

Basic Quarter Midget Preparation

Earlier in this training manual it was pointed out that the biggest secret to speed on the track was the driver's pattern. The next biggest secret is car preparation. Before you can expect your car or driver to perform to their potential on race day it needs to arrive properly prepared and ready to go. While quarter midgets are fairly simple race cars there are still a long list of things that go wrong at the worst times. Making sure the car is up to snuff before you get the track is the only way to make sure that at the track you will have to time to work with your driver and basic chassis adjustments and leave time enough to have fun as well. If you are fixing issues at the track that could have been fixed at home you will usually start and end your day behind where you want to be.

The following sections will walk you through most of the basic areas of making sure your quarter midget race car is ready to go!!

BRAKES - BLEEDING THE HYDRAULIC SYSTEM

This, again is a reasonably easy task. You should get a friend to help, as it needs someone to operate the brake pedal while you bleed the system. Make sure you have a supply of the same type of brake fluid that is already in your system. There other ways to do this, and as long as you make sure you are getting all the air out of the system your brakke will be ready to go.

- 1) Get a clean, empty jar and put a little new fluid in it
- 2) Push a rubber tube over the bleed nipple on the brake caliper, and the other end into the jar of fluid
- 3) Now loosen the bleed nipple, and get your helper to press & hold the brake pedal; Fluid will begin to be forced through the bleed nipple and into the tube, towards the jar
- 4) Tighten the bleed nipple, and release the brake pedal
- 5) Loosen the bleed nipple, and press & hold the brake pedal
- 6) During this process, it will be necessary to keep refilling the main brake reservoir with new fluid
- 7) Repeat this process until no air bubbles are appearing through the bleed nipple, and new fluid is pumping out into the tube/jar
- 8) Tighten the bleed nipple, replace the reservoir cap, and the pedal should now stop solidly when pressed, with no 'sponginess' or unacceptably long travel.

BRAKE PADS

Many cars today have started using aluminum brake rotors and therefore have also started using softer brake pads. Make sure that you keep your eye on the wear on your brake pads and replace them before they result in metal on metal contact. They are easy to replace and waiting too long do so will result in irregular wear and possible gouging of your brake rotor leading to need more parts to be replaced. If your rotor does get gouged you are better off putting a new one on so otherwise you will start to need brake pads even faster.

ENGINE TORQUE SPECIFICATIONS

Be careful, when trying to make everything vibration-proof, not to overtighten bolts in the alloy engine casing (for example the throttle plate bolts), as I have found that it is all too easy to strip the thread in the bolt hole. On a similar note, while I was trying to screw the carburetor studs in as far as they would go, in order to gain more clearance between the carb and the right rear tire. I caused the alloy cylinder head to crack. Luckily, it was only my old reserve engine, but it was still a costly error.

There are torque specifications for every part of a Honda engine, try to use them at all times to prevent breaking something that you don't want to break.

Honda Engines

- Crankcase 108 in. lbs
- Gearbox 204 in. lbs
- Gearbox cover 204 in. lbs
- Connecting Rod 108 in. lbs
- Cylinder Head 204 in. lbs
- Flywheel Nut 55 **FT. lbs**

Deco Engines

- Cylinder Head 204 in. lbs
- Oil Pan 32 **FT. lbs**

CHANGING VALVE SPRINGS

This is good if you're not familiar with engine maintenance, and haven't done it before, but the good news is, with a little care, it's an easy procedure, without needing to remove the cylinder head. The Honda 160 engine may only need new valve springs once or twice per season. The Honda GX120 on the other hand likes to have new valve spring about every other week for any class with the blue restrictor plate or no restrictor plate

- 1) Remove the 4 bolts securing the valve cover, and lift off the cover. Take care not to damage the gasket, as it may be reusable, though it's preferable to fit a new one.
- 2) Now ensure that the piston is at Top Dead Center - To do this, you need to remove the spark plug and shine a light inside to confirm that the piston is at the top of it's stroke. The rocker arms should also be loose, indicating that both valves are closed. I like to then stick a plastic zip tie down into the cylinder fish it around until it is under the valve to keep it from dropping down past where it can be retrieved.
- 3) Remove the rocker arms, exposing the tops of the valve springs.
- 4) As stated, at this point the valve springs will be at their loosest, and you can now gently but firmly push down with your thumbs on the spring, and slide the collet out of it's notch, releasing the spring. (On the exhaust valve, the valve rotator must first be removed). The push rod will drop into the engine slightly, but it will not disappear if you have followed the above procedure to obtain T.D.C.
- 5) Lift the spring off, and replace with the new spring, pushing firmly down until you are able to slide the notch into position. This requires full compression of the spring by pressing down with both thumbs, but is easily possible without the use of a compression tool. (Remember to replace the exhaust valve rotator).
- 6) Repeat for the second spring.
- 7) Refit the rocker arms and adjust the valve clearances.(Exhaust = 0.20 mm, Inlet =0.15 mm)
- 8) Replace the gasket and cover.

NUT AND BOLTING

In addition to all the other work that you do on your quarter midget one of the most important steps you can take is to "nut and bolt" the car which simply means to start at one corner of the car with a set of wrenches and check each nut and bolt and make sure they are tight. The great thing about most quarter midgets is that the majority of nuts and bolts require a single or pair of half inch open end wrenches. My favorite tool for this job is a ratcheting box end ½ inch. wrench, it really helps speed things up.

During this process make sure to not overtighten and it is not that difficult to strip the threads and require you to put on a new nut or bolt.

Check each shock, radius rod, steering wheel, wheel nut, foot pedals, spindle nut, exhaust system and so on. For the radius rods not only should they be tight to the car, you also want to make sure that they can “swivel” freely as well. If they don’t then you can loosen the jam nuts and reposition the rod end to see if that makes a difference as well as making sure the end is lubricated as well with something like Tri-Flow or WD-40.

Also use this time to inspect the safety items. Make sure the seat belts are still properly attached and that all the required bolts are in the bumpers and nerf bars.

Making the above one of your weekly routines will go a long ways towards not only keeping your program in good shape but also leaving you time at the track to enjoy the time you can spend with your family.

REAR AXLE PREPARATION

When I first spun my rear axle with the Car on chassis stands, the wheels spun for just under 2 turns before grinding to a halt. There's potentially a lot of drag on the axle, what with chain & sprockets, brake disc & pads, and two or four axle bearings, all taking turns at dragging and rubbing in the wrong places. When you think about it, it's got to be a good idea to get the axle running as freely as possible and I've heard it said that a free-rotating axle could shave tenths off your lap times. I don't know how accurate that statement is, but in an effort to gain every advantage, I used the following method, which resulted in an axle that now spins freely with just a gentle push, and for much more than just two spins.

This next procedure assumes that you are starting with a straight & true axle, and a chassis with level axle mounts. First, remove the axle and all components.

Bearings

Carefully remove the seal from one side of the bearing, wash out the grease from around the ball bearings with WD40, starter fluid or carb cleaner and then re-lubricate with a light highgrade oil. By doing this my bearings were immediately spinning completely freely. I am now in the habit of checking the bearings regularly, & re-oiling them before each race, just to make sure they don't dry out or seize. Do not use grease or WD-40. Grease will cause drag and WD-40 will collect dirt use a hi-grade oil like Marvel Mystery Oil or similar.

Hubs, Sprockets, and Brake Discs

Ensure that these items slide comfortably (but not too freely) onto the axle. Mine were ** extremely ** tight on the axle, and took considerable effort to move them even a tiny amount, making adjustments very difficult, if not impossible. After I had managed to remove all the components, I took the risk of VERY LIGHTLY smoothing the axle with a very fine wet and dry, afterwards cleaning the axle thoroughly with WD40. The components were ready to go back onto the axle.

Reassembly

With all the carriers, chains, and bearings loosely back in their correct positions, I then began replacing and tightening the bolts which hold the bearing carriers to the chassis, and the allen bolts which secure the two halves of the bearing carriers together. I found the tightening sequence to be critical, and took considerable time tightening each bolt a little at a time, constantly checking that the axle was still movable within the bearings, i.e. that it would slide a few inches in and out. If it becomes tight, back off the bolt that caused the tightness & tighten the bolts in a different order. It takes time and patience, but eventually all bolts are tightened down, and the axle should still be movable through the bearings.

CHAIN ALIGNMENT

One of the most common ailments to strike a car at exactly the wrong time is the chain falling off. To make sure that the chain stays on the car almost all the time requires a few steps that are simple but important.

The chain connects the engine gear to the axle gear so the first important step is to make sure that the two gears are in alignment with other. This step takes two parts first making sure that the engine is bolted in square to the frame so that the gear is perpendicular to the rear axle, and secondly to make sure that the axle gear is position horizontally directly behind the engine gear.

The second part is usually accomplished by positioning a pair of locking axle collars, one on each side of the axle gear hub. Make sure to leave a little play in the axle gear hub so that it can slide a bit to the left and a bit to the right from center, maybe with just a bit under a ¼ inch total movement allowed.

Proper alignment will also ensure good wear on the aluminum gears that are commonly used. When the chain is misaligned it will not only be more likely to come off but it will also chew up the gears causing them to be replaced more often.

In addition to alignment you must also set the proper tension on the chain. This is done by selecting the correct chain length and fine tuned by sliding the motor forward or backwards. Of course when moving the motor keep in mind to keep it straight as described above. You are looking for about a ½" of play up and down in the chain when on the ground ready to race. The absolute best way to check chain tension is with the car set on a flat surface, tires inflated to proper pressure and driver in the car.

Of course this is not always possible as finding your car is often times much easier than finding your driver. If you are going to check chain tension on the pit car then you should at least do it on time on the ground properly then move it back up on the pit cart and check where its at so

that you can benchmark yourself. Different rear geometry and different size gears will cause the difference on the ground to the pit car to go in different directions. Different brands cars are different in this area so there is no single rule of thumb.

GEARING

Selecting the right gear for you car and driver is a required step to make sure that your engine is operating at the most efficient RPM range for maximum power. Even if your driver is flat footing it around the track the RPM of the engine will still go up and down based on where on track it is in relation to the corners and the banking. Choosing the right gear ratio determines what range your engine will be in. The Honda engines use a gear box that reduces the engine RPM by a ratio of 6:00 to 1. This means to calculate your gear ratio you use the following formula

$$\text{Axle Gear} / \text{Engine Gear} \times 6.00$$

So for example an axle gear of 27 and an engine gear of 33 would equal

$$27 / 33 \times 6 = 4.91$$

The higher the number the higher the RPM your engine will turn. The lower the number the less RPM your engine will turn. If you engine is near its normal racing range (around 5100 or so with a Red restrictor plate or 5300 or so with a Blue one) then a change of .10 would equal APPROXIMATELY a change of 100 RPM. This is just a baseline to get started.

While RPM is important it isn't really super important until you move from the novice to the competitive classes. Remember, nothing trumps driver pattern for performance on the track. When you get to that point though a very important tip is to remember is that more RPM usually doesn't mean more speed.

For example if your engine works best at 5300 RPM and your drivers lap times are 7.5 seconds per lap and the competition that you want to catch up to is turning laps of 7.2 seconds, if your RPM is down to say 5100 or so the first inclination many handlers have is to add more gear to get the RPM up. Often times this is the wrong thing to do. If your car is slower by .3 of a second per lap and you are down 200 RPM then fixing whatever else is wrong with the car will bring your RPM right back to where it belongs. Look for driver pattern, if they are holding down the gas the entire lap, and how well the car is turning first before looking at Gear change. If you were down 300, 400, or 500 RPM while your are .3 off the pace then go ahead and try to get *some* of that back with a gear change.

FRONT WHEEL BEARINGS

Front wheel bearings are just as important as the rear but are put together in a different manner so they get their own section. There are two different types of front wheel bearings, sealed ball bearings, and tapered roller bearings. For both to work at their peak and not slow the car down it is very important that they are kept clean and lubricated.

When front wheels used the sealed ball bearing style of hubs the spindle nut that holds the hub on is put on until it is fully tight. The bearings are set at the right tension inside the hub already.

When tapered roller bearings are used the spindle nut is used to set the pressure of the bearings inside the races that are part of the hub. Set the pressure by tightening the nut to the point where the wheel still spins freely but doesn't have any side to side wobble.

Tapered bearings are great, especially for the right front of any class above Senior Honda as they can handle more load gracefully but they still need to be maintained and well lubricated. Many people try thin lubricants such as Tri-Flow which a great product but not the right choice here. Instead use something like a good quality white lithium grease.

ADJUSTING TIRE SIZES ONCE MOUNTED

It never fails when you buy a tire, it's the wrong size. This has frustrated racers for years! Well, now I have a couple of tips to solve the problem! You should now be able to have any size tire you want.

Tires Too big

Make sure you've used the correct rim size.

It doesn't make sense to mount an 8.00 on an 8 3/4" rim and expect it to be 34"

Step 1: Pre-heat your oven to 350 degrees.

Step 2: Remove the valve stem from your tire.

Step 3: Insert tire into oven for 15 minutes. This should shrink the tire approximately 1". Sometimes more, but usually less.

Step 4: Remove tire with oven mitts, either insert the valve stem and dunk into cold water for about 10 minutes or set in a cool place with no valve stem and cool for 30 minutes. You WILL notice a size difference when you remove the tire and think you 8.00 is about 33", and it COULD happen, so be careful.

Tire too small

This one isn't as bad, we could use the oven trick but....

Fill your tire with about 20 lbs. of air and check the size. If it grows 1/2" then let it sit there overnight. If it doesn't grow that much, put another 10 lbs. in it and set it in the sun for a couple of hours. Usually what I do is set it in the car with my tape measure and check it during the day. Once it's grown 1/2" to 3/4" bigger than what you want, place it in a tub of cool water for about 15 minutes. Then let your air out and see what it comes up to. If it's too big by 1/4" or so, let all the air out overnight.