# CARBURETTOR SETUP

## Two stroke carburetor Settings

| Engine | Carburetor | Low speed | Hi speed | 3rd jet |
|---|---|---|---|---|
| Leopard 125cc | Tillotson HL334A | 1 1/4 | 1 | - |
| Parilla PV100 Piston Port | Walbro WB-32 | 3/4 | 3/4 | - |
| Yamaha KT100SC & Piston Port | Walbro WB-32 | 1 1/2 | 1/2 | - |
| Yamaha J | Walbro | 1 1/2 | 3/8 | - |
| Reed valve | Ibea 24mm 2 jet | 1 1/4 | 3/4 | - |
| Rotary valve | Ibea 24 mm 3rd jet | 1 1/2 | 1 | 1/4 |

## Walbro Carb settings

The Walbro carb has a low speed and a high speed needle (although the names are kind of a misnomer as both needles control the mixture at wide open throttle) The low speed needle is the one closest to the motor and typically has a long rubber extension T on it for tuning. Its basically (very) used for tuning throttle response off the corners. The high speed needle is the one closest to your airbox. Its used to deliver most of the fuel during full throttle operation.

Turning the needles clockwise makes the needle go deeper into its seat, leaning out the mixture. Turning the needles counterclockwise will richen the mixture. In Yamaha classes, we used to set a baseline with the low speed needle around 1 3/4 turns from being seated and start with the high speed needle around 1/2 turn from being seated and tune from there.

Keep in mind these are very generalized settings and explanations. Many things affect fuel flow including pop off pressure, atmospheric pressure, the cleanliness of the carb screen, the condition of the pump diaphragm etc etc. I'd suggest you get some baseline advice from the guy who built your motor or maybe some of the front runners in your class.

The trick to adjusting carbs is to find the leanest setting that lets the engine pull all the way around the track in the first few laps of the race. When looking for this setting always start rich and go leaner. Try to dial it in before the engine gets too hot and, check it at the start of the next session. From there develope a plan as to when you need to open the low needle to control engine heat. When I see the 1/2 way flag I check the gages.

If you find the engine loads up with fuel in the tightest corners, turn the low needle leaner (1/8 turn at a time) untill it comes off the corner fairly clean. The leanest I would go on the low would be 1-1/2 turns open.

Next listen how it sounds at the end of the longest straight. If it burbles (4strokes) then lean the high down a bit (1/16th turn at a time) untill it runs clean at max rpm. The leanest I would go on the high would be a 1/8th of a turn open. I try not to adjust the high during a race because, small adjustments are hard to make and have big results on the fastest part of the track. For this reason I try to leave the high fairly rich to give myself some head room.

The high and low work together and, do have an effect on each other. If you lean the low then lean the high, you might now be too lean on the low.

If the low is way too lean it will feel dead coming off of turns. Also, you might feel a dead spot about half way down the straight. If you open the low but still feel weak in the midrange, open the high a little.

The exact settings and adjustments you make will depend on the design of your track and how the fuel loads and unloads in your crankcase

.

# Chassis Setups

Kart Chassis Tuning from an Engineering Standpoint But Made Simple

In every article kart tuning that I have read use phrases like “the chassis is too grippy” or the “chassis will not transfer weight” or “try removing the XXXXX and see what happens….but the bad thing we are trying to cure may get worse”. I just kept getting more confused the more I read. My self and a few other racer/engineers began to dissect and analyze what we were reading and feeling the kart do and try to understand what was really happening. The following is what we concluded.

Tires of a given compound and a given surface have a constant coefficient of friction. In the case of race tires, this coefficient of friction is about 1.6 to 2. This means that the weight on the tire times the coefficient gives the amount of force that the tire can generate. In the case of a go kart of say 400 lbs,, the total possible force available is 640 lbs (400 lbs * 1.6) This maximum grip calculation assumes that the surface is flat (ie 1 g vertical load) and the tire is cambered about -1.5 degrees. With a kart this 1.5 deg lean is possible on the outside tire in the front but is difficult to accomplish in the rear with the relatively solid rear axle. If everything were in a perfect world, we would be getting a constant 1.6 gees any time we were braking into a corner and then going around the mid 1/3 of the corner and fade off to say 1 gee as we exit off the corner. In the real world, we have to fight the chassis setup and our own raw driving talent. We came to the conclusion that kart tuning is a never-ending balance act, but we need to analyze. Lets try to take this apart one piece at a time.

- A chassis is a spring twisted about it’s front/rear axis by gee loading. Most everything that we do to tune a chassis is a combination of adding or removing strength to this spring. This spring constant thought of as degrees twist per gee of cornering force. Some of the added springs may be linear in behavior like adding tubes or nonlinear like adding tubes to a fiberglass seat.
- As the cornering force goes up, the twist that your body applies to the chassis increases.
- As you raise your body, the twist that your body applies to the chassis increases.
- At some point, the twist load that you apply to the chassis will be enough to raise the inside rear tire off the pavement.
- If the inside rear tire is on the ground it will to some degree try to drive the car straight.
- If the inside rear tire is say .003” off the ground at full cornering, the outside rear tire is real close to 90 degrees to the track.
- If the inside rear tire is say 1.5” in the air, then the outside tire is +2 deg camber (a bad thing).
- The real trick is getting this magical .003” inside rear tire lift (+/- a little bit) on every corner. This requires a gifted driver that can hold the chassis at a constant cornering load to hold the force that he and the added lead constant and at the limit.
- It is possible to start spinning both rear tires so fast that the rear tires act as one force and all this does not seem to make any difference. It takes a lot of hp and poor traction to get to this mode.
- A track with lots of twists along the centerline of the track or with lots of bumps will make this diabolical to figure out. The loads will jack across corners on the chassis as you hit the undulations and just accelerating straight will be a challenge let alone accelerate consistently off a corner.
- A chassis that is too weak in twist will gives a feeling of pogoing around the track.
- Almost any structure has a natural frequency that it wants to vibrate at. This is known as it’s natural frequency. In a cart, the big things to consider are twisting strength of the chassis, vertical deflection of the chassis, vertical deflection of the tires, horizontal deflection of the tire and axle strength. If any two or three of these happen to want to vibrate at the same frequency, especially when aggravated by bumps in the track, you are in for bounce or hop. This is one of those things that changing any of these may help. The easy thing to change is the tire pressure. Also try changing seat braces, axles, cg height or distribution, tire brand, driver…
- Too grippy of a chassis is a chassis that is so stiff that at the cornering loads that you are capable of generating, you are not capable of lifting the inside tire and the chassis will constantly be in a bind. The cure is to removing strength from the chassis or raise the weight in the chassis to increase the degrees twist that the chassis goes to.
- A tire can only pull 1.6 gees in one direction at a time, weather cornering, braking or some combination of the above.
- Adding caster or moving the tires out will help raise this inside rear tire at least on initial turn in but once the chassis reaches steady state neutral steer, the ability to consistently lift the inside rear tire a little bit is the trick.
- I like to set brake balance by appling the brakes at mid turn. I adjust the brake balance so that the kart doesn’t oversteer or understeer due to this application of brake force. None of this can be done on the kart stand.
- In mid turn the chassis should not ever have understeer. I like to run a fairly stiff chassis and start with the front narrow and the move the front tires out about ¼” at a time until the push goes away.
- The chassis will feel as if it has oversteer from drivers seat.
- In autocross the cart will be fastest at about 10 to 14 psi tire pressure front and rear. I am not sure why this number is way less than the pressures that I here from the road racers. I am suspect that with the bumps we deal with and the time on the track offers a whole new set of problems and compromises compared to the amount of time on track and surfaces the road racers have to deal with.
- Jetting changes with air temperature and absolute barometric pressure. You need a weather station to get a handle on this.