WELCOME

Thank you for purchasing a NC Chassis Xtreme Quarter Midget. For nearly ten years NC Chassis Co. has strived to provide the best service in the industry. We understand that great service to a customer means not only receiving great product but also being able to understand how to use that product to its fullest potential.

As the development of product changes so does the characteristics of that product. Through communication with our dealers, customers, and trackside representatives we learn every week how to stay ahead of the competition.

RACERS EDGE

Races are won at the shop not at the track. There is not a statement in racing that carries any more truth. To have great performance on the track you must have great performance in the shop. NASCAR, USAC, and Outlaw Sprints don't have great mechanics at great salaries just because they know how to change a front axle. They understand the importance to details, is the will to win.

Many of those details are explained in this manual. The specifications and suggested adjustments are what we have found to be best for most drivers and most tracks. Don't lose sight of the fact that every driver has their own style, and to keep the checkered flag out of the hands of other NC Chassis drivers, you need to try some of your own combinations. Just never lose sight of the basics.

MANUAL FORMAT

For every car assembled at NC Chassis Co. there is a set-up procedure that we go through, upon completion of that car. This manual is based on that procedure. Through each section we will discuss the proper location and pick-up points of each part of the car and explain the function of those adjustments. Once you understand the function of these components we will discuss how to implement that knowledge at the track for optimal performance.

MAINTENENCE

After and during every racing event, inspection and maintenance is a necessity. Clean, silicone, adjust, and replace parts as necessary. When inspection reveals the need for replacement of a component, use genuine NC Chassis parts available from your NC Chassis dealer or contact our Customer Service at (330) 798-7744. Inspection is required more often for dirt and/or sandy conditions.

Always silicone all bearings immediately after a thorough cleaning, to prevent any rust. Check all shocks for bad leaks and depressurization. Compress your Carrera shocks while holding them straight up and down. All shocks should push the entire shaft back out. A 7/3 Hold Down shock will probably have minimal or very slow movement. Most shocks will have minimal oil left around the shaft. If a shock has a large amount of oil within the lower cone, a seal may need replaced.

Part 1

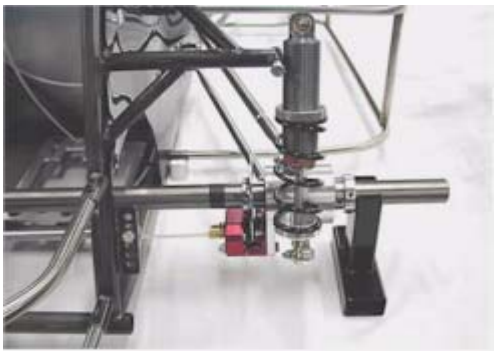
Positioning Ride Height Blocks and Axle Blocks

Ride height and axle blocks have been an important addition to our set-up procedure. The axle block holds the axle within close proximity of the average tire and wheel combination, while the ride height block suspends the chassis without driver to the proper racing ride height. This positions all radius rods within the appropriate angle. So when we apply the proper measurements to the car, everything is positioned as it would be on the track under racing conditions. Contact your NC Chassis dealer or call are Customer Service at (330) 798-7744, for information on purchasing these set-up blocks.

Procedure: Remove all hubs and spacers. Place the car on the flattest surface possible. Disconnect the top of all shocks from the frame and let them hang toward the outside of the car. So that they do not interfere with anything. Position the axle blocks up against the shoulder of the spindle bolts for the front, and against the split collar in the rear. Place the ride height blocks under the nerf bar spuds on the 2000, 2001, and 2002 models (Refer to pictures 1-2). On the 1900 chassis place the rear ride height blocks under the frame directly behind the side panel, and on the front blocks place them under the frame directly below the front nerf bar spud. Its best if the car is resting on each of the four ride height blocks. Don't worry if it's not, the surface that you have the ride height blocks on may not be level enough. If there is a gap within 1/8" between one of the blocks and the frame, your settings will be accurate.

1900 Ride Height Blocks		**2002, 2001, 2000 Ride Height Blocks**	
LF. ½"	*RF.* ¾"	*LF.* ¾"	*RF.* 1"
LR. ¾"	*RR.* 1 1/8"	*LR.* 7/8"	*RR.* 1 1/8"

The ride height blocks can also be used with the driver to set ride height. Refer to the Ride Height section for this procedure.



Picture 1

Picture 2

Part 2

Front and Rear Panhard Bars

The **rear Panhard bar** is the radius rod bolted to the back of the left rear-bearing carrier and to right side of the frame. The **front Panhard bar** is the radius rod that bolts directly to the front axle and to the right side of the frame.

The front and rear Panhard bars greatly affect the handling of the car. Minimal movement up or down can drastically raise or lower the right front and right rear tire temperature. Always remember that the front and rear Panhard bars work the opposite of one another. Lowering the rear Panhard bar on the right side of the frame will put more temperature in the right rear tire and tighten the car. Lowering the front Panhard bar on the right side of the frame will also put more temperature in the right front tire, however this will loosen the

car. This works this way because by putting temperature in the right front tire, it will have better grip; this will tend to loosen the rear.

The same applies for when these bars are raised. When the rear Panhard bar is raised on the right side of the frame, the temperature in the right rear tire will decrease, which will loosen the car. If the front Panhard bar is raised on the right side of the frame you will decrease the right front tire temperature, taking grip away from the right front. This tends to tighten the rear.

The rear Panhard bar is also adjustable on the left rear-bearing carrier. When changing the location point on the right side of the frame it is not necessary to change the location point on the left rear-bearing carrier. This is adjustable on the left rear-bearing carrier because, the less angle or the more level the Panhard bar is with the rear axle the less grip the rear will have. This adjustment is rarely changed. Its affect on the chassis is minimal. The factory setting will usually work for any racetrack. If you lower the rear Panhard bar on the right side frame rail, to where the left rear location point is higher then the right rear location point; you should lower the Panhard bar on the left rear bearing-carrier.

The Panhard bar should be used as a last resort when making a chassis adjustment. It can drastically change the handling of the car. If this adjustment is made at the wrong time you may find yourself making more adjustments then needed to compensate.

Points To Remember

- Lowering the rear Panhard bar will tighten the car.
- Raising the rear Panhard bar will loosen the car.
- Lowering the front Panhard bar will loosen the car.
- Raising the front Panhard bar will tighten the car.

Refer to the measurement sheets for the recommended Panhard bar locations for your car.

Part 3

How to Square the Rear Axle

It is important that the rear axle is square in relation to the frame. On the 2002 model chassis the left rear radius rods have **two** available mounting points on the left side of the frame to which they can be bolted. The left rear radius rods should be in the lower of the two mounting points at this time. The next important step is the location of the rear axle from left to right. This is adjusted by the rear Panhard bar. On all model cars move rear axle to the right so the left rear radius rods are parallel to the left side of the frame, from front to back without hitting the left rear spring (Refer to picture 3). This allows the left rear tire and wheel to be tucked in as close to the frame possible. We then square the rear axle by adjusting the radius rods on the left and right rear of the car. You want the back of the rear axle and the centerline of the rear frame crosstube to the measurements shown below (Refer to picture 4).

1900 Chassis: **4 ¾”**

2000 Chassis: **4 ¾”**

2001 Chassis: **4 ¾”**

2002 Chassis 33”-35”: **5”**

2002 Chassis 37”-39”: **4 ¾”**

Picture 3

Picture 4

Part 4

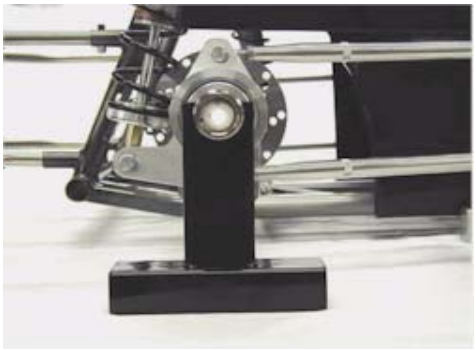
Timing the Bearing Carriers

When timing the bearing carriers you want the top dead center of the carrier to be as close to the centerline of the rear axle as possible. After the carrier is at top dead center rotate the top radius rod one more turn to a turn in a half bringing the top of the carrier forward. This prevents the carrier from rotating back past top dead center under load. This could cause the bearing carriers to have a slight bind through the corner.

Procedure: The left and right rear radius rods are used to rotate the bearing carriers, and always recheck the rear axle to make certain it is still square with the rear frame crosstube. If you have a **1900**, **2000**, **2001** model chassis this procedure will be fairly simple to find the top dead center. Rotate the carrier so that the flat surface on the rear of the bearing carrier plate is perpendicular to the ground. Any 90-degree ruler works well. If you have a **2002** model chassis do the same for the left rear bearing carrier plate (Refer to picture 5). However for the right rear bearing carrier use the bottom of the brake plate and make sure it runs evenly with the bottom frame rail (Refer to picture 6). Keep in mind, with a **2002** model car the radius rods locate at the center of the carrier on top and bottom. Positioning the bolt of the top radius rod directly over the center of the rear axle can be a good reference point.

If you use a small level to time the carriers make sure the car is level or the bubble on the gauge will not be accurate.

Picture 5



Picture 6

Part 5

Front Axle Wheelbase and Lead

The front axle location is very critical to the performance of the car. If it is not properly positioned in the car you could create a bind that would alter the handling of the car. **Always make sure the front axle is not bent after any contact on the racetrack.** This procedure will be discussed later in the manual under Spindle and Steering Alignment.

The front axle is not square in the chassis. The front geometry of our cars have a ½" to 1 ¼" of lead built in, depending on the model car. Lead is how much further forward the Right Front tire is then the Left Front tire. The reason for lead is to allow the car to roll to the apex of the corner, with minimal steering impute. This allows the car to roll with little resistance. **Momentum is everything on a 1/20 of a mile track.** The driver must be smooth and the car must be completely free of any bind. **The less the drivers hands move the faster the car will be.**

Wheelbase is the distance between the front tires and the rear tires. It's measured with the front and rear axles. Imagine a square. The smaller the square, the shorter the distance is between each corner of that square. Now think of an arial view of a racecar. Notice it is nothing more than a square. The shorter the wheelbase, the faster the weight will transfer to each tire and/or corner of the racecar. So in theory a smaller car will tighten up quicker than a larger car. **The same applies from left to right.** The narrower the car, the faster the weight will transfer from left to right. This is critical to understand when dealing with a biking situation. The wider and longer the base of the car, the slower the weight will transfer. This will be explained further under Douglas Wheels and Spacing.

Procedure: The left to right position of the front axle needs to be adjusted. First re-bolt the top of the left front shock. Then use the front Panhard bar to position the left front spring collar on the left front shock is roughly a 1/16" from the frame or bodywork (Refer to picture 7). Then bring the left side of the front axle back until it is almost touching the vertical frame tube on the left side of the car (Refer to picture 8).

Moving to the right front shock, notice the bottom of the shock is bolted between to plates, which are welded to the top of the axle. Make sure these mounting plates are straight up and down, by rotating the front axle using the right front radius rods. Then take a tape measure and attach it to the shock mounting plate closest to the right front radius rods and pull the tape back to the center of the rear axle (Refer to picture 9). Adjust the right side of the front axle to the recommended wheelbase using the right front radius rods (Refer to picture 10). **Refer to the measurement sheets for the recommended wheelbase of your car.**

Point To Remember:

- When adjusting the right side of the front axle, make sure that on the left side of the front axle you do not hit the frame. More clearance may be needed between the axle and the frame or bodywork once you have the proper wheelbase.

Picture 7

Picture 8

Picture 9

Picture 10

Part 6

Caster/Camber Front Axle

Caster is the rotation of the front axle or spindle forward and backward. Forward is **negative caster.** Backward is **positive caster.** Rotating the top of the front axle forward will make the car easier to steer. Rotating the top of the front axle back will make the car harder to steer. When the front axle has too much negative caster it will be difficult for the driver to keep the car straight. However the more negative caster your driver can run the faster the car will be. It tends to allow the car to roll better.

We do not build any caster into our front axles. Caster has a remarkable effect on the performance of the car. To have a fixed caster setting could be a disadvantage at a lot of tracks. Making the 2002 adjustable left and right caster/camber front axle, one of are best developments. To understand the full advantages of this front axle you need to understand caster split. Caster split is the degree of difference between the left and right spindles of the front axle. A common caster split is 5 degrees; 2 degrees forward on the left front and 3 degrees back on the right front. The greater the caster split, the more the car will turn left. The more negative caster in the left front, the more **right front weight** the car will have through the car. The more positive caster in the left front, the more **right rear weight** the car will have through the corner.

Camber is the degree of tip from left to right in either one of the front tires. On the right front when leaning the top of the tire towards the car this is **negative camber**. Leaning the tire and wheel away from the car is **positive camber**. The left front tire and wheel is the same. Leaning the top of the left front tire towards the car is **negative camber**. When you lean the tire away from the car this is **positive camber**. The purposes for adjusting camber to the racetrack are equalizing temperature and wear across the surface of the front tires.

When you change the caster you change the angle of the spindle which in turn changes the camber. With the right front, the more positive caster the more negative camber is needed. With the left front, the more negative caster the more positive camber is needed.

Procedure 1900, 2000, 2001 Front Axle: Standing at the right or left side of the car. By rotating the axle using the right front radius rods, position the spindle barrel 90 degrees with the bottom of the frame. This will position the front axle virtually straight up and down. To set the camber, place the car on the ground with tires and wheels. Using a 90-degree straight edge, slide the straight edge directly up against the outside of the right front tire and wheel. The bottom of the tire or wheel should be touching the straight edge and there should be a gap of relatively **3/16”** between the top of the wheel and the straight edge.

Procedure 2002 Front Axle: This front axle has a black caster block on both the left and right side of the front axle, which rotate forward and back by loosening three bolts. The camber block is the aluminum block that fits within the serations directly on top of the black caster block.

There are seventeen lines on the caster block. The centerline has a dot above it. When this dot is inline with the groove on the front axle the caster block is at zero. Each line represents 2 degrees of movement. One degree of movement would be between the lines. With both left and right caster blocks at zero position the

front axle straight up and down. Looking at the right front spindle barrel rotate the axle until the barrel is 90 degrees with the bottom of the frame using the right front radius rods. Then rotate the top of the right front caster block **back 6 degrees** (3 lines). Rotate the top of the left front caster block **forward 2 degrees** (1 line).

The camber block is numbered on each side 1-4. The location dots are 7/8 of a degree change from dot to dot. The rotation of camber block from number to number is roughly a ¼ of a degree change. The arrow locates the center dot. So, if the camber block is positioned with the number 1 over the center dot and you rotate the camber block to the number 2, the camber block will offset slightly to either side of the center dot and change the camber by a ¼ of a degree. The factory setting for the right front camber block is the number 3 offset away from the car on the center dot. The factory setting for the left front camber block is the number 1 on the second dot away from the car. This is a good starting point.

Always keep in mind that the easiest and probably most efficient way to check camber is to simply place the car on the ground and visually see how much it has changed from one adjustment to the next.

Points To Remember:

- The more caster split the more the car will want to turn left.
- Caster split is usually based on the drivers' preference. Keep them comfortable.
- For larger tracks set the left front caster block at zero. The car will drive straight easier.
- The greater the degree of banking in the track, the more negative right front camber is needed.
- The more positive left front camber, the more the car will tend to turn left.
- **Always** have enough right front negative camber, so that the sidewall of the tire is never rolling under.

Part 7

Spindle and Steering Shaft Alignment

This procedure is to make sure you have the correct amount of steer from left to right. The **front alignment gauge** is an absolute must for checking your front alignment (Refer to picture 11). If you change the front axle or have any altercation on the track, you should always recheck the front alignment. This will help you to detect a bent spindle or axle. Numerous times I am asked to look at a car that some how has lost 2-3 tenths of a second, 97% of the time they have a bent front axle. At any point that you feel your car has lost corner speed check the alignment of the front end. **Never under estimate contact on the racetrack.**

Timing the steering shaft is very critical. When you read the procedure below you will notice that we will add a 1/16" – 1/8" of toe out to the Left Front spindle, **after** we time the steering shaft and the front axle can be lifted in and out of the alignment gauge without any bind. This adjustment is made so that at corner entry the Left Front turns sooner than the Right Front. This helps the car roll to the apex of the corner with minimal steering impute. If this alignment is incorrect and the Left Front turns to much faster than the Right Front, the Right Front will tend to drive straight causing a great deal of bind and resistance in the front end. This is not something that can be checked very quickly in the pits so please make sure this is checked at your shop regularly and after an altercation.

If the front axle was bent it is almost always bent on the right side. With the front axle bent it is possible to re-align the spindles with each other so that they slip in and out of the alignment gauge. If this happens all that you would have to do is stand on the right side of the car and look down directly over top the right front. The spindle will be pointing towards you and the end of the axle will be pointing towards the nerf bar. **Replacement of the front axle would be the only solution at that time.** Otherwise if you were to use the bent front axle, your alignment would never be correct. The Right Front spindle could never turn far enough to the left, because it is already turned to the left when the wheels are pointed straight.

Procedure: Lift the front of the car and position the alignment gauge under the front spindles (Refer to picture 11). Standing at the front of the car you will notice to ears welded on the steering shaft. Bolted to

those ears are the left and right steering rods. Rotate the steering rods until the ears appear evenly split and the steering shaft appears to run directly through the center of the two ears. We refer to this point as 11 and 1 O'clock (Refer to picture 12). Now that the steering shaft is timed properly make sure the rods are not in a bind, they should swivel on the ball of the hiem without any effort. The front axle at this time should drop in and out of the alignment gauge without any resistance.

Tighten the jam nuts on the right steering rod and remove the alignment gauge out from underneath the car. With the left steering rod put another **half to full turn in**, which will give you a 1/16"- 1/8" of Left Front toe out. Remember to put the final turn in the left steering rod, when it is out of the alignment gauge. Then tighten the left steering rod jam nuts.

Picture 11

Picture 12

Part 8

Douglas Wheels and Spacing

The proper spacing for all model cars is the same. The left front and right front should always be as close to the front springs as possible without touching the spring. **Do not base this on the steering turned all the way to the left**. Very little steering impute is required to turn the car. If you are using the adjustable caster/camber front axle you will need to reverse the bolts in the left front hub. Otherwise the bolts will hit the caster block and the tire will be spaced too far out.

The left rear should always be spaced as close to the left rear radius rods as possible. The right rear should be the only wheel that is adjusted. We suggest you stay between 33 ½"-34" from the center of the left rear tire to the center of the right rear tire. Spacing the right rear in toward the bearing carrier will tighten the car. Spacing the right rear out will loosen the car.

Rim or wheel offsets are also very important. Picture a triangle that has a 4" base and a triangle that has a 14" base. Which one do you think would be easier to blow over? The one with the 14" base is not going to move very easily. A racecar is based on the same philosophy. The wider the base of the car the more stable the car will be. The narrower the wheel is, the narrower the tire will be. The narrower the tire is, the hotter the tire will be. The wider the wheel, the wider the tire. The wider the tire, the cooler the tire. **To be fast or stay fast you must keep the tires as cool as possible**. With the Douglas 1piece wheels you can run up to a 10" wheel and not have to worry much about the tire pulling off the wheel. This gives you a tremendous advantage by running the Douglas wheels over rim-halves. Plus you will not have the leakage problems faced with rim-halves.

The key point to all this is the fact that with a wider wheel you can run a narrower tread width (33"-33 ¼") for better grip, cool the tire, and still stabilize the car by maintaining a wide base. The suggested offsets are as listed. To properly measure a rim halve refer to picture 13 (This wheel has a 2 ½" outer rim half).

1900 Wheel Set-Up *(Outer / Inner)*		**2000, 2001, 2002 Wheel Set-Up** *(Outer / Inner)*	
LF. 2x5 / 3x5	**RF.** 2.5x6 / 4x6	**LF.** 2x5 / 3x5	**RF.** 2x6 / 4.5x6
LR. 2.5x5 / 3x5	**RR.** 4.5x6 / 4x6	**LR.** 2.5x5 / 3x5	**RR.** 4.5x6 / 4x6

Picture 13

Part 9

Tire Compounds

Were not going to discuss what tire you should run on your car, because tire compounds change almost every year. Instead we are going to discuss how to find the right tire for track conditions and driver. Without a tire spec the tire game can be difficult if you make it difficult. Keep in mind **think long, think wrong**. Pick a tire and stay with it. I base my tire selection on three elements: Track, weather, and driver.

If a track has an abrasive surface then a harder compound would probably hold up better. This is seldom a factor but must be considered if the tire seems to be coming apart. If the weather has been very hot and sunny a harder compound would be better. If your driver is very smooth and maintains a consistent lap time then a harder compound may be better. If the driver does not mind driving a loose car than a harder compound may be better. For most racing conditions the harder compound will be faster. Because the **harder the tire the cooler it will stay**. The softer the tire the quicker it will grip. **However the faster it comes in, the faster it will go away**.

Sometimes I will base my tire choice on the format of the show and the performance of the drivers. How many laps are the races? Have there been a lot of caution flags? What is the qualifying procedure? These are all-important factors, however always remember minor chassis adjustments will determine weather the tires come in sooner or later. We will discuss these adjustments in a later section.

Part 10

Air Pressure and Tire Stagger

The air pressure for the right front and right rear is normally between **12-15 psi.** The left front is normally **10 psi.** The left rear is normally between **5-7 psi.** The less air pressure in the tire, the more the tire will grip. The more air pressure in the tire, the less the tire will grip.

Front tire stagger is the difference in circumference between the right front tire and the left front tire. Rear tire stagger is the difference in circumference between the right rear tire and the left rear tire. The circumference must be measured around the center of the tire. If the right rear tire measured 34 ¾" and the left rear tire measures 31". The rear stagger on the car would be 3 ¾". **Stagger must always be measured with the air pressure you are going to run.** Air pressure, wheel offsets, and the tire specification numbers determine the circumference of the tire when it's mounted. More air pressure will expand the tire. The wider the wheel the more the tire is spread out, therefor the smaller the circumference will be.

The front stagger is around 1 ¾" with the tires currently on the market. The more front stagger the better the car will enter the corner on any track. Rear stagger depends on the degree of banking in the track and whether the left rear is **locked** or **unlocked**. Locked is when you drive off the left and right rear tires. Unlocked is when the left rear spins separately from the right rear. Locked will tighten the car and unlocked will loosen the car. Refer to the chart for our recommended set-ups.

Points To Remember:

- The more rear stagger the looser the car.
- The less rear stagger the tighter the car.
- The larger and higher banked the track, the less stagger is needed.
- The smaller and flatter the track, the more stagger is needed.
- The more stagger you can run the better the car will roll in and through the corner.

Jr. Honda	Unlocked	2 ½"-3 ½" stagger
Sr. Honda	Unlocked	2 ½"-3 ½" stagger
Hvy. Honda	Unlocked	2 ½"-3 ½" stagger
Lt. 160	Locked	3 ¾"-5" stagger
Hvy.160	Unlocked	2 ½"-3 ½" stagger
Jr. Stock	Locked	3 ¾"-5" stagger
Sr. Stock	Unlocked	2 ½"-3 ½" stagger
Lt. Mod	Locked	3 ¾"-5" stagger
Hvy. Mod	Unlocked	2 ½"-3 ½" stagger
Lt. B	Locked	3 ¾"-5" stagger
Hvy. B	Unlocked	2 ½"-3 ½" stagger
Lt. A	Locked	3 ¾"-5" stagger
Hvy. A	Locked	3 ¾"-5" stagger

*** These are recommendations only. Many racers experiment with locked or unlocked. We recommend you do the same.**

Part 11

Springs and Shocks

Spring set-up is based on the class, size of the car, weight of the driver, and the type of track. For this reason the spring and shock recommendations listed can only be used as a guide. A different combination may be required for you to achieve optimal performance. Give us a call if you cannot find the combination best for you.

1900

Jr. Honda / Jr. Stock / Lt.B / Lt.A

LF. 85 **RF.** 115
LR. 125 **RR.** 115

Sr. Honda / Hvy. Honda / Sr. Stock

LF. 95 **RF.** 135
LR. 135 **RR.** 135

Lt.160 / Lt.Mod

LF. 85 **RF.** 125
LR. 135 **RR.** 125

Hvy.160 / Hvy.Mod / Hvy.B / Hvy.A

LF. 95 **RF.** 145
LR. 145 **RR.** 145

2000

Jr. Honda / Jr. Stock

LF. 95 **RF.** 85
LR. 105 **RR.** 85

Sr. Honda / Hvy. Honda / Sr. Stock

LF. 125 **RF.** 115
LR. 135 **RR.** 115

Lt.160 / Lt.Mod / Lt.B / Lt.A

LF. 105 **RF.** 95
LR. 115 **RR.** 95

Hvy.160 / Hvy.Mod / Hvy.B / Hvy.A

LF. 135 **RF.** 135
LR. 145 **RR.** 135

2001

Jr. Honda / Jr. Stock

LF. 105 **RF.** 105
LR. 105 **RR.** 105

Sr. Honda / Hvy. Honda / Sr. Stock

LF. 125 **RF.** 125
LR. 125 **RR.** 125

Lt.160 / Lt.Mod / Lt.B / Lt.A

LF. 115 **RF.** 115
LR. 115 **RR.** 115

Hvy.160 / Hvy.Mod / Hvy.B / Hvy.A

LF. 135 **RF.** 145
LR. 145 **RR.** 145

2002

Jr. Honda / Jr. Stock / Lt.B / Lt.A

LF. 105 **RF.** 115
LR. 115 **RR.** 115

Sr. Honda / Hvy. Honda / Sr. Stock

LF. 135 **RF.** 145
LR. 145 **RR.** 145

Lt.160 / Lt.Mod

LF. 115 **RF.** 125
LR. 125 **RR.** 125

Hvy.160 / Hvy.Mod / Hvy.B / Hvy.A

LF. 145 **RF.** 155
LR. 155 **RR.** 155

Shocks for All Cars

Carrera Shocks

LF. 3/3 **RF.** 3/5
LR. 7/3 **RR.** 5/7

NC Shocks

LF. 3 **RF.** 5
LR. 5 **RR.** 6

Part 12

Ride Height and Tip

Ride height is very critical to the handling of the car. The lower the car is to the track the looser the car will be. The higher the car is from the track the tighter the car will be. Tip is the difference in ride height between the left side of the car and the right side of the car. Usually the more tip you have in the car the tighter the car. However we have found in quarter midgets that it really depends on where you adjust or change the tip of the racecar. Always keep in mind that any time you raise the left side of the car you will tighten the car. **Anytime you lower the left side of the car; you will loosen the car**. This is based on the roll-center of the car. Always try to keep the driver and additional weight low and left. When I make adjustments to the chassis, **I always want to keep the chassis as low to the ground as I can**. Unless the

car is to loose. When you raise the car, it becomes easier for the weight to transfer from one corner of the car to the next. This helps to put heat in the tires, which in turn tightens the car. Some of these adjustments will be discussed in a later section. On all of are cars we usually have between a **¼"-1/2" of tip** in the chassis after the ride height is set.

Procedure: When measuring ride height you always want the driver and any additional weight needed, in the car. You should have the stagger and air pressures set, with the correct springs and shocks on the car. A shock or spring change while at the track will not effect the ride height very much. Usually from my experience, it takes atleast 30 pounds of spring weight change to effect the ride height and/or cross percentages. Lastly make sure the car is setting on the flattest surface possible.

With the driver in racing position, utilize a set of ride height blocks as discussed in **Part 1.** When doing this place them in the same locations under the frame. Adjust the spring collars up or down, until each block can just slide out from underneath the chassis. A tape measure can be used, but it may be difficult to get at eye level with the measurement. Stay within a 1/8" of the suggested height and you should have a good baseline for almost any track.

After the ride height is set, keep the driver in the car. **Make sure the chain is not tight**. Adjust the motor till the chain has about 3/16" of drop. Lift the left side of the chassis slightly to simulate the car going through the corner. The chain must still be loose. **Having the chain too tight can eliminate the performance of the car.**

Part 13

Weight Distribution and Track-side Adjustments

Fine tuning weight distribution to equalize tire temperature, is the goal when making adjustments to the chassis. Through my experience any time one tire has more temperature than another does, it is because there is more weight on the tire with a greater temperature. To lower the temperature in that tire you need to take weight off that corner of the car. However this is where things get tricky and I'll explain in a second.

How do we adjust weight? With a coil over suspension there is a shock, a spring, and a shock collar. Turn the collar **clockwise** (put turns in) it will put tension on the spring, raise that corner of the car, and therefore put weight on that corner of the car. If you turn the shock collar **counter clockwise** (take turns out) you will lower that corner of the car, and take weight off that corner of the car. When you add weight to one corner of the car, you add weight to the diagonal corner of the car. The same thing happens when you take weight off one corner of the car.

We have found that our cars usually run best at either 44%-46% or 47%-49% of cross weight. To get your cross weight add the weight on the right front with the weight on the left rear and divide that total by the total weight of the car. **Always set the ride height first before putting the car and driver on the scales**. Because when adjusting the cross weight, you are effecting the ride height. Therefore you must have a starting point. When adjusting cross try to make equal changes from one corner of the car to the next, so that you effect the ride height and balance of the car as little as possible. **Increasing cross** is adding left rear weight. **Reducing cross** is taking left rear weight out.

To **increase cross percentage** put turns in the right front and left rear. Take turns out of the right rear and left front. To **reduce cross percentage** take turns out of the right front and left rear. Put turns in the right rear and left front. Lower cross weight will tend to loosen the car. Higher cross will tend to tighten the car.

Now remember when I said, "The more weight on a tire the greater the temperature will be in that tire." Here's the tricky part and will use the right front as an example. When the car is setting on the scales and you put turns in the right front, you will increase the weight on the right front and left rear tires. However when the car is entering the corner on the track there is weight transfer. Weight transfer from the left rear to the right front. By putting turns in the right front you are raising the ride height of the right front corner

which holds weight on the left rear. **This delays the weight from going to the right front tire on corner entry. Which tends to cool the tire because it took weight off the right front tire.**

Keep one thing in mind. **Weight transfers in a triangle**. From the left rear, to the right front, and then to the right rear. The right rear reacts differently. This has to do with cross weight. Taking turns out of the right rear, takes weight off the right rear and puts it on the left rear. This increases cross. Which intern cools the right rear tire and puts heat in the left rear tire on the track.

If your following me you may be asking yourself if I increase cross, I tighten up the car. If I tighten up the car, how does it cool the right rear tire? It tightens up the car because you drive more off the left rear, which puts heat in the left rear tire. So if you need to cool the right rear but keep the car loose. Take half to the same amount of turns **out** of the right front. This remember, will reduce the cross you added.

Here's the key point. When you run a low cross percentage, **the weight you take off the left rear must be balanced between the right front and right rear**. What it takes to balance these two corners will depend on the track, driver, and class.

These are fine-tuning tips to achieve equal tire temperature, good tire wear, and overall better performance. Put the car on the scales; turn the shock collars every direction imaginable. Until you understand how much one adjustment effects another. You will find with are cars it does not take much adjustment to get a reaction on the track.

Points To Remember

- Lower cross weight will tend to loosen the car.
- Higher cross weight will tend to tighten the car.
- The limit for adjustment on one spring should be 3-4 turns. If more is required than a softer or stiffer spring is probably necessary for that corner of the car.

Part 14

Drivers Ed.

Does your driver drive over everything but the racetrack? If so, don't stress out. Good drivers are hard to find and most of the good ones have had a lot of coaching. Don't get sucked into the idea of having the next Nextel Cup driver to soon. Because while your thrashing to figure out what's wrong with the car, your little Tony Stewart is thinking about swimming at the pool as soon as they get out of the car.

With the tracks being so small if the driver runs the wrong pattern, it will devastate the performance of the car. There is no room for error, when you want to win a national event. When I go to the track to work with a driver and handler, **we spend four hours on driving and forty minutes on set-up**. I'm sure you can guess where we pick up two tenths 96% of the time. This is why quarter midget drivers excel in racing. The best chassis set-up will go unnoticed with a bad racing line.

There is no such thing as a perfect racecar. Set-up can only go so far. **The driver must know how to compensate for the chassis throughout the race.** Many parents do not know or understand these fundamentals. But they are key to being a dominate raceteam. The driver must understand the basic fundamentals of how a chassis works. They must be smooth. They have to be aggressive. They have to want to be in that racecar. **Driving is intense and intimidating**, do not push your driver beyond their limitations. **Patience** has got to be the number one rule for parents.

Part 15

Dirt Set-Up

For dirt we use a dirt steering shaft and a dirt left front spindle. These components allow more steer to the right for when the car is sideways. Adjustments work the same on dirt as they do for asphalt. Suspension is the only change that is really made. We simply put soft shocks on all four corners and soften the spring weight by 20-30 pounds. Raise the ride height for clearance and weight transfer. Lower the stagger and air pressure for grip. Space the right rear in for side bight and possibly lock the left rear hub.

If the track takes rubber, then simply lean towards the pavement settings to loosen the car. Leave the right rear spaced in for side bight. The key for dirt is knowing what the track conditions are going to be throughout the day.

Part 16

Speedway Front Axle

The Speedway front axle is a great advantage. It allows the right front to be spaced in further by flipping the right front hub. This allows you to run a wider right front wheel and tire and stay within the 34" tread-width rule. We tested a 5.50 right front tire on a 8" Douglas wheel and it was faster.

Procedure: To install the Speedway axle you will need an Extended right front spindle and to change the length of the right front radius rods. On a 33"-35" car you will need 20 ½" radius rods. On a 37"-39" car you will need 21 ½" radius rods. Measure everything to the same measurements given in this manual and you will be ready to race.

Part 17

Checkered Flag Comments

After all is said and done remember we are only a phone call away. No question is a dumb question. Racing has many variables, theories, and opinions. Trust me you will develop your own. Remember that all racecars require constant attention to details, not just one thing will make your car fast. A consistent competitor is always well prepared when they get to the track. **Have a game plan and stick to it**. Always take thorough notes of track conditions and adjustments done to the car. Never forget your baseline.

Xtreme 1900 Car Measurements

Rear Panhard Bar:

- The rear Panhard bar is bolted in the bottom hole of the left bearing carrier and in the third hole from the bottom on the right side of the frame.
- Loosen the heim joint nuts and by turning the Panhard bar, position the axle so the left side radius rods that are bolted to the left bearing carrier are parallel to the frame, from front to back.

Front Panhard Bar:

- The front Panhard bar is bolted in front of your front axle and in the third hole up from the bottom on the right side of the frame.
- Loosen the heim joint nuts and by turning the Panhard bar, position the axle so the left front shock is positioned straight up and down.

Square Rear Axle:

- The distance between the back of the rear axle and the centerline of the rear frame crosstube is 4-3/4" on both left and right side of car.

Timing Bearing Carrier:

- This means you want the top dead center of the bearing carrier to be as close to the center of the axle as possible, you should do this at the same time you have squared the rear axle. The same radius rods are used to rotate the bearing carrier and you must recheck the rear axle to make sure it is still square in the car.
- The easiest way to time your bearing carrier is by using the back of the bearing carrier plate; it is flat and vertical. Position this 90 degrees with the ground.

Wheelbase:

- The front axle of the 1900 car is set with a ½" of lead.
- The distance from the back plate on the front axle where the bottom heim of the right front shock locates, to the center of the rear axle on the right side, should measure as listed below according to your car size.
- 76" car 46" Wheelbase
- 78" car 48" Wheelbase
- 80" car 50" Wheelbase
- Position the left side of front axle within a 1 1/6" from the vertical frame tube on the left side of car.

Xtreme 2000 Car Measurements

Rear Panhard Bar:

- The rear Panhard bar bolts in the second hold up from the bottom of the left bearing carrier.
- On the right side, it is attached to the frame using an aluminum slider. From the top of the rear frame crosstube to the center of the slider the measurement should be 1-3/4". With the car on the ground with the driver in it at the proper ride height, the slider should locate about parallel with the rear axle. A final adjustment may need made at that time.

Front Panhard Bar:

- The front Panhard bar bolts in front of your front axle.
- On the right side, it also is attached to the frame using an aluminum slider. From the bottom of the front frame crosstube to the center of the slider the measurement should be 1-1/2". With the car on the ground with the driver in it at the proper ride height, this slider should also locate about parallel with the front axle. A final adjustment may need made at that time.
- Loosen the heim joint nuts and by turning the Panhard bar, position the axle so the left front shock is positioned straight up and down.

Square Rear Axle:

- The distance between the back of the rear axle and the centerline of the rear frame crosstube is 4-3/4" on both left and right side of car.

Timing Bearing Carriers:

- This means you want the top dead center of the bearing carrier to be as close to the center of the axle as possible, you should do this at the same time you have squared the rear axle. The same radius rods are used to rotate the bearing carrier and you must recheck the rear axle to make sure it is still square in the car.
- The easiest way to time your bearing carrier is by using the back of the bearing carrier plate; it is flat and vertical. Position this 90 degrees with the ground.

Wheelbase:

- The front axle of the 2000 car is set with a ½" of lead.
- The distance from the back plate on the front axle where the bottom heim of the right front shock locates, to the center of the rear axle on the right side, should measure as listed below according to your car size.
- 33" car 49-1/4" Wheelbase
- 37"-41"car 50-1/4" Wheelbase
- Position the left side of front axle within a 1 /16' from the vertical frame tube on the left side of car.

Xtreme 2001 Car Measurements

Rear Panhard Bar:

- Rear Panhard bar bolts in the second hole up from the bottom of the left bearing carrier.
- On the right side, it is attached to the frame using an aluminum slider. From the top of rear frame crosstube to the center of the slider, the measurement should be 1-3/4". With the car on the ground, with the driver in it, and at the proper hide height, the slider should locate about the parallel with the rear axle. A final adjustment may need made at that time.
- Loosen the heim joint nuts and by turning the Panhard bar, position the axle so the left side radius rods that are bolted to the left bearing carrier are parallel to the frame, from front to back.

Front Panhard Bar:

- The front Panhard bar bolts in the front of your front axle.
- On the right side, it also is attached to the frame using an aluminum slider. From the bottom of the front frame crosstube to the center of the slider, the measurement should be 1-1/2". With the car on the ground, with the driver in it, and at the proper ride height, this slider would also locate about parallel with the front axle. A final adjustment may need made at that time.
- Loosen the heim joint nuts and by turning the Panhard bar, position the axle so the left front shock is positioned straight up and down.

Square Rear Axle:

- This means you want the top dead center of the bearing carriers to be as close to the center of the axle as possible, you should do this at the same time you have squared the rear axle. The same radius rods are used to rotate the bearing carrier and you must recheck the rear axle to make sure it is still square in the car.
- The easiest way to time your bearing carrier is by using the back of the bearing carrier plate; it is flat and vertical. Position this 90 degrees with the ground.

Wheelbase:

- The front axle of the 2001 car is set with 1-1/4" of lead.
- The distance from the back plate on the front axle where the bottom heim of the right front shock locates, to the center of the rear axle on the right side should measure as listed below according to your car.
- 33"-35" car 48-1/2" Wheelbase
- 37"-41" car 49-1/2" Wheelbase
- Position the left side of the front axle within a 1/16" from the vertical frame tube on the left side of car.

Xtreme 2002 Car Measurements

Rear Panhard Bar:

- The rear Panhard bar bolts in the second hole up from the bottom of the left bearing carrier.
- On the right side, the Panhard bar bolts to the frame in the fourth hole up from the bottom. Loosen the heim joint nuts and by turning the Panhard bar, position the axle so the left side radius rods that are bolted to the left bearing carrier are parallel to the frame, from front to back.

Front Panhard Bar:

- The front Panhard bar bolts in front of your front axle.
- On the right side, the Panhard bar bolts to the frame in the second hole up from the bottom. Loosen the heim joint nuts and by turning the Panhard bar, position the axle so the left front shock is positioned straight up and down.

Square Rear Axle:

- The distance between the back of the rear axle and the centerline of the rear frame crosstube in 5" on the 33"-35" cars and 4 3/4" on the 37"-39" cars.

Timing Bearing Carriers:

- This means you want the top dead center of the bearing carrier to be as close to the center of the axle as possible, you should do this at the same time you have squared the rear axle. The same radius rods are used to rotate the bearing carrier and you must recheck the rear axle to make sure it is still square in the car.

- The easiest way to time your left bearing carrier is by using the back edge of the plate; it is flat and vertical. Position this 90 degrees with the ground. On the right it would be easiest to use the bottom of the brake plate and make sure it runs evenly with the bottom frame rail. Keep in mind, the radius rods locate at the center of your bearing carrier and positioning the bolt of the top radius rod to the center of the axle can be a reference point.

Wheelbase:

- The front axle of the 2002 car is set with 1"-1 ¼" of lead.
- The distance from the back plate on the front axle where the bottom heim of the right front shock locates, to the center of the rear axle on the right side, should measure as listed below according to your size car.
- 33"-35" car 48-5/8" Wheelbase
- 37"-39" car 49-5/8" Wheelbase
- Position the left side of front axle within 1/ 16" from the vertical frame tube on the left side of car.

Tips to Help Car and Driver Stay Fast

CHASSIS ADJUSTMENT OPTIONS TO CORRECT A "LOOSE" OR OVERSTEER CONDITION (pavement, locked rear axle)

- RAISE THE LEFT REAR RIDE HEIGHT TO INCREASE CROSS WEIGHT IN CHASSIS (THE LEFT REAR THEN DRIVES MORE)
- INCREASE LEFT REAR TIRE PRESSURE (REDUCES STAGGER AND INCREASES CROSS WEIGHT IF RIDE HEIGHT NOT READJUSTED)
- REDUCE THE RIGHT REAR SPRING RATE
- LOWER THE REAR PANHARD BAR ON THE FRAME SIDE
- INCREASE THE LEFT REAR SPRING RATE
- INCREASE THE RIGHT FRONT SPRING RATE
- REDUCE REAR TIRE STAGGER
- REDUCE THE AMOUNT OF FRONT AXLE LEAD IN THE CAR
- REDUCE RIGHT FRONT CASTER (CHANGES CAMBER WHILE FRONT WHEELS ARE TURNED AND DOESN'T UNLOAD THE LEFT REAR AS MUCH)
- MOVE THE RIGHT REAR TIRE IN
- LOWER THE ENTIRE REAR OF CAR AND/OR RAISE THE FRONT OF CAR

Notes: Increased cross weight helps only in the middle and exit of corner, not entry. Increased front spring rate helps on entry and middle but not on exit.

CHASSIS ADJUSTMENT OPTIONS TO CORRECT A "TIGHT" OR UNDERSTEER CONDITION (pavement, locked rear axle)

- LOWER THE LEFT REAR RIDE HEIGHT TO DECREASE CROSS WEIGHT IN CHASSIS (THE LEFT REAR THEN DRIVES LESS)
- DECREASE LEFT REAR TIRE PRESSURE (INCREASE STAGGER AND DECREASES CROSS WEIGHT IF RIDE HEIGHT NOT READJUSTED
- INCREASE THE RIGHT REAR SPRING RATE
- RAISE THE REAR PANHARD BAR ON THE FRAME SIDE
- DECREASE THE LEFT REAR SPRING RATE
- DECREASE THE RIGHT FRONT SPRING RATE
- INCREASE REAR TIRE STAGGER
- INCREASE THE AMOUNT OF FRONT AXLE LEAD IN THE CAR

- INCREASE RIGHT FRONT CASTER-INCREASES CAMBER WITH WHEEL TURNED AND UNLOADS THE LEFT REAR

- MOVE THE RIGHT REAR TIRE OUT

- RAISE THE ENTIRE REAR OF CAR AND/OR LOWER THE FRONT OF CAR

  Notes: Increased cross weight helps only in the middle and exit of corner, not entry. Increased front spring rate helps on entry and middle but not an exit.

CHASSIS ADJUSTMENT OPTIONS TO CORRECT A "LOOSE OR OVERSTEER CONDITION (pavement, unlocked rear axle)

- PUT TURNS IN RIGHT REAR-RAISES RIDE HEIGHT AND INCREASES NORMAL FORCE ON RIGHT REAR TIRES

- TAKE TURNS OUT OF RIGHT FRONT-LOWERS RIDE HEIGHT AND DECREASES NORMAL FORCE ON RIGHT FRONT TIRE

- REDUCE THE RIGHT REAR SPRING RATE

- LOWER THE REAR PANHARD BAR ON THE FRAME SIDE

- INCREASE THE RIGHT FRONT SPRING RATE

- REDUCE THE AMOUNT OF FRONT AXLE LEAD IN THE CAR

- REDUCE RIGHT FRONT CASTER (CHANGES CAMBER WHILE FRONT WHEELS ARE TURNED AND DOESN'T UNLOAD THE LEFT REAR AS MUCH)

- MOVE THE RIGHT REAR TIRE IN

- LOWER THE ENTIRE REAR OF CAR AND/OR RAISE THE FRONT OF CAR

  Notes: Increased front spring rate helps on entry and middle but not on exit

CHASSIS ADJUSTMENT OPTIONS TO CORRECT A "TIGHT" OR UNDERSTEER CONDITION (pavement, unlocked rear axle)

- TAKE TURNS OUT OF RIGHT REAR-LOWERS RIDE HEIGHT AND DECREASES NORMAL FORCE ON RIGHT REAR TIRE

- PUT TURNS IN RIGHT FRONT-RAISES RIDE HEIGHT AND INCREASES NORMAL FORCE ON RIGHT FRONT TIRE

- INCREASE THE RIGHT REAR SPRING RATE

- RAISE THE REAR PANHARD BAR ON THE FRAME SIDE

- LOWER THE FRONT PANHARD BAR

- DECREASE THE RIGHT FRONT SPRING RATE

- INCREASE THE AMOUNT OF FRONT AXLE LEAD IN THE CAR
- INCREASE RIGHT FRONT CASTER (CHANGES CAMBER WHILE FRONT WHEELS ARE TURNED AND DOESN'T UNLOAD THE LEFT REAR AS MUCH)
- MOVE THE RIGHT REAR TIRE OUT
- RAISE THE ENTIRE REAR OF CAR AND/OR LOWER THE FRONT OF CAR

  Notes: Lowering the front panhard bar does not help on corner exit