NOVICE HANDBOOK

FOR QUARTER MIDGET HANDLERS

By Steve Clark

Some Of this information is gathered from other sources and compiled here for handlers use

Welcome to the world of Quarter Midgets. I want to start off by giving you a few thoughts that I have before we get into the technical part. Racing Quarter Midgets will teach your driver a lot of little lessons that they will experience during their lifetime.

1. How to win with dignity
2. How to lose with dignity
3. And last but not lease how to be a good sport.

In life your not always going to win at every thing that you pursue so you need to know how to handle a defeat as well as a victory and this sport I think teaches this to some degree. As far as the good sport it is up to us dads to teach this because they watch us and do as we do. I like for my drivers to get out and shake hands with the others driver and handlers no mater if they come in last or first. This is a very completive sport but please if you do have some concerns about something try to do it out of sight and range of the little ears and the spectators at the track because like I said before they watch us and do as we do.

You have two sides of the fence the competition side and the having fun side. Every driver and handler wants to win that's just natural but not every one does there is only one winner of a race and you will loose more than you will win. To me every driver that get out there and races hard and does the best they can do no mater if they win or come in last is a winner. I guess what I'm trying to say is don't put to much emphasis on winning but put it on just having fun. Driving these little cars is not as easy as it looks. The thought process of these little guys is equivalent to 160 mph in a normal size car. I have even told a few dads that was fussing at the way their driver was driving to take off the body of the car wrap their legs around the bars and take a couple of laps around the track and just see if they can turn the same times. They come back with a different outlook. Every child is different some it clicks real fast some and some takes a while, my youngest rode in the back and waved at the spectators for two years before he really started racing. I still think he had rather go to the track and see every one than really race but he enjoys it either way.

All ways be positive around your driver because if he thinks he/she can't win he/she never will. They will give up and just ride they have to know there's always a chance to win. Just like the little train would say -I think I can, I think I can, I think I can. They may not always win but they will do better than if they just gave up.

Spend quality time teaching the driver the basics. Communication is at the top of the list. Ask them what they think the car is doing on the track. AND listen. NEVER make the driver feel inadequate. Try to explain in a calm manner. Always let the driver help. Believe it or not all drivers are capable of doing more than just putting numbers on the car. Teach them a racecar does not have to be dirty. Teach them pride in their equipment.

In closing I hope every family member will enjoy you time in Quarter Midgets and make a lot of new friends all around the country. I believe that this is the best father and son/daughter time that you can have. You guys are a team the crew chief and the driver it will take booth to win.

Steve Clark

Getting Started

Most people buy a used Quarter midget to see if they like the sport before diving in with a full checkbook. But once they've fallen in love with it (the vast majority of those who try it do), they usually want to part with their beginner equipment -- which usually wasn't state of the art -- and get something they believe will make them instantly competitive. This usually occurs at the end of the first or second season.

Sadly, they rarely become anymore competitive with the newer, more expensive equipment than they were with the older, all other things being equal. Oh sure, there are some advantages to the newer, high-dollar equipment. It is less likely to be worn out for one; for another, the newer equipment will give the driver a greater sense of security and comfort with his/her own driving abilities. But most of the great leaps forward a driver will make in getting quicker doesn't necessarily come from the equipment; in almost every instance, it's from becoming a better driver and a better handler. This gives you, the entry-level handler, great opportunities to pick up competitive equipment for what amounts to a song.

When you first get started don't go out and buy a new car because it will get wrecked a lot. Find a good used car to start in then move up to a new one. You will just about get your money back on a used car when you are ready to sell it. You will bend a lot of radius rods the first year. I'm not saying your driver is a bad driver but you are running in the novice class and all the other drivers are in training just as you are and when you get them together they are going to bump and bang.

So what happens when you buy a roller? First, you'll need to buy the other parts that will enable you to race. Let's say you find a great Quarter Midget -- straight frame, full bodywork, tires and wheels-- for, say, $1,500. (For comparison, a new, bare frame will set you back around $900-$1000.) So $1,500 for a roller is a pretty good price. You can find them cheaper and you can find them more expensive. It's been my experience that you almost always get what you pay for. So be a smart shopper.

Before I get in this to deep you need to talk to other members in your club about the car you are interested in, they can tell you about the car. Most of the time they know if it is a good car or not. Call and talk to the novice trainer and the president of the club they will be glad to help you get what you pay for. Also try to purchase a QM that has an established base in your club these other members can help you get it set up, if you buy one that no one else is running you will be on your own.

To the base roller price add:

Engine (again, getting what you pay for)	***$350-$800***
Exhaust	***$40 - $100***
New tire	***$40 –55 each***
Racing Jacket or Suit:	***$40 - $300***
Helmet:	***$125 - $350***
Neck Brace:	***$20 - $40***
Gloves:	***$20 - $60***
Stop Watch:	***$15 - $45***
Kart Stand:	***$50***
Spare parts:	***$50- $250***
Air tank:	***$20- $30***
Fuel and oil:	***$5 - $75***
Something to transport your car	***$100 - $10,000***

Now, you're up to $1,500 for the roller and at least $1,100 for all the other stuff for a minimum total of $2,600. Only you can decide if that's a better deal than buying a complete setup, usually from someone getting out of Quarter Midgets. Someone getting out of is usually a very motivated seller and I've seen deals for everything -- engines, extra parts, etc. -- for as low as $800 and as high as $5,000. Both were great bargains.

When buying the complete setup, look to acquire the car, engine(s), pipes, extra gears, new ones run around $15 each, engine oil, extra brake pads, axle clamps, air filters, fuel filters, spares, spares, spares. If you don't have these, you'll need them eventually and $10 here and $20 there starts to add up real quickly. If you're buying a car from someone who is moving up to newer equipment, you're not in as good a bargaining position as you would be with someone selling to get out of Quarter Midgets. He or she most likely is interested only in selling the car, sometimes with engine and sometimes without. Still, there are advantages to this also. Most often, this seller is someone you're going to be seeing regularly at the track and with human consciences being what they are, this seller is more likely to be more honest. Having said that, I must say that Quarter Midget people as a group are the most trustful and honest folks I've ever met.

Some specific things to look for when buying any used Quarter Midget:

> The most important of all is the car it self MAKE SURE YOU BUY A DOWN TUBE OFF SET CAR. If it doesn’t have tubes from the front top of the roll cage to the front of the car it is an old old car and not competitive.
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> The Quarter Midget should be clean, neat, well assembled and apparently well cared for. If it's dirty with cracked fiberglass and rust everywhere, shy away from it. If the seller doesn't care enough about it to keep it in good shape, why would you want to put your child in something that might fall apart? There are lots of cars for sale. Look around find a good one.
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> Inspect the frame closely for cracks or rewelding. A painted frame sometimes makes finding cracks more difficult than an unpainted frame. A cracked frame that has been rewelded properly is more than likely okay, and no reason to shy away from an otherwise smart deal. Look for cracks and or bent tubes around the front of the car, rear axle area and especially around the engine mount tubes. If the welding was sloppily done, shy away from that one also. Don't waste your time on one that has been hastily or badly repaired.
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> Check the frame for straightness most of the time you can eyeball it or by measuring the diagonals... from the left front upright bar on the front to the very intersection if the very back cross bar, Measure the other diagonal. They should be within 0.125-0.25 inches of each other. This can be done from tipping the car up and measuring on the bottom of the belly pan. If the measurement is greater than that, the frame is warped. Go look for another Car.
>
> Roll the Car back and forth on pavement. It should roll freely and easily. Check the spindles and/or check the toe-in alignment. Spindles should look the same both left and right. Spindle bearings should not be binding. Steering should be without binding. Don't be turned off by an unpainted frame. Some people don't paint their frames. One, unpainted frames make cracks easier to see; two, it takes longer to get a painted one from the factory; three, a painted frame is slightly heavier (you'll find in Quarter Midgets that less weight is a good thing).

Wheels should be free of cracks, obviously, but also free of hefty nicks, especially on the lips. They should roll freely. If you can feel roughness while spinning the front wheel/tire, you'll need to replace the bearings. Not a big deal, nor actually expensive, but another bargaining chip. Unless the tires are new or almost new (the tread surface will be soft; you'll be able to easily dig your fingernail into the rubber), plan on buying new tires with any used Quarter Midget (about $160 a set).

One-piece wheels offer convenience while being more expensive initially and more expensive to replace. Two-piece wheels are somewhat of a pain to mount, and more apt to leak air, but less expensive to replace in the event of damage. While my personal preference is for two-piece wheels, either are more than acceptable (and I own both).

Check rear bearings for roughness by spinning the axle (with the chain disconnected). If any roughness exists or if the axle spins slowly, you can plan on replacing the axle bearings (even easier than replacing front bearings, but $10 to 20 each and you'll need two; front bearings are $3.25 each and you'll need four). However, another cause of a rear axle spinning slowly might be misalign bearings, especially if bearing cassettes are not used.

While spinning the rear axle, also check visually for a bent rear axle (new axles start at around $55 and go much higher, depending on material and size).

Check brakes for air bubbles in the brake lines (they'll be visible when you apply the brakes)(this is just a sign you need to bleed the brakes), for ease of operation and whether when applying the brakes will lock up the right rear wheel. Check brake pads for wear (relatively easy to replace and not that expensive). Check master cylinder(s) for leaks (rebuild kits are $11 each). Check that the brake fluid is clean (has it been replaced regularly or recently?). Dirty, dark brake fluid is a sure sign the seller hasn't been caring for the brakes or the car. Ask the seller what type of brake fluid he/she uses (DOT 5 is the most common in Quarter Midgets and costs around $11 a bottle). Don't mix brake fluids; always replace with the same type.

Hopefully, you can buy a used gauge. Gauges usually work or don't work; there rarely is a middle ground. Sometimes one function of a multiple-function gauge will not work (the cylinder head temperature might give erratic readings, for example). This is most often caused by a bad gauge lead, and they are inexpensively replaced and even more inexpensively sent back to the factory for reconditioning. Some gauges will offer at least dual functions, most commonly cylinder head temperature (CHT) and revolutions per minute (RPM). Some three-function gauges will add exhaust gas temperature (EGT) or speed (MPH). Some of the newer, more expensive gauges will offer memory recall. My feeling is that novices need at least a tachometer (SunDec gauge is around $79).

A floor pan that is not torn or dented is highly desirable, as it keeps the Car cleaner inside and adds a bit of aerodynamics. New floor pans can be made of sheet aluminum (use the old one as a template) usually around $40 a sheet aluminum.

Check fuel tanks for being clean inside (no residue from leftover fuel) and that the tank doesn't leak. Also check for flexible fuel lines (they get hard with age but are cheap and easy to replace). A handler really wanting to sell his used car should have replaced the fuel lines anyhow, clean fuel filter (again, cheap and easy to replace) and check to make sure the fuel valve will turn off the fuel.

Exhaust systems run the gamut of inexpensive to expensive. A one-piece Honda pipe costs around $60 new plus $5 for the Briggs Stratton muffler. You simply bolt it to the engine. Shy away from exhausts that have large dents in them. If you're buying a new exhaust, be sure to get the most recent version, or the version used by most Quarter Midgets at the track(s) you run.

Bodywork should be straight and in good repair. It is not unusual for bodywork to have been patched (some forms of Quarter Midgets qualify as a contact sport!) or re-glassed. Bad bodywork shouldn't be a deal-breaker but would serve as a major negotiating point. You can always hang new bodywork for about $150 plus your own labor. A hood for a quarter Midget will run you about $50 plus shipping and shipping will cost more the hood.

Generally, the more you spend for an engine, the better the engine. For comparison purposes, a new in-the-box Honda is around $469. Add $200-$350 for blueprinting on top of that (not always required and sometimes not even suggested until after the engine has been used). Ask how often the oil has been changed (the correct answer is at least after every race weekend) what kind of oil was used.

When buying, negotiate for all the extras you can get the seller to part with. Again, if the seller is getting out of Quarter Midgets, there's a strong incentive on his/her part to get rid of it all at once. Offer to write one check for everything. You avoid the hassle of having to round up all the stuff that you're going to need, and the seller avoids the hassle of getting rid of stuff with a fairly limited market over a longer period of time.

The most crucial extras would be: a second or even third motor, kart stand (about $35 new), extra gears (around $15-$20 and you'll need several sets), fuel jugs ($15), extra wheels and tires (about $250 a set)

Some tools and other things you might need: wheel balancers ($20), gear puller (about $17), tire breaker, stainless steel safety wire, air tank, air gauge, Stop Watch, etc.

You'll need a small set of metric and standard wrenches and sockets, screwdrivers, wire cutters, pliers, scissors, hex-head sockets, extensions, extension cord, folding lawn chairs, cooler, rain suit, umbrella, WD-40, carb cleaner, brake cleaner, Castrol Super Clean, hand cleaner, paper towels, sun block, a hat, electric drill, drill bits, hack saw, hammer, assorted nuts, bolts, washers, cotter pins, duct tape, clear tape, electrical tape, sandpaper, old toothbrushes, extra carb parts, aspirin, lip balm, insect spray, etc., etc., etc.

Those extras that make the experience more enjoyable are pit boards ($25), stopwatches ($25+), a pit canopy ($100+), car cover ($85), trailer ($2,000), etc. The handler who is getting out of the sport will have absolutely no use for most of this so bargain accordingly.
You'll also need a fire extinguisher ($20+).

Most will buy a new helmet ($150-$600). Used helmets tend to retain some of their former owner's fragrant identity. And you can never be sure of what you're buying when you buy a used helmet (has it hit a concrete wall?). Do yourself and your head a favor and buy a new one, despite the bargain that a used helmet represent. Remember it is your child’s head and it is better safe than sorry.

A SA2000 rating for helmets is required. You cannot use a motorcycle helmet (M rating) you must have a helmet for racing. Most manufacturers (and serious race drivers) strongly recommend replacing a helmet every three years due to deterioration of the foam lining over the years. This deterioration is due to natural deterioration of the helmet materials,

environmental conditions and normal wear and tear. Just remember, it's your child's head and they only have one.

However, the rest of your personal driving gear can easily be purchased used. With driving suits, gloves, just shop wisely. A $150 driving suit new is probably only worth $25 to $50 a year later, so racers on a budget can save some serious money here. Having said that, I see very few used driving suits for sale;

While driving shoes look cool, they cost a lot more than wrestling shoes, which are basically the same thing. I've found that wrestling shoes actually last longer, too. Sneakers are an acceptable and often used alternative to driving/wrestling shoes. You must wear socks.

Ask the seller who is getting out if they kept a notebook of track setups and results. If they did, ask if they'll throw it in with the sale. While of no use to the seller if he or she is getting out, that little notebook is a gold mine for the novice handler. Last but not least, if you're a novice handler, make part of the deal that the seller will accompany you to the track for your first weekend and provide technical and wrenching support.

That first weekend is hectic and confusing enough for almost all novices, having someone who knows what's happening, how to tune and adjust for conditions, set up the car, and provide a sympathetic ear for your failures (yes, there will be failures) will make racing Quarter Midgets a whole lot more enjoyable. That sort of help is worth a fortune to you, to the seller, it's a way for him/her to give something back to the sport by helping another novice get started.

Training

This is some things that you will have to work on with your driver. If your driver knows most of the things below the training will be much easier. Go over some of these things when you are driving or just sitting around the house or where ever but don't get upset if your driver doesn't always remember. Also don't push to hard to learn everything the training director will work with the driver and after they do it on the track they will put it all together and it will click.

The complete guide is located at www.quartermidgets.org in the documents area.

Purpose of the Program

- To instruct drivers in the basic procedures of Quarter Midget racing.
- To promote driver safety from a driver's viewpoint.
- To offer all drivers an opportunity to improve their driving techniques through non-competitive And competitive practice sessions with qualified adult supervision.
- To train newcomers in driver safety.
- This class in not here to teach you how to win. It is here to teach you how to race. For this reason the novice class will not be ran in a point's series.

1. Flags

A. Every driver and car owner/handler must know the meaning and color of each flag. A driver should not be allowed on the track until he/she has demonstrated that they know their flags and their meanings. Point out that flags and hand signals are the only way to communicate with the driver when the car is in motion.

Color and meaning of the QMA flags now in use throughout the nation:

RED	Stop Immediately
YELLOW	Caution, Slow Down, No Passing
GREEN	Start, Increase Speed, Go
BLACK	Disqualified, Go To Pits
WHITE	One Lap To finish.
CHECKERED	The race is finished
BLACK & YELLOW flags together	All Cars Slow Down And Exit Track

2. Hand Signals Used and Their Meanings

A. Hand signals are as important as flags and care should be taken that all novice drivers are able to recognize those listed below. Give examples of the use of each hand signal:

1. Finger drawn across throat in slashing motion…Turn off switch and stop.
2. Hand held flat in downward motion…Slow down.
3. Thumb and index finger in open/close motion…Give it more throttle.
4. Any flag held in furled position, with one or more fingers held above it…Take number of laps indicated by fingers, then take action required by flag.

5 Arms extended to the front in an opening & closing motion…Move in or out as indicated.

6. Finger pointing to top of head…Think about what you're doing.
7. Hand or flag pointing to rear end…Move to the back of the pack.

3. Car Safety, Dos and Do Nots

1. The car is definitely not a toy. It is not to be played with in the usual sense of the word.
2. Obey the flagperson. He is in charge out on the track. Do not take signals from the pit area ***during an event***. (Explain why: disqualification, taking eyes away from track can cause accidents, etc.)
3. Keep in mind what you are doing…not what you did last week or what you will do tomorrow.
4. Do not watch or wave to the spectators, mother or father. Keep your eyes on what is happening on the track in front of you.
5. Do not chew gum or candy while driving. If involved in an accident, you could choke.
6. Before leaving the pit area for the track, always check your safety equipment to be sure it is in operating condition. Be sure your visor is clean and pulled down. Your helmet must be tight. Be sure your safety belt, neck collar, and gloves are tight. When checking your belts try to pull the lap belt first then the drivers' right side shoulder belt then the drivers left side shoulder belt. When tightening your lap belts snug them up enough that you cannot get your finger under them and on your shoulder belts no more than one or two fingers under the belts.

7. When leaving the pit area and coming out onto the track follow these simple rules:

a. Look for other cars already on the track; do not break into flow of traffic – stay above white line.

b. If flagperson is on duty, await their signal before coming out onto the track.

c. Do not drop into the flow of traffic already on the track. Let the pack go by before dropping down to run your pattern.

d. Do not "play" with other drivers on the track. "Fooling around" can cause accidents.

e. Tell your handler, should they attempt to refuel you on the track, they ***must*** refuel in the pits.

f. If someone is standing in the on chute or pit lane area – ***STOP*** – do not run him or her over.

8. Always keep your switch in the "off" position when the car is not in use.

9. Do not remain in the car during refueling operation.

10. Drivers should be cautioned to keep elbows and hands inside the car at all times.

11. When leaving the track to enter the pit area:

a. Look quickly behind you for other cars before turning out of the traffic pattern.

b. Hold left hand up on the inside to signal to other drivers that you are pulling out and going to pits.

c. After leaving the traffic pattern, move up to the wall and follow it around until you reach the entrance.

d. The car handler should be waiting at the pit entrance for his driver.

e. Upon reaching the pit entrance, drive slowly to pit position, turn off switch and apply brake. Be sure to allow room for any other cars that may also want to exit the track.

f. Watch out for other drivers, handlers and cars as you go to your pit position.

C. Safety in the Pit Area

1. Fuel and safety habit:

a. Before practice or racing make sure all fire extinguisher are in their proper location.

b. Whenever a car is being refueled, the driver is to leave car and stand to one side – this applies at all times.

c. NO smoking while refueling.

d. There will be no refueling on the track or in the "infield" or hot chute. Refuel in the pit area only. Except AA & Half's

2. Playing and/or roughhousing: No playing in the pit area or out on the track. Drivers, etc, could be hit by cars.

3. Always stay near your car unless you have permission from your handler to leave the area. Always tell your handler where you will be…you could miss an event.

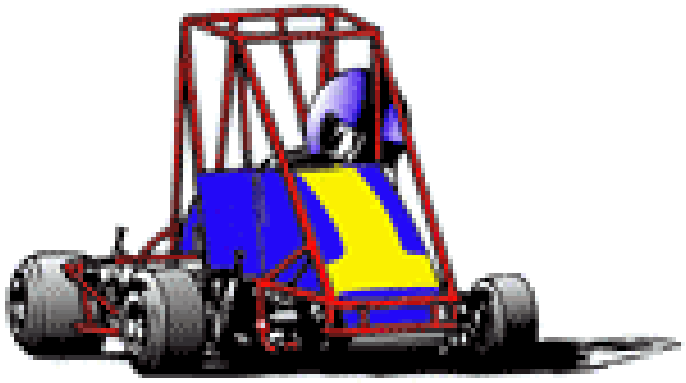
4. When watching the program always remain "behind" the fence. Do not sit on exposed walls at the entrance to the track or pit area.

5. Do not attempt to help push a car off/onto the track. Let the adult care handler or owner tend to that chore.

IV. On Track Training Procedures

The on track training will be handled by the training director but you should put your driver in the car and point out switch and its function – Ask driver to look you in the eyes and remove hand from steering wheel to turn switch on. Hands back on wheel. Drill your driver several times until driver can confidently switch on & off with out looking down. Example:

Switch on (no peeking) – hands back on wheel.
Switch off (no peeking) – hands back on wheel.
Switch on (no peeking) – hands back on wheel.
Switch off (no peeking) – hands back on wheel.
(No fair if you peek.)



Chassis Setup

OK here is what I understand from reading, working on one myself and talking to other people about how they set up a Nevro/Coggin racecar. There are a lot of N/C cars out there and the basic for them is about the same as any car so that is what we will use. Other cars might have slightly different setups but this will get you in the ball park.

First we need to have the correct tire and wheels mounted on the car and the car on level ground. Find a spot on you garage that is level you may have to look around because most garages have a slope or you can level your trailer and do it there.

The tires sizes the N/C recommends are:

Right rear = 7.0,7.10,or 8.0 x 6 and should measure 34.5" to 36"; rim size 4x6 outer and 4x6 inner; air pressure should be 15 PSI HOT

Left rear = 4.5 X 5 or 5.0 X 6 and should measure 31" to 32.5"; rim size 2x5 outer and 3x5 inner; air pressure should be 4-5 PSI HOT

Left front = 4.5 X 5, 5.0 X 6 or 3.5 X 5 and should measure 31" to 32.5"; rim size 2x5 outer and 3x5 inner; air pressure should be 10 PSI HOT

Right front = 5.0 X 6 and should measure 32" to 34" rim size 2x6 outer and 4x6 inner; air pressure should be 15 PSI HOT

Run the right front as close to the shock as possible. Be careful not to rub. The closer you can get it the faster you will be. Also run the left front and the left rear as close as possible also. The right rear is the one we will play with. The closer you run the right rear to the frame the tighter the car will be by giving it more side bite.

The next thing we need to check is the **rear axle**. Measure from the rear side of the axle to the center of the rear bar on the car. This should be 4-3/4". Measure this on both sides of the axle and should always be square. To make the adjustment you adjust the rear carriers radius rod's on the right and left sides. When you do this make sure you have the carriers 90 degrees with the ground. Using a square against the rear of the carriers and the ground.

Now go to the **front axle**. The front axle should have 1/2" to 3/4" lead always. This should be checked often and should never be square. The left front shock mount should not have any shims and the shock should be able to move back and forth. Make sure the front of the mount should be parallel to the ground again using your square. The left front of the axle should almost hit the up right bar of the frame. You want the make sure the axle is moved as far right as possible. The shock should be straight up and down and almost hitting the up right and fiberglass. The front panhard bar should be in the top hole on the frame.

After all this is set go to the right side of the car and with the tape hooked to the back of the front shock mounting plate measure to the center of the rear carrier. This should be 46" on a 76" car, 48" on a 78" car, and 50" on a 80" car. Always run the front axle this way.

Now lets go to the left rear of the car. Using the panhard bar move the rear axle over to the right until the shock almost hits the left top radius rod. Recheck your rear axle to make sure it is still square with the frame.

The rear panhard bar should be mounted in the tope hole on the frame and the bottom hole on the carrier. This is critical with regard to chassis roll. The slightest changed will make a big change on the chassis roll, so be careful in changing this. N/C said that this should work for 90% of the tracks. If this bar is lowered on the frame side you will increase the weight

transferred see a definite increases in the temperature on the right rear. You will make the car stick to much which will slow you down. If you do have to lower the rear panhard you need to lower the front also so that both are in the same position.

To set the steering remove the tires and place the spindles in a spindle jig. The ears on the steering rod should be at 11 o'clock and 1 o'clock. If not, adjust the steering rod by lengthening or shorting each side. Then remove the jig and turn the left front 1 turn out, this will give the front end a 1/8" tow out. This is another adjustment that is critical and can be knocked out with the slightest hit. Remember this is very important. You can replace the tires now.

Some chassis builders don't like to use scales but I had rather use the scales to do the final setup to get the weights closer to the cross weight that I need. I set the ride height then I try to get the two front tires the same weight. Next I shoot for a cross weight of the right rear to the left front and get this about 53.3%. To figure your cross weight you get the total weight of the car. Then add the right rear and the left front together and divide that into the car total. This seems to work for me and may not always work for everyone. We set the ride height by a simple method that will enable you to make changes to your racecar instantly in the hot shoot using only your hand, your eyes, a 1/2" wrench, a heat gun or pyrometer and an air pressure gauge. We will break corner weight down into two groups of cars. The early cars, such as the Kurtis, the early Stanley, and just about any car built before l985, that had very little "offset". Offset is the difference between the distance the left tires are from the body, and the distance the right side tires are from the body.

Your racecar will perform and react to all the adjustments that will be explain to you and it does not matter which class you race. All the cars perform exactly the same for all the classes. So you learn how to set your car only one time. The difference between cars will only be with regards to class weight. The spring weights that we recommend for those weight classes and the drivers upper body weight is determined by spring adjustment due to tire temperature and body roll. Let's get started by making sure you have done everything to your racecar that we have just discussed.

Now lift the car completely off the ground. If you have a car stand, that works just fine. With the car off the ground, adjust the right front shock adjuster so that the shock is fully extended which is approximate 2" of shock travel. Adjust the band wheel adjusters so that there is no pre-load on the spring with the shock fully extended. In other words, the shock has no more outward travel but you can still turn the spring easily by hand on the shock, because there is no pre-load on it. Do the same with the right rear shock using the same procedure. Now this setting we will call set.

Now, place the car on the ground or on a level spot and have your driver sit in the car. With the driver in the car, we will adjust the left front and left rear ride height.

First, adjust the left front shock adjuster by turning turns in which will raise the left front. Keep turning until you can place your fingers under the left front frame rail behind the left front tire. Raise the left front so that your fingers can be placed under the frame rail up to your 2nd set of knuckles. If, when you are adjusting, you run out of shock travel, don't worry just keep adjusting in. This will stiffen the left front spring and help bold up the left front comer.

Do the same to the left rear, but this time, raise the left rear until you can place all of your fingers up to where your fingers are attached to your hand. Now check the front with your fingers and lower if necessary. I've have fitted your car with 2 adjusters per shock. The flat one closest to the springs is used as an adjuster. The second one is used as a lock. Check

these often to make sure they do not work loose and change your adjustments. You may have to place a piece of electrical tape to hold it front changing. However, if you lock it tightly, it should not come loose. This sets the left side of your race car.

Now, the left side is set and you never have to make any more chassis adjustments to the left side. The only time you ever adjust the left front or left rear is if the left side is hitting the ground through the turns. If your car is hitting the track you must put one turn in each left side shock, one turn in the left front and one turn in the left rear. If the car still hits, repeat the process.

The left rear suspension is extremely important and I will get into that later. Now, we have the car's left side ride height set. So, if you call for help in setting your car, I will assume that your car is set and at what we call set.

At this Point go to the right front coil over shock, which should be at set. Put 2 turns in from set. (We have just made this spring stiffer) Now, go to the right rear which is at set and put 2 full turns in from set, (We have just made this spring stiffer) So, now we have on the right side only 2 turns in from set. Again, do not play with the left side of your car unless it is hitting the track.

Now, keeping all this in mind, let's jump to the front axle. The fastest way around the track is with the front axle straight up and down on the left side. That is, the shock mound bracket is straight up and down with the ground. With the axle brackets straight up and down, the driver may tell you that the car is too easy to steer and may be darting down the straight away. If your driver is darting, you will have to tip the front axle back until your driver is comfortable. However, you should slowly keep tipping the axle forward until your driver is smooth and not darting. Most drivers have their front axle tipped back about 1/16" from straight up and down.

Now, back to the chassis set up. Keeping in mind everything we have talked about we are ready to put the car on the racetrack. With the driver in the racecar, step down with your foot onto the left nerf bar. You should get some bounce or up and down movement. If not, check ride height using your hand as we discussed earlier. Keep in mind that you are 2 turns in from set on the right front and right rear.

The 2 turns in the right rear will help to heat the right rear tire faster than nominal. As soon as the race car is stable on the track and is not likely to spin out, bring the car into the hot shoot and take the 2 turns out of the right rear coil spring. Send the car back out, and if the car remains stable, bring the car back into the hot shoot and take one more turn out of the right rear coil over spring. We now have one turn out from set on the right rear. At this point, you should have the racecar balanced properly to the racetrack and it is time to start checking tire air pressure and tire temperature.

Our goal is to have equal temperature on the right front, right rear and left rear. Keep in mind that if the right front tire heats up it is because the right front is too soft. To cool down the right front temperature, stiffen the right front by putting one more turn into tight front coil spring adjuster.

If the left rear tire is colder than the right front tire and right rear tire, it is because the right front is too soft. Put one more turn in the right front. This should stiffen the right front and keep the weight from transferring to the right front tire. When the weight cannot transfer to the right front tire, it will hold the weight on the left rear tire, which will bring up the left rear tire temp. You may have to take a 1/2 or 1 more turn out of the right adjuster to help hold down weight and heat in the left rear tire. It is extremely important that the left rear tire is as hot, if not

hotter than the right rear tire. It is entirely possible to get the, same temp in all 3 tires. Example: Right front 127 degrees; Right rear 127 degrees; Left rear 127 degrees,

Remember always: If the right front tire is hot it can be cooled down by adding more and stiffening the right front shock spring. If the right front is too cold, the right front is too stiff, take turns out to bring heat back up.

Heat can be raised in the left rear by adding turns to right front up. To add heat to the right rear tire put turns into right rear spring adjuster. When you add turns to the right rear spring, you stiffen the, spring and that adds heat in the tire. The hotter the right rear tire, the tighter the racecar.

Let's summarize:

Right front - Add turns to cool tire (make stiffer). Take out turns to heat tires (make softer).
Right rear - Add turns to heat (make stiffer). Take out turns to cool tires (make softer).

It's just opposite to cool front tires add turns, to cool rear tires, take turns out.

Left front - When you add turns to right front, you heat left rear tire
Left rear - When you take turns out of tight front you @l left rear dm.

If car has a Push make sure you have two turns in right front from set. Make sure left rear side height is correct by checking with your hand. Make sure you have the correct tire. Try a harder tire compound. Also, realize that it's the right rear that is hooked up to tight and is causing the push. Keep taking turns out of the right rear to stop the push. As you take turns out of the right rear shock adjuster, keep an eye on the left front. If it is raising too high, you will have to put some turns back into right rear. You should be able to stop any push by making use of any of these suggestions.

If the racecar is too loose in the rear, add turns to the right rear springs. By adding turns, you stiffen the right rear spring, which will tighten the racecar. Also, move the right rear tire as close to the bearing carrier as possible. Also, lower the panhard bar to the second hole, but be careful not to tighten up the racecar too much. The hotter the tires get the tighter the car gets, the slower it will go. You will find that 95% of the time you will run your rare car with the left side set as we discussed earlier, and the right front coil spring will have 2 turns in from set and the right rear coil spring will have one turn out from set.

Spring rates are pre-determined at the factory. Most light cars will run a 75 to 85lb. spring on the left front, a 115 to 125lb. Spring on the right front, and 115 to 125lb. on the right front and a 125 to 135lb. spring on the left rear. Most heavy cars will run an 85, 95 or 105lb. on the left front, a 135 to 145lb. spring on the right front, a 135 to 145lb. spring on the right rear, and a 145lb. spring on the left rear. You can also go up to 155 lb. to 165lb. springs. Always check air pressure and maintain 4 to 5lb. left rear air pressure. Make sure that left rear tire is as hot as the right rear. You can accomplish this by adding turns to the right front and taking turns out of the right rear. Last but not least, you will spend less money on tires.

Rear Stagger: If you are running Honda, Stock or Modified rear end stagger is not as important, because you are not running locked. (Both left and right drive the rear axle.) When running unlocked or the left rear hub is not keyed and turns freely without turning the axle, then 2" to 2-1/2" of stagger is fine, and you should be able to run that any where you race.

If you are running light "B", light "A" or heavy "A", you have to lock the left rear and stagger becomes critical. Let me say here that, on occasion, you may be able to run these classes unlocked, but it takes a very experienced driver to accomplish it. At most tracks, it is

impossible. Regarding Heavy "B", I never run locked - the worst thing you can do to a heavy "B" is lock it up. Check this chart:

Honda	left rear	unlocked	2 - 2-1/2" stagger
Super Stock	left rear	unlocked	2 - 2-1/2" stagger
Modified	left rear	unlocked	2 - 2-1/2" stagger
Light "B"	left rear	Locked	2-1/2 - 5" stagger
Heavy "B"	left rear	unlocked	2-1/2" stagger
Light "AA'	left rear	locked	2-l/2 - 5" stagger
Heavy 'AA'	left rear	locked	2-1/2 - 5" stagger

Now, always run between 2-1/2" to 3-1/2" of stagger when locked. Remember the higher the banking of the track, the less the stagger. And if the banking is high enough, like Atlanta or Mini Indy, you can even try unlocked with 2-1/2" stagger.

If you have to run more than 3-1/2, of stagger, it is because the track is small and flat with tight turns. If the track is long and flat with tight turns, be careful not to have too much stagger on because stagger and locked kills straightaway speeds. YOU will need the stagger to get you through the turns, but do not overdo it.

With the tires that are available today, it will be hard to find the stagger you may need get the job done. If you can find old 4.5 x 5 or 3.6 x 5 tires and can afford to purchase some, they will be worth their weight in gold.

Front End Stagger: Always about 2". However, with the tire problem, you will have to settle with 1". Like I said before, look for the old 4.5 x 5 and 3.6 x 5 low profile tires.

Springs: When should you change springs? If you have to run your car with more than 2 turns in from set you need the next size stiffer spring. Example: you would go from a 135lb. spring to the next size or a 145lb. spring. If you have to run your car with more than 2 turns out from set, then you need softer springs. Example: you have a 135lb. spring, now you would have to go to a 125lb. spring. So, more than 2 turns in, go to a stiffer spring. More than 2 turns out, go to softer springs. This only holds true for the right front and right rear springs only.

The left side is controlled by your hand and finger measurements. If, to obtain proper ride height, you have to completely collapse springs, go to a stiffer spring. Always run a 10lb. heavier spring on the left rear than on the right rear. Example: Left rear is a 145, right rear is a 135. We call this "reverse split." Spring weights available in lbs. of 45-55-65-75-85-95-105-115-125-13 5-145-155-165-175-185.

Right Front Spindles Camber Adjustments: Average racetrack, straight up and down. Flat track: angle in at bottom for more tire bite. High bank track: angle in at top for less tire roll through the turns.

Tip: If you make all the adjustments we have discussed, the tip will be proper and will vary according to your driver's weight anywhere from 1/2" to 1".

Gear: If your engine gear shows wear on inside teeth, it is because as the car enters the turn and the right side of the frame drops down. The rear panhard bar gets longer as it drops with the frame. As the frame drops and the panbard bar gets longer, the frame moves to the right. This movement moves the engine with it and the chain also moves to the right, but the rear axle does not. To solve this, allow quick-change gear hub to float on the rear axle. When you line up your chain, move the quick-change gear hub to the right slightly so the chain is out of line. Then move the locking collar to the right and place a quarter as a measuring tool device

in between the locking collar and the quick-change hub. When you lock the hub in gear, also allow some space in the left side. This allows the quick-change hub to float and move with the frame and axle.

CLASSIC TUNE-UP NOTES: Regarding your racecar being too tight. We stated in our chassis set up notes, that to make your race car loose, take one or two out of set from the right rear shock adjuster. This will help loosen your racecar. However, we had to do just the opposite at the Eastern Grand Nationals this year.

Please Note: When the racetrack has a lot of rubber down on the track, try putting one or two turns in from set to keep the racecar loose. This only applies to a track with a lot of rubber on the surface. We were surprised to see the two turns in from set working to keep the car loose. This is what we think happens: Because of the rubber buildup on the track, we have to slow down the Total Weight Transfer to the right rear tire through the track comers. By adding one or two turns to the right rear spring adjuster, we stiffen the spring, and that helps slow down the total weight transfer to the tight rear tire.

This only applies to a track with a lot of rubber down. Also, to keep the racecar loose when the track is free of a large rubber build-up, go back to the two turns out from set. Now 3 or4 turns out from set will tend to tighten the car because of the sudden transfer of weight to the right rear tire. This will apply more weight faster to the right rear tire, which will put more pressure or weight on to the tire and force it to the track. The more weight that transfers to the right rear, the tighter the car will get. After 2 turns out, keep in mind that we are talking about fast weight transfer only. Tires only get hot through weight transfer and chassis roll.

If your racecar is very loose and you have tried everything, then realize that your car is stiff and it is time to change to softer springs than normal.

EXAMPLE: If you have a 145lb. Spring on the right rear, you may have to drop to as low as an 85 lb. spring. This is a temporary fix, and you should watch the track - and when the track gets to get tight, then GO BACK TO YOUR 145 LB. SPRING.

Getting Your Quarter Midget Around the Track

How to get around the track is a particularly tricky deal. It has to be looked at as a package, or a combination for your weight, class, tires, chassis stiffness, front to rear ratio, and distribution of weight to all four corners of the car. For info when we say the right front you should be behind the car looking forward.

The sad fact of the matter is, there is no pat setup that will work for every car at every track. Shoot- there's no pat setup that will work on the same car at the same track on different days. With this in mind, I believe we'll be far better off to work on the principles and get the car to do what we want than to just put out some deal saying "run this tire on this corner of the car at x weight" etc.

Weighting the car out- Imagine you're sitting on that four-legged wooden stool in your garage, and you're getting tired of that thing wobbling. So you cut off a little on the long leg to even it out-- but you cut off too much and now it wobbles the other way. See how the weight is carried diagonally? That's pretty much how your car works also (on a perfectly stiff chassis with wooden or steel tires). When you add or remove weight on the, say, right front- you pretty much make a direct change to the amount of the load that wheel carries. Since the chassis and tires have 'give' part of the weight that should have transferred to the left rear is spread to the other corners of the chassis. How much depends on chassis flex and tire pressure. If you're pushing, raise the left front of the chassis. This makes the left front bite more. If you're loose do the same with the left rear.

Weighting the car out is something that is probably best changed in the garage under controlled conditions. There are other ways to fine tune at the track that are a little easier to control.

Air pressure is one of the most powerful tools we have available to us for trackside tuning. Let's look at some actions and effects.

Raising rear tire pressure- decreases grip on rear of car. Loosens the rear. This will free the car up in the corners. Raising rear pressure will not increase front bite on a pushing car, but will help to balance the front and rear. This could help to make a pushing car at least drivable if everything else has been tried.

Raising front tire pressure- decreases grip on the front of the car. I would keep raising front tire pressure until the car started to push, then back off. High tire pressures give more speed (less rolling resistance). Using higher tire pressures (all the way around) usually helps "free" up the car, provided a good front to rear balance has been attained.

Cross tire pressure- increasing left front and right rear tire pressure at the same time has dramatic effects, go easy on this one (1 to 2 lb. increments). This will loosen the rear while increasing grip on the front. Inversely, increasing right front and left rear tire pressures will tighten up the rear while decreasing grip on the front of the car.

Here are a few final thoughts on tire pressure. Like I said earlier, there are no pat answers- corner radius, track composition, tire compound, and a multitude of other things have to be considered. However, knowing how to predict what will happen from a change you make can easily make a difference of several finishing positions.

Stagger- Rear tire stagger makes the car want to turn in the opposite direction of the side the larger tire is located on (larger tire on the right rear makes the car want to turn left). What is overlooked by a lot of people is that stagger has a direct effect on weighting the car out (larger

diameter tire increases weight on that corner). My belief is corner speed at all costs. Take a stopwatch and time the amount of time spent on the straightaway compared to the amount of a lap time spent in the corners, it'll surprise you. On a dirt track I'd sacrifice a mile an hour of straightaway speed to gain a mile an hour on the corners in a heartbeat. I think sometimes someone will make a stagger change at the track and swear that it fixed the handling problem they were having, when in fact it was the weight distribution change that fixed the problem. I've usually had good luck running fairly large amounts of stagger (about 3 inches). The right amount of stagger can definitely make your car faster in the corners IF everything else is right. Front stagger on the other hand is almost pure weight jacking. Installing a larger diameter tire on a corner on the front acts pretty much the same as moving the tire.

Track Width- Let's start with the basics. Narrowing the front track width will usually increase front side bite (more grip). On the new offset cars you want the centerline of the tire to be directly over the spindle and leave them alone. Narrowing the rear track width will usually increase rear side bite. These are generally accepted statements, but it goes a lot deeper than just general statements. The newer cars have the wheels tucked in to where the centerline of the tire is directly over the spindle. You don't want to change this. Nearly every older car has negative camber (looking head on at the car the front tires look like their leaning in at the top or take the tire off and the spindle bolt will go up slightly). When the right front tire is moved out by itself, the tire not only moves out- but also up (lowering the right front of the chassis, decreasing weight on the right front corner). In addition to this, the front side-to-side weight center is changed, further increasing left front running weight. This could be a good fix for a slight "pushy" condition. What is interesting is that we've increased front side bite (admittedly in a left turn situation) by widening the front track width. Another factor that enters into the equation is castor. Castor is the front to rear angle of the spindle bolt and plays a large role in "turning in" to a corner. When the steering is turned left, weight is jacked to the left front tire and released from the left rear- resulting in more front grip and less rear grip when turning in to the corner. Higher (numerically) castor angles result in more "turn in" grip.

Ride Height plays a much more important role in handling than I've ever heard anyone admit to. It could be one of the most overlooked tools we have to dial a car in. In raising the front or back of the car we increase grip on the end that's raised. On the flip side of the coin, lower the back of the car to free up the rear. There's another thing we can look at. Since I brought up front-to-rear, remember that letting off the throttle (heaven forbid) or braking (even more heaven forbid) transfers weight to the front of the car, loosening it up. When the throttle is picked up weight transfers to the rear, increasing rear grip (decreasing front grip).

The Most Important Part in the Race Car

The most important part in the racecar is the driver! Even with the most expensive car and the perfect set up your team will never win a race if the driver is not focused and enthusiastic. For every hour you spend working on the car you should spend an hour working with your driver either at home or at the track. Here are some important tips that are easily forgotten during the heat of racing. Maybe you want to make a copy and post it in the trailer to remind you.

-AT HOME-

Just like you can work on the car at home, you can also work with the driver at home. This is some of the most important time. A 5-minute discussion in the garage or on the ride to the track can prevent a lot of frustration at the track.

- Work out hand signals before you get on the track. You can't communicate any other way when the driver is out on the track. If possible let the driver invent the hand signal for the concept you are trying communicate. Our signal for "you are squaring up the corners" is a square made with fingers. This was my driver's invention. He always fixes his line when I give him this signal.
- Talk about going around the track and discuss the racing line and when to do things. Use Matchbox cars to discuss line-ups and passing. Make track diagrams to discuss the racing line.
- Discuss problems/mistakes you both encountered at the track and possible solutions.
- Sit in the car and visualize track situations and the proper reaction. Believe it or not this works.
- Discuss fire drills. Drivers should be able to get out of the car when instructed by a handler.

-PRACTICE-

- **Get seat time**. **Get seat time**. **Get seat time**. Go to the track as often as possible to practice. Fast drivers are experienced drivers. But please be careful of a new driver and watch for fatigue. Their little arms get tired very quickly and the car will start to get erratic.
- Start slow. In addition to the restrictor plate add some slack to the throttle cable to keep the speedway down. This will give the driver confidence. It also allows the driver to learn the important getting on and off the track safely skills. You can take the slack out in stages as they build confidence. A driver that is scared of the car will never go fast.
- Don't push your driver to hard to win. This should be fun for him and you. I have seen many kids get pushed out of the sport by a dad/handler yelling at them during and after the races.
- Set goals for the practice. I usually set 1-2 specific goals for a practice. Some can be as simple as raising your hand every time you want the driver leave the track and come into the pits. I sometimes will discuss my own goals, like select the correct tires for this set of conditions.
- Walk around the track with your driver. This is one way you can talk to them while they are on the track. At most tracks there is a "no practice" time just before racing starts. This is a great time to take a quiet walk around the track with your driver.
- Push the driver around the track to discuss the racing line and when to do things. This works well to imprint a mental picture of correct track position.
- Do fire drills at the track. The "stop, drop and roll" routine they learn at school is valuable here.

- Watch for driver fatigue. Some tiredness should be expected as you are trying to build endurance in the arms and neck. Don't overdo it.
- Try and keep practice interesting. Here are a few ideas:
  - Run a full race sequence with the flags. Yellow, Green, 20-40 laps then, White and Checkered. Let your driver practice the victory lap with the checkered. With any luck they will need this.
  - Let your driver review his/her times on the stopwatch.
  - Practice with others.
  - Practice with the flags and line-ups. This really helps during race day.
- Never say anything negative when they first come off the track. It is best to wait until the driver mentions a mistake, or bring it up midweek.
- Always praise the driver's efforts. Admit handler's faults. "I should have told you..." "Practice is for Daddy too."

-Race Day-

There are a few things you can do to keep your drivers focused and thinking during the race day. This really helps when it is your turn to race.

- Watch other races. "See when #2 did that he spun". "#7 wasn't looking when the green flag dropped. See how far back he is now." You can also videotape races and practice and take then home for the driver to watch.
- Watch for signs of fatigue if you practice on race day. Don't wear down the racer's edge on race day. Non-race day practice is for building endurance.
- Make sure to go to the bathroom before you put the helmet on. As soon as you get them all hooked up they will need to go, believe me.
- Keep the driver hydrated and properly fed. Always bring a cooler with drinks and or Gatorade.
- Let the kids play.
- Last but not lease remember to teach you driver to be a good sport, win or lose, and have them go shake hands with all the other drivers or tell them good race or something. I would also like to add that the handler should lead by example with both the other drivers and handlers. I make it a point to congratulate 1-2 drivers while we are waiting to get scaled after the race. And also remember you are his or her hero and you need to always set a good example at the track.

These tips are designed to help newcomers tackle the basic necessary adjustments and servicing of Quarter midgets. What I have done is put together some articles that I have notice that novice and not so novice handlers have questions about. If you are a seasoned racer, and have any useful additions for this page, please email me

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.
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.
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.

CHANGING PISTON RINGS

Again, with a little care, this is a reasonably easy procedure, as long as you have some basic mechanical know how.
1) Drain the oil.
2) Remove carburetor, cylinder head, and crankcase cover.
3) Scribe a mark across the crank gear and cam.
4) Lift out the camshaft, pushrods, and the two cam followers.
5) Undo the 2 bolts which hold the piston / connecting rod in place, and carefully remove the piston through the top of the block.
6) The old piston rings can be expanded gently apart and lifted off the top of the piston.

*****NOTE the order of the rings for correct placement of the new rings.*****

7) There is a very small marking on one face of each ring (a 'z' on standard rings - this marking should face up towards the cylinder head. Carefully pull each ring apart and slip it over the top of the piston into its correct slot. If you're careful, this can be done manually without leaving any marks on the piston, though it is possible to buy a special set of pliers to do the job.
8) Using a piston ring compressor tool, and plenty of oil, re-insert the piston into the block, and then bolt the connecting rod back onto the crankshaft.
9) Reassemble the engine.

The whole procedure is straightforward, and the most time-consuming part is removing the ancillary engine parts, and replacing them afterwards.

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 high-grade 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, SPROCKET & DISC CARRIERS

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.

FINAL TIGHTENING/ADJUSTMENTS

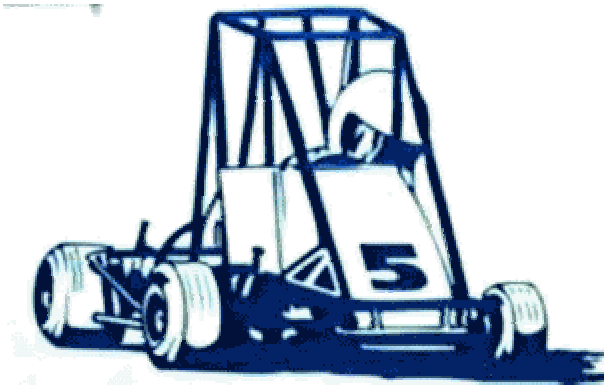
When this procedure is complete, the tiny allen bolts which hold the bearings in place, can be secured into their respective drill marks on the axle (preferably using 'blue' locking compound to avoid losing them), and the sprockets and brake disc can be centered and tightened. Again, these procedures should be carried out with care, as a well-aligned chain also reduces drag and wear, as does a free turning (non-rubbing) brake disc. When you finally stand back and spin the rear wheels, you should be amazed at how much more freely the axle spins.

CAR STORAGE BETWEEN RACES

1) This one's a bit obvious, it's a good idea to stand the car on a chassis stands between races, rather than on it's wheels, as the tires will develop a flat spot if stood in one place for any length of time.
2) Also regarding tires, do not leave tires fully inflated when parked/stored between races, as this will cause the tires to become rounded, resulting in a smaller contact patch & a loss of grip.
3) When parking the Car between races, always leave the engines at Compression Stroke, so that the strain is taken off the valve springs or valve warping. If you don't, a new set of valve springs will show signs of compression within a couple of weeks, even without running the engines.

GENERAL ENGINE MAINTENANCE TIPS

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.



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.

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.

HONDA GX120 SPECS

These are general specifications of the Honda GX120 engine. Please check your own manual or technical specs for accurate information relating to your engine. No liability will be accepted for any errors herein.

Engine Type Air-cooled 4-stroke OHV single cylinder
Bore x Stroke 60 x 42mm
Displacement 118cc
Compression Ratio 8.5:1
Maximum Power Output 4HP (2.9kW)/3,600rpm
Recommended Power Output 3.5HP (2.6kW)/3,600rpm
Maximum Torque 0.75kg-m(7.4Nm)/2,500rpm
Ignition System Transistorized magneto
Oil capacity 0.6 liters
Fuel Consumption 230g/PS-hr(313g/kWh)
Dimensions (L x W x H) 305 x 341 x 318mm
Dry Weight 13kg
SPARK PLUG: NGK BP6ES or BPR6ES
PLUG GAP: 0.7 - 0.8 mm (0.028 - 0.031 in)

HONDA GX160 SPECS

These are general specifications of the Honda GX160 engine. Please check your own manual or technical specs for accurate information relating to your engine. No liability will be accepted for any errors herein.

Engine Type Air-cooled 4-stroke OHV 25° inclined single cylinder
Bore x Stroke 68 x 45mm
Displacement 163cc
Compression Ratio 8.5:1
Maximum Power Output 5.5HP (4.1kW)/3,600rpm
Recommended Power Output 4.8HP (3.5kW)/3,600rpm
Maximum Torque 1.1kg-m(10.8Nm)/2,500rpm
Ignition System Transistorized magneto
Oil capacity 0.6 liters
Fuel Consumption 230g/PS-hr(313g/kWh)
Dimensions(L x W x H) 312 x 362 x 335mm
Dry Weight 15kg
SPARK PLUG: NGK BP6ES or BPR6ES
PLUG GAP: 0.7 - 0.8 mm (0.028 - 0.031 in)

WINTERIZING YOUR QUARTER MIDGET

Well we have made it to the end of another racing season and now it time to do one of two things, put the Quarter Midget in storage for a few months or start right away getting ready for next spring. Unless you've got a snowmobile, winter is the time most of us racers dread. Although some look to the end of the racing season as a time for a little rest and relaxation, we should be careful not to neglect the thing we love the best our Quarter Midgets. You've been beating your car up all year and now a complete freshen up is much needed.

The first thing you want to do is wash down your equipment. When you get to tear it down, it makes it much easier and more fun when everything is fairly clean. Simply get out the elbow grease, that is; engine cleaner, degreaser and laundry detergent, and start scrubbing it down. You may also want to try carb cleaner and starter fluid, which will get a lot of the grease and grime off. Before going crazy with the garden hose though, tie a plastic bag around the engine to keep the moisture out. If your engine also needs a good cleaning, which it surely will, tie a plastic bag around the carb and the exhaust instead of the whole motor, but still be very careful not to spray water directly into either opening. Once you've cleaned it up a bit, you can start to take apart the car and repair and replace any damaged or worn parts.

First, remove the tires and prepare them for storage. If they have some life left in them, you'll want to store them and reuse them next spring. Let the air out of the tires and spray them down with ArmorAll, which will help, keep the rubber pliable or instead of ArmorAll you can use any of the tire formulas that will help soften the tire. Once they're sprayed down, place the tires in a plastic bag and store them in a dry, cool place. When storing your tires, they should be stacked by resting each tire on its rim and not on the tread. This will eliminate the possibility of "flat spotting" your tires. If your tires are worn down below the dimples you can either keep them for practice tires or remove them from the wheels and discard them.

Now you need to remove the engine from the chassis. Before you do that, some engine builders suggest you run a little fuel with a oil mixture through it before you store it. This will help lubricate the internal parts and clean the carb of any debris. If you run alcohol through your system this should be done after each and every race to eliminate moisture which alcohol attracts. If you have a lot of time on your engine, you may want to take advantage of your downtime and send it to an engine builder for refreshing. Both you and your engine builder will be much happier if you do it now and not two weeks before the season begins. If it still has plenty of life left in it and you're not sending it in, you should remove the head and apply a light coating of oil to the cylinder walls. Use the same oil you normally run in your engine and apply it with a clean cloth. Do not use your fingers to apply the oil because the body acid could damage the metal over a period of time. Another is to squirt a little oil down the intake until the engine stalls. This will also help guard against internal rust. Remove the side cover and being careful not to disturb the position of the camshaft in relation to the crankshaft gear, remove any oil residue from the bottom of the crankcase. Now replace the side cover and add fresh oil.

Now remove the carburetor and inspect it. This is a good time to tear it down and rebuild it. Carb rebuild kits are inexpensive and the process is very simple to do. It's also one of the easiest and most important ways to prevent future problems. Drain the fuel from the bowl by turning it upside down and letting, it drain out. Wrap the carb in a clean cloth and store it in a dry place Then plug both the exhaust and carb openings with a clean and oiled cloth or wrap them in a plastic bag.

If your QM has been sitting around for a while, make sure there isn't any debris in the cylinder before packing it away. We've heard of mechanics finding the nests of small creatures inside engines at the end of a long winter. Inside the cylinders you could find corn and other

munchies piled on top of the piston. You can imagine what would happen if you fire it up next spring before checking it. With both the carb and exhaust openings plugged, wrap the engine in a towel and store it in a warm dry place. You should also make sure you leave the engine on the compression stroke, turn the flywheel until you can fell the compression in the engine and stop. This should also be done after each race while the engine is still hot. Now drain the fuel from all the lines, tank and fuel pump, and store it away.

Now for the brakes. Remove the pads from the rear calipers and check them for excessive wear. Rear discs will also attract rust and should be coated with WD-40. Today's hydraulic systems don't need to be drained and refilled with fresh fluid unless it is other than the automotive type. If you choose to drain and rebuild the master cylinder, you can leave the system dry only if the seals are well lubricated.

If the chain is damaged at all, throw it away and replace it in the spring. If it's still good, soak it in a can of oil through the winter. With the chassis now bare, we can check for stress cracks and other aging problems. Check each weld for cracks or breaks.

Now look at the front of the Car and check the spindles for wear. If the spindle has too much play, check the bushing and washers and replace them if necessary. Next, move to the rear axle and remove the bearings from their housings. Again, check for excessive play. If everything is correctly in place and secure, spray heavily with a coat of lubricant and reinstall.

The last items to take care of are the tach and the battery ignition. The battery in the tach should be taken out to avoid any leakage. It will probably drain out over the winter so it's a good idea to just remove it now and replace it in the spring. This is also a good time to send the gauge back to its manufacturer to get it recalibrated. The cost of recalibration should be around $40 and is well worth the time and money. Also remove the battery from the ignition if you are running a Deco. Make sure the battery is kept off the ground on a 2x4 so it isn't directly on the concrete, which will quickly drain it of any remaining power. (Remember, if your battery is dead, you need to discard it safely. Not all trash collectors will pick up old batteries and it's against the law in most states to dump it in an unauthorized site. In many states it is a law that retailers must accept all used lead acid batteries deposited by customers at their store. Check with your local auto parts store for the best way to get rid of your battery. Some places will even pay you for them.

Now before you snuggle in for the winter, take a look at your toolbox. Tools are probably the most expensive and hard to replace items in your garage so why not take care of them too? It's a good idea to remove each shelf and grease the rollers of your toolbox every fall. Then take each tool and individually clean it, dry it and rub it down with a lightly oiled cloth. Then clean out that junk drawer that has collected every nut, bolt and bent cotter key imaginable and marvel at all that newfound space you thought you didn't have. Finally you're ready to put the car away, put the engine in a safe place and hibernate until the early spring. You'll rest much easier now that you've taken care of your most prized possessions.

Basic Chassis Set-up

Weight Distribution

+ 53-55% left side weight (LR+LF/total car weight multiplied by 100=left side %)
+ 51-53% crossweight (LR+RF/total car weight multiplied by 100=crossweight%)
+ 41-43% nose weight (LF+RF/total car weight multiplied by 100=nose weight%)
+ 3/8-1" rear stagger
+ 3/8-1" front stagger (use front stagger to increase crossweight %)
+ 55-70 durometer tires (grip of tires--can vary)

Cures for Common Handling Problems

Bicycling
Left side tires lose contact with the racing surface

+ more overall left side weight %
+ harder tire compound (mainly RR)
+ more air pressure
+ widen car
+ add stagger to rear

Loose
Rear tires fail to grip-- common cures for looseness:

+ reduce air pressure rear tires
+ reduce stagger rear tires
+ softer tire compound rear tires
+ narrow rear end
+ widen the front end
+ increase cross weight (LR+RF lbs.)
+ harder compound on front tires

Tight
Front tires fail to grip--cures are the opposite of the cures for looseness

+ increase air pressure rear tires
+ increase stagger rear tires
+ softer tire compound front tires
+ widen rear end
+ narrow the front end
+ decrease cross weight (LR+RF lbs.)
+ harder compound on rear tires

Tire Technical Information

+ Mounting Tires
+ Inflating Tires
+ Inflation Pressure
+ Vehicle Track Width
+ Rim Width
+ Improving Steering Performance

Mounting Tires

Safety Warning: Serious injury or death may result from an explosion of the tire/rim assembly due to the use of excessive pressure during mounting. Never exceed 35psi (240 KPA) to seat the beads. During tire inflation, always have assembly secured, stand clear, and use remote controlled clip-on air hose. Only specially trained persons should mount tires.

1. Racing car tires come tubeless in all sizes. Extra care should be taken to prevent air leakage from both the tire and the wheel. Double check for any damage to the tire bead, O-ring, or wheel rim. Never mount tires on unapproved rims (too wide or too narrow).

2. The tubeless valve, TR412, is recommended.

3. For best rim mounting and the prevention of bead damage, apply lubricant to the bead of the tire and the rim of the wheel before mounting.

4. The maximum tire seating pressure is 35 psi.

5. After assembling split rim wheels, make sure the bead of the tire is seated all the way around the circumference of the rim.

6. Once seated and assembled, reduce pressure to 6-21 psi. To insure proper mounting, all Bridgestone/Firestone Car Tires display a directional sign on both sides of the tire.

REAR □

This means when mounting on the Rear Axle, the tire should Rotate In The Same Direction As The Arrow

FRONT □

This means when mounting on the Front Axle, the tire should Rotate In The Same Direction As The Arrow

A new tire has more grip. It is recommended to use new tires for actual races and pre-qualification. Use an old tire (half-used) for practice.

Inflating Tires

For best results, adjust the inflation pressure according to your car's performance Characteristics.

Typical Pressure Ranges:

Asphalt	12-21 psi
Dirt	6-12 psi

Inflation Pressure

Pressure	**Higher**	**Lower**
Grip	Decrease	Increase
Contact Area	Decrease	Increase
Steering Response	Quick	Slow
Lateral Stiffness	Hard	Soft
Traction Braking	Decrease	Increase
Wet Performance	Increase	Decrease
Wear	A	B

(A) Center part of tread wears quickly **(B) Both side parts of tread wear quickly**

1. In case slide speed is too fast (past grip limit point): Decrease the pressure
2. In case of unsteadiness and/or tottering in turning the corner: Increase the pressure

Vehicle Track Width

1. If the circuit has long straights and has high average speed, the narrower. track width is effective.

2. If the circuit has many corners and has low average speed, then wider track width is effective.

3. In the case of understeering: Widen the front track width or make rear track width narrower.

4. In the case of oversteering: Widen the rear track width or make front track width narrower.

Rim Width

Rim Width	Wider	Narrower
Grip	Increase	Decrease
Handling Performance	Increase	Decrease
Steering Response	Quick	Slow
Lateral Stiffness	Hard	Soft
Wet Performance	Decrease	Increase
Rolling Resistance	Increase	Decrease

Example of rim width adjustment:

1. In the case of under steering: Make the front rim wider or rear rim narrower.
2. In the case of over steering: Make the rear rim wider or the front rim narrower
3. In the case of rain conditions: Make the front and rear rim narrower

I have mounted these tires using a minimum of air pressure, a tire clamp, no valve stem, and soapy water as a lubricant.

Adjusting tire sizes once mounted

It never fails when I buy a tire, it's the wrong size. This has frustrated me 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.

Improving Steering Performance

	Oversteer	Understeer

		Oversteer		Understeer	
Tire Size		Front Narrower	Rear Wider	Front Wider	Rear Narrower
Compound		Change to Lower grip	Change to Higher grip	Change to Higher grip	Change to Lower grip
Pressure (Adjust Within Permissible Range)	Entering Corner (Constant Speed)	Lower	Raise	Raise	Lower
	Exiting Corner (Constant Speed)	Raise	Lower	Lower	Raise
Rim Width		Narrower	Wider	Wider	Narrower
Track Width		Narrower	Wider	Wider	Narrower

Gear Charts

Quarter Midget Gear Charts

ENGINE SPROCKES

Axle	19	20	21	22	23	24	25	26	27	28	29	30
23	6.94	6.59	6.28	5.99	5.73	5.48	5.25	5.04	4.85	4.67	4.50	4.35
24	7.24	6.88	6.55	6.25	5.98	5.73	5.50	5.29	5.09	4.91	4.74	4.58
25	7.54	7.16	6.82	6.51	6.23	5.97	5.73	5.51	5.31	5.12	4.94	4.78
26	7.84	7.45	7.09	6.77	6.48	6.21	5.96	5.73	5.52	5.32	5.14	4.97
27	8.14	7.74	7.37	7.03	6.73	6.45	6.19	5.95	5.73	5.53	5.35	5.14
28	8.44	8.02	7.64	7.29	6.98	6.69	6.42	6.17	5.94	5.73	5.53	5.35
29	8.75	8.31	7.91	7.55	7.22	6.92	6.65	6.39	6.15	5.93	5.73	5.54
30	9.05	8.60	8.18	7.81	7.47	7.16	6.88	6.61	6.14	5.93	5.93	5.55
31	9.35	8.88	8.46	8.07	7.72	7.40	7.11	6.83	6.58	6.34	6.13	5.92
32	9.65	9.17	8.73	8.33	7.97	7.64	7.33	7.05	6.79	6.55	6.32	6.11
33	9.95	9.45	9.00	8.40	8.22	7.88	7.56	7.22	7.00	6.75	6.52	6.30
34	10.25	9.74	9.28	8.86	8.47	8.12	7.79	7.49	7.22	6.96	6.72	6.49
35	10.56	10.03	9.55	9.12	8.72	8.36	8.02	7.71	7.43	7.16	6.92	6.69

The number is the actual gear ratio between the engine crank and the rear axel. (using the DECO 5.73 gear box)

ENGINE SPROCKES

Axle	25	26	27	28	29	30	31	32	33	34	35
20	4.80	4.62	4.44	4.29	4.14	4.00	3.87	3.75	3.64	3.53	3.43
21	5.04	4.85	4.67	4.50	4.34	4.20	4.06	3.94	3.82	3.71	3.60
22	5.28	5.08	4.89	4.71	4.55	4.40	4.26	4.13	4.00	3.88	3.77
23	5.52	5.31	5.11	4.93	4.76	4.60	4.45	4.31	4.18	4.06	3.94
24	5.76	5.54	5.33	5.14	4.97	4.80	4.65	4.50	4.36	4.24	4.15
25	6.00	5.77	5.56	5.36	5.17	5.00	4.84	4.69	4.55	4.41	4.29
26	6.24	6.00	5.78	5.57	5.38	5.20	5.03	4.88	4.73	4.59	4.46
27	6.48	6.23	6.00	5.79	5.59	5.40	5.23	5.06	4.91	4.76	4.63
28	6.72	6.46	6.22	6.00	5.79	5.60	5.42	5.25	5.09	4.94	4.80
29	6.96	6.69	6.44	6.21	6.00	5.80	5.61	5.44	5.27	5.12	4.97
30	7.20	6.92	6.67	6.43	6.20	6.00	5.81	5.63	5.45	5.29	5.14
31	7.44	7.15	6.89	6.64	6.40	6.20	6.00	5.81	5.64	5.47	5.31
32	7.69	7.38	7.11	6.86	6.62	6.40	6.19	6.00	5.82	5.65	5.49
33	7.92	7.62	7.33	7.07	6.83	6.60	6.39	6.19	6.00	5.82	5.66

The number is the actual gear ratio Between the engine crank and the rear axel. (using the HONDA 6-to-1 Gear Box)

WARNING: NO LIABILITY WILL BE ACCEPTED FOR ANY DAMAGE, INJURY OR MISHAPS RESULTING FROM USE OF THESE TIPS. I HAVE SUCCESSFULLY USED ALL OF THE ABOVE INFORMATION AND METHODS, AND HAVE BEEN PLEASED WITH THE RESULTS, AND ANY USER OF THE ADVICE DOES SO AT THEIR OWN RISK.

I would like to thank the following for help and input:

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Thanks
Steve