Stoxkarts basic set up book

A Stoxkart although quite basic still needs to be maintained and this guide is designed to give you a few pointers. With only 13bhp to play with the secret is less friction. Too tight a chain, binding brakes, too much Toe out, non greased bearings are the most common things. Each and every driver has their own way of doing things but if you follow this guide with just a few tweaks to suite your own personal ideas you will not go far wrong.

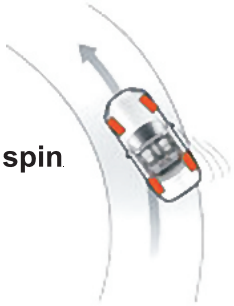
This guide is very much a beginners guide for those that have no knowledge of setting up a race car.

Here are a few basic terms you need to understand.

Understeer/Oversteer

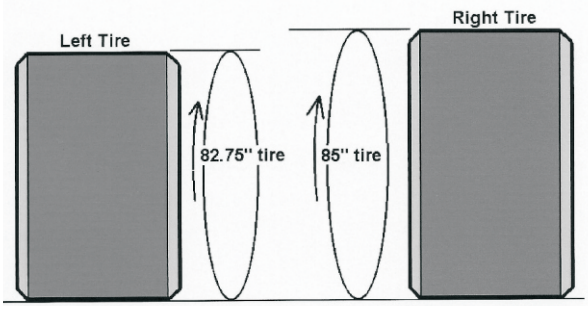
Understeer.
This is when you turn into the corner but the kart keeps going straight

Oversteer.
This is where you turn into the corner and the back end trys to come round causing a spin

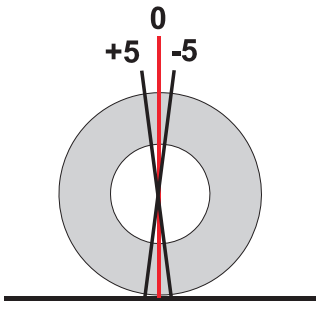


Stagger

Stagger.
This is the difference in tyre size from one wheel to another. Measuring around the tyre. Here The stagger is 2.25 Inches

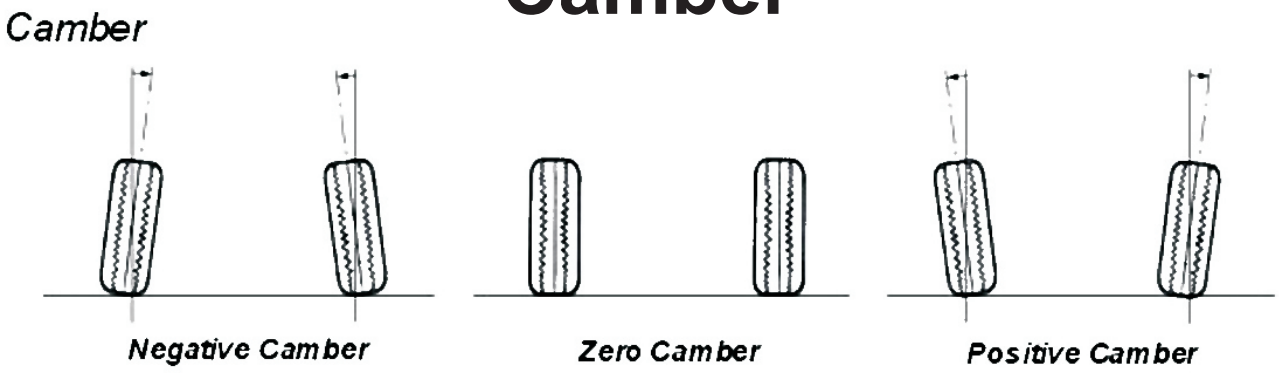


Castor



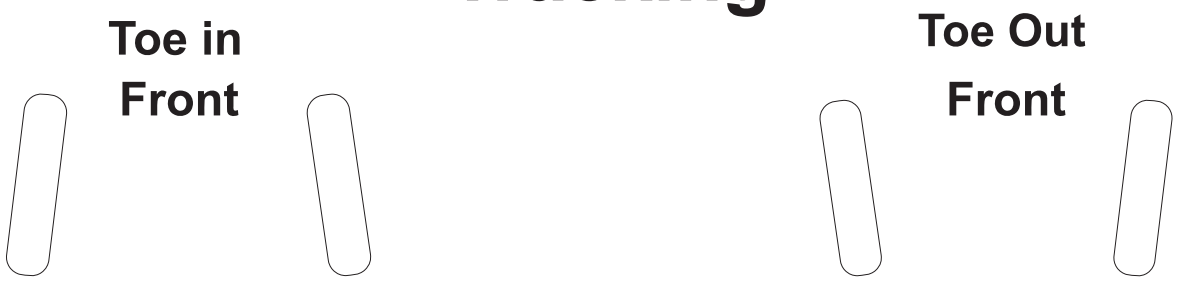
Castor. This is the angle that the Kingpin bolts lean backwards or forwards from vertical

Camber



Camber. This is how much a front wheel leans in or out at the top.

Tracking



Toe in is when you do the tracking and the measurement at the front of the wheels is smaller than the measurement at the rear. Toe out is the reverse ie. the measurement at the back is smaller.

Basic Servicing

We will start with what we suggest you do after every few meetings. We also produce a downloadable check sheet.

First off check all the Aerofiol bolts are secure none of the bracings have come loose. Check for panel work damage and check the bumper rubbers and plastics. The karts are easier to work on if you take the panels off.

Start at the front and work your way back.
Check that the pedals are free and working. Quite often the bolts can get rusty and prevent the springs from pulling the pedal back which can lead to slight pressure on the brakes. Oil the bolts that go through the pedals and do not over tighten them as long as they are in the nylock nut they should not come undone.

Check the throttle cable for tight spots and fraying, make sure it is getting full throttle, with the engine off.
A drop of oil into the plastic outer cable never hurts.

Check the bolts holding the master cylinder and if you have a reservoir type check the fluid level.Check the bolts on the brake linkage are not too tight, again these need to be able to move.

Check that the steering column is straight, very often a slight bend can really effect the steering. Check and lube the rose joint or bush at the bottom of the column and make sure it moves freely.

Jack the front up and check for play in the plug in bearings by trying to move the wheel up and down if there is play you can tighten the king pin bolt or replace the bearings.

Check the wheel bearings by trying to push and pull the wheel. If there is movement tighten the nut on the end of the stub axle.

Check the wheels run free and are not binding or catching the brake disc.

Take the wheels off, undo the track rod at the Stub axle and make sure it turns freely, repeat at the other side. Wire brush rose joint threads, put a spot of oil on threads and bearings then fasten back up. Check the track rod nuts are tight both ends and that they can swivel and are not binding. If there is play in them it is exaggerated through the steering so replace them.

Check the tracking, We recommend Parallel for tarmac and up to 3mm toe out for shale but everyone will have their own preference.

Check the steering mounting bolts are tight at the top of the column and the secondary fixing is secure.

Check the hubs spin freely, if they are catching find out what it is that is stopping them. If you run Gold tapered front hubs check they are greased and also check they are not overtightend.
Quite often it can be the caliper binding. If the callipers have lost the rubber on the mountings we have found a piece of thin petrol pipe is an ideal replacement or you can solid mount them using M6 bolts. Check the pads for material too.

Remove seat cover and check that all the mounting bolts are tight.

Every couple of meetings or so remove the clutch and add copper slip to the crank shaft, on the new type clutch check the shoes and give a quick rough up with emery paper, make sure the shims and spacers are ok, copper slip the bearings and refit.

Check the chain for tension, do not run it too tight, about 1" of play at the top is about right.

Check the oil every meeting.

Remove air filter cover and check air filter especially after shale meetings.

Check the rear sprocket carrier for cracks, make sure the sprocket is aligned and tight. Check bolts in the end of the back axle for tightness and check the rear caliper is not binding and that the rear pads are not too far away from the disc. The closer they are the stiffer pedal you will get. These can be adjusted by the 2 allen bolts on the rear caliper.

Make sure the axle bearing carriers are tight and grease them up. We tend to point the grease nipples to the rear when we fit them also check for cracks.

Check Battery and fuel tank are secure, check the fuel filter is clear and after a shale meeting check the non return valve is not clogged. You can do this by trying to blow down it. You should be able to blow but not suck.

Check the floor bolts are secure,oil roof hinges and catches, adjust the catches if necessary.

Use a 12mm spanner to check the side casing bolts behind the clutch.

Check the engine securing bolts are tight.

This is what we class as a basic service which you should carry out every 3 or 4 meetings.
For a weekly we tend to just check and oil the chain, check plug in bearings for play, check back axle for bends, check tracking and set to what you prefer, visual check on welds and belts, check wheels are running free and grease rear bearings.

Common Problems

Kart keeps loosing chain. Check it is well lubricated, check it is in alignment with the clutch, check the sprocket or carrier are not bent or cracked, Check the play in the clutch, check for a twist and check the teeth on both the sprocket and the clutch.

Chain goes tight and slack. Most likely a bend on the rear axle

Front Wheels drop when jacking up. Plug in bearings are broken or worn.

Wheels not pointing straight. Tracking is out, check for bent column, rod ends or bent steering arm on the Stub axle If these all seem ok then strip the hub off and check that the stub spindle is not bent.

Front wheels will not spin freely. Check calliper for binding on disc, check wheel bearings are not too tight.

Back axle won't turn freely. Check chain is not too tight, check calliper for binding, check bearings are free.

Crank case bolts keep coming loose. Check for a bend on the rear axle and check the chain tension is not to tight. Also check the clutch sprocket for worn or missing teeth.

Starter motor just clicks. Check leads on to starter and battery, check it has a good earth. If it starts with a booster pack it could be a battery issue or again a bad earth. If it still just clicks with booster it could be the starter solenoid.

Karts turns over but will not fire. Check fuel is on, if cold try a little choke. If it still does not fire get a spare spark plug and fit it to the plug lead and turn engine over while earthing plug and check for a spark. If it sparks fit new plug just in case old one is duff. If no spark then probably a coil pack failure. If there is a spark then take the fuel pipe off the carb and crank engine to see if it is pumping fuel. If no fuel replace the fuel pump. If it pumps fuel and has a spark drop fuel bowl off, remove jet and emulsion tube and clean out and refit. If still will not start take the rocker cover off and check for broken rocker arm. If all these things are ok then it should start.

Engine starts but runs rough. It is possibly a blocked low idle jet. To get to this you need to take out the black plastic tick over crew. Under that is a small black plastic funnel shaped piece which you also take out. You will then see a black column ring which you need to gently prize out, this is the slow idle jet. You need a single strand of wire from a wire brush and if column turn the jet upside down you will see a tiny hole that you need to push the piece of wire into You may feel it pop and if you look on the side of the jet there is an inspection hole so you can see if the wire has come through. Re-assemble and see if that has sorted it.

Basic Kart Set-Up

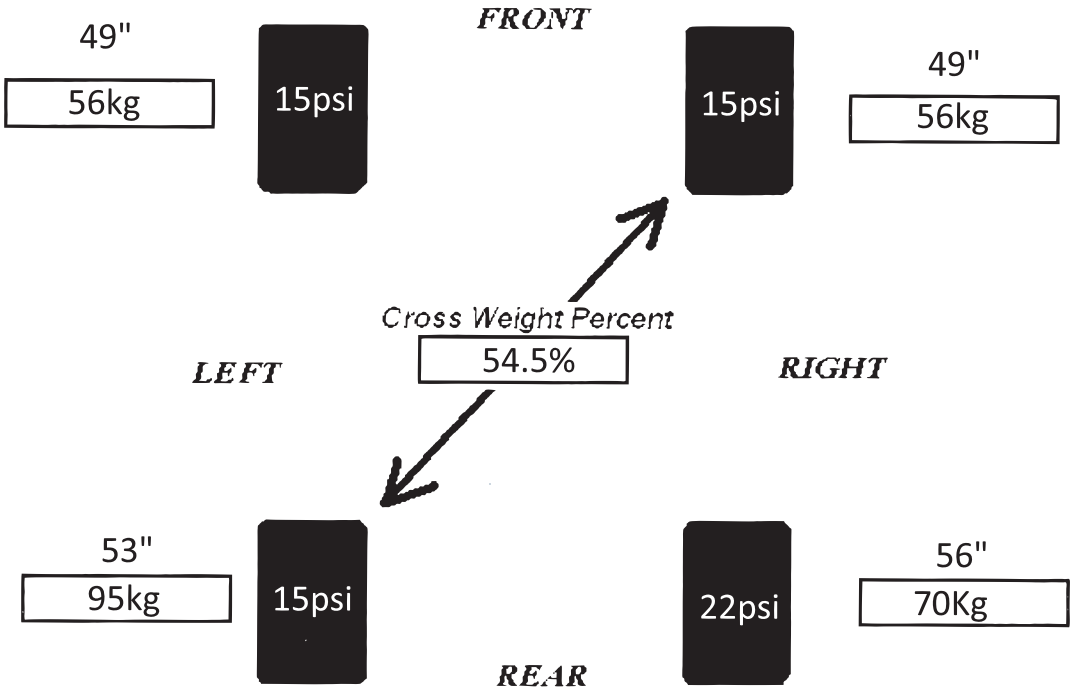
Each driver likes their kart to handle to suite them so we are going to give you a very basic starting point which is how we set the hire karts and karts that come to us for repair. You do not need fancy electronic scales in fact a couple of people use bathroom scales. Unless you are a driver who knows what to do if a Kart acts a certain way you will at some point need some type of scales. Scales are of no use if you do not know what you are looking to achieve or how to achieve it though.
Some people weigh with the driver in and others without, the choice is yours. We always do ours without.
There are so many things on the kart can alter what the readings are on the scales. Stagger, camber and tyre pressures are the main things that alter the weight on the Kart. It is not very easy to explain in words but hopefully you will be able to understand the following.

Stagger

Stagger is the differance between tyre sizes on the kart. On the back ofyour kart the outside wheel will be bigger than the one on the inside if you took them off and stood them side by side. If you put a taller tyre on the back outside it does two things, 1) it gives more stagger which in effect helps the Kart turn in on the corner but the more important thing it does is that it transfers weight diagonally across the kart to the front inside corner.

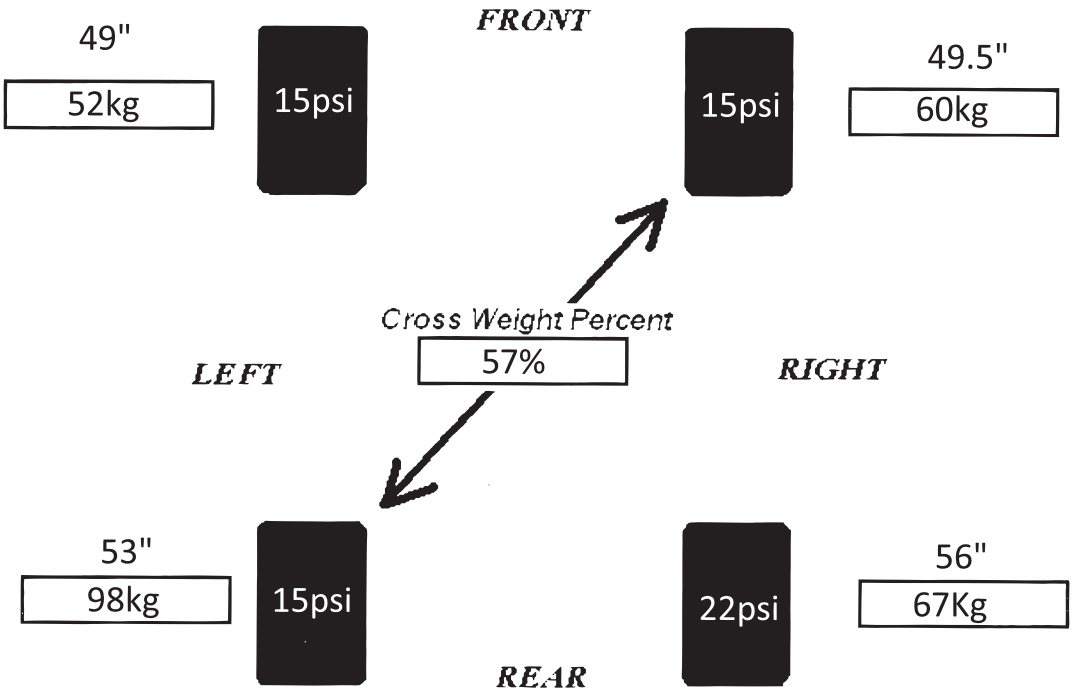
You can do similar by increasing tyre pressures. If you put more air in the back outside it will again transfer weight diagonally to the front inside. What this also does is take weight off the Diagonally opposite wheels in this case the Back inside and front outside.

Below is just a basic diagrame to try and explain.

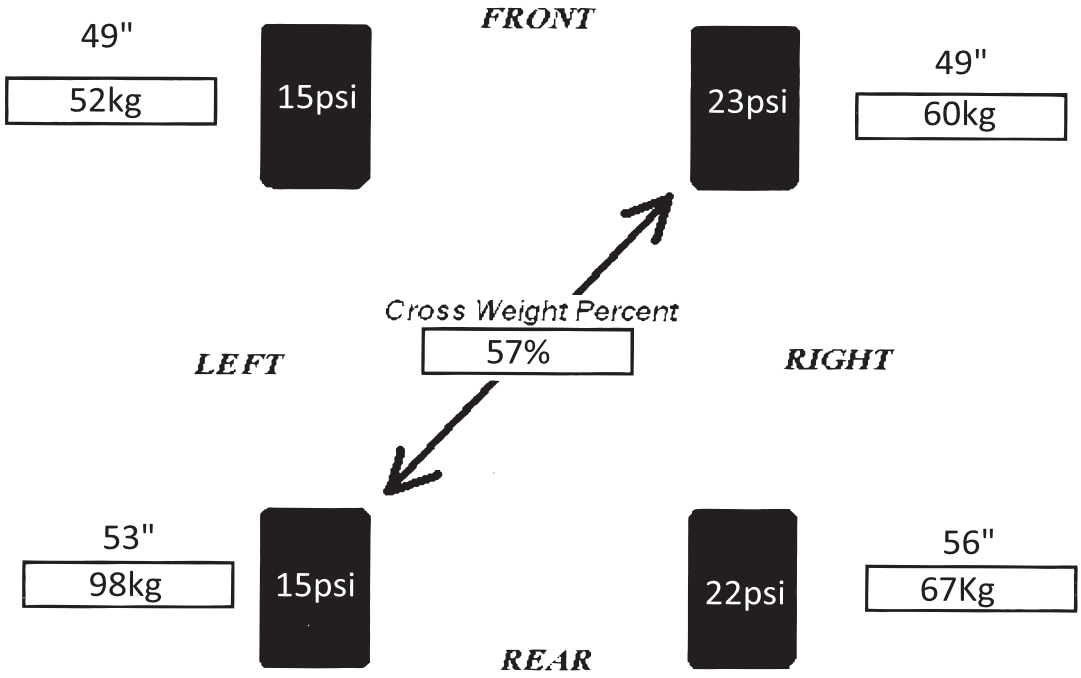


So as you can see we have measured all the wheels. The fronts are both 49" the offside rear is 56" and the Inside rear is 53". This means there is no stagger on the front and 3" on the rear. with the pressures shown on the tyres. To work out your percentages there is a formula. For the Cross weight we add the back inside 95kg to the front outside which is 56kg This gives us a total weight of 151kg. You then find the total weight of the kart. by adding all 4 wheels together, in this case it equalls 277Kg. So you then Divide 151kg by 277kg and times it by 100 to give you a total of 54.5% cross.

So if we were to alter just one tyre by size it makes a dramatic effect on the kart. Below we have gone up 1/2" on the front offside tyre keeping all the pressures the same. You can see it has added 4kg to the front off side and taken 4 off the front inside. It has also added 3kg to the back inside and taken 3kg off the back outside. So using the formula BI 98 + F/O 60 = 158 Divided that by the total weight of 277 it has now taken the cross weight up to 57%.

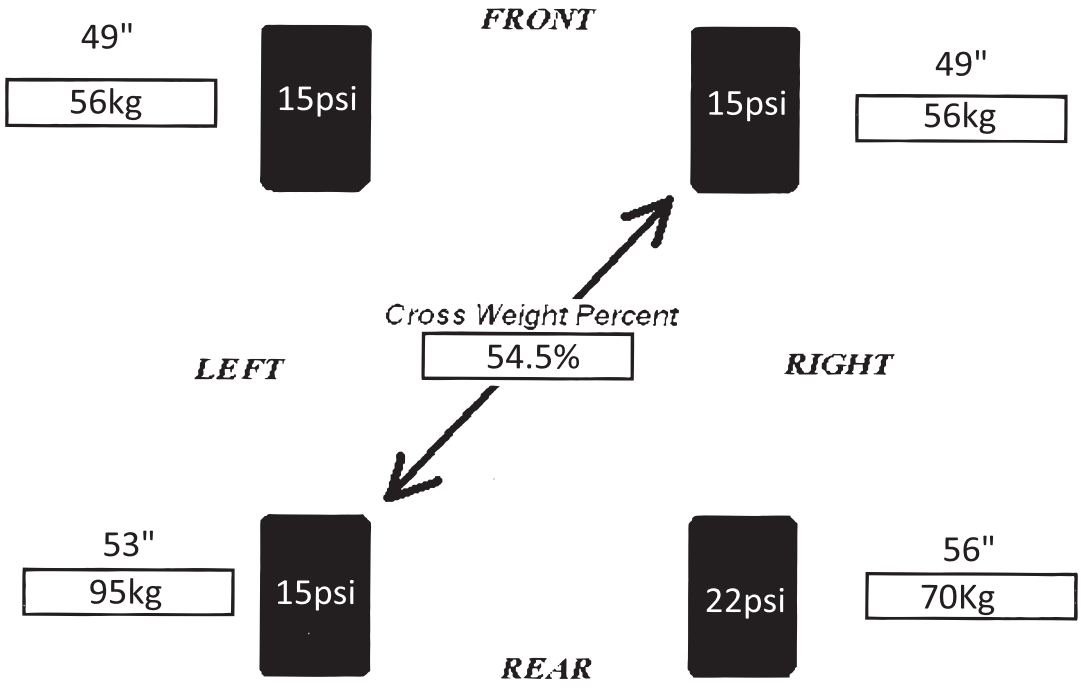


We can achieve a similar thing by altering tyre pressures. If we revert back to our original front tyres which are 49" but instead of 15psi in the front outside we go to 23psi You can see it has achieved the same readings.



At Stoxkarts HQ we tend to ignore the weights on the rear and simply work with the weights on the front of the kart to try and achieve certain percentages. These are what we have found work for us but they are not gospel and others may do things totally different but again it is a base point to start from. The tyre pressures we are using are only for guidance.

To work out the percentages we want for various track conditions is very similar to how we work out the cross weight. Going back to the original set up if you add the 2 front wheels weights on the scales they give you a total of 112kg so to find the front percentage that we want we would divide one of the fronts 56Kg by the total front of 112kg then multiply by 100 which gives you 50%. So on this set up we are running equal accross the front. A 50-50 set up is good for wet shale.



As we said we tend to ignore the weights on the rear and simply work with the weights on the front to achieve the front weight percentages that we want.
Again as a rough guide we tend to run Wet Shale 50-50 Dry Shale/Wet Tarmac 60-40 Dry Tarmac 60-40 or 80-20. The most common figure people tend to use is the 60-40 Most karts tend to run best on both surfaces with this and in our opinion it is the best overall base point. The Higher figure always being the front inside on a kart .
Again these are just guides and altering these often alters other handling Characteristics. Commonly the less Cross weight you have the looser the kart will become (Oversteer). The more you have the more it will push (Understeer).

So in theory we should be able to alter a kart to the figures we want by simply blowing up the tyres, however in practice this does not work as you would have to have extreme pressures to get the desired effect which would then cause a lot of bounce or other handling issues.

If we go back to the set up where we put 23psi in the front outside with equal sized tyres, using the calculation of 52kg on the front inside divided by 112kg (total front Weight) X 100 = 46.4% on the front inside giving a 46.4-53.6 split Compared with the 50-50 we had originally.

So to achieve the figures we want we are going to have to use a combination of tyre sizes and also tyre pressures. Some times you can get it by just altering the front tyres or pressures but more often than not you need to alter all 4 pressures and probably a couple of tyres.

We will start with a base setting as the original, equal size front tyres and equal front pressures. We know this gives us 50-50 across the front but we want to try and achieve the 60-40 base set up without going silly on pressures. We are not interested in Cross Weight at this time so we have left it off. The same with the rear weights.

Base Point

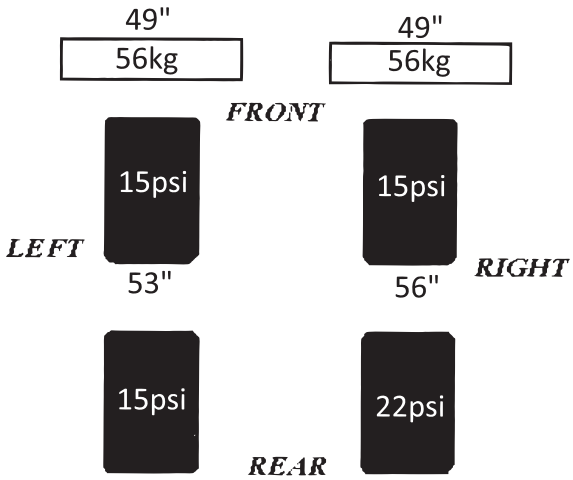
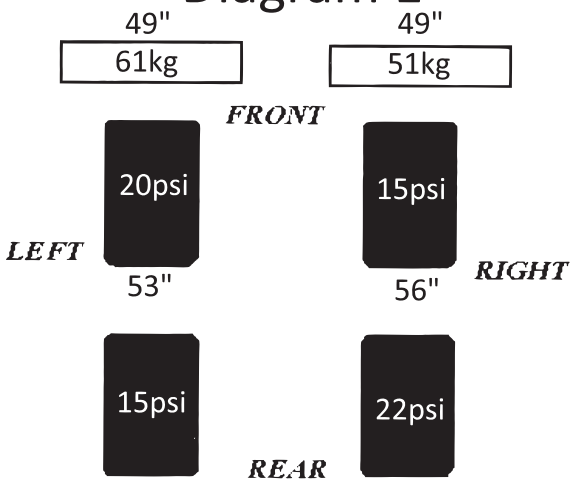


Diagram 1



You can see we have measured all the wheels. The fronts are both 49" the offside rear is 56" and the Inside rear is 53
In Diagram 1 we have put the front inside up to 20psi and left the rest as they are. This has given us 61kg FI and 51kg FO. So we divide the FI by the total front weight of 112Kg x 100 which gives us 54.4 on the front inside and 45.6 on the outside which is not enough for what we want.
In Diagram2 we have now dropped 3Psi out of the FO tyre. This has put the front inside up to 64Kg so we use the formula 64/112x100= 57.1 so we now have a 57.1-42.9 split. We are happy with the front tyres at that so we are now going to alter the rears. In Diagram3. We habe dropped the Back Inside down by 2psi. This now gives us 67Kg so we divide that by the Front total of 112Kg x100 which gives 59.9 - 40.1 which is close enough to our 60-40 split and the pressures are not too bad at that .

Diagram 2

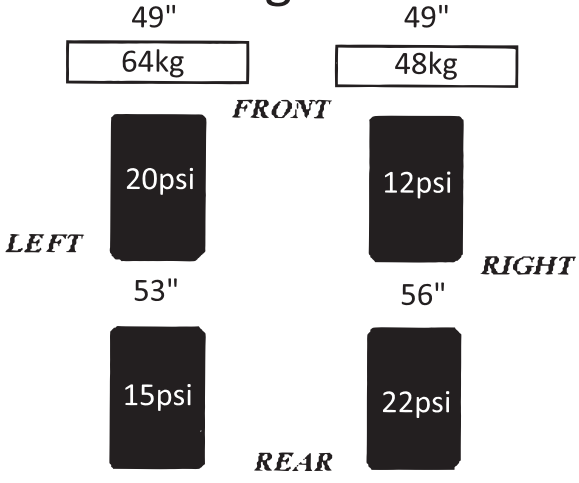
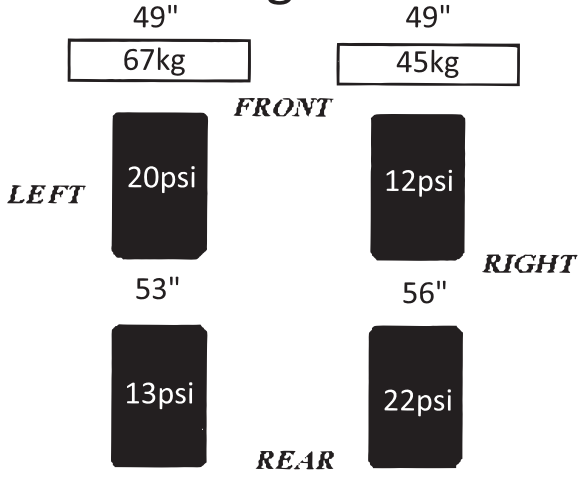


Diagram 3



In Diagram 4 we go back to the base setting but increase the front inside tyre by half an Inch. By changing the wheel it has put the front inside up to 60kg so using the formula 60/112x100= 53.5 so not enough. In diagram 5 we now also put the front inside tyre pressure up by 3psi and dropped the front off side by 2psi we end up with 68kg on the front inside. Again using the formula 68/112x100=60.7 giving a 60.7-39.3 split. if we were to either go up 1psi on the outside front OR down 1psi on the Inside front we would be at the 60-40 we are wanting.

Diagram 4

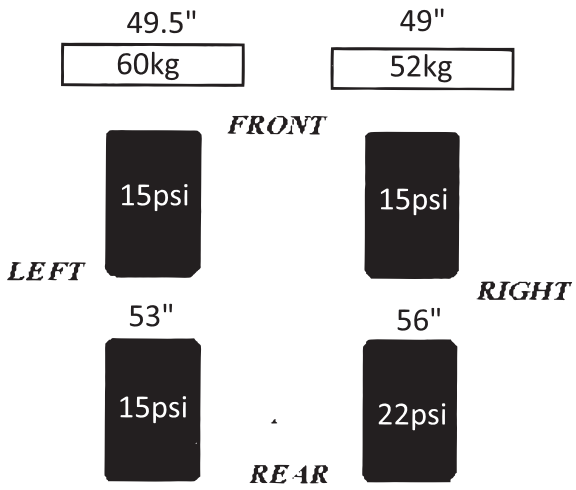
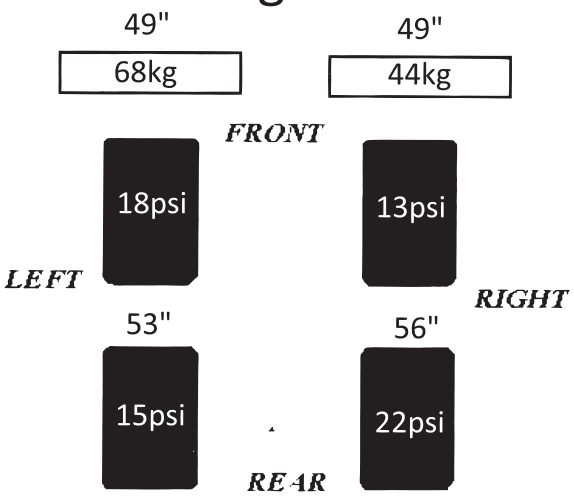


Diagram 5



To get to the 80-20 and keep similar pressures we need to alter wheels about. In Diagram6 we are going to put a 1/2" smaller tyre on the front outside. This means we are now running 1" stagger on the front with 3 on the rear although the front is the opposite way round to the rear. On the Stoxkarts this is common practice.

This has now put the front inside weight up to 73Kg and when we calculate it we have 65.1 which is not enough so we will increase the Front Inside pressure by 2 psi and reduce the back inside by 2psi in Diagram7. You have to remember that whatever you do it alters things diagonally. This gives us 80kg Fi and if we do the math that comes out at 71.4 so again not enough. So what can we do? We could add more air to either the back outside and front inside or reduce it in the Back Inside or Front outside but this will still probably not give us enough so we now need to look at changing the backs. The option here is to either put a taller back outside on or a smaller back inside, remembering that everything works diagonally.

Diagram 6

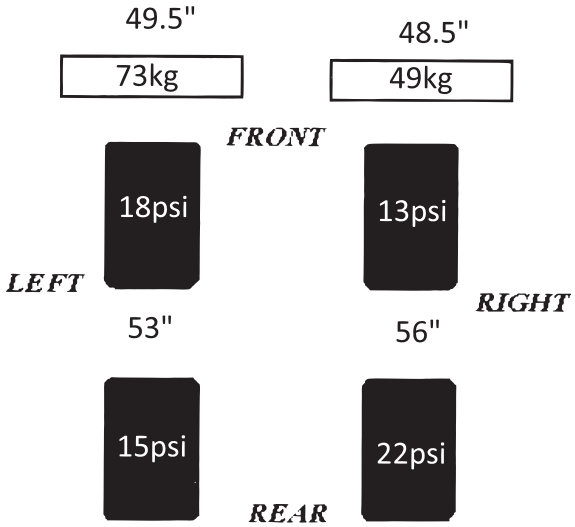
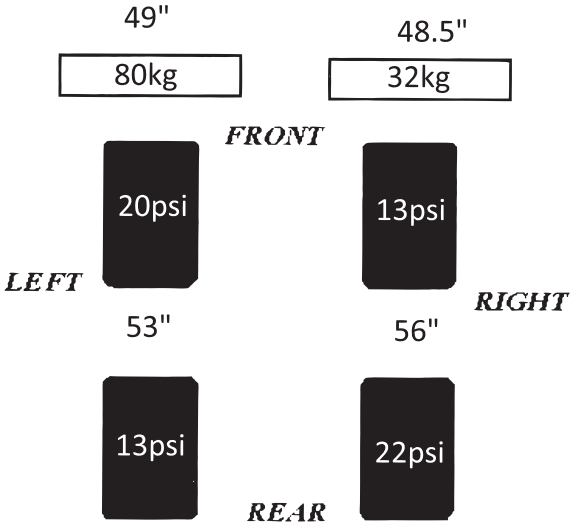
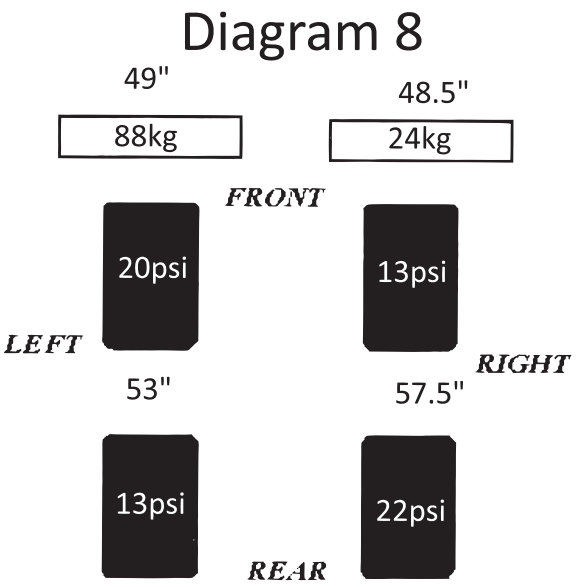
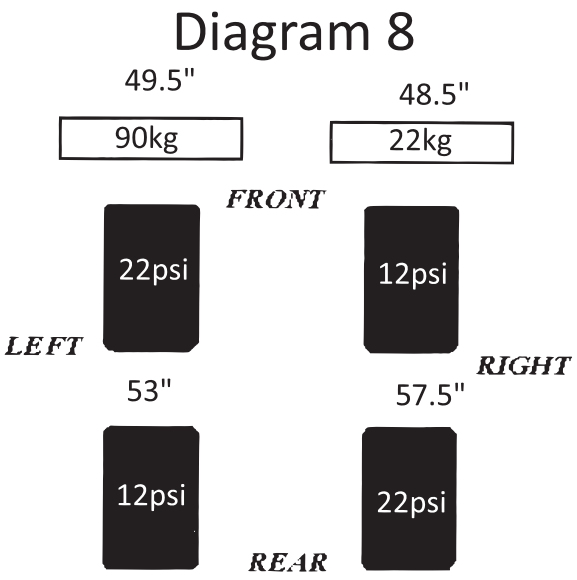


Diagram 7

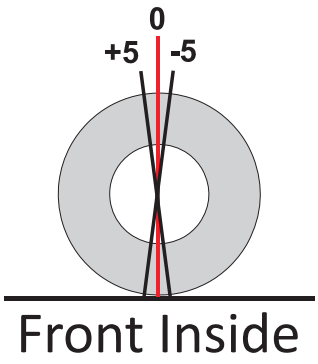


In Diagram 8 we are putting a 1 1/2" larger Back outside on which increases the stagger to 4 1/2"
With the larger back outside on we now have 88kg which when converted comes out at 78.5 so just a bit more is needed We are going to take 1 psi out of the front offside and back inside and add 2psi to the front inside as per Diagram9. This takes the weights to 90kg & 22kg on the front so 90/112x100= 80.3 so we now pretty much have the 80-20 split we are after and the tyre pressures are all pretty sensible. As i have said you do not need to worry about the rear weights and you do not need fancy scales. 2 bathroom type scales will do, you just need to remember that you need to put the back wheels on something the same height as the depth of your scales so that the kart is sat as it would be on the floor.





Castor or King Pin Inclination (KPI)



The castor angle is very important on a Stoxkart. This is the angle at which the kingpin bolt goes through the stub axle. There are several ways to adjust this.
Common faults of incorrect KPI.
Too far forward and the Kart wanders down the straight. Causes bounce.
Too Far back and the steering is heavy. Causes bounce in the corner
a mixture of either and the kart will pull towards the fence.

We have found that the best set up on a Stoxkart is between 0 and -1 degrees on the inside and -1 to -3 on the offside. Again these are just base figures.

To measure these you will need an angle finder, these are relatively cheap off the Internet.

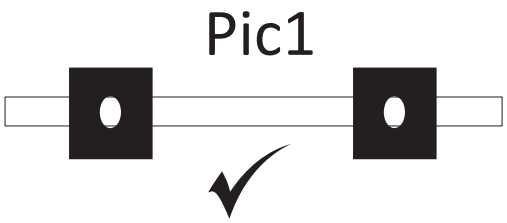
To find the angles you need to measure the front ride height of the kart. front bumper to the floor is fine. Jack the Kart up and take off the wheels and the front stub axles so you just have the plug ins sticking out of the mountings. Lower the kart on the jack so it measures the same height at the front bumper as your fist reading. Find a flat surface and set your angle finder to Zero. Then sit it on the top of your plug in. This should give you a reading. Sometimes swapping plugins from side to side helps. if it is a very minor adjustment you can often sort it by undoing the bolt that holds the plug-in into the mounting block and twisting the plug in to where you want it and then tightening it back up. If you need more then the next thing to try is grinding a flat edge on the front of the Allen bolt that holds the plug-in into the mounting. again you twist the plug-in in the direction you want, the flat edge will all you a little more movement.
If you still need more you can either try twisting the plug-in with a large set of stilsons or file and elongate the hole in the plug-in. Once you have it set and tightened up use a marker pen to mark its position on the mounting block and the plug-in its self so you can checkrit has not moved then re-assemble.

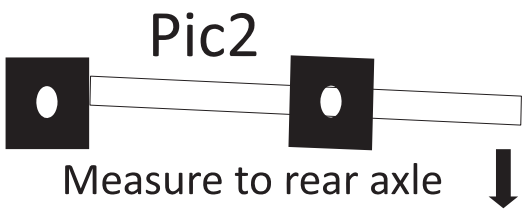
Front End Alignment

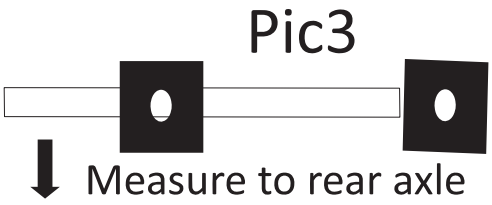
Sometimes you may have major handling problems or are unable to get the required weights on the scales. The most common reason for this is that the front Plug-in mounting Blocks are out of line. You need to do the following on a level floor or surface.
The simplest way to check this is to take off the front stubs and take the plug-ins out. Then slide a rear Axle into the plug-in mountings and if everything is as it should be the axle will go all the way through both mountings. If it does not go all the way through then something is out of line and you need to get them back in line. Try the axle both ways, this may give you an idea of which one is bent.

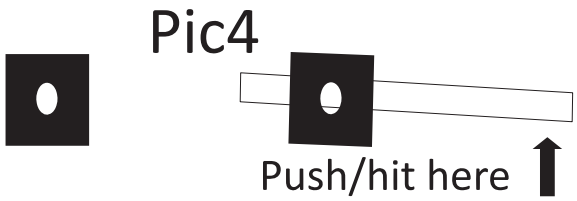
The pics below are a overhead view.

Pic1 is how it should be. In Pic 2 it will not go through so in pic3 we try it in the other side. If you can not tell which side has moved use a tape measure to measure to your back axle and this will tell you. So in this instance we can tell it is the Right hand side that has moved. Put an OLD axle back in the block that has moved and either use a Porta Power or sledge hammer to move it forward until the axle goes all the way through.

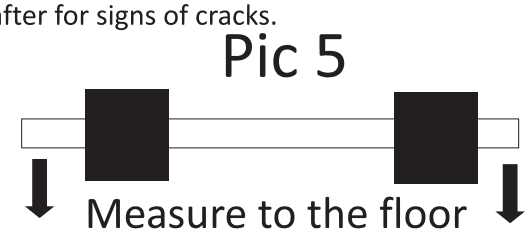


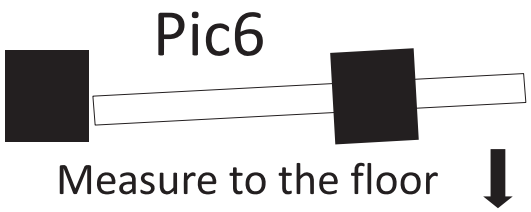


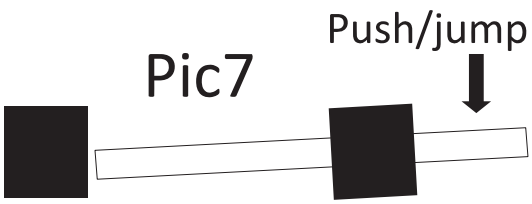




This time do the same thing on the horizontal looking at the front of the kart. In pic 5 it goes through but it is always worth measuring just so you know for future reference. In pic 6 we can see that the Nearside block has moved and the axle will not go through so again we need to move the block. When moving the block this way we put a support under the chassis just under the block. so it can not move. Pic 7 put an Old axle in and jump on it until the axle goes through and then check the measurement to the floor. pic8. IMPORTANT if you have done any pulling, pushing etc. always check the welds after for signs of cracks.







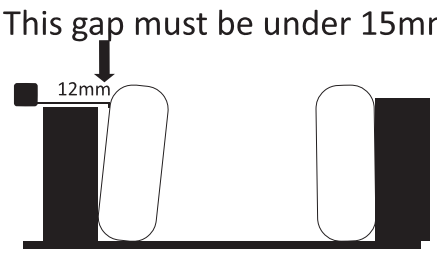
Camber

Negative camber
where the top of the wheel points out

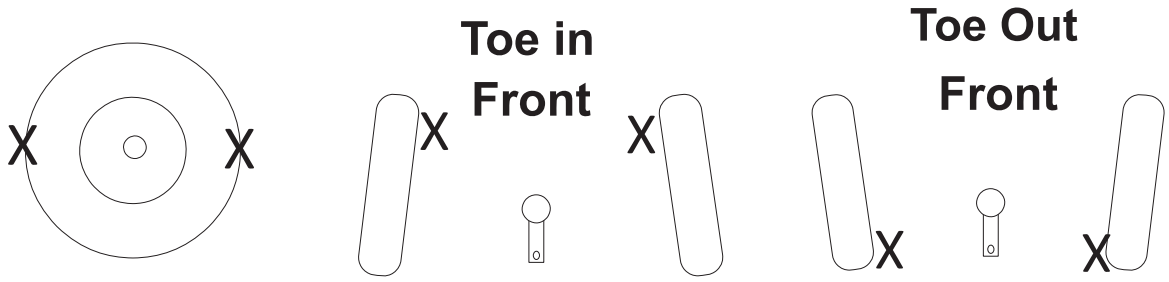
Zero camber
Where wheels are parrallel

Posative camber
where the top of the wheel points in

On a Stoxkart you are only allowed to run a maximum of 15mm camber either Positive or Negative. Quite often karts do develop camber over a period of time. The most common reasons are plug-in bearings worn, bent stub axle, bent plug-in or plug-in blocks have moved. You need to find which of these is causing the issue and either repair or replace. To check the amount of camber is simple. You need a 90 degree edge, a cereal box would even do. Find some level floor and then put the upright edge up to the tyre until it touches and then measure the gap at either the top or bottom depending where it is. In Pic 1 below the front off side is running 12mm of positive camber and the inside is neutral. The karts are designed to run with zero camber but many drivers do prefer to run about 10cm. You need to also realise that that positive camber takes weight off that corner so if you have set your kart at say 60-40 on the inside with zero camber if it does for some reason develop camber it would alter your weights to possibly 65-35 so to compensate for this you would need to inflate that wheel by a couple of psi or the diagonally opposite wheel by a couple of pounds to get back to 60-40.



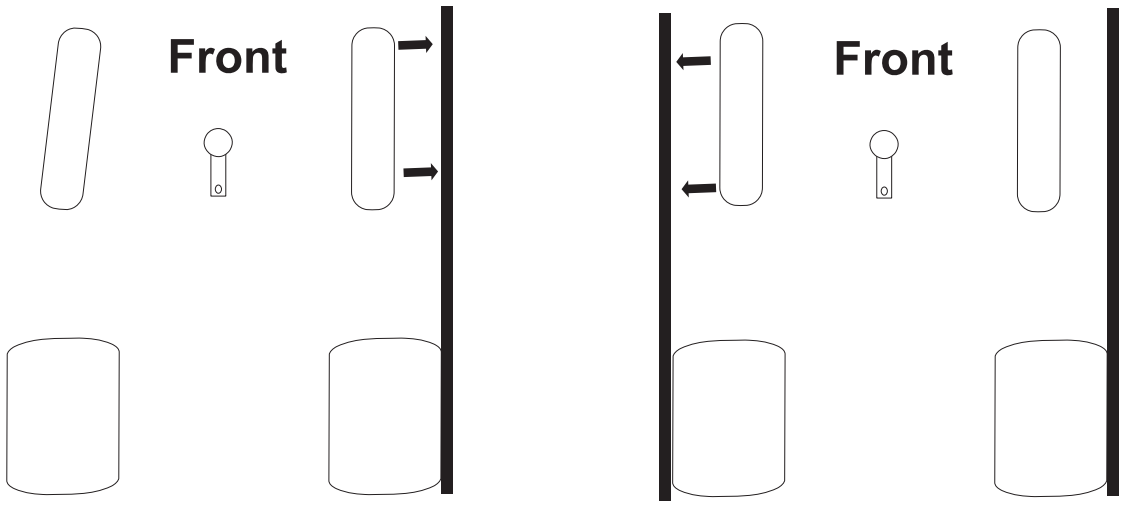
Setting the Tracking.



There are several ways of tracking up, some people have tracking plates others just use a tape measure. We are going to show you 2 ways of doing it. It is very important that you keep the steering column central and keep checking it.

First and most simple although it does involve taking off the bonet or side panels. You need 2 people, you pass the tape measure through the Kart and put one end on the inside wall of the tyre about half way up. As per the X on the drawings you then put the other end at the same hight on the tyre near you and take a reading. You then repeat this process 180 degrees from where you took the first reading as per the X in drawing 2. You then take another reading. If the first reading at the front of the tyre is greater than the one at the rear you have toe out, if it is smaller then you have toe in. To adjust this you need to undo the nuts on the rose joints that lock them to the track rod. Usually one is a left hand thread so be aware. If you then turn the track rod you can either shorten or lengthen the distance. So if the front measurement was larger than the back you are toeing out and want to lengthen the track rod so that it makes the gap at the front smaller. You will need to keep checking your measurements untill you get it where ou want it. If it is quite a distance then do a little bit on both sides rather than all on one. Remember to make sure the steering stays central. If it is toeing in then shorten the track rod rather than lengthening it. Once you are happy tighten everything back up.

Another way is to have a long straight edge or piece of angle iron. Set the steering to the middle then get someone to hold the straight edge flush to the side of the back wheel. Then measure from the straight edge on the front tyre at the front and back of the tyre. You want to get an equal measurement then lock that side up and go to the other side and repeat the process taking care not to move the steering. When you have done both sides you will be tracked parallel. If you want toe out then make the gap at the back of the tyre 1mm more than the front on each side.



It may seem quite a lot to take in at one time but one of the main things to remember is once you have a base setting you are happy with only change one thing at a time. If you end up altering two or things you will never know which made it better or which made it worse.

STOXKARTS Workshop Check Sheet

CHECK	TICK	CHECK	TICK	CHECK	TICK	CHECK	TICK
Aerofoils		Calipers/Pads		Chain		Roof Catches	
Body Work		Stub axle		Clutch		Mirror	
Bumpers		Plug-ins		Chain guard		Floor	
Nerf rails		Brake pipes		Drive Hub		Wheels	
Rubbers		Seat Mounts		Free Hub		Tracking	
Pedals/Springs		Seat Belts		Battery Box		Tags	
Throttle cable		Rear axle		Fuel tank		Update Log Book	
Rose Joints		Axle Bearings		Fuel Filter			
Steering Column		Sprocket Carrier		Air Filter			
Front Hubs		Engine Tension		Engine Oil			

Raceday Check List

Petrol		Helmet/Goggles		AAA Batteries			
Charge Battery		Gloves/ Balaclava		Earphones			
Transponder		Overalls		Licence			
Armband		Raceciever		Log Book			

Jobs to do

Parts to Order

Notes

STOXKARTS Set Up/Results Sheet

Date_____ Track_____ Conditions_____

Front Total

Tracking

Front Stagger

Size
Pressure
Weight
%
Camber
Castor

Size
Pressure
Weight
%
Camber
Castor

Cross Weight Percent

LEFT

RIGHT

Size
Pressure
Weight
%

Rear Stagger

Size
Pressure
Weight
%

Alterations

Comments

Results

Your fastest Lap _____ Fastest Lap of the Day _____

Race 1	Race 2	Race 3	Race 4	Race 5
Lap Time	Lap Time	Lap Time	Lap Time	Lap Time