



2008_{V.0108}

KNOWLEDGE PACKET



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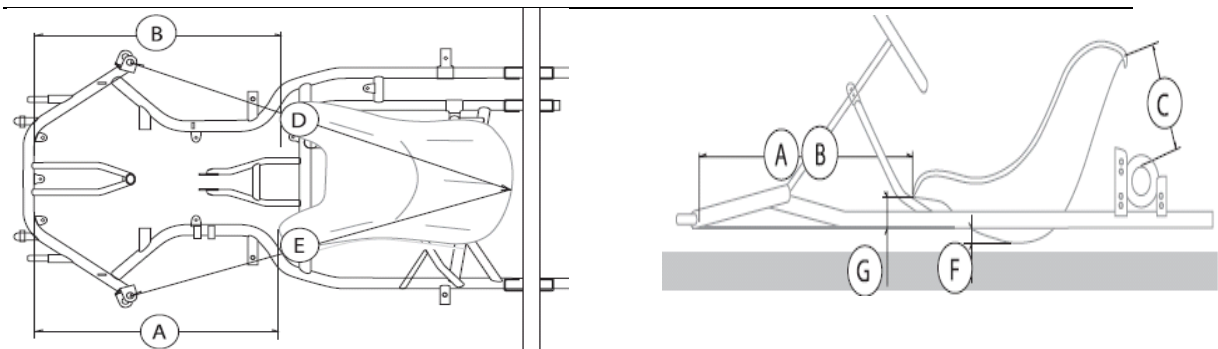
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1. Seat Installation (100 and 125cc)

- A (mm) Dimension.....610mm
- B (mm) Dimension.....605mm
- C (mm) Dimension.....220mm
- G (mm) Dimension.....10cm



-If the driver is taller, measurements A and B can be increased by up to 10mm each, while reducing dimension C by 5mm.

-If the track is very ‘Green’ lacking rubber all dimensions can be changed as well. Often time dimensions A and B can be increased by 20-25mm in order to increase the effective weight percentage on the rear of the chassis, thus increasing the chassis grip. This will increase the chassis effectiveness when the driver is applying the power. In low grip conditions the seat can also be raised higher by increasing dimension G from 10cm to 11-11.5 cm. This change will effectively increase the chassis ‘Side Bite’ allowing the chassis to work the tires more.

Part Number	Product Description
0037.FP	FLAT BOTTOM SEAT - FIBERGLASS
0037.00	STANDARD SEAT - FIBERGLASS

1A. Ballast (Weight Mounting)

J3 recommends using OTK weights, either 1 Kg (2.2 lbs) or 3 Kg (6.6 lbs). Part Numbers for both items are: (PN 0275.03) and (PN 0275.01) When fastening the weights to the seat use both provided holes on the weights with the proper hardware purchased through J3 Competition. Check with the organization(s) you are competing with to insure all rules are met. For general balance of the chassis depending upon how much if any weight you need to mount, it should be placed opposite of the engine and below the seat on the front edge that contours the driver’s legs. This will provide for a good starting point.

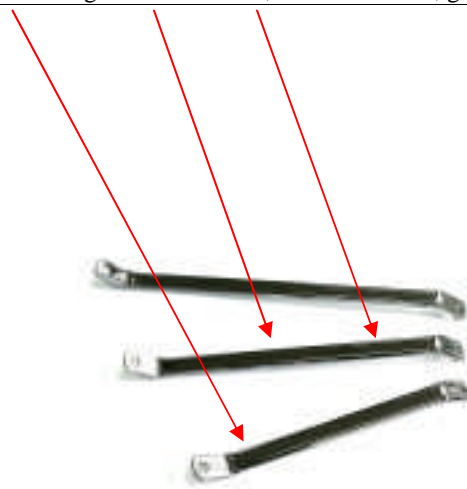


1B. Rear Seat Struts

Each Kosmic Kart is supplied with two (2) supplemental seat struts, one (1) for each side. The extra seat struts are designed to be fixed atop the rear axle cassette and then fastened to the seat with the provided hardware. A good place to start is using one (1) on each side. Many drivers prefer to use two (2) on each side, which will effectively force more direct-pressure from the driver's weight transfer on the rear tires. This will consequently improve grip to the rear of the chassis.

By removing seat struts you allow for the rear of the chassis to release and spring off the track easier. This can be an added benefit when attempting to improve the chassis performance during cornering. Be careful though, by removing seat struts, the initial cornering may improve, but the potential to create an over-steer on exist will become more prevalent as well as the overall balance of the chassis.

J3 has several lengths of seat struts, so don't rush it, get the right size!



Part Number	Product Description
0006.280	SUPPLEMENTARY SEAT'S SUPPORT 280 mm
0006.300	SUPPLEMENTARY SEAT'S SUPPORT 300 mm
0006.320	SUPPLEMENTARY SEAT'S SUPPORT 320 mm
0006.340	SUPPLEMENTARY SEAT'S SUPPORT 340 mm
0006.380	SUPPLEMENTARY SEAT'S SUPPORT 380 mm
0006.400	SUPPLEMENTARY SEAT'S SUPPORT 400 mm
0007.340	SUPPLEMENTARY BENT SEAT'S SUPPORT 340 mm



2. Front Track Adjustment

Nearly all Post-2005 Kosmic Racing Karts are sold with HST front stub axle, which has a 25mm stub in order increase the chassis front-end grip or effectiveness.

The recommended front width is to use 3-5mm spacers on the inside of the hub (Standard 90mm HST Hub). If the track has less grip a narrow front track will improve the chassis initial reaction, however, this may cause the chassis to lose performance on longer corners. A track with medium to high grip often times requires a wider front track width in order to increase the chassis weight transfer. This also helps the chassis to be more effective on longer corners when more driver input is often times required to keep the speed up.

3. Rear Track Adjustment

We recommend always starting with the standard OTK 92mm rear hubs. Typically we will start the rear track at the maximum.

- For the senior divisions this will be 55" and for the junior divisions this will be 53 ½". (Measured from outside rear wheel to outside rear wheel). From this point the only real movement is to narrow the rear track.

- By narrowing the rear track of the chassis while leaving the front track untouched the chassis will become more effective at releasing the inside rear tires during cornering. This can initially improve the chassis performance as well as through the entire corner. However, as grip levels change a narrow rear track can also create too much 'Side Bite' thus, giving the chassis too much grip in the middle of the corner and decreasing its effectiveness. It is also recommended when the grip levels are low to test the rear track width narrower due the potential increase in 'Side Bite' from the tire. Rear width can sometimes be complicated in regards to the effects it has on the chassis performance, therefore, make minuet changes when adjusting. And one of the major factors with rear width is chassis balance 'Feel'. Some drivers do not like to drive on a chassis with a narrower rear track width, so know your driver.

4. Caster / Camber adjustments

Caster and Camber can be adjusted at the front-end of the chassis. Depending on which model Kosmic Racing Kart you have, there will be either 4-position ball bearing adjustment, 4-position non-bearing eccentric either in D.8mm or D.10mm, or Post-2007 20-position ball bearing adjustment.

J3 recommends starting with full caster, which can be attained with the top eccentric arrow facing forward and the bottom eccentric arrow facing backwards. This will give the front-end maximum grip from a caster perspective and can possibly make the chassis more difficult to turn as well. This is the most often setup regarding the caster position.



The eccentrics can be rotated to reduce the amount of caster, which will make the chassis easier to steer and it will remove front-end grip as well. The Front-end geometry can effect the chassis in many different ways as well depending upon the track conditions. We recommend keeping it basic until you are familiar and comfortable making these changes to your chassis.

2008 Kosmic Eccentric! Notice the Added Adjustment Holes!



Part Number	Product Description
0211.D0KIT	COMPLETE HST EXCENTRIC BUSH D.22-10 New - 2008
0211.C0	INTEGRAL EXCENTRIC BUSH HST
0212.C0	INTEGRAL CONCENTRIC BUSH HST
0212.A0KIT	COMPLETE CONCENTRIC BUSH D.22
0211.A0KIT	COMPLETE EXCENTRIC BUSH D.22

5. Front-End Ride Height Adjustments

The Kosmic Racing Kart has three (3) washers that are placed between the stub axles and the 'C' on the Front-end of the chassis. Two (2) of the washers are special 4mm thick washers (PN 0215.00) and one (1) standard 1.5mm thick washer (PN RP 10x16x1.5). By altering these washers you will be effectively changing the front ride height. The chassis comes standard with one 4mm washer on top of the stub axle and the remaining washers below the stub axle. This is a recommended starting position at all venues.

Raising the Front Ride Height

This is accomplished by placing washers from the bottom of the stub axle and placing them on top of the stub axle. This has a positive effect on the entire chassis when the grip levels increase and the chassis begins to understeer. Essentially the front ride height has been increased so, when the steering wheel is turned the inside tire is pushed/forced



further into the track thus giving the driver a more positive feel (Front-Grip) and it will result in a better handling chassis.

Lowering the Front Ride Height

The process for lowering the front ride height is the exact opposite as raising the front ride height. The advantages here are that the front-end will feel 'lighter' while losing some of its efficiencies. This can also sometimes be good on high grip tracks where the driver has troubles driving on the higher grip.

*Front-End ride height adjustments can make a big difference if applied correctly; however, this adjustment is best saved after other adjustments have been made to your Kosmic

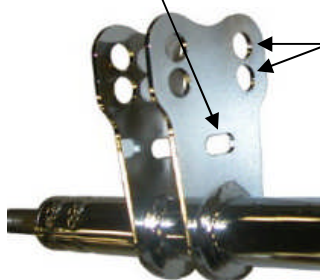
6. Ackerman and Steering Adjustments

Kosmic Racing Kart's have two (2) different types of steering columns both are 47cm. The standard steering columns part number is (PN 0005.BA). The pitman arm or mounting plate on the column has two (2) locations for fixing the tie rod tubes. The standard and most often used fixing points are the lower set of holes, this gives maximum Ackerman setting. When the tie rod tubes are located in the upper holes, Ackerman has essentially reduced. Reducing the Ackerman will effectively make the steering lighter and easier for driver physically; however, this will also reduce the radius at which the front wheels turn making the front end less effective and responsive to input from the driver throughout the turning process.

The second steering column available in 47cm is (PN 0005.F0). The pitman arm on this column is longer, thus moving both sets of holed further away from the column, which increases the grip and responsiveness of the chassis front-end.

! Notice the 'Slot'! – This indicates the 47cm column with added Ackerman

! Notice the two sets of holes!





7. Rear Ride Height Adjustments

Kosmic Karts that have been produced from 2006 and beyond are equipped with a three (3) position rear carriage adjustment. This is a nice feature with gives the owner ample room to adjust the rear axle of their chassis. Each chassis comes standard with the axle placed in the center position of holes. We highly recommend starting with the rear ride height in the center and adjusting as needed once at the track. Typically the adjustments here are not very frequent, however, when adjustments are made and in the right direction positive gains will be found on the stopwatch.

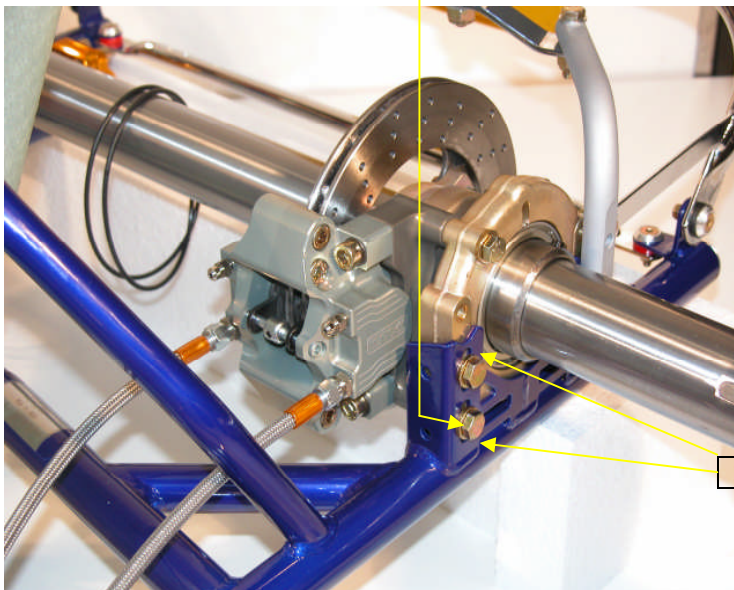
Lowering the Rear Ride Height

This essentially means raising the axle to the top set of holes, which will conversely lower the chassis position to the track surface. The typical reasoning behind this move is to 'free' the back of the chassis, therefore, reducing the grip level. How does this work? Essentially by doing so you have reduced the chassis effort to release or lift the inside rear tire during cornering, which can be crucial in optimizing a racing Karts performance (*Note: Lifting the inside rear tire too much, will cause more negative problems than being a benefit*) The benefit of this move will be noticed under braking also, with the chassis closer to the track surface, general braking will result in a less nervous chassis.

Raising the Rear Ride Height

This is an option than can yield effective results, but rarely. This change will increase the chassis rear grip level.

! Notice the chassis is in the center position!



! Notice the additional holes for adjustment!



8. Tire Pressures

<i>Class</i>	<i>Compound/Make</i>	<i>Cold</i>	<i>Hot</i>
Cadet	Bridgestone YHC	<i>Vary</i>	12.5psi / .85 Bar
100cc Junior	Bridgestone YHC	<i>Vary</i>	12.5psi / .85 Bar
TaG Senior	Bridgestone YHC	<i>Vary</i>	12.5psi / .85 Bar
ICA	Bridgestone YJB	<i>Vary</i>	11.5psi / .75-.8 Bar
125cc/KZ/ICC	Bridgestone YJB	<i>Vary</i>	11.5psi / .75 Bar

General rule: The higher the tire pressure is started out at, the quicker the tire will reach its optimum pressure. This will also cause the tire to have a decreased window of effectiveness. Therefore, in longer races it is better to start off at a lower pressure giving the tire a longer window of optimum operating time.

9. Axle Chart and the effectiveness

Axles are very much talked about regarding tuning a Kart and rightfully so. OTK produces six (6) axles for the 100cc category and five (5) for the 125cc gearbox category. OTK Type 'N' is the standard axle and medium stiffness for the entire range. This axle is also what each chassis comes standard with from the factory.

Which is the best axle to use when? Generally the consensus is that a softer axle (Type U) will free the chassis letting it operate more freely around the track. This may be true in some instances but typically not with the OTK material. Typically it is recommended to use a harder axle (Type H or HH) when the grip levels increase. Softer axles are recommended more for use when the grip levels are low. Why is this true? This holds true mainly due to the fact the chassis are made of soft 30mm tubular steel. With a soft chassis and a softer axle you will essentially create the tire to work more creating "Side Bite" or the sidewall of the tire to rollover. This will cause the chassis to 'Hop' and therefore lose its effectiveness throughout the race. Keep with the 'N' axle; we use this axle 80% of the time and as the grip level increases the 'H' will work for your needs. Remember that the axle doesn't simply work outside the chassis, it also creates balance between the frame rails, and therefore, increased stiffness on your axle selection will give the chassis more balance as well.

**Axle Chart provided on the following page*



10A. Tuning Bars (Rear Torsion Bar)

Kosmic Racing Karts are provided with only one (1) style rear torsion bar. The bar is made of steel and measures 470mm (PN 0235.GA). The bar is round on each end at 30mm with the center being flattened to resemble a 'Blade'. Since the rear torsion bar is manufactured in a 'Blade' configuration we also suggest using it in the horizontal position, thus the blade laying flat. In typical dry conditions we recommend to NOT use the rear bar. The rear bar will make the chassis more stable; however, it can cause the chassis to work the tires too much, which will result in poor tire wear and a large possibility of an understeer.

**Note: This is a good option if you are looking for added grip*

When should you use the rear torsion bar? The rear torsion bar has its main advantages in longer sweeping corners. If the track layout is made of sweeping corners try the rear bar, but only do this on applications where the Hp is greater than 100cc application.

11. Rear Hubs

The possible options for rear hubs on the Kosmic Kart are very large. They range from different lengths to different material stiffness. All Kosmic (Racing Edition) Karts come outfitted with magnesium rear hubs where Kosmic (Competition Edition) Karts come outfitted with aluminum rear hubs. We recommend the magnesium hubs since they are stiffer than the optional soft aluminum hubs. This creates added consistency as well as improved handling and driver feel as well. Below is a breakdown of the different options:

OTK – Part Number	Description	Material Type
0046.KE	WHEEL'S BOSS AL D. 50 X 56	Aluminum
0053.KE	WHEEL'S BOSS AL D. 50 X 92	Aluminum
0046.E0	WHEEL'S BOSS MG D. 50 X 56	Magnesium
0053.E0	WHEEL'S BOSS MG D. 50 X 92	Magnesium
0053.F0	WHEEL'S BOSS MG D. 50 X 148	Magnesium

Each Kosmic Kart comes standard with either 50 x 92 rear hub. This hub is recommended for primary use. Using either the 56mm or 148mm rear hubs are great options as well. The 56mm rear hub will allow the wheel and tire to flex more creating the potential for a better outcome on lower Hp applications. The largest hub, 148mm, is only used and recommended for use in gearbox applications. This hub adds more rear grip and stability, which are often times required by larger Hp applications.

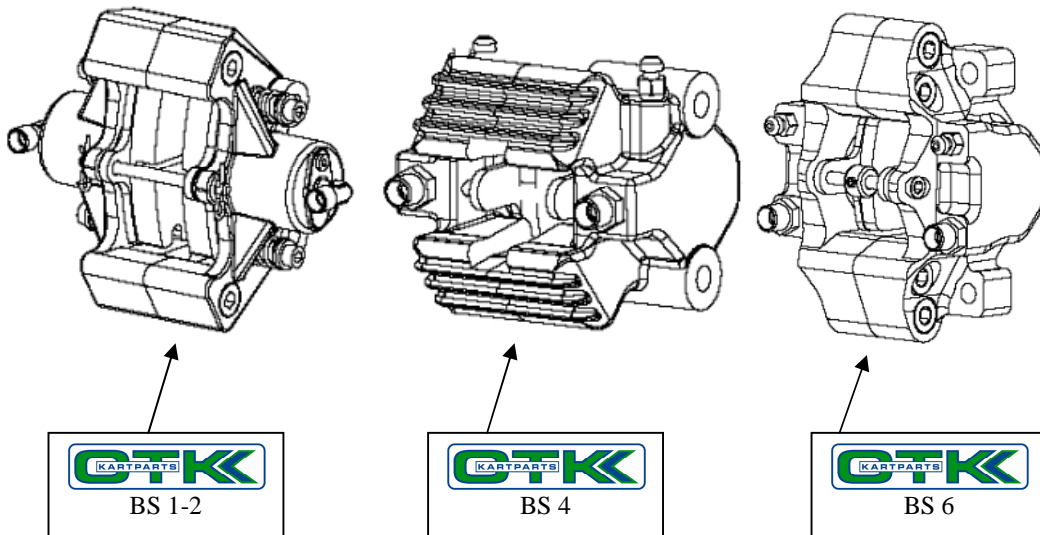
“This Hub is the best option nearly all the time” – J3

12. Braking Systems (Rear)

Depending on the year of production, your Kosmic Racing Kart may have several different braking systems. All braking systems are equipped with highest of quality standards as well as CIK/FIA Homologated. Typically any chassis purchased later than 2006 will come fully equipped with the BS6 rear caliper and for gearbox applications the BS6 with its counterpart the BS5 system.

In order to simplify the situation we have provided an estimated time line detail the braking system you may have:

Production Year	Part Number	Product Description	System Type
2000 - 2003	0082.KA	COMPLETE HYDRAULIC REAR BRAKE CALIPER	BS 1-2
2003-2005	0082.DA	COMPLETE HYDRAULIC SELF-ADJUSTING REAR BRAKE CALIPER	BS 4
2005-2008	0082.EA	COMPLETE HYDRAULIC SELF-ADJUSTING REAR BRAKE CALIPER	BS 6



*Brake Fluid requirements are as follows:

Fluid	System
Dot 4	BS1-2
Dot 4	BS 4
Dot 5	BS 5/6

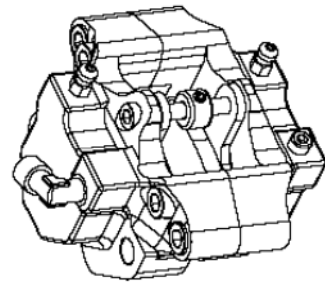
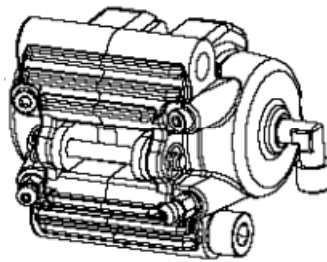
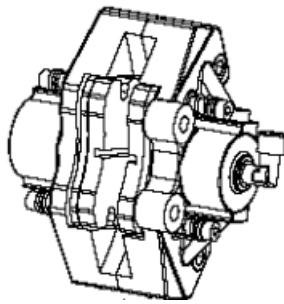


12b. Braking Systems (Front)

Depending on the year of production, your Kosmic Racing Kart may have several different braking systems. All braking systems are equipped with highest of quality standards as well as CIK/FIA Homologated. Typically any chassis purchased later than 2006 will come fully equipped with the BS6 rear caliper and for gearbox applications the BS6 with its counterpart the BS5 system.

In order to simplify the situation we have provided an estimated time line detail the braking system you may have:

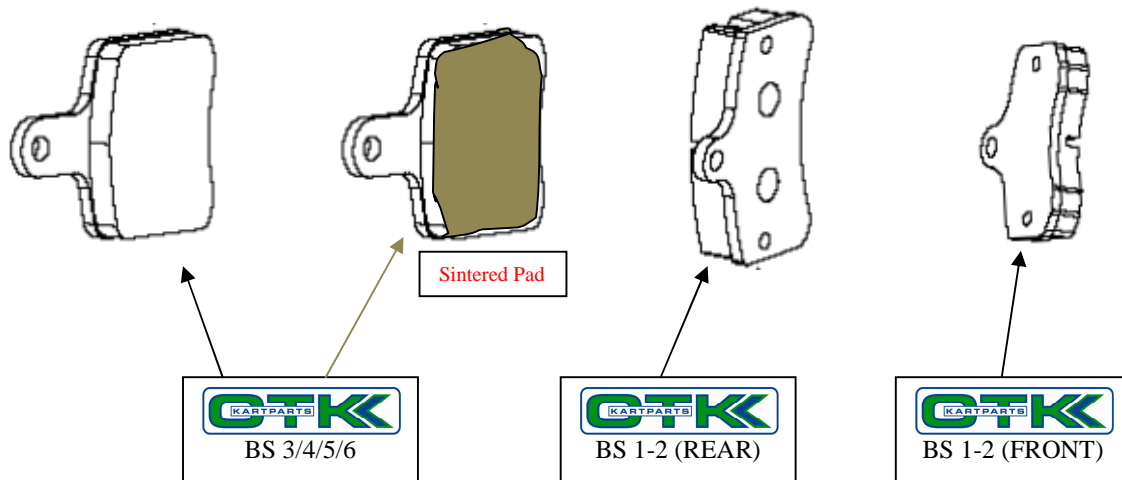
Production Year	Part Number	Product Description	System Type
2000 - 2003	0100.BA	COMPLETE HYDRAULIC FRONT BRAKE CALIPER	BS 1-2
2003-2005	0100.DA	COMPLETE HYDRAULIC SELF-ADJUSTING FRONT BRAKE CALIPER	BS 3
2005-2008	0100.EA	COMPLETE HYDRAULIC SELF-ADJUSTING FRONT BRAKE CALIPER	BS 5



12c. Brake Pad Identification

With the several different braking system options, there are corresponding brake pads for each system. The unique advantages to the OTK braking systems are that the BS3/4 and BS 5/6 all require the same brake pad for the front and rear. The BS 1-2 system is the only system that calls for separate rear and front brake pads.

Part Number	Product Description	System Type
0082.B4	REAR BRAKE PAD	BS 1-2
0100.B4	FRONT BRAKE PAD	BS 1-2
0082.D4	REAR/FRONT BRAKE PAD	BS 3/4/5/6
0082.D4A	REAR/FRONT BRAKE PAD SINTERED	BS 3/4/5/6



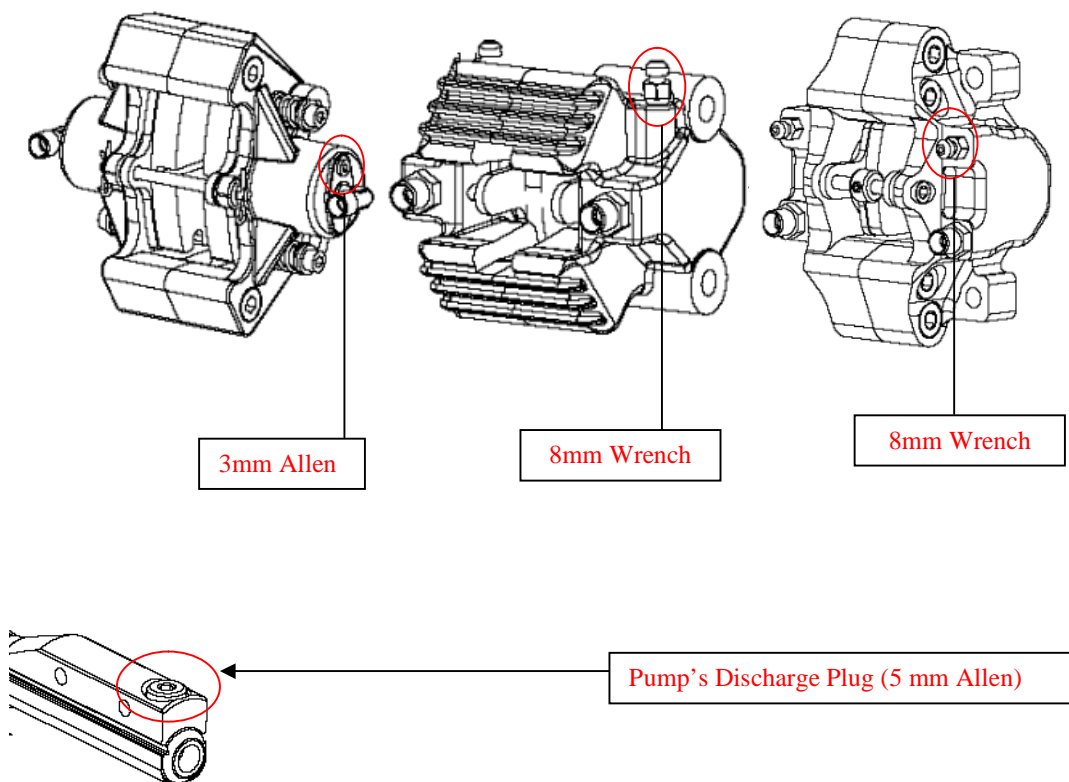


12d. Brake Bleeding

When bleeding your make sure have the proper OTK brake bleed kit (PN 0156.00). This tool enables for an effective and efficient job. Here are the steps required.

1. Take a 5mm Allen wrench and remove the braking pumps discharge plug
2. Insert your OTK Bleeding Kit by carefully begin screwing it into the fitting.
3. Once secure, remove the top cap on the Bleeding Kit and turn the valve to the 'On' Position'
4. Now, move to the rear caliper and underneath the bleeding screws place a rag (in order to absorb any residue and spillage).
5. Once complete remove the bleeding screw and let the bleeding kit force all the air out of the brake line
6. Once the air appears to be gone, insert the bleeding screw.
7. Repeat this step for each brake pump on the chassis
8. When finished make sure that you have securely tightened the discharge plugs.

***Highlighted are the Bleeding Screws on the various caliper models**





13. Basic Wet Weather Tips

Most of the time, the dreaded rain comes and the change over from dry to wet setup is rushed with only a 15-25 minute window to make the changes. What can be done in such a short window of time? Actually, a lot, almost everything you will need to do.

Wet Conditions

- Widen the front hubs as far as possible
- Narrow the rear track width so the center line of the rear tire matches the center line of the front tire
- Loosen the extra seat struts, you can keep them on, but make sure they are loose with the nut barely attached (so it will not fall off)
- Remove the front torsion bar (and rear if you were running it in the wet)
- Loosen the floor tray bolts
- Adjust the front-end geometry to 4mm open toe-in

**This will be a very good starting point*

Very Wet Conditions

- Widen the front hubs as far as possible (Install Longer Front Hubs if Possible)
- Narrow the rear track width so the center line of the rear tire matches the center line of the front tire (Use shorter rear hubs 56mm)
- Loosen the extra seat struts, you can keep them on, but make sure they are loose with the nut barely attached (so it will not fall off)
- Remove the front torsion bar (and rear if you were running it in the wet)
- Loosen the floor tray bolts
- Adjust the front-end geometry to 4mm open toe-in
- Raise the front ride height
- Install a softer axle or try raising the rear axle
- Remember if the track has sweeping corners, try the rear bar. It will lose efficiency in the slower corners, but the gains in the long sweeping corners may offset the difference?
- Try to also raise the seat in an attempt to bring the driver's center of gravity higher

**This will be a very good starting point*

! Notice the Longer Front Hub for added Grip!





14. Conclusion

J3 Competition is committed to making all Kosmic Racing Kart owner's champions and race winners. We hope this informative 'Knowledge Packet' will further help our customer's understand the basic workings of their chassis. J3 Competition's technical line is always available for any clarification(s) or added understandings regarding the material found in this packet or additional information required.

The information in this packet is 'general knowledge' and may not apply to all owners or track conditions encountered. Keep in mind that trial and error is still a great means of understanding the Kosmic material. Our aim is lessen the learning curve and instill our knowledge and assets to help our customers reach their desired results at a greater rate!

The J3 Competition's technical department will be releasing monthly updates on certain products both new and current to keep the entire customer base up to *Speed!*

Thanks Again

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- 1.3 Factors to check during weight distribution analysis
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Chapter 1: Weight Distribution

1.1 Introduction

The most important handling adjustment is made before the kart reaches the track. The kart must be scaled and adjusted to ensure optimum performance. The desired weight distribution is achieved by scaling and adjusting the chassis and moving around weights. Improper weight distribution can cause front end push (understeer), excessive or insufficient load on any one tire, chassis binding, and lack of side bite in cornering among many other problems. An improper weight distribution can also lead to incorrect diagnosis of handling problems at the track. For Tonykarts, the following weight distributions are recommended:

43% Front Weight
57% Rear Weight
50%:50% Left/Right Weight

These are just recommended starting points. Weight can be moved around at the track to change the handling characteristics of the chassis. Moving weight to the front of the kart will provide more front end grip while moving weight to the rear of the kart will provide more rear grip. Weight can also be moved vertically up or down. Moving the weight vertically upwards will provide more grip in the location of the weight while lowering the vertical position of the weight will have the opposite effect. Keep the side to side weight distribution as close to 50%:50% as possible.

1.2 Seat Placement/Adjustment

The seat placement is the single most important weight adjustment on the kart and is done before weight distribution analysis. Perfect seat placement may result in almost perfect weight distribution before any weight is even added to the kart. Tonykart provides a set of specifications for seat placement that should be followed as closely as possible. Consult your local Tonykart Dealer for specifications for your specific model.

1.3 Factors to Check Prior to Performing Weight Distribution Analysis

The following processes are all very important to ensuring accurate weight distribution analysis.

1. Ensure that the floor is level.

This can be done by purchasing a 5-6 ft. level and checking the floor where the centerlines of the front and rear axles will rest. The floor should also be checked along both sides of the kart across the width of the wheel base. Compensate for an unlevel floor by placing shims under the appropriate corner scales.

2. Set toe and center the steering wheel.

If the wheels are not centered during weighing, the geometry of the kart, mostly the castor, will cause the corners of the kart to be loaded incorrectly. The readings on your scales will then be false

3. Set castor and camber

4. Set spindle heights at desired height.

5. Check tires to make sure they are at race settings.

6. Add weight in appropriate places to approximate fuel and/or oil.

Remember, however, that fuel and oil weights are dynamic. They will change during a race.

7. Replicate racing conditions.

When the driver is in the kart, it's critical they maintain a normal driving position as movements will effect readings. Wear full race gear during weighing to have the highest level of accuracy possible.

8. Zero all scales.

1.4: Adjusting Kart Weight

Kart weights are usually not at the desired specifications after the first weighing. If distribution is off, and weight is needed, begin to place the appropriate amounts in the appropriate places. By following Tonykart's seat specifications, you should be able to obtain 50/50% side to side distribution. If you are way off on your side to side weight distribution than recheck your factors effecting weight distribution. You might have to move the seat just a little bit to obtain the correct weight distribution. If you are at the limit of your specific weight class than you might have to live with weight distribution that is not perfect. However, your Tonykart seat specifications should put your distribution pretty close. If you are under your specific class weight limit, add weight to the appropriate locations. Do not place any lead shot inside the frame. The weight will shift during cornering and cause handling problems.

Although overall side to side weight distribution may be correct, individual front or rear side to side distribution may be slightly skewed. Your front wheels should weigh within 5 lbs. of each other while the same applies to the rear wheels. If this is not the case, recheck all of the factors effecting weight distribution given above and reweigh. If the problem still exists, you

may have a chassis problem.

Once final weight placement is determined, secure all weight properly. Preference is Grade 5 or better with 5/16 bolts of appropriate length. Be sure to cross drill and safety wire or safety clip each one. Most sanctioning bodies require double nutting of ballast as well. Be sure to consult your rule book. If your weight is not secure, this can cause serious problems for other drivers at the track if your weight comes loose. Not only does this have the potential to cause injury and equipment damage, it is basis for disqualification during a race.

Chapter 2: Front End

2.1: Introduction to the Front End

Many important and easy handling adjustments can be made to the front end of the kart. Most handling problems that occur during the entrance of the corner are probably results of improper front end adjustment. Turn in, front end bite, and steering response can all be corrected by simple adjustments to the front of the kart.

2.2: Toe Adjustment

The toe settings on a kart can effect weight distribution, top speed, and cornering response. The more the kart is toed in or out, the slower the top speed becomes due to excessive drag by the tires. Increasing toe out will increase initial cornering response. If the kart feels touchy and the back end gets loose at the entrance of the corner than you probably have too much toe out. Neutral toe adjustment is recommended for Tonykart chassis. The toe should only be changed as a last resort. Look to other adjustments first to correct handling problems before changing your toe settings.

IMPORTANT: When making adjustment to toe, make sure that the toe is equal on each side. Twist the tie rods until they are completely in or out, and mark them. Turn them back in from there, measuring toe and counting turns until the desired point is reached.

2.3 Castor

Castor effects the bite of the front and rear end and also changes apparent weight of the steering. It does this by transferring weight to the opposite rear wheel during cornering. The less castor in a kart, the less road-fell the driver will receive. Castor adds feel and bite to the front end. On Tonykarts, there are two pills used to adjust the castor giving you three possibilities:

12 degrees
Neutral (14 degrees)
16 degrees

For most applications, use the neutral castor pill. Too much castor slows the cornering speed of the kart due to unnecessary grip. However, on cold days, or when the use of harder compound tires are required, adding castor can help prevent understeer and make the kart more driveable. Although the use of 12 degrees castor in Tonykarts is uncommon, it may be necessary under sticky track conditions to free up the kart.

2.4: Spindle Height

By rearranging the two spindle spacers, the spindle height of each side of the kart may be changed. Keep both sides the same height. By moving both spindle spacers to the top of the spindle, you are raising the front end of the chassis. Raising the chassis height creates more leverage in which to transfer side weight to the opposing tire and thus results in more front end bite at the entrance of the corner. Lowering the chassis, or moving both spindle spacers to the bottom of the spindle, has the opposite effect and creates less front end bite at the entrance of the corner.

2.5: Wheel Spacers

The most common and easiest adjustment to make to the front end of the kart is to change the front track, or front end width. Widening the front track will create more flex in the front end of the kart and result in more front end grip and quicker turn in. Narrowing the front track will have the opposite effect and result in slower turn in and less front end bite.

2.6: Camber

Chapter 3: Rear End Adjustment

3.1: Introduction to the Rear End

The rear end of a kart begins from the back of the seat with adjustments including wheel hub length, track, rear ride height, axle stiffness, and seat struts. Changes to these settings are usually made when handling problems occur on the exit of the corner.

3.2: Wheel Hub Length

Tonykart makes three different wheel hub lengths for their chassis. It's highly recommended that you purchase all three of these sizes as they are the most commonly adjusted setting on the kart. The longer the hub the more rear end bite. Use the shortest hub if the kart feels tight at the exit of the corner and use the longest hub when the kart feels loose at the exit of the corner.

3.3: Rear Track

For American sprint racing, most rules dictate a maximum rear track of 50.0 inches. Because Tonykarts are raced primarily in Europe, they are designed for rules allowing a 55.0 inch rear track. Therefore, it is important to set your kart's rear track to the maximum of 50.0 inches. It becomes necessary to narrow the track when the rear of the kart is tight at the exit of the corner and has too much rear end bite. However, this is an adjustment only made when you have first changed your wheel hub length to the shortest hub available and are still tight at the exit of the corner. Narrow the rear track in 1/2 inch increments.

3.4: Rear Ride Height

On most Tonykart chassis there are two setting for the rear ride height. The factory recommends running the chassis with a higher ride height for better grip. The higher ride height, like the front end, creates more leverage in which to transfer the cornering loads to the opposing tire and thus results in more grip. Lowering the rear ride height will have the opposite effect and cause the kart to be extremely loose. Only in extreme cases should you change the rear ride height.

3.5: Axle Stiffness

Tonykart makes two types of axles for American Sprint Racing, type N and type C with the type N being the softer axle. In almost all cases you will use the type N axle. Such cases in which you may need to use the type C axle are cold weather, slippery track conditions, and when rules mandate the use of harder compound tires. You shouldn't be afraid to run a type C axle but at the same time, changing to the type C axle is a dramatic change and should be used only when the rear end of the kart is uncontrollably loose at the exit of the corner.

3.6: Seat Struts

On a Tonykart chassis, the factory recommends running two seat struts on both sides of the seat running from the very top of the seat to the two outer bearing cassettes. On the motor side it may only be possible to use one strut. The seat struts allow the high leverage point of the driver to be used to transfer load to the rear tires and thus create more rear end bite. When the extra seat struts are removed, the drivers high position on the kart is not taken advantage of and minimal load is transferred to the rear tires. As a result, the kart becomes extremely loose. The seat struts are therefore only removed when all else fails to loosen up the rear of the kart. If you do have to remove seat struts, try removing one set at a time.

Chapter 4: Miscellaneous Adjustments

4.1: Center Torsion Bar

Some Tonykart chassis have an adjustable torsion bar in the middle of the kart just below the seat. The bar can either be layed flat like a table top or vertical like a wall. Laying the bar flat will free the kart to slide from side to side while setting the bar vertical will give the kart more side bite and result in less drifting of the kart with all four wheels. Tonykart also makes different stiffness torsion bars to further enhance adjustment ability. The softer the bar the less side bite you will have.

4.2: Tire Pressures

Tire pressures can range dramatically from as low as 10 psi to 30psi depending on the compound of the tire. For extremely sticky tires you should stay between 10psi and 14psi. For SL tires like a Bridgestone YGC you can go as high as 16psi and with Dunlop SL4's you can go as high as 18psi. For extremely hard tires such as Bridgestone YBN's you will need to run tire pressures as high as 30psi. All tires have a range in which they work the best. In general, the higher the tire pressure,

the faster the tires will come up to race performance and the more grip you will have. However, if you put too much air pressure in the tires, the kart will become very loose. The reason for this is because the high pressures will cause the tire contact patch to form a curve in which there becomes a high point on the center of the contact patch. As a result, only part of the tire is actually touching the track and the kart gets loose.

4.3: Front Bumper

Tonykart recommends keeping the front bumper tight at almost all times. However, loosening the front bumper can be used as a tuning tool. Loosening the front bumper will give you more front end bite.

4.4: Side Pods

In normal circumstances you will want to leave the side pods tight although you shouldn't be afraid to loosen them as a chassis adjustment. Loosening the side pods will give the kart more side bite and allow for less four wheel sliding.

Chapter 5: Troubleshooting

Below is a chart of quick and easy adjustments recommended for different handling problems. Always make only one adjustment at a time.

Handling Problem	Chasis Adjustment
The back end is loose at the entrance of the corner or there is too much front end bite.	<ol style="list-style-type: none"> 1. Move in one wheel spacer on both spindles 2. Drop 1 psi in the front tires 3. Move weight away from the front of the kart 4. lower the front of the chassis 5. Put less castor in. 6. Tighten the front bumper if not already tight. 7. Check to make sure your toe is set at neutral
The front end of the kart is "pushing out", there is understeer, or the back end is tight at the entrance of the corner.	<ol style="list-style-type: none"> 1. Move out one wheel spacer on both spindles. 2. Raise the air pressure in the front tires by 1 psi. 3. Add weight to the front of the kart 4. Add more castor. 5. Raise the front end of the kart 6. Loosen the front bumper. 7. Check to make sure your toe is set at neutral, add more toe out.
The kart is sliding on all four wheels too much or there is not enough side bite.	<ol style="list-style-type: none"> 1. Turn the torsion bar in the center of the kart to the vertical position. 2. Loosen the side pods. 3. Raise the air pressure in all 4 tires by 1 psi.
The kart is not sliding enough on all four wheels or there is too much side bite.	<ol style="list-style-type: none"> 1. Turn the torsion bar in the center of the kart to the horizontal position. 2. Tighten the side pods. 3. Lower the air pressure in all 4 tires by 1 psi.
The kart is loose at the exit of the corner.	<ol style="list-style-type: none"> 1. Put longer wheel hubs on the axle. 2. Set the rear track to the maximum 50.0 inches if not already done. 3. Raise the air pressure in the rear tires by 1 psi. 4. Raise any ballast to a higher vertical position on the rear of the kart. 5. Raise the rear ride height to the maximum if not

	already done. 6. Change the axle to Type C.
The kart is tight at the exit of the corner or the front end is understeering at the exit of the corner.	<ol style="list-style-type: none">1. Put shorter wheel hubs on the axle.2. Move in the rear track by 1/2 inch.3. Lower the air pressure in the rear tires by 1 psi.4. Change the axle to Type N if not already done.5. Lower any ballast to a lower vertical position at the rear of the kart.6. Remove one set of seat struts.7. Lower the rear ride height.