieve maximum throw or less throw when setting up your throttle and brake.

Throttle/brake setup
The same servo controls the throttle and brakes, and depends on their corresponding linkage setup to work together properly.

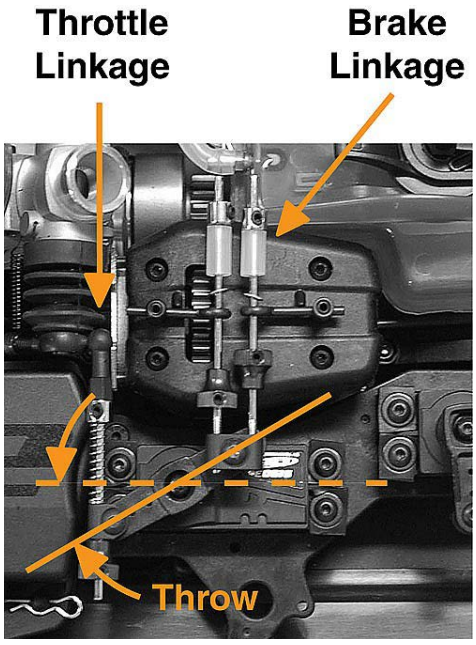
Set the throttle servo linkage so that when you apply full throttle, the barrel of the carburettor is open all the way. Then you fine-tune the EPA for that thrown so it stops just short of fully open.

Set the brake linkage so that when you push the trigger outward for braking, the brakes are fully applied. Then fine-tune the EPA for that throw so the plates stop just short of full pressure on the brakes.

When the throttle trigger is in its centre or neutral state, you want the carb to be at its idle position with little to no brakes are applied.

If you want to have a measure of drag brake at neutral, then set it with the brake linkage or EPA. (Drag brake means that the brakes being slightly applied at neutral.)

It's important to adjust the linkage in concert with the EPA settings so that the linkage will not be jammed or strained at full left or right throw, but is just right.



The throw has been set for throttle and brake linkages in this RC8B 1:8 nitro buggy.

Brushless Motor Speed, KV

lower KV
slower acceleration

higher KV
faster acceleration



The #917 Reedy 540R Brushless Motor is 3900kV.

Motor Springs, brushed motors

less tension
more RPM

more tension
more torque

You can change the tension of the spring by changing the angle of its two ends (by squeezing them closer together or pushing them farther apart). The tension of the spring affects the pressure of the brush against the armature.



The #780 Motor Spring has a 9 oz. rate. Thicker and thinner wires change the rate.

Timing, brushed motor

clockwise
more RPM
less torque
"advancing"

counter-clockwise
less RPM
more torque

Brushed motor timing is accomplished by loosening (but not removing) the top screws of the endbell (not the brush hood screws) and turning the endbell slightly. Then the screws are tightened again.

Timing marks are found on the hood (top of the motor), marked on the side of the can (see photo below), or on a label.

There is usually a mark on the hood that would line up with the timing marks. Each vertical line of timing marks off 4-6 degree increments.

It's best not to go below the 0-degree mark, for it retards the time and could create efficiency problems. Too much timing will have a similar effect; even though you can hear the motor has a lot more RPM, advancing the time takes away efficiency and could cause the motor to overheat or burn off the armature wire's coating - ruining the motor.

You can see the notches in the endbell hood for lining up with the small timing indicator stamped into the can.



The far left vertical line marks 0 degrees.

Motor Turns, brushed

fewer turns
higher RPM
higher top end
more battery draw
less run time

more turns
lower RPM
more acceleration
less battery draw
more run time

Turns refers to the number of times the wire was wound around each armature arm.

Sintered Rotor, brushless motors

smaller diameter
more RPM

larger diameter
more torque



The #LRP50638 LRP Works X-12 Sintered Rotor is 13.0mm in diameter.

Steering Servo

more torque
best for large vehicles

more speed
best for on road

Off-road needs more torque because of the larger wheels and rougher ground. Monster trucks need the most torque because of the power needed to turn the heavier wheels.



This T4.1 truck is using an XP digital servo available from Team Associated.